



Open Source Used In Umbrella - Virtual Appliance (FEDRAMP) 4.0.1

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section 10

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```
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```

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```

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1.7 traceroute 2.1.0-2

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Version 2.1, February 1999

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```
<one line to give the program's name and a brief idea of what it does.>  
Copyright (C) 19yy <name of author>
```

```
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```

```
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along with this program; if not, write to the Free Software  
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```

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```
Gnomovision version 69, Copyright (C) 19xx name of author  
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.  
This is free software, and you are welcome to redistribute it  
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```

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program `Gnomovision' (a program to direct compilers to make passes
at assemblers) written by James Hacker.

<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice

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The End

1.10 python-jsonpointer 2.0-0ubuntu1

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1.11 python-jsonschema 3.2.0-0ubuntu2

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1.12 grub2 1.99-21ubuntu3.19

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```

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```
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This program comes with ABSOLUTELY NO WARRANTY; for details type `show w'.  
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under certain conditions; type `show c' for details.
```

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1.13 libnet-smtp-ssl-perl 1.04-1

1.13.1 Available under license :

No license file was found, but licenses were detected in source scan.

abstract: 'SSL support for Net::SMTP'

author:

- 'Casey West <casey@geeknest.com>'

build_requires:

ExtUtils::MakeMaker: '0'

configure_requires:

ExtUtils::MakeMaker: '0'
dynamic_config: 1
generated_by: 'ExtUtils::MakeMaker version 7.16, CPAN::Meta::Converter version 2.150005'
license: unknown
meta-spec:
url: <http://module-build.sourceforge.net/META-spec-v1.4.html>
version: '1.4'
name: Net-SMTP-SSL
no_index:
directory:
- t
- inc
requires:
IO::Socket::SSL: '0'
Net::SMTP: '0'
Test::More: '0.47'
version: '1.04'
x_deprecated: 1
x_serialization_backend: 'CPAN::Meta::YAML version 0.018'

Found in path(s):

* /opt/cola/permits/1144894765_1616107099.35/0/libnet-smtp-ssl-perl-1-04-orig-1-tar-gz/Net-SMTP-SSL-1.04/META.yml

No license file was found, but licenses were detected in source scan.

NAME

Net::SMTP::SSL - SSL support for Net::SMTP

SYNOPSIS

```
use Net::SMTP::SSL;
```

```
my $smtps = Net::SMTP::SSL->new("example.com", Port => 465);
```

DESCRIPTION

Implements the same API as Net::SMTP, but uses IO::Socket::SSL for its network operations. Due to the nature of "Net::SMTP"'s "new" method, it is not overridden to make use of a default port for the SMTPS service.

Perhaps future versions will be smart like that. Port 465 is usually what you want, and it's not a pain to specify that.

For interface documentation, please see Net::SMTP.

SEE ALSO

Net::SMTP, IO::Socket::SSL, perl.

AUTHOR

Casey West, <casey@geeknest.com>.

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Found in path(s):

```
* /opt/cola/permits/1144894765_1616107099.35/0/libnet-smtp-ssl-perl-1-04-orig-1-tar-gz/Net-SMTP-SSL-1.04/README
```

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=head1 NAME

Net::SMTP::SSL - SSL support for Net::SMTP

=head1 SYNOPSIS

```
use Net::SMTP::SSL;
```

```
my $smtps = Net::SMTP::SSL->new("example.com", Port => 465);
```

=head1 DEPRECATED

B<Hey! Read this!>

Since Net::SMTP v1.28 (2014-10-08), Net::SMTP itself has support for SMTP over SSL, and also for STARTTLS. Use Net::SMTP, not Net::SMTP::SSL.

=head1 DESCRIPTION

Implements the same API as L<Net::SMTP|Net::SMTP>, but uses L<IO::Socket::SSL|IO::Socket::SSL> for its network operations. Due to the nature of C<Net::SMTP>'s C<new> method, it is not overridden to make use of a default port for the SMTPS service. Perhaps future versions will be smart like that. Port C<465> is usually what you want, and it's not a pain to specify that.

For interface documentation, please see L<Net::SMTP|Net::SMTP>.

=head1 SEE ALSO

L<Net::SMTP>,
L<IO::Socket::SSL>,
L<perl>.

=head1 AUTHOR

Casey West, <F<casey@geeknest.com>>.

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=cut

Found in path(s):

* /opt/cola/permits/1144894765_1616107099.35/0/libnet-smtp-ssl-perl-1-04-orig-1-tar-gz/Net-SMTP-SSL-1.04/lib/Net/SMTP/SSL.pm

1.14 libsort-naturally-perl 1.03-2

1.14.1 Available under license :

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abstract: 'sort lexically, but sort numeral parts numerically'

author:

- 'Sean M. Burke <sburke@cpan.org>'

build_requires:

ExtUtils::MakeMaker: 0

configure_requires:

ExtUtils::MakeMaker: 0

dynamic_config: 1

generated_by: 'ExtUtils::MakeMaker version 6.62, CPAN::Meta::Converter version 2.120921'

license: perl

meta-spec:

url: <http://module-build.sourceforge.net/META-spec-v1.4.html>

version: 1.4

name: Sort-Naturally

no_index:

directory:

- t

- inc

requires:

perl: 5

resources:

repository: <https://github.com/bingos/sort-naturally>

version: 1.03

Found in path(s):

* /opt/cola/permits/1146470788_1616530553.37/0/libsort-naturally-perl-1-03-orig-1-tar-gz/Sort-Naturally-1.03/META.yml

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Sort::Naturally

[extracted from the Pod...]

NAME

Sort::Naturally -- sort lexically, but sort numeral parts numerically

SYNOPSIS

```
@them = nsort(qw(
  foo12a foo12z foo13a foo 14 9x foo12 fooa foolio Foolio Foo12a
));
print join(' ', @them), "\n";
```

Prints:

```
9x 14 foo fooa foolio Foolio foo12 foo12a Foo12a foo12z foo13a
```

(Or "foo12a" + "Foo12a" and "foolio" + "Foolio" and might be switched, depending on your locale.)

DESCRIPTION

This module exports two functions, `nsort` and `ncmp`; they are used in implementing my idea of a "natural sorting" algorithm. Under natural sorting, numeric substrings are compared numerically, and other word-characters are compared lexically.

This is the way I define natural sorting:

- o Non-numeric word-character substrings are sorted lexically, case-insensitively: "Foo" comes between "fish" and "fowl".
- o Numeric substrings are sorted numerically: "100" comes after "20", not before.
- o `\W` substrings (neither words-characters nor digits) are ignored.
- o Our use of `\w`, `\d`, `\D`, and `\W` is locale-sensitive: `Sort::Naturally` uses a `use locale` statement.
- o When comparing two strings, where a numeric substring

in one place is not up against a numeric substring in another, the non-numeric always comes first. This is fudged by reading pretending that the lack of a number substring has the value -1, like so:

```
foo    => "foo", -1
foobar => "foo", -1, "bar"
foo13  => "foo", 13,
foo13xyz => "foo", 13, "xyz"
```

That's so that "foo" will come before "foo13", which will come before "foobar".

- o The start of a string is exceptional: leading non-\W (non-word, non-digit) components are ignored, and numbers come before letters.
- o I define "numeric substring" just as sequences matching `m^\d+/-` -- scientific notation, commas, decimals, etc., are not seen. If your data has thousands separators in numbers ("20,000 Leagues Under The Sea" or "20.000 lieues sous les mers"), consider stripping them before feeding them to `nsort` or `ncmp`.

[end Pod extract]

INSTALLATION

You install `Sort::Naturally`, as you would install any perl module library, by running these commands:

```
perl Makefile.PL
make
make test
make install
```

If you want to install a private copy of `Sort::Naturally` in your home directory, then you should try to produce the initial Makefile with something like this command:

```
perl Makefile.PL LIB=~/.perl
```

See `perldoc perlmodinstall` for more information on installing modules.

DOCUMENTATION

POD-format documentation is included in Naturally.pm. POD is readable with the 'perldoc' utility. See ChangeLog for recent changes.

SUPPORT

Questions, bug reports, useful code bits, and suggestions for Sort::Naturally should just be sent to me at sburke@cpan.org

AVAILABILITY

The latest version of Sort::Naturally is available from the Comprehensive Perl Archive Network (CPAN). Visit <http://www.perl.com/CPAN/> to find a CPAN site near you.

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Found in path(s):

```
* /opt/cola/permits/1146470788_1616530553.37/0/libsort-naturally-perl-1-03-orig-1-tar-gz/Sort-Naturally-1.03/README
```

No license file was found, but licenses were detected in source scan.

=head1 NAME

Sort::Naturally -- sort lexically, but sort numeral parts numerically

=head1 SYNOPSIS

```
@them = nsort(qw(
  foo12a foo12z foo13a foo 14 9x foo12 fooa foolio Foolio Foo12a
));
print join(' ', @them), "\n";
```

Prints:

```
9x 14 foo foaa foolio Foolio foo12 foo12a Foo12a foo12z foo13a
```

(Or "foo12a" + "Foo12a" and "foolio" + "Foolio" and might be switched, depending on your locale.)

=head1 DESCRIPTION

This module exports two functions, C<nsort> and C<ncmp>; they are used in implementing my idea of a "natural sorting" algorithm. Under natural sorting, numeric substrings are compared numerically, and other word-characters are compared lexically.

This is the way I define natural sorting:

=over

=item *

Non-numeric word-character substrings are sorted lexically, case-insensitively: "Foo" comes between "fish" and "fowl".

=item *

Numeric substrings are sorted numerically:
"100" comes after "20", not before.

=item
*

\W substrings (neither words-characters nor digits) are I<ignored>.

=item *

Our use of \w, \d, \D, and \W is locale-sensitive: Sort::Naturally uses a C<use locale> statement.

=item *

When comparing two strings, where a numeric substring in one place is I<not> up against a numeric substring in another, the non-numeric always comes first. This is fudged by reading pretending that the lack of a number substring has the value -1, like so:

```
foo    => "foo", -1  
foobar => "foo", -1, "bar"
```

```
foo13 => "foo", 13,  
foo13xyz => "foo", 13, "xyz"
```

That's so that "foo" will come before "foo13", which will come before "foobar".

=item *

The start of a string is exceptional: leading non-`\W` (non-word, non-digit) components are ignored, and numbers come I<before> letters.

=item *

I define "numeric substring" just as sequences matching `m/\d+/-` -- scientific notation, commas, decimals, etc., are not seen. If your data has thousands separators in numbers ("20,000 Leagues Under The Sea" or "20.000 lieues sous les mers"), consider stripping them before feeding them to `C<nsort>` or `C<ncmp>`.

=back

=head2 The `nsort` function

This function takes a list of strings, and returns a copy of the list, sorted.

This is what most people will want to use:

```
@stuff = nsort(...list...);
```

When `nsort` needs to compare non-numeric substrings, it uses Perl's `C<lc>` function in scope of a `<use locale>`. And when `nsort` needs to lowercase things, it uses Perl's `C<lc>` function in scope of a `<use locale>`. If you want `nsort` to use other functions instead, you can specify them in an arrayref as the first argument to `nsort`:

```
@stuff = nsort( [  
    \&string_comparator, # optional  
    \&lowercaser_function # optional  
],  
    ...list...  
);
```

If you want to specify a string comparator but no lowercaser,

then the options list is `C<[\&comparator, "]>` or `C<[\&comparator]>`. If you want to specify no string comparator but a lowercaser, then the options list is `C<[" , \&lowercaser]>`.

Any comparator you specify is called as `C<$comparator-E<gt>($left, $right)>`, and, like a normal Perl `C<cmp>` replacement, must return -1, 0, or 1 depending on whether the left argument is stringwise less than, equal to, or greater than the right argument.

Any lowercaser function you specify is called as `C<$lowercased = $lowercaser-E<gt>($original)>`. The routine must not modify its `C<$_[0]>`.

=head2 The `ncmp` function

Often, when sorting non-string values like this:

```
@objects_sorted = sort { $a->tag cmp $b->tag } @objects;
```

...or even in a Schwartzian transform, like this:

```
@strings =
  map $_->[0]
  sort { $a->[1] cmp $b->[1] }
  map { [$_, make_a_sort_key_from($_)] }
  @_
;
```

...you might want something that replaces not `C<sort>`, but `C<cmp>`. That's what `Sort::Naturally`'s `C<ncmp>` function is for. Call it with the syntax `C<ncmp($left,$right)>` instead of `C<$left cmp $right>`, but otherwise it's a fine replacement:

```
@objects_sorted = sort { ncmp($a->tag,$b->tag) } @objects;
```

```
@strings =
  map $_->[0]
  sort { ncmp($a->[1], $b->[1]) }
  map { [$_, make_a_sort_key_from($_)] }
  @_
;
```

Just as with `C<nsort>` can take different a string-comparator and/or lowercaser, you can do the same with `C<ncmp>`, by passing

an arrayref as the first argument:

```
ncmp( [  
    \&string_comparator, # optional  
    \&lowercaser_function # optional  
    ],  
    $left, $right  
    )
```

You might get string comparators from `L<Sort::ArbBiLex|Sort::ArbBiLex>`.

=head1 NOTES

=over

=item *

This module is not a substitute for `L<Sort::Versions|Sort::Versions>`! If you just need proper version sorting, use `I<that!>`

=item *

If you need something that works `I<sort of>` like this module's functions, but not quite the same, consider scouting thru this module's source code, and adapting what you see. Besides the functions that actually compile in this module, after the POD, there's several alternate attempts of mine at natural sorting routines, which are not compiled as part of the module, but which you might find useful. They should all be `I<working>` implementations of slightly different algorithms (all of them based on Martin Pool's `C<nsort>`) which I eventually discarded in favor of my algorithm. If you are having to naturally-sort `I<very large>` data sets, and sorting is getting ridiculously slow, you might consider trying one of those discarded functions -- I have a feeling they might be faster on large data sets. Benchmark them on your data and see. (Unless you `I<need>` the speed, don't bother. Hint: substitute `C<sort>` for `C<nsort>` in your code, and unless your program speeds up drastically, it's not the sorting that's slowing things down. But if it `I<is>` `C<nsort>` that's slowing things down, consider just:

```
if(@set >= SOME_VERY_BIG_NUMBER) {  
    no locale; # vroom vroom  
    @sorted = sort(@set); # feh, good enough
```

```
} elsif(@set >= SOME_BIG_NUMBER) {
    use locale;
    @sorted = sort(@set); # feh, good enough
} else {
    # but keep it pretty for normal cases
    @sorted = nsort(@set);
}
```

=item *

If you do adapt the routines in this module, email me; I'd just be interested in hearing about it.

=item *

Thanks to the EFNNet #perl people for encouraging this module, especially magister and a-mused.

=back

=head1 COPYRIGHT AND DISCLAIMER

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=head1 AUTHOR

Sean M. Burke C<sburke@cpan.org>

=cut

END OF DOCS

#####

BEGIN OLD STUFF #####

We can't have "use integer;", or else (5 <=> 5.1) comes out "0" !

#-----

sub nsort {


```

my($cmp, $lc);
return @_ if @_ < 2; # Just to be CLEVER.

my($x, $i); # scratch vars

# And now, the GREAT BIG Schwartzian transform:

map
  $_->[0],

sort {
  # Uses $i as the index variable, $x as the result.
  $x = 0;
  $i = 1;
  DEBUG and print "\nComparing ", map("{$_}", @$a),
    ' ', map("{$_}", @$b), ", ...\\n";

  while($i < @$a and $i < @$b) {
    DEBUG and print " comparing $i: {$a->[$i]} cmp {$b->[$i]} => ",
      $a->[$i] cmp $b->[$i], "\\n";
    last if ($x = ($a->[$i] cmp $b->[$i])); # lexicographic
    ++$i;

    DEBUG and print " comparing $i: {$a->[$i]} <=> {$b->[$i]} => ",
      $a->[$i] <=> $b->[$i], "\\n";
    last if ($x = ($a->[$i]
<=> $b->[$i])); # numeric
    ++$i;
  }

  DEBUG and print "{$a->[0]} : {$b->[0]} is ",
    $x || (@$a <=> @$b) || 0
    , "\\n"
    ;
  $x || (@$a <=> @$b) || ($a->[0] cmp $b->[0]);
  # unless we found a result for $x in the while loop,
  # use length as a tiebreaker, otherwise use cmp
  # on the original string as a fallback tiebreaker.
}

map {
  my @bit = ($x = defined($_) ? $_ : "");

  if($x =~ m/^[+-]?(?=\d|\.\d)\d*(?!\.\d*)?(?:[Ee](?:[+-]?[d+])?)\z/s) {
    # It's entirely purely numeric, so treat it specially:
    push @bit, "", $x;
  } else {
    # Consume the string.

```

```

while(length $x) {
  push @bit, ($x =~ s/^\(D+\)/s) ? lc($1) : "";
  push @bit, ($x =~ s/^\(d+\)/s) ? $1 : 0;
}
}
DEBUG and print "$bit[0] => ", map("{$_} ", @bit), "\n";

# End result: [original bit      , (text, number), (text, number), ...]
# Minimally: [0-length original bit,]
# Examples:
# ['10'
=> "  , 10,      ]
# ['fo900' => 'fo' , 900,      ]
# ['foo10' => 'foo', 10,      ]
# ['foo9.pl' => 'foo', 9, , '.pl', 0 ]
# ['foo32.pl' => 'foo', 32, , '.pl', 0 ]
# ['foo325.pl' => 'foo', 325, , '.pl', 0 ]
# Yes, always an ODD number of elements.

\@bit;
}
@_;
}

#-----
# Same as before, except without the pure-number trap.

sub nsorts {
return @_ if @_ < 2; # Just to be CLEVER.

my($x, $i); # scratch vars

# And now, the GREAT BIG Schwartzian transform:

map
$_->[0],

sort {
# Uses $i as the index variable, $x as the result.
$x = 0;
$i = 1;
DEBUG and print "\nComparing ", map("{$_}", @$a),
  ' : ', map("{$_}", @$b), , "... \n";

while($i < @$a and $i < @$b) {
  DEBUG and print " comparing $i: {$a->[$i]} cmp {$b->[$i]} => ",
    $a->[$i] cmp $b->[$i], "\n";
}
}
}

```

```

last if ($x = ($a->[$i] cmp $b->[$i])); # lexicographic
++$i;

DEBUG and print " comparing $i: {$a->[$i]} <=> {$b->[$i]} => ",
  $a->[$i] <=> $b->[$i], "\n";
last if ($x = ($a->[$i] <=> $b->[$i])); # numeric
++$i;
}

DEBUG and print "{$a->[0]} : {$b->[0]} is ",
  $x || (@$a <=> @$b) || 0
, "\n"
;
$x || (@$a <=> @$b) || ($a->[0] cmp $b->[0]);
# unless we found a result for $x in the while loop,
# use length as a tiebreaker, otherwise use cmp
# on the original string as a fallback tiebreaker.
}

map {
my @bit = ($x = defined($_) ? $_ : "");

while(length $x) {
  push @bit, ($x =~ s/^(D+)/s) ? lc($1) : "";
  push @bit, ($x =~ s/^(d+)/s) ? $1 : 0;
}
DEBUG and print "$bit[0] => ", map("{$_} ", @bit), "\n";

# End result: [original bit      , (text, number), (text, number), ...]
# Minimally: [0-length original bit,]
# Examples:
# ['10'      => "
, 10,      ]
# ['fo900'   => 'fo', 900,      ]
# ['foo10'   => 'foo', 10,      ]
# ['foo9.pl' => 'foo', 9,  , '.pl', 0 ]
# ['foo32.pl' => 'foo', 32,  , '.pl', 0 ]
# ['foo325.pl' => 'foo', 325,  , '.pl', 0 ]
# Yes, always an ODD number of elements.

\@bit;
}
@_;
}

#-----
# Same as before, except for the sort-key-making

```

```

sub nsort0 {
return @_ if @_ < 2; # Just to be CLEVER.

my($x, $i); # scratch vars

# And now, the GREAT BIG Schwartzian transform:

map
$_->[0],

sort {
# Uses $i as the index variable, $x as the result.
$x = 0;
$i = 1;
DEBUG and print "\nComparing ", map("{$_}", @$a),
    ' ', map("{$_}", @$b), ", ... \n";

while($i < @$a and $i < @$b) {
    DEBUG and print " comparing $i: {$a->[$i]} cmp {$b->[$i]} => ",
        $a->[$i] cmp $b->[$i], "\n";
    last
if ($x = ($a->[$i] cmp $b->[$i])); # lexicographic
    ++$i;

    DEBUG and print " comparing $i: {$a->[$i]} <=> {$b->[$i]} => ",
        $a->[$i] <=> $b->[$i], "\n";
    last if ($x = ($a->[$i] <=> $b->[$i])); # numeric
    ++$i;
}

DEBUG and print "{$a->[0]} : {$b->[0]} is ",
    $x || (@$a <=> @$b) || 0
    , "\n"
;
$x || (@$a <=> @$b) || ($a->[0] cmp $b->[0]);
# unless we found a result for $x in the while loop,
# use length as a tiebreaker, otherwise use cmp
# on the original string as a fallback tiebreaker.
}

map {
my @bit = ($x = defined($_) ? $_ : "");

if($x =~ m/^[+-]?(?=\d|\.\d)\d*(?!\.d*)(?:[Ee](?:[+-]?\d+)?\z/s) {
# It's entirely purely numeric, so treat it specially:
push @bit, ", $x;
} else {
# Consume the string.

```

```

while(length $x) {
  push @bit, ($x =~ s/^(\\D+)/s) ? lc($1) : "";
  # Secret sauce:
  if($x =~ s/^(\\d+)/s) {
    if(substr($1,0,1) eq '0' and
$1 != 0) {
      push @bit, $1 / (10 ** length($1));
    } else {
      push @bit, $1;
    }
  } else {
    push @bit, 0;
  }
}
}
}
DEBUG and print "$bit[0] => ", map("{$_} ", @bit), "\n";

\\@bit;
}
@_;
}

#-----
# Like nsort0, but WITHOUT pure number handling, and WITH special treatment
# of pulling off extensions and version numbers.

sub nsortf {
  return @_ if @_ < 2; # Just to be CLEVER.

  my($x, $i); # scratch vars

  # And now, the GREAT BIG Schwartzian transform:

  map
    $_->[0],

  sort {
    # Uses $i as the index variable, $x as the result.
    $x = 0;
    $i = 3;
    DEBUG and print "\nComparing ", map("{$_}", @$a),
      ' ', map("{$_}", @$b), ", "...\\n";

    while($i < @$a and $i < @$b) {
      DEBUG and print " comparing $i: {$a->[$i]} cmp {$b->[$i]} => ",
        $a->[$i] cmp $b->[$i], "\\n";
      last if ($x = ($a->[$i]

```

```

cmp $b->[$i]); # lexicographic
++$i;

DEBUG and print " comparing $i: {$a->[$i]} <=> {$b->[$i]} => ",
  $a->[$i] <=> $b->[$i], "\n";
last if ($x = ($a->[$i] <=> $b->[$i])); # numeric
++$i;
}

DEBUG and print "{$a->[0]} : {$b->[0]} is ",
  $x || (@$a <=> @$b) || 0
, "\n"
;
$x || (@$a <=> @$b ) || ($a->[1] cmp $b->[1])
|| ($a->[2] <=> $b->[2]) || ($a->[0] cmp $b->[0]);
# unless we found a result for $x in the while loop,
# use length as a tiebreaker, otherwise use the
# lc'd extension, otherwise the version, otherwise use
# the original string as a fallback tiebreaker.
}

map {
my @bit = ( ($x = defined($_) ? $_ : ""), "0");

{
# Consume the string.

# First, pull off any VAX-style version
$bit[2] = $1 if $x =~ s/(\d+)/;

# Then pull off any apparent extension
if ($x !~ m/^\.+$/s and # don't mangle ".", "..", or "...")
  $x =~
s/(\.[^\.;]*)$/sg
  # We could try to avoid catching all-digit extensions,
  # but I think that's getting /too/ clever.
) {
  $i = $1;
  if ($x =~ m<[^\|:|/]|>s) {
    # We didn't take the whole basename.
    $bit[1] = lc $i;
    DEBUG and print "Consuming extension \"$1\"\n";
  } else {
    # We DID take the whole basename. Fix it.
    $x = $1; # Repair it.
  }
}
}
}

```

```

push @bit, ", -1" if $x =~ m/^\./s;
# A hack to make .-initial filenames sort first, regardless of locale.
# And -1 is always a sort-firster, since in the code below, there's
# no allowance for filenames containing negative numbers: -1.dat
# will be read as string '-' followed by number 1.

while(length $x) {
  push @bit, ($x =~ s/^(D+)/s) ? lc($1) : "";
  # Secret sauce:
  if($x =~ s/^(d+)/s) {
    if(substr($1,0,1) eq '0' and $1 != 0) {
      push @bit, $1 / (10
** length($1));
    } else {
      push @bit, $1;
    }
  } else {
    push @bit, 0;
  }
}

DEBUG and print "$bit[0] => ", map("{$_} ", @bit), "\n";

\@bit;
}
@_;
}

# yowza yowza yowza.

Found in path(s):
* /opt/cola/permits/1146470788_1616530553.37/0/libsort-naturally-perl-1-03-orig-1-tar-gz/Sort-Naturally-1.03/lib/Sort/Naturally.pm

```

1.15 libhtml-tagset-perl 3.20-4

1.15.1 Available under license :

No license file was found, but licenses were detected in source scan.

=head1 CAVEATS

You may find it useful to alter the behavior of modules (like C<HTML::Element> or C<HTML::TreeBuilder>) that use C<HTML::Tagset>'s data tables by altering the data tables themselves. You are welcome to try, but be careful; and be aware that different modules may or may react differently to the data tables being changed.

Note that it may be inappropriate to use these tables for I<producing> HTML -- for example, C<%isHeadOrBodyElement> lists the tagnames for all elements that can appear either in the head or in the body, such as "script". That doesn't mean that I am saying your code that produces HTML should feel free to put script elements in either place! If you are producing programs that spit out HTML, you should be I<intimately> familiar with the DTDs for HTML or XHTML (available at C<<http://www.w3.org/>>), and you should slavishly obey them, not the data tables in this document.

=head1 SEE ALSO

L<HTML::Element>,
L<HTML::TreeBuilder>, L<HTML::LinkExtor>

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Copyright 2005-2008 Andy Lester.

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=head1 ACKNOWLEDGEMENTS

Most of the code/data in this module was adapted from code written by Gisle Aas for C<HTML::Element>, C<HTML::TreeBuilder>, and C<HTML::LinkExtor>. Then it was maintained by Sean M. Burke.

=head1 AUTHOR

Current maintainer: Andy Lester, C<<< <[andy at petdance.com](mailto:andy@petdance.com)> >>

=head1 BUGS

Please report any bugs or feature requests to C<bug-html-tagset at rt.cpan.org>, or through the web interface at L<<http://rt.cpan.org/NoAuth/ReportBug.html?Queue=HTML-Tagset>>. I will be notified, and then you'll automatically be notified of progress on your bug as I make changes.

=cut

Found in path(s):

* /opt/cola/permits/1146693911_1616601054.92/0/libhtml-tagset-perl-3-20-orig-1-tar-gz/HTML-Tagset-3.20/Tagset.pm

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README for HTML::Tagset

HTML::Tagset

This module contains data tables useful in dealing with HTML.

It provides no functions or methods.

PREREQUISITES

This suite requires Perl 5.

HTML::Tagset doesn't use any nonstandard modules.

INSTALLATION

You install HTML::Tagset, as you would install any perl module library, by running these commands:

```
perl Makefile.PL
make
make test
make install
```

If you want to install a private copy of HTML::Tagset in your home directory, then you should try to produce the initial Makefile with something like this command:

```
perl Makefile.PL LIB=~/.perl
```

DOCUMENTATION

POD-format documentation is included in Tagset.pm. POD is readable with the 'perldoc' utility. See ChangeLog for recent changes.

MACPERL INSTALLATION NOTES

Don't bother with the makefiles. Just make a HTML directory in your MacPerl site_lib or lib directory, and move Tagset.pm

into there.

SUPPORT

Questions, bug reports, and suggestions for HTML::Tagset should just be sent to me at sburke@cpan.org

AVAILABILITY

The latest version of HTML::Tagset is available from the Comprehensive Perl Archive Network (CPAN). Visit <http://www.perl.com/CPAN/> to find a CPAN site near you.

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Found in path(s):

* /opt/cola/permits/1146693911_1616601054.92/0/libhtml-tagset-perl-3-20-orig-1-tar-gz/HTML-Tagset-3.20/README

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license: ~

Found in path(s):

* /opt/cola/permits/1146693911_1616601054.92/0/libhtml-tagset-perl-3-20-orig-1-tar-gz/HTML-Tagset-3.20/META.yml

1.16 libtext-diff-perl 1.45-1

1.16.1 Available under license :

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Version 2, June 1991

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1.17 libjson-any-perl 1.39-2

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1.18 libmailtools-perl 2.21-1

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=encoding utf8

=head1 NAME

Mail::Filter - filter mail through multiple subroutines

=head1 SYNOPSIS

```
use Mail::Filter;
```

```
my $filter = Mail::Filter->new( \&filter1, \&filter2 );
```

```
my $mail = Mail::Internet->new( [ <> ] );
```

```
my $mail = $filter->filter($mail);
```

```
my $folder = Mail::Folder->new( .... );
```

```
my $filter->filter($folder);
```

=head1 DESCRIPTION

C<Mail::Filter> provides an interface to filtering Email through multiple subroutines.

C<Mail::Filter> filters mail by calling each filter subroutine in turn. Each filter subroutine is called with two arguments, the first is the filter object and the second is the mail or folder object being filtered.

The result from each filter sub is passed to the next filter as the mail object. If a filter subroutine returns undef, then C<Mail::Filter> will abort and return immediately.

The function returns the result from the last subroutine to operate on the mail object.

=head1 METHODS

=head2 Constructors

=over 4

=item Mail::Filter-E<gt>B<new>(@filters)

Create a new C<Mail::Filter> object with the given filter subroutines. Each filter may be either a code reference or the name of a method to call on the <Mail::Filter> object.

=back

=head2 Accessors

=over 4

=item \$obj-E<gt>B<add>(@filters)

Add the given @filters to the end of the filter list.

=back

=head2 Processing

=over 4

=item \$obj-E<gt>B<filter>(\$mail|\$folder)

If the first argument is a L<Mail::Internet|Mail::Internet> object, then this object will be passed through the filter list. If the first argument is a Mail::Folder object, then each message in turn will be passed through the filter list.

=item \$obj-E<gt>B<folder>()

While the `L<filter()|Mail::Filter/"Processing">` method is called with a `Mail::Folder` object, these filter subroutines can call this method to obtain the folder object that is being processed.

```
=item $obj-E<gt>B<msgnum>()
```

If the `L<filter()|Mail::Filter/"Processing">` method is called with a `Mail::Folder` object, then the filter subroutines may call this method to obtain the message number of the message that is being processed.

```
=back
```

```
=head1 SEE ALSO
```

This module is part of the MailTools distribution,
F<<http://perl.overmeer.net/mailtools/>>.

```
=head1 AUTHORS
```

The MailTools bundle was developed by Graham Barr. Later, Mark Overmeer took over maintenance without commitment to further development.

Mail::Cap by Gisle Aas E<lt>aas@oslonett.noE<gt>.

Mail::Field::AddrList by Peter Orbaek E<lt>poe@cit.dkE<gt>.

Mail::Mailer and Mail::Send by Tim Bunce E<lt>Tim.Bunce@ig.co.ukE<gt>.

For other contributors see ChangeLog.

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Found in path(s):

```
* /opt/cola/permits/1146929080_1616812141.62/0/libmailtools-perl-2-21-orig-1-tar-gz/MailTools-2.21/lib/Mail/Filter.pod
```

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abstract: 'Various ancient e-mail related modules'

author:

- 'Mark Overmeer <markov@cpan.org>'

build_requires:

```
ExtUtils::MakeMaker: '0'
configure_requires:
ExtUtils::MakeMaker: '0'
dynamic_config: 1
generated_by: 'ExtUtils::MakeMaker version 7.3, CPAN::Meta::Converter version 2.150010'
license: perl
meta-spec:
url: http://module-build.sourceforge.net/META-spec-v1.4.html
version: '1.4'
name: MailTools
no_index:
directory:
- t
- inc
requires:
Date::Format: '0'
Date::Parse: '0'
IO::Handle: '0'
Net::Domain: '1.05'
Net::SMTP: '1.03'
Test::More: '0'
resources:
homepage: http://perl.overmeer.net/CPAN/
license: http://dev.perl.org/licenses/
repository: https://github.com/markov2/perl5-MailTools.git
version: '2.21'
x_serialization_backend: 'CPAN::Meta::YAML version 0.011'
```

Found in path(s):

```
* /opt/cola/permits/1146929080_1616812141.62/0/libmailtools-perl-2-21-orig-1-tar-gz/MailTools-2.21/META.yml
```

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=encoding utf8

=head1 NAME

Mail::Internet - manipulate email messages

=head1 SYNOPSIS

```
use Mail::Internet;
my $msg = Mail::Internet->new(*STDIN);
```

=head1 DESCRIPTION

This package implements reading, creating, manipulating, and writing email messages. Sometimes, the implementation tries to be too smart, but in the general case it works as expected.

If you start writing a B<new application>, you should use the L<Mail::Box> distribution, which has more features and handles messages much better according to the RFCs. See L<<http://perl.overmeer.net/mailbox/>>. You may also chose L<MIME::Entity>, to get at least some multipart support in your application.

=head1 METHODS

=head2 Constructors

=over 4

=item \$obj-E<gt>B<dup>()

Duplicate the message as a whole. Both header and body will be deep-copied: a new L<Mail::Internet|Mail::Internet> object is returned.

=item \$obj-E<gt>B<extract>(\@lines)

Extract header

and body from an ARRAY of message lines. Requires an object already created with L<new()|Mail::Internet/"Constructors">, which contents will get overwritten.

=item \$obj-E<gt>B<new>([\$arg], [%options])

=item Mail::Internet-E<gt>B<new>([\$arg], [%options])

\$arg is optional and may be either a file descriptor (reference to a GLOB) or a reference to an array. If given the new object will be initialized with headers and body either from the array of read from the file descriptor.

The L<Mail::Header::new()|Mail::Header/"Constructors"> %options C<Modify>, C<MailFrom> and C<FoldLength> may also be given.

-Option--Default

Body []

Header undef

=over 2

=item Body => ARRAY-of-LINES

The value of this option should be a reference to an array which contains the lines for the body of the message. Each line should be terminated with C<\n> (LF). If Body is given then C<Mail::Internet> will not attempt to

read the body from C<\$arg> (even if it is specified).

=item Header => Mail::Header

The

value of this option should be a L<Mail::Header|Mail::Header> object. If given then C<Mail::Internet> will not attempt to read a mail header from C<\$arg>, if it was specified.

=back

=item \$obj-E<gt>B<read>(\$fh)

Read a message from the \$fh into an already existing message object. Better use L<new()|Mail::Internet/"Constructors"> with the \$fh as first argument.

=back

=head2 Accessors

=over 4

=item \$obj-E<gt>B<body>([\$body])

Returns the body of the message. This is a reference to an array. Each entry in the array represents a single line in the message.

If I<\$body> is given, it can be a reference to an array or an array, then the body will be replaced. If a reference is passed, it is used directly and not copied, so any subsequent changes to the array will change the contents of the body.

=item \$obj-E<gt>B<head>()

Returns the C<Mail::Header> object which holds the headers for the current message

=back

=head2 Processing the message as a whole

=over 4

=item \$obj-E<gt>B<as_mbox_string>([\$already_escaped])

Returns the message as a string in mbox format. C<\$already_escaped>, if given and true, indicates that L<escape_from()|Mail::Internet/"High-level functionality"> has already been called on

this object.

```
=item $Obj-E<gt>B<as_string>()
```

Returns the message as a single string.

```
=item $Obj-E<gt>B<print>( [$fh] )
```

Print the header, body or whole message to file descriptor I<\$fh>. I<\$fd> should be a reference to a GLOB. If I<\$fh> is not given the output will be sent to STDOUT.

example:

```
$mail->print( \*STDOUT ); # Print message to STDOUT
```

```
=item $Obj-E<gt>B<print_body>( [$fh] )
```

Print only the body to the \$fh (default STDOUT).

```
=item $Obj-E<gt>B<print_header>( [$fh] )
```

Print only the header to the \$fh (default STDOUT).

```
=back
```

```
=head2 Processing the header
```

Most of these methods are simply wrappers around methods provided by L<Mail::Header|Mail::Header>.

```
=over 4
```

```
=item $Obj-E<gt>B<add>(PAIRS)
```

The PAIRS are field-name and field-content.

For each PAIR,

L<Mail::Header::add()|Mail::Header/"Processing"> is called. All fields are added after existing fields. The last addition is returned.

```
=item $Obj-E<gt>B<combine>( $tag, [$with] )
```

See L<Mail::Header::combine()|Mail::Header/"Processing">.

```
=item $Obj-E<gt>B<delete>( $tag, [$tags] )
```

Delete all fields with the name \$tag. L<Mail::Header::delete()|Mail::Header/"Processing"> is doing the work.

=item \$obj-E<gt>B<fold>([\$length])

See L<Mail::Header::fold()|Mail::Header/"Processing">.

=item \$obj-E<gt>B<fold_length>([\$tag], [\$length])

See L<Mail::Header::fold_length()|Mail::Header/"Accessors">.

=item \$obj-E<gt>B<get>(\$tag, [\$tags])

In LIST context, all fields with the name \$tag are returned. In SCALAR context, only the first field which matches the earliest \$tag is returned. L<Mail::Header::get()|Mail::Header/"Processing"> is called to collect the data.

=item \$obj-E<gt>B<header>(\@lines)

See L<Mail::Header::header()|Mail::Header/"Fake" constructors">.

=item
\$obj-E<gt>B<replace>(PAIRS)

The PAIRS are field-name and field-content. For each PAIR, L<Mail::Header::replace()|Mail::Header/"Processing"> is called with index 0. If a \$field is already in the header, it will be removed first. Do not specified the same field-name twice.

=back

=head2 Processing the body

=over 4

=item \$obj-E<gt>B<remove_sig>([\$nlines])

Attempts to remove a user's signature from the body of a message. It does this by looking for a line equal to C<'-- '> within the last C<\$nlines> of the message. If found then that line and all lines after it will be removed. If C<\$nlines> is not given a default value of 10 will be used. This would be of most use in auto-reply scripts.

=item \$obj-E<gt>B<sign>(%options)

Add your signature to the body. L<remove_sig()|Mail::Internet/"Processing the body"> will strip existing signatures first.

-Option --Default

File undef

Signature []

=over 2

=item File => FILEHANDLE

Take from the FILEHANDLE all lines starting from the first C<< -- >>.

=item Signature => STRING|ARRAY-of-LINES

=back

=item \$obj-E<gt>B<tidy_body>()

Removes all leading and trailing lines from the body that only contain white spaces.

=back

=head2 High-level functionality

=over 4

=item \$obj-E<gt>B<escape_from>()

It can cause problems with some applications if a message contains a line starting with C<'From '>, in particular when attempting to split a folder. This method inserts a leading C<'>' on any line that matches the regular expression C</^>*From/>

=item \$obj-E<gt>B<nntp_post>([%options])

Post an article via NNTP. Requires Net::NNTP to be installed.

-Option--Default

Debug <false>

Host <required>

Port 119

=over 2

=item Debug => BOOLEAN

Debug value to pass to Net::NNTP, see L<Net::NNTP>

=item Host => HOSTNAME|Net::NNTP object

Name of NNTP server to connect to, or a Net::NNTP object to use.

=item Port => INTEGER

Port number to connect to on remote host

=back

=item \$obj-E<gt>B<reply>(%options)

Create

a new object with header initialised for a reply to the current object. And the body will be a copy of the current message indented.

The C<.mailhdr> file in your home directory (if exists) will be read first, to provide defaults.

-Option --Default

Exclude []

Indent '>'

Keep []

ReplyAll false

=over 2

=item Exclude => ARRAY-of-FIELDS

Remove the listed FIELDS from the produced message.

=item Indent => STRING

Use as indentation string. The string may contain C<%%> to get a single C<%>, C<%f> to get the first from name, C<%F> is the first character of C<%f>, C<%l> is the last name, C<%L> its first character, C<%n> the whole from string, and C<%I> the first character of each of the names in the from string.

=item Keep => ARRAY-of-FIELDS

Copy the listed FIELDS from the original message.

=item ReplyAll => BOOLEAN

Automatically include all To and Cc addresses of the original mail, excluding those mentioned in the Bcc list.

=back

=item \$obj-E<gt>B<send>(

[*\$type*, [*\$args...*]])

Send a Mail::Internet message using L<Mail::Mailer|Mail::Mailer>. *\$type* and *\$args* are passed on to L<Mail::Mailer::new()|Mail::Mailer/"Constructors">.

=item *\$obj-E*<gt;B<smtpsend>([*%options*])

Send a Mail::Internet message using direct SMTP to the given ADDRESSES, each can be either a string or a reference to a list of email addresses. If none of C<To>, <Cc> or C<Bcc> are given then the addresses are extracted from the message being sent.

The return value will be a list of email addresses that the message was sent to. If the message was not sent the list will be empty.

Requires Net::SMTP and Net::Domain to be installed.

-Option --Default

Bcc undef

Cc undef

Debug <false>

Hello localhost.localdomain

Host \$ENV{SMTPHOSTS}

MailFrom Mail::Util::mailaddress()

Port 25

To undef

=over 2

=item Bcc => ADDRESSES

=item Cc => ADDRESSES

=item Debug => BOOLEAN

Debug value to pass to Net::SMTP, see <Net::SMTP>

=item

Hello => STRING

Send a HELO (or EHLO) command to the server with the given name.

=item Host => HOSTNAME

Name of the SMTP server to connect to, or a Net::SMTP object to use

If C<Host> is not given then the SMTP host is found by attempting connections first to hosts specified in C<\$ENV{SMTPHOSTS}>, a colon

separated list, then C<mailhost> and C<localhost>.

=item MailFrom => ADDRESS

The e-mail address which is used as sender. By default,
L<Mail::Util::mailaddress()|Mail::Util/"FUNCTIONS"> provides the address of the sender.

=item Port => INTEGER

Port number to connect to on remote host

=item To => ADDRESSES

=back

=item \$obj-E<gt>B<unescape_from>()

Remove the escaping added by L<escape_from()|Mail::Internet/"High-level functionality">.

=back

=head1 SEE ALSO

This module is part of the MailTools distribution,
F<<http://perl.overmeer.net/mailtools/>>.

=head1 AUTHORS

The MailTools bundle was developed by Graham Barr. Later, Mark Overmeer took over maintenance without commitment to further development.

Mail::Cap by Gisle Aas E<lt>aas@oslonett.noE<gt>.
Mail::Field::AddrList by Peter Orbaek E<lt>poe@cit.dkE<gt>.
Mail::Mailer and Mail::Send by Tim Bunce E<lt>Tim.Bunce@ig.co.ukE<gt>.
For other contributors see ChangeLog.

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under the same terms as Perl itself.

See F<<http://www.perl.com/perl/misc/Artistic.html>>

Found in path(s):

* /opt/cola/permits/1146929080_1616812141.62/0/libmailtools-perl-2-21-orig-1-tar-gz/MailTools-

2.21/lib/Mail/Internet.pod

No license file was found, but licenses were detected in source scan.

=encoding utf8

=head1 NAME

MailTools - bundle of ancient email modules

=head1 SYNOPSIS

This is a place-holder for the distribution

=head1 DESCRIPTION

MailTools is a bundle: an ancient form of combining packages into one distribution. Gladly, it can be distributed as if it is a normal distribution as well.

B<Be warned:> The code you find here is very old. It works for simple emails, but when you start with new code then please use more sophisticated libraries. The main reason that you still find this code on CPAN, is because many books use it as example.

=head2 Component

In this distribution, you find

=over 4

=item Mail::Address

Parse email address from a header line.

=item Mail::Cap

Interpret mailcap files: mappings of file-types to applications as used by many command-line email programs.

=item Mail::Field

Simplifies access to (some) email header fields. Used by L<Mail::Header|Mail::Header>.

=item

Mail::Filter

Process L<Mail::Internet|Mail::Internet> messages.

=item Mail::Header

Collection of L<Mail::Field|Mail::Field> objects, representing the header of a L<Mail::Internet|Mail::Internet> object.

=item Mail::Internet

Represents a single email message, with header and body.

=item Mail::Mailer

Send L<Mail::Internet|Mail::Internet> emails via direct smtp or local MTA's.

=item Mail::Send

Build a L<Mail::Internet|Mail::Internet> object, and then send it out using L<Mail::Mailer|Mail::Mailer>.

=item Mail::Util

"Smart functions" you should not depend on.

=back

=head1 SEE ALSO

This module is part of the MailTools distribution,
F<<http://perl.overmeer.net/mailtools/>>.

=head1 AUTHORS

The MailTools bundle was developed by Graham Barr. Later, Mark Overmeer took over maintenance without commitment to further development.

Mail::Cap by Gisle Aas E<lt>aas@oslonett.noE<gt>.

Mail::Field::AddrList by Peter Orbaek E<lt>poe@cit.dkE<gt>.

Mail::Mailer and Mail::Send by Tim Bunce

E<lt>Tim.Bunce@ig.co.ukE<gt>.

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under the same terms as Perl itself.

See F<<http://www.perl.com/perl/misc/Artistic.html>>

Found in path(s):

```
* /opt/cola/permits/1146929080_1616812141.62/0/libmailtools-perl-2-21-orig-1-tar-gz/MailTools-2.21/lib/MailTools.pod
```

No license file was found, but licenses were detected in source scan.

=encoding utf8

=head1 NAME

Mail::Cap - understand mailcap files

=head1 SYNOPSIS

```
my $mc = Mail::Cap->new;
```

```
my $desc = $mc->description('image/gif');  
print "GIF desc: $desc\n";
```

```
my $cmd = $mc->viewCmd('text/plain; charset=iso-8859-1', 'file.txt');
```

=head1 DESCRIPTION

Parse mailcap files as specified in "RFC 1524 --A User Agent Configuration Mechanism For Multimedia Mail Format Information". In the description below C<\$type> refers to the MIME type as specified in the C<Content-Type> header of mail or HTTP messages. Examples of types are:

```
image/gif  
text/html  
text/plain; charset=iso-8859-1
```

You could also take a look at the File::MimeInfo distribution, which are accessing tables which are used by many applications on a system, and therefore have succeeded the mail-cap specifications on modern (UNIX) systems.

=head1 METHODS

=head2 Constructors

=over 4

=item Mail::Cap-E<gt>B<new>(%options)

Create

and initialize a new Mail::Cap object. If you give it an argument it will try to parse the specified file. Without any arguments it will search for the mailcap file using the standard mailcap path, or the MAILCAPS environment variable if it is defined.

```
-Option --Default  
filename undef  
take 'FIRST'
```

=over 2

```
=item filename => FILENAME
```

Add the specified file to the list to standard locations. This file is tried first.

```
=item take => 'ALL'|'FIRST'
```

Include all mailcap files you can find. By default, only the first file is parsed, however the RFC tells us to include ALL. To maintain backwards compatibility, the default only takes the FIRST.

=back

example:

```
$mcap = new Mail::Cap;  
$mcap = new Mail::Cap "/mydir/mailcap";  
$mcap = new Mail::Cap filename => "/mydir/mailcap";  
$mcap = new Mail::Cap take => 'ALL';  
$mcap = Mail::Cap->new(take => 'ALL');
```

=back

=head2 Run commands

These methods invoke a suitable program presenting or manipulating the media object in the specified file. They all return C<1> if a command was found, and C<0> otherwise. You might test C<\$?> for the outcome of the command.

=over 4

```
=item $obj-E<gt>B<compose>($type, $file)
```

```
=item $obj-E<gt>B<edit>($type, $file)
```

=item \$Obj-E<gt>B<print>(\$type, \$file)

=item \$Obj-E<gt>B<view>(\$type, \$file)

=back

=head2 Command creator

These methods return a string that is suitable for feeding to system() in order to invoke a suitable program presenting or manipulating the media object in the specified file. It will return C<undef> if no suitable specification exists.

=over 4

=item \$Obj-E<gt>B<composeCmd>(\$type, \$file)

=item \$Obj-E<gt>B<editCmd>(\$type, \$file)

=item \$Obj-E<gt>B<printCmd>(\$type, \$file)

=item \$Obj-E<gt>B<viewCmd>(\$type, \$file)

=back

=head2 Look-up definitions

Methods return the corresponding mailcap field for the type.

=over 4

=item \$Obj-E<gt>B<description>(\$type)

=item \$Obj-E<gt>B<field>(\$type, \$field)

Returns the specified field for the type. Returns undef if no specification exists.

=item \$Obj-E<gt>B<nametemplate>(\$type)

=item \$Obj-E<gt>B<textualnewlines>(\$type)

=item \$Obj-E<gt>B<x11_bitmap>(\$type)

=back

=head1 SEE ALSO

This module is part of the MailTools distribution,
F<<http://perl.overmeer.net/mailtools/>>.

=head1 AUTHORS

The MailTools bundle was developed by Graham Barr. Later, Mark Overmeer took over maintenance without commitment to further development.

Mail::Cap by Gisle Aas E<[lt>aas@oslonett.noE<gt>](mailto:aas@oslonett.no).

Mail::Field::AddrList by Peter Orbaek E<[lt>poe@cit.dkE<gt>](mailto:poe@cit.dk).

Mail::Mailer and Mail::Send by Tim Bunce E<[lt>Tim.Bunce@ig.co.ukE<gt>](mailto:Tim.Bunce@ig.co.uk).

For other contributors see ChangeLog.

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Found in path(s):

* /opt/cola/permits/1146929080_1616812141.62/0/libmailtools-perl-2-21-orig-1-tar-gz/MailTools-
2.21/lib/Mail/Cap.pod

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=encoding utf8

=head1 NAME

Mail::Field::Date - a date header field

=head1 INHERITANCE

Mail::Field::Date

is a Mail::Field

=head1 SYNOPSIS

```
use HTTP::Date 'time2iso';  
my $field = Mail::Field->new(Date => time2iso());
```

=head1 DESCRIPTION

Represents one "Date" header field.

Extends L<"DESCRIPTION" in Mail::Field|Mail::Field/"DESCRIPTION">.

=head1 METHODS

Extends L<"METHODS" in Mail::Field|Mail::Field/"METHODS">.

=head2 Constructors

Extends L<"Constructors" in Mail::Field|Mail::Field/"Constructors">.

=over 4

=item Mail::Field::Date-E<gt>B<combine>(\$fields)

Inherited, see L<Mail::Field/"Constructors">

=item Mail::Field::Date-E<gt>B<extract>(\$tag, \$head [, \$index])

Inherited, see L<Mail::Field/"Constructors">

=item Mail::Field::Date-E<gt>B<new>(\$tag [, STRING | %options])

Inherited, see L<Mail::Field/"Constructors">

=back

=head2 "Fake" constructors

Extends L<"Fake" constructors" in Mail::Field|Mail::Field/"Fake" constructors">.

=over 4

=item \$obj-E<gt>B<create>(%options)

Inherited, see L<Mail::Field/"Fake" constructors">

=item \$obj-E<gt>B<parse>()

Inherited, see L<Mail::Field/"Fake" constructors">

=back

=head2 Accessors

Extends L<"Accessors" in Mail::Field|Mail::Field/"Accessors">.

=over 4

=item \$obj-E<gt>B<set>(%options)

-Option --Default

Time undef

TimeStr undef

=over 2

=item Time => SECONDS

=item TimeStr => STRING

A string acceptable to Date::Parse.

=back

=item \$obj-E<gt>B<stringify>()

Inherited, see L<Mail::Field/"Accessors">

=item \$obj-E<gt>B<tag>()

=item Mail::Field::Date-E<gt>B<tag>()

Inherited, see L<Mail::Field/"Accessors">

=back

=head2 Smart accessors

Extends L<"Smart accessors" in Mail::Field|Mail::Field/"Smart accessors">.

=over 4

=item \$obj-E<gt>B<text>([STRING])

Inherited, see L<Mail::Field/"Smart accessors">

=item \$obj-E<gt>B<time>([\$time])

Query (or change) the \$time (as stored in the field) in seconds.

=back

=head1

DETAILS

Extends L<"DETAILS" in Mail::Field|Mail::Field/"DETAILS">.

=head1 DIAGNOSTICS

=over 4

=item Error: Undefined subroutine <method> called

Mail::Field objects use autoloading to compile new functionality. Apparently, the method called is not implemented for the specific class of the field object.

=back

=head1 SEE ALSO

This module is part of the MailTools distribution,
F<<http://perl.overmeer.net/mailtools/>>.

=head1 AUTHORS

The MailTools bundle was developed by Graham Barr. Later, Mark Overmeer took over maintenance without commitment to further development.

Mail::Cap by Gisle Aas E<lt>aas@oslonett.noE<gt>.
Mail::Field::AddrList by Peter Orbaek E<lt>poe@cit.dkE<gt>.
Mail::Mailer and Mail::Send by Tim Bunce E<lt>Tim.Bunce@ig.co.ukE<gt>.
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See F<<http://www.perl.com/perl/misc/Artistic.html>>

Found in path(s):

* /opt/cola/permits/1146929080_1616812141.62/0/libmailtools-perl-2-21-orig-1-tar-gz/MailTools-2.21/lib/Mail/Field/Date.pod

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Found in path(s):

* /opt/cola/permits/1146929080_1616812141.62/0/libmailtools-perl-2-21-orig-1-tar-gz/MailTools-

```

2.21/lib/Mail/Filter.pm
* /opt/cola/permits/1146929080_1616812141.62/0/libmailtools-perl-2-21-orig-1-tar-gz/MailTools-
2.21/lib/Mail/Mailer/rfc822.pm
* /opt/cola/permits/1146929080_1616812141.62/0/libmailtools-perl-2-21-orig-1-tar-gz/MailTools-
2.21/lib/Mail/Util.pm
* /opt/cola/permits/1146929080_1616812141.62/0/libmailtools-perl-2-21-orig-1-tar-gz/MailTools-
2.21/lib/Mail/Send.pm
* /opt/cola/permits/1146929080_1616812141.62/0/libmailtools-perl-2-21-orig-1-tar-gz/MailTools-
2.21/lib/Mail/Field/Date.pm
* /opt/cola/permits/1146929080_1616812141.62/0/libmailtools-perl-2-21-orig-1-tar-gz/MailTools-
2.21/lib/Mail/Field/AddrList.pm
* /opt/cola/permits/1146929080_1616812141.62/0/libmailtools-perl-2-21-orig-1-tar-gz/MailTools-
2.21/lib/MailTools.pm
* /opt/cola/permits/1146929080_1616812141.62/0/libmailtools-perl-2-21-orig-1-tar-gz/MailTools-
2.21/lib/Mail/Field.pm
*
/opt/cola/permits/1146929080_1616812141.62/0/libmailtools-perl-2-21-orig-1-tar-gz/MailTools-
2.21/lib/Mail/Mailer.pm
* /opt/cola/permits/1146929080_1616812141.62/0/libmailtools-perl-2-21-orig-1-tar-gz/MailTools-
2.21/lib/Mail/Mailer/qmail.pm
* /opt/cola/permits/1146929080_1616812141.62/0/libmailtools-perl-2-21-orig-1-tar-gz/MailTools-
2.21/lib/Mail/Address.pm
* /opt/cola/permits/1146929080_1616812141.62/0/libmailtools-perl-2-21-orig-1-tar-gz/MailTools-
2.21/lib/Mail/Field/Generic.pm
* /opt/cola/permits/1146929080_1616812141.62/0/libmailtools-perl-2-21-orig-1-tar-gz/MailTools-
2.21/lib/Mail/Cap.pm
* /opt/cola/permits/1146929080_1616812141.62/0/libmailtools-perl-2-21-orig-1-tar-gz/MailTools-
2.21/lib/Mail/Mailer/testfile.pm
* /opt/cola/permits/1146929080_1616812141.62/0/libmailtools-perl-2-21-orig-1-tar-gz/MailTools-
2.21/lib/Mail/Header.pm
* /opt/cola/permits/1146929080_1616812141.62/0/libmailtools-perl-2-21-orig-1-tar-gz/MailTools-
2.21/lib/Mail/Mailer/smtp.pm
*
/opt/cola/permits/1146929080_1616812141.62/0/libmailtools-perl-2-21-orig-1-tar-gz/MailTools-
2.21/lib/Mail/Internet.pm
* /opt/cola/permits/1146929080_1616812141.62/0/libmailtools-perl-2-21-orig-1-tar-gz/MailTools-
2.21/lib/Mail/Mailer/smtps.pm
* /opt/cola/permits/1146929080_1616812141.62/0/libmailtools-perl-2-21-orig-1-tar-gz/MailTools-
2.21/lib/Mail/Mailer/sendmail.pm
No license file was found, but licenses were detected in source scan.

```

=encoding utf8

=head1 NAME

Mail::Field::AddrList - object representation of e-mail address lists

=head1 INHERITANCE

Mail::Field::AddrList

is a Mail::Field

=head1 SYNOPSIS

```
use Mail::Field::AddrList;
```

```
$to = Mail::Field->new('To');
```

```
$from = Mail::Field->new('From', 'poe@daimi.aau.dk (Peter Orbaek)');
```

```
$from->create('foo@bar.com' => 'Mr. Foo', poe => 'Peter');
```

```
$from->parse('foo@bar.com (Mr Foo), Peter Orbaek <poe>');
```

```
# make a RFC822 header string
```

```
print $from->stringify(),"\n";
```

```
# extract e-mail addresses and names
```

```
@addresses = $from->addresses(); # strings
```

```
@names = $from->names(); # strings
```

```
@addr = $from->addr_list(); # Mail::Address objects (v2.00)
```

```
# adjoin a new address to the list
```

```
$from->set_address('foo@bar.com', 'Mr. Foo');
```

=head1 DESCRIPTION

Defines parsing and formatting of address field, for the following fields: C<To>, C<From>, C<Cc>, C<Reply-To>, and C<Sender>.

All

the normally used features of the address field specification of RFC2822 are implemented, but some complex (and therefore hardly ever used) constructs will not be understood. Use Mail::Message::Field::Full in MailBox if you need full RFC compliance.

Extends L<"DESCRIPTION" in Mail::Field|Mail::Field/"DESCRIPTION">.

=head1 METHODS

Extends L<"METHODS" in Mail::Field|Mail::Field/"METHODS">.

=head2 Constructors

Extends L<"Constructors" in Mail::Field|Mail::Field/"Constructors">.

=over 4

=item Mail::Field::AddrList-E<gt>B<combine>(\$fields)

Inherited, see L<Mail::Field/"Constructors">

=item Mail::Field::AddrList-E<gt>B<extract>(\$tag, \$head [, \$index])

Inherited, see L<Mail::Field/"Constructors">

=item Mail::Field::AddrList-E<gt>B<new>(\$tag [, STRING | %options])

Inherited, see L<Mail::Field/"Constructors">

=back

=head2 "Fake" constructors

Extends L<"Fake" constructors" in Mail::Field|Mail::Field/"Fake" constructors">.

=over 4

=item \$obj-E<gt>B<create>(%options)

Inherited,
see L<Mail::Field/"Fake" constructors">

=item \$obj-E<gt>B<parse>()

Inherited, see L<Mail::Field/"Fake" constructors">

=back

=head2 Accessors

Extends L<"Accessors" in Mail::Field|Mail::Field/"Accessors">.

=over 4

=item \$obj-E<gt>B<set>(%options)

Inherited, see L<Mail::Field/"Accessors">

=item \$obj-E<gt>B<stringify>()

Inherited, see L<Mail::Field/"Accessors">

=item \$obj-E<gt>B<tag>()

=item Mail::Field::AddrList-E<gt>B<tag>()

Inherited, see L<Mail::Field/"Accessors">

=back

=head2 Smart accessors

Extends L<"Smart accessors" in Mail::Field|Mail::Field/"Smart accessors">.

=over 4

=item \$obj-E<gt>B<addr_list>()

Returns the collected L<Mail::Address|Mail::Address> objects.

=item \$obj-E<gt>B<addresses>()

Returns a list of email addresses, found in the field content.

=item \$obj-E<gt>B<names>()

Returns a list of nicely formatted names, for each of the addresses found in the content.

=item \$obj-E<gt>B<set_address>(\$email, \$name)

Add/replace an \$email address to the field.

=item \$obj-E<gt>B<text>([STRING])

Inherited, see L<Mail::Field/"Smart accessors">

=back

=head1 DETAILS

Extends L<"DETAILS" in Mail::Field|Mail::Field/"DETAILS">.

=head1 DIAGNOSTICS

=over 4

=item Error: Undefined subroutine <method> called

Mail::Field objects use autoloading to compile new functionality. Apparently, the method called is not implemented for the specific class of the field object.

=back

=head1 SEE ALSO

This module is part of the MailTools distribution,
F<<http://perl.overmeer.net/mailtools/>>.

=head1 AUTHORS

The MailTools bundle was developed by Graham Barr. Later, Mark Overmeer took over maintenance without commitment to further development.

Mail::Cap by Gisle Aas E<lt>aas@oslonett.noE<gt>.

Mail::Field::AddrList by Peter Orbaek E<lt>poe@cit.dkE<gt>.

Mail::Mailer and Mail::Send by Tim Bunce E<lt>Tim.Bunce@ig.co.ukE<gt>.

For other contributors see ChangeLog.

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Found in path(s):

* /opt/cola/permits/1146929080_1616812141.62/0/libmailtools-perl-2-21-orig-1-tar-gz/MailTools-
2.21/lib/Mail/Field/AddrList.pod

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#!/usr/bin/perl -w

Note by Mark Overmeer:

This script does work, but Mail::Send may provide a nicer interface

NAME

mail-mailer.pl - Smtplib client written in Perl

#

SYNOPSIS

mail-mailer.pl -s "Test" --smtp=my-smtp-server.com admin@net1.net

#

INTRODUCTION

This script can be an alternative to the 'mail' Unix command when

sending e-mails.

It reads the mail body from the standard input.

```

# If your system is Windows, use the '--smtp' option to send your
# e-mails.
# This script works in Linux, Unix and Windows environments.
#
# OPTIONS
# -f From
# -s Subject
# -c Cc-address
# -b bcc-address
# --sendmail Use sendmail to send the e-mail
# --qmail Use qmail-inject to send the e-mail
# --smtp=HOSTNAME Use HOSTNAME as the SMTP server.
# --help Prints the help info and exits
#
# EXAMPLES
# cat mailbody.txt | mail-mailer.pl -f me@mydom.com -s "Hy dude" --sendmail friend@dom.com
#
#
AUTHOR
# Bruno Negrao G Zica <bnegrao@engepel.com.br>
#
# COPYRIGHT
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# This program is free software; you can redistribute it and/or modify
# it under the same terms as Perl itself.
#
# LAST MODIFIED
# 01/12/2004
#####
use Mail::Mailer;
use Getopt::Long;
use strict;

# hash that'll receive the arguments and options
my %opt;
GetOptions ( \%opt, 'help', 'f=s', 's=s', 'c=s', 'b=s', 'sendmail',
'qmail', 'smtp=s' );

if ($opt{help}) { help(); exit 0; }

$opt{to} = $ARGV[$#ARGV]; # the "To" address is the last argument
die "Error: You didn't specify a destination e-mail address.\n"
unless ( $opt{to} || $opt{c} || $opt{b} );

# Defining the method to send the message
my $mailer; # Mail::Mailer object
if ($opt{sendmail}) {
$mailer = new Mail::Mailer 'sendmail';

```

```

} elsif ($opt{qmail}) {
    $mailer = new Mail::Mailer 'qmail';
} elsif ($opt{smtp}) {
    $mailer = new Mail::Mailer
'smtp', Server => $opt{smtp};
} else {
    die "Error: you didn't specify the delivery method. ".
        "Possible methods are:\n'--qmail', '--sendmail', and ".
        "--smtp=HOSTNAME\n";
}
# Setting the headers
my %headers; # hash with the e-mail headers
$headers{To} = $opt{to};
$headers{From} = $opt{f} if defined $opt{f};
$headers{Cc} = $opt{c} if defined $opt{c};
$headers{Bcc} = $opt{b} if defined $opt{b};
$headers{Subject} = $opt{s} if defined $opt{s};
$mailer->open(\%headers);

# Reading and feeding the e-mail body
while (<STDIN>) {
    last if ( $_ =~ /^^\$/);
    print $mailer $_;
}

# Finishing
$mailer->close();

# Subroutines
sub help {
    print '
Example 1: Entering the e-mail body by hand:
mail-mailer.pl -s "Hy buddy" --qmail friend@domain.com
[ ENTER YOUR MESSAGE BODY ]
[ A SINGLE . (dot sign) ALONE IN ONE LINE TO SAY ]
[ YOU FINISHED YOUR E-MAIL ]
.';
}

Example 2: Using the output of another program as the body:
dir c:\ | perl mail-mailer.pl -f me@mydom.com -s "My c:\" admin@mydom.com
--smtp=server1.mydom.com

```

OPTIONS

```

-f addr From address.
-s TEXT Subject.
-c addr Cc-address.
-b addr bcc-address.
--sendmail Use sendmail to send the e-mail.

```

```
--qmail Use qmail-inject to send the e-mail.
--smtp HOSTNAME Use HOSTNAME as the SMTP server.
--help Prints this help text.
';
}
```

Found in path(s):

```
* /opt/cola/permits/1146929080_1616812141.62/0/libmailtools-perl-2-21-orig-1-tar-gz/MailTools-2.21/examples/mail-mailer.pl
```

No license file was found, but licenses were detected in source scan.

=encoding utf8

=head1 NAME

Mail::Send - Simple electronic mail interface

=head1 SYNOPSIS

```
require Mail::Send;
```

```
$msg = Mail::Send->new;
```

```
$msg = Mail::Send->new(Subject => 'example', To => 'timbo');
```

```
$msg->to('user@host');
```

```
$msg->to('user@host', 'user2@example.com');
```

```
$msg->subject('example subject');
```

```
$msg->cc('user@host');
```

```
$msg->bcc('someone@else');
```

```
$msg->set($header, @values);
```

```
$msg->add($header, @values);
```

```
$msg->delete($header);
```

```
# Launch mailer and set headers. The filehandle returned
```

```
# by open() is an instance of the Mail::Mailer class.
```

```
# Arguments to the open() method are passed to the Mail::Mailer
```

```
# constructor.
```

```
$fh = $msg->open; # some default mailer
```

```
$fh = $msg->open('sendmail'); # explicit
```

```
print $fh "Body of message";
```

```
$fh->close # complete the message and send it
```

```
or die "couldn't send whole message: $!\n";
```

=head1 DESCRIPTION

L<Mail::Send|Mail::Send> creates

e-mail messages without using the L<Mail::Header|Mail::Header> knowledge, which means that all escaping and folding must be done by you! Also: do not forget to escape leading dots. Simplicity has its price.

When you have time, take a look at Mail::Transport which is part of the MailBox suite.

=head1 METHODS

=head2 Constructors

=over 4

=item Mail::Send-E<gt>B<new>(PAIRS)

A list of header fields (provided as key-value PAIRS) can be used to initialize the object, limited to the few provided as method: C<to>, C<subject>, C<cc>, and C<bcc>. For other header fields, use L<add()|Mail::Send/"Header fields">.

=back

=head2 Header fields

=over 4

=item \$obj-E<gt>B<add>(\$fieldname, @values)

Add values to the list of defined values for the \$fieldname.

=item \$obj-E<gt>B<bcc>(@values)

=item \$obj-E<gt>B<cc>(@values)

=item \$obj-E<gt>B<delete>(\$fieldname)

=item \$obj-E<gt>B<set>(\$fieldname, @values)

The @values will replace the old values for the \$fieldname. Returned is the LIST of values after modification.

=item \$obj-E<gt>B<subject>(@values)

=item \$obj-E<gt>B<to>(@values)

=back

=head2 Sending

=over 4

=item \$obj-E<gt>B<open>(%options)

The %options are used to initiate a mailer object via L<Mail::Mailer::new()|Mail::Mailer/"Constructors">. Then L<Mail::Mailer::open()|Mail::Mailer/"Constructors"> is called with the knowledge collected in this C<Mail::Send> object.

Be warned: this module implements raw smtp, which means that you have to escape lines which start with a dot, by adding one in front.

=back

=head1 SEE ALSO

This module is part of the MailTools distribution, F<<http://perl.overmeer.net/mailtools/>>.

=head1 AUTHORS

The MailTools bundle was developed by Graham Barr. Later, Mark Overmeer took over maintenance without commitment to further development.

Mail::Cap by Gisle Aas E<lt>aas@oslonett.noE<gt>.

Mail::Field::AddrList by Peter Orbaek E<lt>poe@cit.dkE<gt>.

Mail::Mailer and Mail::Send by Tim Bunce E<lt>Tim.Bunce@ig.co.ukE<gt>.

For other contributors
see ChangeLog.

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See F<<http://www.perl.com/perl/misc/Artistic.html>>

Found in path(s):

* /opt/cola/permits/1146929080_1616812141.62/0/libmailtools-perl-2-21-orig-1-tar-gz/MailTools-
2.21/lib/Mail/Send.pod

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=encoding utf8

=head1 NAME

Mail::Field - base-class for manipulation of mail header fields

=head1 INHERITANCE

Mail::Field is extended by

Mail::Field::AddrList

Mail::Field::Date

Mail::Field::Generic

=head1 SYNOPSIS

use Mail::Field;

```
my $field = Mail::Field->new('Subject', 'some subject text');
my $field = Mail::Field->new(Subject => 'some subject text');
print $field->tag, ": ", $field->stringify, "\n";
```

```
my $field = Mail::Field->subject('some subject text');
```

=head1 DESCRIPTION

C<Mail::Field> creates and manipulates fields in MIME headers, collected within a L<Mail::Header|Mail::Header> object. Different field types have their own sub-class (extension), defining additional useful accessors to the field content.

People are invited to merge their implementation to special fields into MailTools, to maintain a consistent set of packages and documentation.

=head1 METHODS

=head2 Constructors

Mail::Field

(and its sub-classes) define several methods which return new objects. These can all be categorized as constructor.

=over 4

=item Mail::Field-E<gt>B<combine>(\$fields)

Take a LIST of C<Mail::Field> objects (which should all be of the same sub-class) and create a new object in that same class.

=item Mail::Field-E<gt>B<extract>(\$tag, \$head [, \$index])

Takes as arguments the tag name, a C<Mail::Header> object

and optionally an index.

If the index argument is given then `C<extract>` will retrieve the given tag from the `C<Mail::Head>` object and create a new `C<Mail::Field>` based object. `I<undef>` will be returned in the field does not exist.

If the index argument is not given the result depends on the context in which `C<extract>` is called. If called in a scalar context the result will be as if `C<extract>` was called with an index value of zero. If called in an array context then all tags will be retrieved and a list of `C<Mail::Field>` objects will be returned.

```
=item Mail::Field-E<gt>B<new>(
  $tag [, STRING | %options] )
```

Create an object in the class which defines the field specified by the `$tag` argument.

=back

=head2 "Fake" constructors

=over 4

```
=item $obj-E<gt>B<create>(%options)
```

This constructor is used internally with preprocessed field information. When called on an existing object, its original content will get replaced.

```
=item $obj-E<gt>B<parse>()
```

Parse a field line.

=back

=head2 Accessors

=over 4

```
=item $obj-E<gt>B<set>(%options)
```

Change the settings (the content, but then smart) of this field.

```
=item $obj-E<gt>B<stringify>()
```

Returns the field as a string.

=item \$obj-E<gt>B<tag>()

=item Mail::Field-E<gt>B<tag>()

Return the tag (in the correct case) for this item. Well, actually any casing is OK, because the field tags are treated case-insensitive; however people have some preferences.

=back

=head2 Smart accessors

=over 4

=item \$obj-E<gt>B<text>([STRING])

Without arguments, the field is returned as `L<stringify()|Mail::Field/"Accessors">` does. Otherwise, the `STRING` is parsed with `L<parse()|Mail::Field/"Fake" constructors">` to replace the object's content.

It is more clear to call either `L<stringify()|Mail::Field/"Accessors">` or `L<parse()|Mail::Field/"Fake" constructors">` directly, because this method does not add additional processing.

=back

=head1 DETAILS

=head2 SUB-CLASS PACKAGE NAMES

All sub-classes should be called `Mail::Field::I<name>` where `I<name>` is derived from the tag using these rules.

=over 4

=item *

Consider a tag as being made up of elements separated by '-'

=item *

Convert all characters to lowercase except the first in each element, which should be uppercase.

=item *

`I<name>` is then created from these elements by using the first `N` characters from each element.

=item *

N is calculated by using the formula :-

$$\text{int}((7 + \text{\#elements}) / \text{\#elements})$$

=item *

I<name> is then limited to a maximum of 8 characters, keeping the first 8 characters.

=back

For an example of this take a look at the definition of the C<_header_pkg_name()> subroutine in C<Mail::Field>

=head1 DIAGNOSTICS

=over 4

=item Error: Undefined subroutine <method> called

Mail::Field objects use autoloading to compile new functionality. Apparently, the method called is not implemented for the specific class of the field object.

=back

=head1 SEE ALSO

This module is part of the MailTools distribution, F<<http://perl.overmeer.net/mailtools/>>.

=head1 AUTHORS

The MailTools bundle was developed by Graham Barr. Later, Mark Overmeer took over maintenance without commitment to further development.

Mail::Cap by Gisle Aas E<lt>aas@oslonett.noE<gt>.
Mail::Field::AddrList by Peter Orbaek E<lt>poe@cit.dkE<gt>.
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Found in path(s):

* /opt/cola/permits/1146929080_1616812141.62/0/libmailtools-perl-2-21-orig-1-tar-gz/MailTools-
2.21/lib/Mail/Field.pod

No license file was found, but licenses were detected in source scan.

=encoding utf8

=head1 NAME

Mail::Mailer - send simple emails

=head1 INHERITANCE

Mail::Mailer
is an IO::Handle

=head1 SYNOPSIS

```
use Mail::Mailer;
use Mail::Mailer qw(mail); # specifies default mailer
```

```
$mailer = Mail::Mailer->new;
$mailer = Mail::Mailer->new($type, @args);
```

```
$mailer->open(\%headers);
print $mailer $body;
$mailer->close
    or die "couldn't send whole message: $!\n";
```

=head1 DESCRIPTION

Sends mail using any of the built-in methods. As TYPE argument
to L<new()|Mail::Mailer/"Constructors">, you can specify any of

=over 4

=item C<sendmail>

Use the C<sendmail> program to deliver the mail.

=item C<smtp>

Use the C<smtp> protocol via Net::SMTP to deliver the mail. The server to use can be specified in C<@args> with

```
$mailer = Mail::Mailer->new('smtp', Server => $server);
```

The smtp mailer does not handle C<Cc> and C<Bcc> lines, neither their C<Resent-*> fellows. The C<Debug> options enables debugging output from C<Net::SMTP>.

[added 2.21] You may also use the C<< StartTLS => 1 >> options to upgrade the connection with STARTTLS. You need C<libnet> version 1.28 (2014) for this to work.

You may also use the C<< Auth => [\$user, \$password] >> option for SASL authentication. To make this work, you have to install the L<Authen::SASL> distribution yourself: it is not automatically installed.

=item C<smtps>

This option is B<deprecated> when you have C<libnet> 1.28 (2014) and above.

Use the smtp over ssl protocol via L<Net::SMTP::SSL> to deliver the mail. Usage is identical to C<smtp>. You have to install Authen::SASL as well.

```
$mailer = Mail::Mailer->new('smtps', Server => $server);
```

=item C<qmail>

Use qmail's qmail-inject program to deliver the mail.

=item C<testfile>

Used for debugging, this displays the data to the file named in C<\${Mail::Mailer::testfile::config}{outfile}> which defaults to a file named C<mailer.testfile>. No mail is ever sent.

=back

C<Mail::Mailer>

will search for executables in the above order. The default mailer will be the first one found.

=head1 METHODS

=head2 Constructors

=over 4

=item Mail::Mailer-E<gt>B<new>(\$stype, %options)

The \$stype is one of the back-end sender implementations, as described in the DESCRIPTION chapter of this manual page. The %options are passed to that back-end.

=item \$obj-E<gt>B<open>(HASH)

The HASH consists of key and value pairs, the key being the name of the header field (eg, C<To>), and the value being the corresponding contents of the header field. The value can either be a scalar (eg, C<gnat@frii.com>) or a reference to an array of scalars (C<< eg, ['gnat@frii.com', 'Tim.Bunce@ig.co.uk'] >>).

=back

=head1 DETAILS

=head2 ENVIRONMENT VARIABLES

=over 4

=item PERL_MAILERS

Augments/override the build in choice for binary used to send out our mail messages.

Format:

```
"type1:mailbinary1;mailbinary2;...:type2:mailbinaryX;...:..."
```

Example: assume you want you use private sendmail binary instead of mailx, one could set C<PERL_MAILERS> to:

```
"mail:/does/not/exists:sendmail:$HOME/test/bin/sendmail"
```

On systems which may include C<:> in file names, use C<|> as separator between type-groups.

```
"mail:c:/does/not/exists|sendmail:$HOME/test/bin/sendmail"
```

=back

=head2 BUGS

Mail::Mailer does not help with folding, and does not protect against various web-script hacker attacks, for instance where a new-line is inserted in the content of the field.

=head1 SEE ALSO

This module is part of the MailTools distribution,
F<<http://perl.overmeer.net/mailtools/>>.

=head1 AUTHORS

The MailTools bundle was developed by Graham Barr. Later, Mark Overmeer took over maintenance without commitment to further development.

Mail::Cap by Gisle Aas E<lt>aas@oslonett.noE<gt>.

Mail::Field::AddrList by Peter Orbaek E<lt>poe@cit.dkE<gt>.

Mail::Mailer and Mail::Send by Tim Bunce E<lt>Tim.Bunce@ig.co.ukE<gt>.

For other contributors see ChangeLog.

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Found in path(s):

* /opt/cola/permits/1146929080_1616812141.62/0/libmailtools-perl-2-21-orig-1-tar-gz/MailTools-2.21/lib/Mail/Mailer.pod

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MailTools

* My extended documentation: <<http://perl.overmeer.net/CPAN/>>

* Development via GitHub: <<https://github.com/markov2/perl5-MailTools>>

* Download from CPAN: <<ftp://ftp.cpan.org/pub/CPAN/authors/id/M/MA/MARKOV/>>

* Indexed from CPAN: <<http://search.cpan.org/~markov/MailTools/>>

and <<https://metacpan.org/release/MailTools>>

MailTools is one of the oldest modules on CPAN. It started off in 1995, the year Perl 5.0 got released! That's just in the beginning of the MIME standards.

Email has become more complex over the years. The components of

MailTools only understand very basic emails and fairly simple mime headers. Fixing some things will break existing applications.

The only reason for still maintaining it, is because it is used as example in many books and therefore applications still use it. Not because it is good. Sometimes it is good enough, though.

Later, this module got extended by the MIME::Entity modules to support multipart and more smartness. But even those modules are quite limited, considering modern emails.

****Please note:**** When you start all over, please consider Mail::Box!

For a feature overview, take a look at the

[MailBox overview](http://perl.overmeer.net/mailbox/html/Mail_Box-Overview/)

and

[MailBox features](http://perl.overmeer.net/mailbox/html/Mail_Box-Index/)

pages.

Development & Release

Important to know, is that I use an extension on POD to write the manuals. The "raw" unprocessed version is visible on GitHub. It will run without problems, but does not contain manual-pages.

Releases to CPAN are different: "raw" documentation gets removed from the code and translated into real POD and clean HTML. This reformatting is implemented with the OODoc distribution (A name I chose before OpenOffice existed, sorry for the confusion)

Clone from github for the "raw" version. For instance, when you want to contribute a new feature.

On github,

you can find the processed version for each release. But the better source is CPAN; to get it installed simply run:

```
```sh
 cpan -i MailTools
```
```

Contributing

When you want to contribute to this module, you do not need to provide a perfect patch... actually: it is nearly impossible to create a patch which I will merge without modification. Usually, I need to adapt the style of code and documentation to my own strict rules.

When you submit an extension, please contribute a set with

1. code
2. code documentation
3. regression tests in t/

****Please note:****

When you contribute in any way, you agree to transfer the copyrights to Mark Overmeer (you will get the honors in the code and/or ChangeLog). You also automatically agree that your contribution is released under the same license as this project: licensed as perl itself.

Copyright and License

Graham Barr wrote most of these components, since 2001 maintained by Mark Overmeer. Copyright is with these authors.

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Found in path(s):

* /opt/cola/permits/1146929080_1616812141.62/0/libmailtools-perl-2-21-orig-1-tar-gz/MailTools-2.21/README.md

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=encoding utf8

=head1 NAME

Mail::Field::Generic - implementation for inspecific fields

=head1 INHERITANCE

Mail::Field::Generic
is a Mail::Field

=head1 SYNOPSIS

```
use Mail::Field;
my $field = Mail::Field->new('Subject', 'some subject text');
my $field = Mail::Field->new(subject => 'some subject text');
```

=head1 DESCRIPTION

A generic implementation for header fields without own implementation. This is fine for fields like C<Subject>, C<X-Mailer>, etc., where the field holds only a string of no particular importance/format.

Extends L<"DESCRIPTION" in Mail::Field|Mail::Field/"DESCRIPTION">.

=head1 METHODS

Extends L<"METHODS" in Mail::Field|Mail::Field/"METHODS">.

=head2 Constructors

Extends L<"Constructors" in Mail::Field|Mail::Field/"Constructors">.

=over 4

=item Mail::Field::Generic-E<gt>B<combine>(\$fields)

Inherited, see L<Mail::Field/"Constructors">

=item Mail::Field::Generic-E<gt>B<extract>(\$tag,
\$head [, \$index])

Inherited, see L<Mail::Field/"Constructors">

=item Mail::Field::Generic-E<gt>B<new>(\$tag [, STRING | %options])

Inherited, see L<Mail::Field/"Constructors">

=back

=head2 "Fake" constructors

Extends L<"Fake" constructors" in Mail::Field|Mail::Field/"Fake" constructors">.

=over 4

=item \$obj-E<gt>B<create>(%options)

-Option--Default

Text "

=over 2

=item Text => STRING

=back

=item \$obj-E<gt>B<parse>([STRING])

Set the new text, which is empty when no STRING is provided.

=back

=head2 Accessors

Extends L<"Accessors" in Mail::Field|Mail::Field/"Accessors">.

=over 4

=item \$obj-E<gt>B<set>(%options)

Inherited, see L<Mail::Field/"Accessors">

=item \$obj-E<gt>B<stringify>()

Inherited, see L<Mail::Field/"Accessors">

=item \$obj-E<gt>B<tag>()

=item Mail::Field::Generic-E<gt>B<tag>()

Inherited, see L<Mail::Field/"Accessors">

=back

=head2 Smart accessors

Extends L<"Smart accessors" in Mail::Field|Mail::Field/"Smart accessors">.

=over

4

=item \$obj-E<gt>B<text>([STRING])

Inherited, see L<Mail::Field/"Smart accessors">

=back

=head1 DETAILS

Extends L<"DETAILS" in Mail::Field|Mail::Field/"DETAILS">.

=head1 DIAGNOSTICS

=over 4

=item Error: Undefined subroutine <method> called

Mail::Field objects use autoloading to compile new functionality. Apparently, the method called is not implemented for the specific class of the field object.

=back

=head1 SEE ALSO

This module is part of the MailTools distribution,
F<<http://perl.overmeer.net/mailtools/>>.

=head1 AUTHORS

The MailTools bundle was developed by Graham Barr. Later, Mark Overmeer took over maintenance without commitment to further development.

Mail::Cap by Gisle Aas E<lt>aas@oslonett.noE<gt>.

Mail::Field::AddrList by Peter Orbaek E<lt>poe@cit.dkE<gt>.

Mail::Mailer and Mail::Send by Tim Bunce E<lt>Tim.Bunce@ig.co.ukE<gt>.

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2.21/lib/Mail/Field/Generic.pod

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=encoding utf8

=head1 NAME

Mail::Header - manipulate MIME headers

=head1 SYNOPSIS

```
use Mail::Header;
```

```
my $head = Mail::Header->new;  
my $head = Mail::Header->new( \*STDIN );  
my $head = Mail::Header->new( [<>], Modify => 0);
```

=head1 DESCRIPTION

Read, write, create, and manipulate MIME headers, the leading part of each modern e-mail message, but also used in other protocols like HTTP. The fields are kept in L<Mail::Field|Mail::Field> objects.

Be aware that the header fields each have a name part, which shall be treated case-insensitive, and a content part, which may be folded over multiple lines.

Mail::Header does not always follow the RFCs strict enough, does not help you with character encodings. It does not use weak references where it could (because those did not exist when the module was written) which costs some performance and make the implementation a little more complicated. The Mail::Message::Head implementation is much newer and therefore better.

=head1 METHODS

=head2 Constructors

=over 4

=item \$obj-E<gt>B<dup>()

Create a duplicate of the current object.

=item \$obj-E<gt>B<new>([\$source], [%options])

=item Mail::Header-E<gt>B<new>([\$source], [%options])

The \$source may be either a file descriptor (reference to a GLOB) or a reference to an array. If given the new object will be initialized with headers either from the array or read from the file descriptor.

%options is a list of options given in the form of key-value pairs, just like a hash table. Valid options are

-Option --Default

FoldLength 79

MailFrom 'KEEP'

Modify false

=over 2

=item FoldLength => INTEGER

The default length of line to be used when folding header lines.

See L<fold_length()|Mail::Header/"Accessors">.

=item MailFrom => 'IGNORE'|'COERCE'|'KEEP'|'ERROR'

See method L<mail_from()|Mail::Header/"Accessors">.

=item Modify => BOOLEAN

If this value is I<true> then the headers

will be re-formatted,

otherwise the format of the header lines will remain unchanged.

=back

=back

=head2 "Fake" constructors

Be warned that the next constructors all require an already created

header object, of which the original content will be destroyed.

=over 4

=item \$obj-E<gt>B<empty>()

Empty an existing C<Mail::Header> object of all lines.

=item \$obj-E<gt>B<extract>(ARRAY)

Extract a header from the given array into an existing Mail::Header

object. C<extract> B<will modify> this array.

Returns the object that the method was called on.

=item \$obj-E<gt>B<header>([ARRAY])

C<header> does multiple operations. First it will extract a header from

the ARRAY, if given. It will then reformat the header (if reformatting

is permitted), and finally return a reference to an array which

contains the header in a printable form.

=item \$obj-E<gt>B<header_hashref>([HASH])

As L<header()|Mail::Header/"Fake" constructors">, but it will eventually set headers from a hash reference,
and it will return the headers as a hash reference.

example:

```
$fields->{From} = 'Tobias Brox <tobix@cpan.org>';  
$fields->{To} = ['you@somewhere', 'me@localhost'];  
$head->header_hashref($fields);
```

=item \$obj-E<gt>B<read>(\$fh)

Read a header from the given file descriptor into an existing Mail::Header object.

=back

=head2 Accessors

=over 4

=item \$obj-E<gt>B<fold_length>([\$tag], [\$length])

Set the default fold length for all tags or just one. With no arguments the default fold length is returned. With two arguments it sets the fold length for the given tag and returns the previous value. If only C<\$length> is given it sets the default fold length for the current object.

In the two argument form C<fold_length> may be called as a static method, setting default fold lengths for tags that will be used by B<all> C<Mail::Header> objects. See the C<fold> method for a description on how C<Mail::Header> uses these values.

=item \$obj-E<gt>B<mail_from>('IGNORE'|'COERCE'|'KEEP'|'ERROR')

This

specifies what to do when a C<'From '> line is encountered.

Valid values are C<IGNORE> - ignore and discard the header,

C<ERROR> - invoke an error (call die), C<COERCE> - rename them as Mail-From and C<KEEP> - keep them.

=item \$obj-E<gt>B<modify>([\$value])

If C<\$value> is I<false> then C<Mail::Header> will not do any automatic reformatting of the headers, other than to ensure that the line starts with the tags given.

=back

=head2 Processing

=over 4

=item \$obj-E<gt>B<add>(\$tag, \$line [, \$index])

Add a new line to the header. If \$tag is C<undef> the tag will be extracted from the beginning of the given line. If \$index is given, the new line will be inserted into the header at the given point, otherwise the new line will be appended to the end of the header.

=item \$obj-E<gt>B<as_string>()

Returns the header as a single string.

=item \$obj-E<gt>B<cleanup>()

Remove any header line that, other than the tag, only contains whitespace

=item \$obj-E<gt>B<combine>(\$tag [, \$with])

Combine all instances of \$tag into one. The lines will be joined together \$with, or a single space if not given. The new item will be positioned in the header where the first instance was, all other instances of \$tag will be removed.

=item \$obj-E<gt>B<count>(\$tag)

Returns the number of times the given atg appears in the header

=item \$obj-E<gt>B<delete>(\$tag [, \$index])

Delete a tag from the header. If an \$index id is given, then the Nth instance of the tag will be removed. If no \$index is given, then all instances of tag will be removed.

=item \$obj-E<gt>B<fold>([\$length])

Fold the header. If \$length is not given, then C<Mail::Header> uses the following rules to determine what length to fold a line.

=item \$obj-E<gt>B<get>(\$tag [, \$index])

Get the text from a line. If an \$index is given, then the text of the Nth

instance will be returned. If it is not given the return value depends on the context in which C<get> was called. In an array context a list of all the text

from all the instances of the \$tag will be returned. In a scalar context the text for the first instance will be returned.

The lines are unfolded, but still terminated with a new-line (see C<chomp>)

```
=item $obj-E<gt>B<print>( [$fh] )
```

Print the header to the given file descriptor, or C<STDOUT> if no file descriptor is given.

```
=item $obj-E<gt>B<replace>( $tag, $line [, $index ] )
```

Replace a line in the header. If \$tag is C<undef> the tag will be extracted from the beginning of the given line. If \$index is given the new line will replace the Nth instance of that tag, otherwise the first instance of the tag is replaced. If the tag does not appear in the header then a new line will be appended to the header.

```
=item $obj-E<gt>B<tags>()
```

Returns an array of all the tags that exist in the header. Each tag will only appear in the list once. The order of the tags is not specified.

```
=item $obj-E<gt>B<unfold>( [$tag] )
```

Unfold all instances of the given tag so that they do not spread across multiple

lines. If C<\$tag> is not given then all lines are unfolded.

The unfolding process is wrong but (for compatibility reasons) will not be repaired: only one blank at the start of the line should be removed, not all of them.

```
=back
```

```
=head1 SEE ALSO
```

This module is part of the MailTools distribution,
F<<http://perl.overmeer.net/mailtools/>>.

```
=head1 AUTHORS
```

The MailTools bundle was developed by Graham Barr. Later, Mark Overmeer took over maintenance without commitment to further development.

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2.21/lib/Mail/Header.pod

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=encoding utf8

=head1 NAME

Mail::Address - parse mail addresses

=head1 SYNOPSIS

```
use Mail::Address;  
my @addrs = Mail::Address->parse($line);
```

```
foreach $addr (@addrs) {  
    print $addr->format,"\n";  
}
```

=head1 DESCRIPTION

C<Mail::Address> extracts and manipulates email addresses from a message
header. It cannot be used to extract addresses from some random text.
You can use this module to create RFC822 compliant fields.

Although C<Mail::Address> is a very popular subject for books, and is
used in many applications, it does a very poor job on the more complex
message fields. It does only handle simple address formats (which
covers about 95% of what can be found). Problems are with

=over 4

=item *

no support for address groups, even not with the semi-colon as separator between addresses;

=item *

limited support for escapes in phrases and comments. There are cases where it can get wrong; and

=item *

you

have to take care of most escaping when you create an address yourself: C<Mail::Address> does not do that for you.

=back

Often requests are made to the maintainers of this code improve this situation, but this is not a good idea, where it will break zillions of existing applications. If you wish for a fully RFC2822 compliant implementation you may take a look at L<Mail::Message::Field::Full>, part of MailBox.

B<. Example>

```
my $s = Mail::Message::Field::Full->new($from_header);
# ref $s isa Mail::Message::Field::Addresses;
```

```
my @g = $s->groups;      # all groups, at least one
# ref $g[0] isa Mail::Message::Field::AddrGroup;
my $ga = $g[0]->addresses; # group addresses
```

```
my @a = $s->addresses;   # all addresses
# ref $a[0] isa Mail::Message::Field::Address;
```

=head1 METHODS

=head2 Constructors

=over 4

=item Mail::Address-E<gt>B<new>(\$phrase, \$address, [\$comment])

Create a new C<Mail::Address> object which represents an address with the elements given. In

a message these 3 elements would be seen like:

PHRASE <ADDRESS> (COMMENT)

ADDRESS (COMMENT)

example:

```
Mail::Address->new("Perl5 Porters", "perl5-porters@africa.nicoh.com");
```

```
=item $obj-E<gt>B<parse>($line)
```

Parse the given line and return a list of extracted C<Mail::Address> objects.

The line would normally be one taken from a To,Cc or Bcc line in a message

example:

```
my @addr = Mail::Address->parse($line);
```

```
=back
```

```
=head2 Accessors
```

```
=over 4
```

```
=item $obj-E<gt>B<address>()
```

Return the address part of the object.

```
=item $obj-E<gt>B<comment>()
```

Return the comment part of the object

```
=item $obj-E<gt>B<format>(@addresses)
```

Return a string representing the address in a suitable form to be placed on a C<To>, C<Cc>, or C<Bcc> line of a message. This method is called on the first address to be used; other specified addresses will be appended, separated by commas.

```
=item $obj-E<gt>B<phrase>()
```

Return the phrase part of the object.

```
=back
```

```
=head2 Smart accessors
```

```
=over 4
```

```
=item $obj-E<gt>B<host>()
```

Return

the address excluding the user id and '@'

```
=item $obj-E<gt>B<name>()
```

Using the information contained within the object attempt to identify what the person or groups name is.

B<Note:> This function tries to be smart with the "phrase" of the email address, which is probably a very bad idea. Consider to use L<phrase()|Mail::Address/"Accessors"> itself.

```
=item $obj-E<gt>B<user>()
```

Return the address excluding the '@' and the mail domain

```
=back
```

```
=head1 SEE ALSO
```

This module is part of the MailTools distribution,
F<<http://perl.overmeer.net/mailtools/>>.

```
=head1 AUTHORS
```

The MailTools bundle was developed by Graham Barr. Later, Mark Overmeer took over maintenance without commitment to further development.

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```
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```

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=encoding utf8

=head1 NAME

Mail::Util - mail utility functions

=head1 INHERITANCE

Mail::Util

is a Exporter

=head1 SYNOPSIS

use Mail::Util qw(...);

=head1 DESCRIPTION

This package provides several mail related utility functions. Any function required must be explicitly listed on the use line to be exported into the calling package.

=head1 FUNCTIONS

=over 4

=item B<mailaddress>([\$address])

Return a guess at the current users mail address. The user can force the return value by setting the MAILADDRESS environment variable. [2.10] You may set the \$address via the parameter.

WARNING:

When not supplied via the environment variable, <mailaddress> looks at various configuration files and other environmental data. Although this seems to be smart behavior, this is not predictable enough (IMHO) to be used. Please set the MAILADDRESS explicitly, and do not trust on the "automatic detection", even when that produces a correct address (on the moment)

example:

```
# in your main script
```

```
$ENV{MAILADDRESS} = 'me@example.com';
```

```
# everywhere else
```



```
use Mail::Util 'mailaddress';
print mailaddress;
```

```
# since v2.10
mailaddress "me@example.com";
```

```
=item B<maildomain>()
```

Attempt to determine the current user mail domain string via the following methods

```
=over 4
```

```
=item * Look for the MAILDOMAIN environment variable, which can be set from outside the program. This is by far the best way to configure the domain.
```

```
=item * Look for a sendmail.cf file and extract DH parameter
```

```
=item * Look for a smail config file and use the first host defined in hostname(s)
```

```
=item * Try an SMTP connect (if Net::SMTP exists) first to mailhost then localhost
```

```
=item * Use value from Net::Domain::domainname (if Net::Domain exists)
```

```
=back
```

WARNING:

On modern machines, there is only one good way to provide information to this method: the first; always explicitly configure the MAILDOMAIN.

example:

```
# in your main script
$ENV{MAILDOMAIN} = 'example.com';
```

```
# everywhere else
use Mail::Util 'maildomain';
print maildomain;
```

```
=item B<read_mbox>($file)
```

Read \$file, a binmail mailbox file, and return a list of references.
Each reference is a reference to an array containing one message.

WARNING:

This method does not quote lines which accidentally also start with the message separator C<From>, so this implementation can be considered broken. See Mail::Box::Mbox

=back

=head1 SEE ALSO

This module is part of the MailTools distribution,
F<<http://perl.overmeer.net/mailtools/>>.

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* /opt/cola/permits/1146929080_1616812141.62/0/libmailtools-perl-2-21-orig-1-tar-gz/MailTools-
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1.19 python-retrying 1.3.3-4

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1.21 daemon-tools 0.76-7

1.21.1 Available under license :

No license file was found, but licenses were detected in source scan.

```
/* Public domain. */
```

```
/* sysdep: -sigaction */
```

Found in path(s):

```
* /opt/cola/permits/1146929125_1617008988.83/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/hassgact.h1
```

No license file was found, but licenses were detected in source scan.

```
/* Public domain. */
```

```
/* sysdep: +waitpid */
```

```
#define HASWAITPID 1
```

Found in path(s):

```
* /opt/cola/permits/1146929125_1617008988.83/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/haswaitp.h2
```

No license file was found, but licenses were detected in source scan.

```
/* Public domain. */
```

```
#ifndef UINT64_H
```

```
#define UINT64_H
```

```
/* sysdep: -ulong64 */
```

```
typedef unsigned long long uint64;
```

```
#endif
```

Found in path(s):

```
* /opt/cola/permits/1146929125_1617008988.83/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/uint64.h1
```

No license file was found, but licenses were detected in source scan.

```
/* Public domain. */
```

```
/* sysdep: +mkfifo */  
#define HASMKFIFO 1
```

Found in path(s):

```
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/hasmkfho.h2
```

No license file was found, but licenses were detected in source scan.

```
/* Public domain. */
```

```
#ifndef UINT64_H  
#define UINT64_H
```

```
/* sysdep: +ulong64 */
```

```
typedef unsigned long uint64;
```

```
#endif
```

Found in path(s):

```
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/uint64.h2
```

No license file was found, but licenses were detected in source scan.

```
/* Public domain. */
```

```
/* sysdep: -waitpid */
```

Found in path(s):

```
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/haswaitp.h1
```

No license file was found, but licenses were detected in source scan.

```
/* Public domain. */
```

```
/* sysdep: +shortsetgroups */
```

```
#define HASSHORTSETGROUPS 1
```

Found in path(s):

```
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/hasshsgr.h2
```

No license file was found, but licenses were detected in source scan.

```
/* Public domain. */
```

```
/* sysdep: -flock */
```

Found in path(s):

* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/hasflock.h1

No license file was found, but licenses were detected in source scan.

/* Public domain. */

/* sysdep: -sigprocmask */

Found in path(s):

* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/hassgprm.h1

No license file was found, but licenses were detected in source scan.

/* Public domain. */

/* sysdep: -shortsetgroups */

Found in path(s):

* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/hasshgr.h1

No license file was found, but licenses were detected in source scan.

/* Public domain. */

/* sysdep: +flock */

#define HASFLOCK 1

Found in path(s):

* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/hasflock.h2

No license file was found, but licenses were detected in source scan.

/* Public domain. */

Found in path(s):

* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/taia_less.c

* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/sig_pause.c

* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/ndelay.h

* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/x86cpuid.c

* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/trypoll.c

* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/str_start.c

* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-

```

0.76/src/ndelay_on.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/stralloc_eady.c
*
/opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/stralloc.h
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/byte_copy.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/trycpp.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/strerr_sys.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/fd_copy.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/byte_rchr.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/strerr.h
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/buffer_get.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/stralloc_pend.c
*
/opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/buffer.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/wait_pid.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/stralloc_cats.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/pathexec_env.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/tryulong64.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/buffer.h
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/taia.h
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/open_write.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/openreadclose.c
*
/opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/trymkffo.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/wait.h
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/pathexec_run.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-

```

```

0.76/src/tai_unpack.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/chkshsgr.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/buffer_write.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/tai_now.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/fmt_uint0.c
*
/opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/open.h
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/pathexec.h
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/fd_move.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/buffer_1.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/buffer_read.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/env.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/tai.h
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/str_len.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/stralloc_opyb.c
*
/opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/str_diff.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/taia_add.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/fifo.h
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/fmt_ulong.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/env.h
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/fifo.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/lock.h
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/stralloc_catb.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/taia_uint.c
*
/opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/open_append.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/stralloc_opys.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/alloc.c

```



```

* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/trysgprm.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/sig_block.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/alloc.h
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/sig.h
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/taia_approx.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/sig.c
*
/opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/trysysel.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/taia_now.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/str_chr.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/taia_pack.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/buffer_2.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/subgetopt.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/fmt.h
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/taia_sub.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/iopause.h2
*
/opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/fmt_uint.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/subgetopt.h
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/byte_chr.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/buffer_0.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/trydrent.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/tai_pack.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/byte_diff.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/iopause.h1
*
/opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/open_trunc.c

```

```

* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/str.h
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/ndelay_off.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/openreadclose.h
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/scan.h
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/sgetopt.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/direntry.h2
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/gen_alloc.h
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/scan_ulong.c
*
/opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/sgetopt.h
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/lock_exnb.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/taia_frac.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/tryshsgr.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/select.h2
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/select.h1
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/trywaitp.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/lock_ex.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/strerr_die.c
*
/opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/byte_cr.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/error.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/gen_allocdefs.h
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/error.h
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/open_read.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/error_str.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-

```

```

0.76/src/seek.h
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/readclose.h
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/readclose.c
*
/opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/sig_catch.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/buffer_put.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/trysgact.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/tryflock.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/direntry.h1
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/iopause.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/prot.h
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/coe.h
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/wait_nohang.c
*
/opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/byte.h
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/fd.h
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/coe.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/tai_sub.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/prot.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/alloc_re.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/stralloc_cat.c
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/seek_set.c

```

No license file was found, but licenses were detected in source scan.

```
/* Public domain. */
```

```
/* sysdep: +sigaction */
```

```
#define HASSIGACTION 1
```

Found in path(s):

```

* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-
0.76/src/hassgact.h2

```

No license file was found, but licenses were detected in source scan.

```
/* Public domain. */
```

```
/* sysdep: +sigprocmask */
```

```
#define HASSIGPROCMAK 1
```

Found in path(s):

```
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/hassgprm.h2
```

No license file was found, but licenses were detected in source scan.

```
/* Public domain. */
```

```
/* sysdep: -mkfifo */
```

Found in path(s):

```
* /opt/cola/permits/1146929125_1617008988.83/0/daemontools-0-76-orig-tar-gz/admin/daemontools-0.76/src/hasmkffo.h1
```

1.22 libperlcorelibsperl 0.004-2

1.22.1 Available under license :

No license file was found, but licenses were detected in source scan.

abstract: 'libraries historically supplied with Perl 4'

author:

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- 'John Bazik'
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- 'Ilya Zakharevich'
- 'Andrew Main (Zefram) <zefram@fysh.org>'

build_requires:

Config: '0'

IO::Handle: '0'
Module::Build: '0.26'
Test::More: '0'
perl: '5.006'
strict: '0'
warnings: '0'
configure_requires:
Module::Build:
'0.26'
perl: '5.006'
strict: '0'
warnings: '0'
dynamic_config: 0
generated_by: 'Module::Build version 0.4224, CPAN::Meta::Converter version 2.150010'
license: perl
meta-spec:
url: <http://module-build.sourceforge.net/META-spec-v1.4.html>
version: '1.4'
name: Perl4-CoreLibs
provides:
Perl4::CoreLibs:
 file: lib/Perl4/CoreLibs.pm
 version: '0.004'
requires:
File::Find: '0'
Getopt::Long: '0'
IPC::Open2: '0'
IPC::Open3: '0'
Socket: '0'
Text::ParseWords: '3.25'
Time::Local: '0'
perl: '5.006'
strict: '0'
warnings: '0'
warnings::register: '0'
resources:
bugtracker: <https://rt.cpan.org/Public/Dist/Display.html?Name=Perl4-CoreLibs>
license: <http://dev.perl.org/licenses/>
version: '0.004'
x_serialization_backend: 'CPAN::Meta::YAML version 0.012'

Found in path(s):

* /opt/cola/permits/1146929476_1617009919.03/0/libperl4-corelibs-perl-0-004-orig-1-tar-gz/Perl4-CoreLibs-0.004/META.yml

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NAME

Perl4::CoreLibs - libraries historically supplied with Perl 4

DESCRIPTION

This is a collection of ".pl" files that were bundled with the Perl core until core version 5.15.1. Relying on their presence in the core distribution is deprecated; they should be acquired from this CPAN distribution instead. From core version 5.13.3 until their removal, the core versions of these libraries emit a deprecation warning when loaded. The CPAN version does not emit such a warning.

The entire Perl 4 approach to libraries was largely superseded in Perl 5.000 by the system of module namespaces and ".pm" files. Most of the libraries in this collection predate Perl 5.000, but a handful were first introduced in that version. Functionally, most have been directly superseded by modules in the Perl 5 style. These libraries should not be used by new code. This collection exists to support old Perl programs that predate satisfactory replacements.

Most of these libraries have not been substantially maintained in the course of Perl 5 development. They are now very antiquated in style, making no use of the language facilities introduced since Perl 4. They should therefore not be used as programming examples.

INSTALLATION

```
perl Build.PL
./Build
./Build test
./Build install
```

AUTHOR

Known contributing authors for the libraries in this package are Brandon S. Allbery, John Bazik, Tom Christiansen <tchrist@convex.com>, Charles Collins, Joe Douppnik <JRD@CC.USU.EDU>, Marion Hakanson <hakanson@cse.ogi.edu>, Waldemar Kepsch <kebsch.pad@nixpbe.UUCP>, Lee McLoughlin <lmjm@doc.ic.ac.uk>, <A.Macpherson@bnr.co.uk>, Randal L. Schwartz <merlyn@stonehenge.com>, Aaron Sherman <asherman@fmrco.com>, Wayne Thompson, Larry Wall <lwall@jpl-devvax.jpl.nasa.gov>, and Ilya Zakharevich. (Most of these email addresses are probably out of date.)

Known contributing authors for the tests in this package are Tom Christiansen <tchrist@convex.com>, Alexandr Ciornii (alexchorny at gmail.com), Marc Horowitz <marc@mit.edu>, Dave Rolsky <autarch@urth.org>, and David Sundstrom <sunds@asictest.sc.ti.com>.

Andrew Main (Zefram) <zefram@fysh.org> built the Perl4::CoreLibs package.

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Found in path(s):

* /opt/cola/permits/1146929476_1617009919.03/0/libperl4-corelibs-perl-0-004-orig-1-tar-gz/Perl4-CoreLibs-0.004/README

No license file was found, but licenses were detected in source scan.

=head1 AUTHOR

Known contributing authors for the libraries in this package are

Brandon S. Allbery, John Bazik, Tom Christiansen <tchrist@convex.com>, Charles Collins, Joe Doupnik <JRD@CC.USU.EDU>, Marion Hakanson <hakanson@cse.ogi.edu>, Waldemar Kepsch <kebsch.pad@nixpbe.UUCP>, Lee McLoughlin <lmjm@doc.ic.ac.uk>, <A.Macpherson@bnr.co.uk>, Randal L. Schwartz <merlyn@stonehenge.com>, Aaron Sherman <asherman@fmrco.com>, Wayne Thompson, Larry Wall <lwall@jpl-devvax.jpl.nasa.gov>, and Ilya Zakharevich. (Most of these email addresses are probably out of date.)

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Andrew Main (Zefram) <zefram@fysh.org> built the Perl4::CoreLibs package.

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=cut

Found in path(s):

* /opt/cola/permits/1146929476_1617009919.03/0/libperl4-corelibs-perl-0-004-orig-1-tar-gz/Perl4-CoreLibs-0.004/lib/Perl4/CoreLibs.pm

1.23 tcptraceroute 1.5beta7+debian-4.1

1.23.1 Available under license :

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Version 2, June 1991

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```
Gnomovision version 69, Copyright (C) year name of author
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.
```

The hypothetical commands ``show w'` and ``show c'` should show the appropriate parts of the General Public License. Of course, the commands you use may be called something other than ``show w'` and ``show c'`; they could even be mouse-clicks or menu items--whatever suits your program.

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```
Yoyodyne, Inc., hereby disclaims all copyright interest in the program
`Gnomovision' (which makes passes at compilers) written by James Hacker.
```

```
<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
```

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1.24 v86d 0.1.10-1build1

1.24.1 Available under license :

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know. Your code will be removed to comply with your wishes.

If you have any questions about this, please send email to x86emu@linuxlabs.com or KendallB@scitechsoft.com for clarification.

```
CFLAGS = -g -Wall
```

```
RANLIB = ranlib
```

```
OS != uname -s
```

```
sources = lrmi.c lrmi.h
```

```
objects = lrmi.o
```

```
pic_objects = lrmi.lo
```

```
all = liblrmi.a liblrmi.so vbetest
```

```
.if ${OS}=="NetBSD" || ${OS}=="OpenBSD"
```

```
libs= -li386
```

```
.endif
```

```
all: $(all)
```

```
.c.o:
```

```
$(CC) -c $(CPPFLAGS) $(CFLAGS) -o ${.TARGET} ${.IMPSRC}
```

```
.SUFFIXES: .lo
```

```
.c.lo:
```

```
$(CC) -c $(CPPFLAGS) $(CFLAGS) -fPIC -o ${.TARGET} ${.IMPSRC}
```

```
liblrmi.a: $(objects)
```

```
$(AR) -r ${.TARGET} ${.ALLSRC}
```

```
$(RANLIB) ${.TARGET}
```

```
liblrmi.so: $(pic_objects)
```

```
$(CC) $(CPPFLAGS) $(CFLAGS) -fPIC -shared -o ${.TARGET} ${.ALLSRC} ${libs}
```

```
vbetest: vbetest.o liblrmi.a
```

```
$(CC) $(CPPFLAGS) $(CFLAGS) -o ${.TARGET} ${.ALLSRC} ${libs}
```

```
.PHONY: clean
```

```
clean:
```

```
rm -f $(objects) $(pic_objects) vbetest.o $(all) *.core
```

1.25 libcgj-fast-perl 2.15-1

1.25.1 Available under license :

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```
# NAME
```


CGI::Fast - CGI Interface for Fast CGI

```
<div>
```

```
  <a href='https://travis-ci.org/leejo/cgi-fast?branch=master'><img src='https://travis-ci.org/leejo/cgi-
fast.svg?branch=master' alt='Build Status' /></a>
  <a href='https://coveralls.io/r/leejo/cgi-fast?branch=master'><img src='https://coveralls.io/repos/leejo/cgi-
fast/badge.png?branch=master' alt='Coverage Status' /></a>
</div>
```

SYNOPSIS

```
use CGI::Fast
    socket_path => '9000',
    socket_perm => 0777,
    listen_queue => 50;

use CGI qw/ :standard /;

$COUNTER = 0;

# optional, will default to STDOUT, STDERR
CGI::Fast->file_handles({
    fcgi_output_file_handle => IO::Handle->new,
    fcgi_error_file_handle => IO::Handle->new,
});

while ($q = CGI::Fast->new) {
    process_request($q);
}
```

DESCRIPTION

CGI::Fast is a subclass of the CGI object created by CGI.pm. It is specialized to work with the FCGI module, which greatly speeds up CGI scripts by turning them into persistently running server processes. Scripts that perform time-consuming initialization processes, such as loading large modules or opening persistent database connections, will see large performance improvements.

Note that as CGI::Fast is based on CGI.pm it is no longer advised as a way to write Perl web apps. See <https://metacpan.org/pod/CGI#CGI.pm-HAS-BEEN-REMOVED-FROM-THE-PERL-CORE> for more information about this

OTHER PIECES OF THE PUZZLE

In order to use CGI::Fast you'll need the FCGI module. See <http://www.cpan.org/> for details.

WRITING FASTCGI PERL SCRIPTS

FastCGI scripts are persistent: one or more copies of the script are started up when the server initializes, and stay around until the server exits or they die a natural death. After performing whatever one-time initialization it needs, the script enters a loop waiting for incoming connections, processing the request, and waiting some more.

A typical FastCGI script will look like this:

```
#!/perl
use CGI::Fast;
do_some_initialization();
while ($q = CGI::Fast->new) {
    process_request($q);
}
```

Each time there's a new request, CGI::Fast returns a CGI object to your loop. The rest of the time your script waits in the call to new(). When the server requests that your script be terminated, new() will return undef. You can of course exit earlier if you choose. A new version of the script will be respawned to take its place (this may be necessary in order to avoid Perl memory leaks in long-running scripts).

CGI.pm's default CGI object mode also works. Just modify the loop this way:

```
while (CGI::Fast->new) {
    process_request();
}
```

Calls to header(), start_form(), etc. will all operate on the current request.

INSTALLING FASTCGI SCRIPTS

See the FastCGI developer's kit documentation for full details. On the Apache server, the following line must be added to srm.conf:

```
AddType application/x-httpd-fcgi .fcgi
```

FastCGI scripts must end in the extension .fcgi. For each script you install, you must add something like the following to srm.conf:

```
FastCgiServer /usr/etc/httpd/cgi-bin/file_upload.fcgi -processes 2
```

This instructs Apache to launch two copies of file_upload.fcgi at startup time.

USING FASTCGI SCRIPTS AS CGI SCRIPTS

Any script that works correctly as a FastCGI script will also work correctly when installed as a vanilla CGI script. However it will not see any performance benefit.

EXTERNAL FASTCGI SERVER INVOCATION

FastCGI supports a TCP/IP transport mechanism which allows FastCGI scripts to run external to the webserver, perhaps on a remote machine. To configure the webserver to connect to an external FastCGI server, you would add the following to your srm.conf:

```
FastCgiExternalServer /usr/etc/httpd/cgi-bin/file_upload.fcgi -host sputnik:8888
```

Two environment variables affect how the `CGI::Fast` object is created, allowing `CGI::Fast` to be used as an external FastCGI server. (See `FCGI` documentation for `FCGI::OpenSocket` for more information.)

You can set these as ENV variables or imports in the use CGI::Fast statement. If the ENV variables are set then these will be favoured so you can override the import statements on the command line, etc.

- FCGI_SOCKET_PATH / socket_path

The address (TCP/IP) or path (UNIX Domain) of the socket the external FastCGI script to which bind and listen for incoming connections from the web server.

- FCGI_SOCKET_PERM / socket_perm

Permissions for UNIX Domain socket.

- FCGI_LISTEN_QUEUE / listen_queue

Maximum length of the queue of pending connections, defaults to 100.

For example:

```

use CGI::Fast
    socket_path => "sputnik:8888",
    listen_queue => "50"
;

```

```

use CGI qw/ :standard /;

```

```

do_some_initialization();

```

```

while ($q = CGI::Fast->new) {
    process_request($q);
}

```

Or:

```

use CGI::Fast;

```

```

use CGI qw/ :standard /;

```

```

do_some_initialization();

```

```

$ENV{FCGI_SOCKET_PATH} = "sputnik:8888";

```

```

$ENV{FCGI_LISTEN_QUEUE} = 50;

```

```

while ($q = CGI::Fast->new) {
    process_request($q);
}

```

Note the importance of having use CGI after use CGI::Fast as this will prevent any CGI import pragmas being overwritten by CGI::Fast. You can use CGI::Fast as a drop in replacement like so:

```

use CGI::Fast qw/ :standard /

```

FILE HANDLES

FCGI defaults to using STDOUT and STDERR as its output filehandles - this may lead to unexpected redirect of output if you migrate scripts from CGI.pm to CGI::Fast. To get around this you can use the file_handles method, which you must do **before** the first call to CGI::Fast->new. For example using IO::Handle:

```

CGI::Fast->file_handles({
    fcgi_output_file_handle => IO::Handle->new,
    fcgi_error_file_handle => IO::Handle->new,
});

```

```

while (CGI::Fast->new) {

```

```

    ..

```

```
}
```

Overriding STDIN using the `fcgi_input_file_handle` key is also possible, however doing so is likely to break at least POST requests.

CAVEATS

I haven't tested this very much.

LICENSE

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Address bug reports and comments to:

<https://github.com/leejo/cgi-fast>

BUGS

This section intentionally left blank.

SEE ALSO

[CGI::Carp](<https://metacpan.org/pod/CGI::Carp>), [CGI](<https://metacpan.org/pod/CGI>)

Found in path(s):

* /opt/cola/permits/1146929234_1616812377.37/0/libcgi-fast-perl-2-15-orig-1-tar-gz/CGI-Fast-2.15/README

* /opt/cola/permits/1146929234_1616812377.37/0/libcgi-fast-perl-2-15-orig-1-tar-gz/CGI-Fast-2.15/README.md

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=head1 NAME

CGI::Fast - CGI Interface for Fast CGI

=for html

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[!\[\]\(e119fc79c8f448683d20ba4c873025a2_img.jpg\)](https://coveralls.io/r/leejo/cgi-fast?branch=master)

=head1 SYNOPSIS

```
use CGI::Fast
```

```
    socket_path => '9000',
```

```

socket_perm => 0777,
listen_queue => 50;

use CGI qw/ :standard /;

$COUNTER = 0;

# optional, will default to STDOUT, STDERR
CGI::Fast->file_handles({
    fcgi_output_file_handle => IO::Handle->new,
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});

while ($q = CGI::Fast->new) {
    process_request($q);
}

```

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CGI::Fast is a subclass of the CGI object created by CGI.pm. It is specialized to work with the FCGI module, which greatly speeds up CGI scripts by turning them into persistently running server processes. Scripts that perform time-consuming initialization processes, such as loading large modules or opening persistent database connections, will see large performance improvements.

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```

Each time there's a new request, CGI::Fast returns a CGI object to your loop. The rest of the time your script waits in the call to new(). When the server requests that your script be terminated, new() will return undef. You can of course exit earlier if you choose. A new version of the script will be respawned to take its place (this may be necessary in order to avoid Perl memory leaks in long-running scripts).

CGI.pm's default CGI object mode also works. Just modify the loop this way:

```

while (CGI::Fast->new) {
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}

```

Calls to header(), start_form(), etc. will all operate on the current request.

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```
AddType application/x-httpd-fcgi .fcgi
```

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```
FastCgiExternalServer /usr/etc/httpd/cgi-bin/file_upload.fcgi -host sputnik:8888
```

Two environment variables affect how the C<CGI::Fast> object is created, allowing C<CGI::Fast> to be used as an external FastCGI server. (See C<FCGI> documentation for C<FCGI::OpenSocket> for more information.)

You can set these as ENV variables or imports in the use CGI::Fast statement. If the ENV variables are set then these will be favoured so you can override the import statements on the command line, etc.

=over

=item FCGI_SOCKET_PATH / socket_path

The address (TCP/IP) or path (UNIX Domain) of the socket the external FastCGI script to which bind and listen for incoming connections from the web server.

=item FCGI_SOCKET_PERM / socket_perm

Permissions for UNIX Domain socket.

=item FCGI_LISTEN_QUEUE / listen_queue

Maximum length of the queue of pending connections, defaults to 100.

=back

For example:

```
use CGI::Fast
    socket_path => "sputnik:8888",
    listen_queue => "50"
;
```

```
use CGI qw/ :standard /;
```

```
do_some_initialization();
```

```
while ($q = CGI::Fast->new) {
    process_request($q);
}
```



```
}
```

Or:

```
use CGI::Fast;
use CGI qw/ :standard /;

do_some_initialization();

$ENV{FCGI_SOCKET_PATH} = "sputnik:8888";
$ENV{FCGI_LISTEN_QUEUE} = 50;

while ($q = CGI::Fast->new) {
    process_request($q);
}
```

Note the importance of having use CGI after use CGI::Fast as this will prevent any CGI import pragmas being overwritten by CGI::Fast. You can use CGI::Fast as a drop in replacement like so:

```
use CGI::Fast qw/ :standard /
```

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FCGI defaults to using STDOUT and STDERR as its output filehandles - this may lead to unexpected redirect of output if you migrate scripts from CGI.pm to CGI::Fast. To get around this you can use the file_handles method, which you must do **B**<before> the first call to CGI::Fast->new. For example using IO::Handle:

```
CGI::Fast->file_handles({
    fcgi_output_file_handle => IO::Handle->new,
    fcgi_error_file_handle => IO::Handle->new,
});

while (CGI::Fast->new) {
    ..
}
```

Overriding STDIN using the C<fcgi_input_file_handle> key is also possible, however doing so is likely to break at least POST requests.

=head1 CAVEATS

I haven't tested this very much.

=head1 LICENSE

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This library is free software; you can redistribute it and/or modify it under the same terms as Perl itself.

Address bug reports and comments to:

<https://github.com/leejo/cgi-fast>

=head1 BUGS

This section intentionally left blank.

=head1 SEE ALSO

L<CGI::Carp>, L<CGI>

=cut

Found in path(s):

* /opt/cola/permits/1146929234_1616812377.37/0/libcgi-fast-perl-2-15-orig-1-tar-gz/CGI-Fast-2.15/lib/CGI/Fast.pm

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abstract: unknown

author:

- unknown

build_requires:

File::Temp: '0'

Test::More: '0'

configure_requires: { }

dynamic_config: 1

generated_by: 'ExtUtils::MakeMaker version 7.34, CPAN::Meta::Converter version 2.150010'

license: perl

meta-spec:

url: <http://module-build.sourceforge.net/META-spec-v1.4.html>

version: '1.4'

name: CGI-Fast

no_index:

directory:

- t

- inc

- t

requires:

CGI: '4'
Carp: '0'
FCGI: '0.67'
if: '0'
perl: '5.008001'
resources:
bugtracker: <https://github.com/leejo/cgi-fast/issues>
homepage: <https://metacpan.org/module/CGI::Fast>
license: <http://dev.perl.org/licenses/>
repository: <https://github.com/leejo/cgi-fast>
version: '2.15'
x_serialization_backend: 'CPAN::Meta::YAML version 0.018'

Found in path(s):

* /opt/cola/permits/1146929234_1616812377.37/0/libcgi-fast-perl-2-15-orig-1-tar-gz/CGI-Fast-2.15/META.yml

1.26 libbytes-random-secure-perl 0.29-1

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1.27 jsonpatch 1.32

1.27.1 Available under license :

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1.28 adduser 3.118ubuntu5

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Since Nov 27 1996, it was maintained by Guy Maor <maor@debian.org>. He rewrote most of it.

Since May 20 2000, it is maintained by Roland Bauerschmidt <rb@debian.org>.

Since March 24 2004, it is maintained by Roland Bauerschmidt <rb@debian.org>, and co-maintained by Marc Haber <mh+debian-packages@zugschlus.de>

Since 23 Oct 2005, it has been maintained by Joerg Hoh <joerg@joerghoh.de>

Since June 2006, it has been maintained by Stephen Gran <sgran@debian.org>

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1.29 pyparsing 2.4.7-1.ph4

1.29.1 Available under license :

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1.30 pollinate 4.33-3ubuntu2

1.30.1 Available under license :

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Version 3, 29 June 2007

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The

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```
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1.31 libmodule-find-perl 0.15-1

1.31.1 Available under license :

No license file was found, but licenses were detected in source scan.

```
Module::Find
=====
```

Module::Find lets you find and use modules in categories. This can be very useful for auto-detecting driver or plugin modules. You can differentiate between looking in the category itself or in all subcategories.

INSTALLATION

To install this module type the following:

```
perl Makefile.PL
```

make
make test
make install

DEPENDENCIES

This module requires these other modules and libraries:

Test::More
File::Spec
File::Find

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Found in path(s):

* /opt/cola/permits/1189356193_1628679293.11/0/libmodule-find-perl-0-15-orig-tar-gz/Module-Find-0.15/README

No license file was found, but licenses were detected in source scan.

abstract: 'Find and use installed modules in a (sub)category'

author:

- 'Christian Renz <crenz@web42.com>'

build_requires:

Test::More: 0

configure_requires:

ExtUtils::MakeMaker: 0

dynamic_config: 1

generated_by: 'ExtUtils::MakeMaker version 6.66, CPAN::Meta::Converter version 2.133380'

license: perl

meta-spec:

url: <http://module-build.sourceforge.net/META-spec-v1.4.html>

version: 1.4

name: Module-Find

no_index:

directory:

- t

- inc

recommends:

Test::Pod: 1.14

Test::Pod::Coverage: 1.04

requires:

File::Find: 0

File::Spec: 0
perl: 5.006001
resources:
repository: <http://github.com/crenz/Module-Find>
version: 0.15

Found in path(s):

* /opt/cola/permits/1189356193_1628679293.11/0/libmodule-find-perl-0-15-orig-tar-gz/Module-Find-0.15/META.yml

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=back

=head1 HISTORY

=over 8

=item 0.01, 2004-04-22

Original version; created by h2xs 1.22

=item 0.02, 2004-05-25

Added test modules that were left out in the first version. Thanks to Stuart Johnston for alerting me to this.

=item 0.03, 2004-06-18

Fixed a bug (non-localized \$_) by declaring a loop variable in use functions. Thanks to Stuart Johnston for alerting me to this and providing a fix.

Fixed non-platform compatibility by using File::Spec. Thanks to brian d foy.

Added setmoduledirs and updated tests. Idea shamelessly stolen from ...erm... inspired by brian d foy.

=item 0.04, 2005-05-20

Added POD tests.

=item 0.05, 2005-11-30

Fixed issue with bugfix in PathTools-3.14.

=item 0.06, 2008-01-26

Module::Find now won't report duplicate modules several times anymore (thanks to Uwe Völker for the report and

the patch)

=item 0.07, 2009-09-08

Fixed RT#38302: Module::Find now follows symlinks by default
(can be disabled).

=item 0.08, 2009-09-08

Fixed RT#49511: Removed Mac OS X extended attributes from distribution

=item 0.09, 2010-02-26

Fixed RT#38302: Fixed META.yml generation (thanks very much to cpanservice for the help).

=item 0.10, 2010-02-26

Fixed RT#55010: Removed Unicode BOM from Find.pm.

=item 0.11, 2012-05-22

Fixed RT#74251: defined(@array) is deprecated under Perl 5.15.7.
Thanks to Roman F, who contributed the implementation.

=item 0.12, 2014-02-08

Fixed RT#81077: useall fails in taint mode
Thanks to Aran Deltac, who contributed the implementation and test.

Fixed RT#83596: Documentation doesn't describe behaviour if a module fails to load
Clarified documentation for useall and usesub.

Fixed RT#62923: setmoduledirs(undef) doesn't reset to searching @INC
Added more explicit tests.
Thanks to Colin Robertson for his input.

=item 0.13, 2015-03-09

This release contains two contributions from Moritz Lenz:

Link to Module::Pluggable and Class::Factory::Util in "SEE ALSO"

Align
package name parsing with how perl does it (allowing single quotes as module separator)

Also, added a test for meta.yml

=item 0.14, 2019-12-25

A long overdue update. Thank you for the many contributions!

Fixed RT#99055: Removed file readability check (pull request contributed by Moritz Lenz)

Now supports @INC hooks (pull request contributed by Graham Knop)

Now filters out filenames starting with a dot (pull request contributed by Desmond Daignault)

Now uses strict (pull request contributed by Shlomi Fish)

Fixed RT#122016: test/ files show up in metacpan (bug report contributed by Karen Etheridge)

=item 0.15, 2019-12-26

Fixed RT#127657 (bug report contributed by Karen Etheridge): Module::Find now uses @ModuleDirs (if specified) for loading modules. Previously, when using setmoduledirs() to set an array of directories that did not contain @INC, Module::Find would find the modules correctly, but load them from @INC.

=back

=head1 DEVELOPMENT NOTES

Please report any

bugs using the CPAN RT system. The development repository for this module is hosted on GitHub:
L<<http://github.com/crenz/Module-Find/>>.

=head1 SEE ALSO

L<perl>, L<Module::Pluggable>, L<Class::Factory::Util>

=head1 AUTHOR

Christian Renz, E<lt>crenz@web42.comE<gt>

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=cut

Found in path(s):

* /opt/cola/permits/1189356193_1628679293.11/0/libmodule-find-perl-0-15-orig-tar-gz/Module-Find-0.15/Find.pm

1.32 python-secretstorage 3.3.1-1

1.32.1 Available under license :

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1.33 python-certifi 2020.6.20-1.ph4

1.33.1 Available under license :

This package contains a modified version of ca-bundle.crt:

ca-bundle.crt -- Bundle of CA Root Certificates

Certificate data from Mozilla as of: Thu Nov 3 19:04:19 2011#

This is a bundle of X.509 certificates of public Certificate Authorities (CA). These were automatically extracted from Mozilla's root certificates file (certdata.txt). This file can be found in the mozilla source tree:

<http://mxr.mozilla.org/mozilla/source/security/nss/lib/ckfw/builtins/certdata.txt?raw=1#>

It contains the certificates in PEM format and therefore can be directly used with curl / libcurl / php_curl, or with an Apache+mod_ssl webserver for SSL client authentication.

Just configure this file as the SSLCACertificateFile.#

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@(#) \$RCSfile: certdata.txt,v \$

\$Revision: 1.80 \$ \$Date: 2011/11/03 15:11:58 \$

1.34 libtimedate-perl 2.3300-2

1.34.1 Available under license :

No license file was found, but licenses were detected in source scan.

=head1 NAME

Date::Language::Hungarian - Magyar format for Date::Format

=head1 SYNOPSIS

```
my $lang = Date::Language->new('Hungarian');
print $lang->time2str("%a %b %e %T %Y", time);
```

```
@lt = localtime(time);
print $lang->time2str($template, time);
print $lang->strftime($template, @lt);
```

```
print $lang->time2str($template, time, $zone);
print $lang->strftime($template, @lt, $zone);
```

```
print $lang->ctime(time);
print $lang->asctime(@lt);
```

```
print $lang->ctime(time, $zone);
print $lang->asctime(@lt, $zone);
```

See L<Date::Format>.

=head1 AUTHOR

Paula Goddard (paula -at- paulacska -dot- com)

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=cut

Found in path(s):

* /opt/cola/permits/1192040889_1629110966.33/0/libtimedate-perl-2-3300-orig-tar-gz/TimeDate-2.33/lib/Date/Language/Hungarian.pm

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Found in path(s):

* /opt/cola/permits/1192040889_1629110966.33/0/libtimedate-perl-2-3300-orig-tar-gz/TimeDate-2.33/lib/Date/Parse.pm

* /opt/cola/permits/1192040889_1629110966.33/0/libtimedate-perl-2-3300-orig-tar-gz/TimeDate-2.33/lib/Date/Format.pm

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This is the perl5 TimeDate distribution. It requires perl version 5.003 or later

This distribution replaces my earlier GetDate distribution, which was only a date parser. The date parser contained in this distribution is far superior to the yacc based parser, and a *lot* faster.

The parser contained here will only parse absolute dates, if you want a date parser that can parse relative dates then take a look at the Time modules by David Muir on CPAN.

You install the library by running these commands:

```
perl Makefile.PL
make
make test
make install
```

Please report any bugs/suggestions to <gbarr@pobox.com>

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Graham <gbarr@pobox.com>

Found in path(s):

* /opt/cola/permits/1192040889_1629110966.33/0/libtimedate-perl-2-3300-orig-tar-gz/TimeDate-2.33/README

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abstract: unknown

author:

- 'Graham Barr <gbarr@pobox.com>'

build_requires:

ExtUtils::MakeMaker: '0'

configure_requires:

ExtUtils::MakeMaker: '0'

dynamic_config: 1

generated_by: 'ExtUtils::MakeMaker version 7.44, CPAN::Meta::Converter version 2.150010'

license: perl

meta-spec:

url: <http://module-build.sourceforge.net/META-spec-v1.4.html>

version: '1.4'

name: TimeDate

no_index:

directory:

- t

- inc

resources:

bugtracker: <https://github.com/atoomic/perl-TimeDate/issues>

repository: <https://github.com/atoomic/perl-TimeDate>

version: '2.33'

x_serialization_backend: 'CPAN::Meta::YAML version 0.018'

Found in path(s):

* /opt/cola/permits/1192040889_1629110966.33/0/libtimedate-perl-2-3300-orig-tar-gz/TimeDate-2.33/META.yml

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=encoding utf8

=head1 NAME

Date::Language::Bulgarian - localization for Date::Format

=head1 DESCRIPTION

This is Bulgarian localization for Date::Format.

It is important to note that this module source code is in utf8.

All strings which it outputs are in utf8, so it is safe to use it

currently only with English. You are left alone to try and convert

the output when using different Date::Language::* in the same application.

This should be addressed in the future.

=head1 SYNOPSIS

```

use strict;
use warnings;
use Date::Language;
local $|=$/;
my $template = '%a %b %e %T %Y (%Y-%m-%d %H:%M:%S)';
my $time=1290883821; #or just use time();
my @lt = localtime($time);
my %languages = qw(English GMT German EEST Bulgarian EET);
binmode(select, 'utf8');

foreach my $l(keys %languages){
    my $lang = Date::Language->new($l);
    my $zone = $languages{$l};
    print $/. "$l
$zone";
    print $lang->time2str($template, $time);
    print $lang->time2str($template, $time, $zone);

    print $lang->strftime($template, \@lt);
}

=head1 AUTHOR

Krasimir Berov (berov@cpan.org)

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=cut

Found in path(s):
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2.33/lib/Date/Language/Bulgarian.pm

```

1.35 libhttp-cookies-perl 6.10-1

1.35.1 Available under license :

```
# HTTP-COOKIES CONTRIBUTORS #
```

This is the (likely incomplete) list of people who have helped make this distribution what it is, either via code contributions, patches, bug reports, help with troubleshooting, etc. A huge 'thank you' to all of them.

- * Adam Kennedy
- * Adam Sjogren
- * Alexey Tourbin
- * Alex Kapranoff
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- * Alex Peters
- * amire80
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- * Charlie Hothersall-Thomas
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- * Colin Newell
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```

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```
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```

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<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice

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1.36 chardet 4.0.0-1

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Thus, it is not the intent of this section to claim rights or contest

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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it

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License.

Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6.

Any executables

containing that work also fall under Section 6,

whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany the work with the complete corresponding machine-readable

source code for the Library including whatever

changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified

executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

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<signature of Ty Coon>, 1 April 1990
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That's all there is to it!

1.37 libhtml-format-perl 2.12-1.1

1.37.1 Available under license :

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Appendix: How to Apply These Terms to Your New Programs

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To do so, attach the following notices to the program. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

```
<one line to give the program's name and a brief idea of what it does.>  
Copyright (C) 19yy <name of author>
```

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Also add information on how to contact you by electronic and paper mail.

If the program is interactive, make it output a short notice like this when it starts in an interactive mode:

```
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This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.
```

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```
Yoyodyne, Inc., hereby disclaims all copyright interest in the
program `Gnomovision' (a program to direct compilers to make passes
at assemblers) written by James Hacker.
```

```
<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
```

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1.38 libauthen-sasl-perl 2.1600-1.1

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Source: <https://metacpan.org/release/Authen-SASL>

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```
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This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.
```

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```
Yoyodyne, Inc., hereby disclaims all
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program `Gnomovision' (a program to direct compilers to make passes
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```

```
<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
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1.40 python-requests 2.25.1+dfsg-2

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1.41 pythonurllib 1.26.5-1~exp1

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Contributions to the urllib3 project

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Contributors

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* victor.vde <<http://code.google.com/u/victor.vde/>>

* HTTPS patch (which inspired HTTPSConnectionPool)

* erikcederstrand <<http://code.google.com/u/erikcederstrand/>>

* NTLM-authenticated HTTPSConnectionPool

* Basic-authenticated HTTPSConnectionPool (merged into make_headers)

* niphlod <niphlod@gmail.com>

* Client-verified SSL certificates for HTTPSConnectionPool

* Response gzip and deflate encoding support

* Better unicode support for filepost using StringIO buffers

* btoconnor <brian@btoconnor.net>

* Non-multipart encoding for POST requests

* p.dobrogost <<http://code.google.com/u/@WBRSRIBZDhBFXQB6/>>

* Code review, PEP8 compliance, benchmark fix

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- * Design review, bugfixes, test coverage.

- * studer <theo.studer@gmail.com>
- * IPv6 url support and test coverage

- * Shivaram Lingamneni <slingamn@cs.stanford.edu>
- * Support for explicitly closing pooled connections

- * hartator <hartator@gmail.com>
- * Corrected multipart behavior for params

- * Thomas Weischuh <thomas@t-8ch.de>
- * Support for TLS SNI
- * API unification of ssl_version/cert_reqs
- * SSL fingerprint and alternative hostname verification
- * Bugfixes in testsuite

- * Sune Kirkeby <mig@ibofobi.dk>
- * Optional SNI-support for Python 2 via PyOpenSSL.

- * Marc Schlaich <marc.schlaich@gmail.com>
- * Various bugfixes and test improvements.

- * Bryce Boe <bbzbryce@gmail.com>
- * Correct six.moves conflict
- * Fixed pickle support of some exceptions

- * Boris Figovsky <boris.figovsky@ravello systems.com>
- * Allowed to skip SSL hostname verification

- * Cory Benfield
<https://lukasa.co.uk/about/>
- * Stream method for Response objects.
- * Return native strings in header values.
- * Generate 'Host' header when using proxies.

- * Jason Robinson <jaywink@basshero.org>
- * Add missing WrappedSocket.fileno method in PyOpenSSL

- * Audrius Butkevicius <audrius.butkevicius@elastichosts.com>
- * Fixed a race condition

- * Stanislav Vitkovskiy <stas.vitkovsky@gmail.com>
- * Added HTTPS (CONNECT) proxy support

- * Stephen Holsapple <sholsapp@gmail.com>
- * Added abstraction for granular control of request fields

- * Martin von Gagern <Martin.vGagern@gmx.net>
- * Support for non-ASCII header parameters

- * Kevin Burke <kev@inburke.com> and Pavel Kirichenko <juanych@yandex-team.ru>
- * Support for separate connect and request timeouts

- * Peter Waller <p@pwaller.net>
- * HTTPResponse.tell() for determining amount received over the wire

- * Nipunn Koorapati <nipunn1313@gmail.com>
- * Ignore default ports when comparing hosts for equality

- * Danilo @dbrgn <https://dbrgn.ch/>
- * Disabled TLS compression by default on Python 3.2+
- * Disabled TLS compression in pyopenssl contrib module
- * Configurable cipher suites in pyopenssl contrib module

- * Roman Bogorodskiy <roman.bogorodskiy@ericsson.com>
- * Account retries on proxy errors

- * Nicolas Delaby <nicolas.delaby@ezeep.com>
- * Use the platform-specific CA certificate locations

- * Josh Schneier <https://github.com/jschneier>
- * HTTPHeaderDict and associated tests and docs
- * Bugfixes, docs, test coverage

- * Tahia Khan <http://tahia.tk/>
- * Added Timeout examples in docs

- * Arthur Grunseid <https://grunseid.com>
- * source_address support and tests (with https://github.com/bui)

- * Ian Cordasco <graffatcolmingov@gmail.com>
- * PEP8 Compliance and Linting
- * Add ability to pass socket options to an HTTP Connection

- * Erik Tollerud <erik.tollerud@gmail.com>
- * Support for standard library io module.

- * Krishna Prasad <kprasad.iitd@gmail.com>
- * Google App Engine documentation

- * Aaron Meurer
<asmeurer@gmail.com>
- * Added Url.url, which unparses a Url

- * Evgeny Kapun <abacabadabacaba@gmail.com>
- * Bugfixes

- * Benjamin Meyer <bm_witness@yahoo.com>
- * Security Warning Documentation update for proper capture

- * Shivan Sornarajah <github@sornars.com>
- * Support for using ConnectionPool and PoolManager as context managers.

- * Alex Gaynor <alex.gaynor@gmail.com>
- * Updates to the default SSL configuration

- * Tomas Tomecek <ttomecek@redhat.com>
- * Implemented generator for getting chunks from chunked responses.

- * tlynn <https://github.com/tlynn>
- * Respect the warning preferences at import.

- * David D. Riddle <ddriddle@illinois.edu>
- * IPv6 bugfixes in testsuite

- * Thea Flowers <magicalgirl@google.com>
- * App Engine environment tests.
- * Documentation re-write.

- * John Krauss <https://github.com/talos>
- * Clues to debugging problems with `cryptography` dependency in docs

- * Disassem <https://github.com/Disassem>
- * Fix pool-default headers not applying for url-encoded requests like GET.

- * James Atherfold <jlatherfold@hotmail.com>
- * Bugfixes relating to cleanup of connections during errors.

- * Christian Pedersen <https://github.com/chripede>
- * IPv6 HTTPS proxy bugfix

- * Jordan Moldow <<https://github.com/jmoldow>>
- * Fix low-level exceptions leaking from ``HTTPResponse.stream()``.
- * Bugfix for ``ConnectionPool.urlopen(release_conn=False)``.
- * Creation of ``HTTPConnectionPool.ResponseCls``.

- * Predrag Gruevski <<https://github.com/obi1kenobi>>
- * Made cert digest comparison use a constant-time algorithm.

- * Adam Talsma <<https://github.com/a-tal>>
- * Bugfix to ca_cert file paths.

- * Evan Meagher <<https://evanmeagher.net>>
- * Bugfix related to `memoryview` usage in PyOpenSSL adapter

- * John Vandenberg <jayvdb@gmail.com>
- * Python 2.6 fixes; pyflakes and pep8 compliance

- * Andy Caldwell <andy.m.caldwell@gmail.com>
- * Bugfix related to reusing connections in indeterminate states.

- * Ville Skytt <ville.skytta@iki.fi>
- * Logging efficiency
improvements, spelling fixes, Travis config.

- * Shige Takeda <smtakeda@gmail.com>
- * Started Recipes documentation and added a recipe about handling concatenated gzip data in HTTP response

- * Jess Shapiro <jesse@jesseshapiro.net>
- * Various character-encoding fixes/tweaks
- * Disabling IPv6 DNS when IPv6 connections not supported

- * David Foster <<http://dafoster.net/>>
- * Ensure order of request and response headers are preserved.

- * Jeremy Cline <jeremy@jcline.org>
- * Added connection pool keys by scheme

- * Aviv Palivoda <palaviv@gmail.com>
- * History list to Retry object.
- * HTTPResponse contains the last Retry object.

- * Nate Prewitt <nate.prewitt@gmail.com>
- * Ensure timeouts are not booleans and greater than zero.
- * Fixed infinite loop in ``stream`` when amt=None.
- * Added length_remaining to determine remaining data to be read.
- * Added enforce_content_length to raise exception when incorrect content-length received.

- * Seth Michael Larson <sethmichaellarson@protonmail.com>
 - * Created selectors backport that supports PEP 475.
- * Alexandre Dias <alex.dias@smarkets.com>
 - * Don't retry on timeout if method not in whitelist
- * Moinuddin Quadri <moin18@gmail.com>
 - * Lazily load idna package
- * Tom White <s6yg1ez3@mail2tor.com>
 - * Made SOCKS handler differentiate socks5h from socks5 and socks4a from socks4.
- * Tim Burke <tim.burke@gmail.com>
 - * Stop buffering entire deflate-encoded responses.
- * Tuukka Mustonen <tuukka.mustonen@gmail.com>
 - * Add counter for status_forcelist retries.
- * Erik Rose <erik@mozilla.com>
 - * Bugfix to pyopenssl vendoring
- * Wolfgang Richter <wolfgang.richter@gmail.com>
 - * Bugfix related to loading full certificate chains with PyOpenSSL backend.
- * Mike Miller <github@mikeage.net>
 - * Logging improvements to include the HTTP(S) port when opening a new connection
- * Ioannis Tziakos <mail@itziakos.gr>
 - * Fix ``util.selectors._fileobj_to_fd`` to accept ``long``.
 - * Update appveyor tox setup to use the 64bit python.
- * Akamai
(through Jess Shapiro) <jshapiro@akamai.com>
 - * Ongoing maintenance; 2017-2018
- * Dominique Leuenberger <dimstar@opensuse.org>
 - * Minor fixes in the test suite
- * Will Bond <will@wbond.net>
 - * Add Python 2.6 support to ``contrib.securetransport``
- * Aleksei Alekseev <alekseev.yeskela@gmail.com>
 - * using auth info for socks proxy
- * Chris Wilcox <git@crwilcox.com>
 - * Improve contribution guide
 - * Add ``HTTPResponse.geturl`` method to provide ``urllib2.urlopen().geturl()`` behavior

- * Bruce Merry <<https://www.brucemerry.org.za>>
- * Fix leaking exceptions when system calls are interrupted with zero timeout

- * Hugo van Kemenade <<https://github.com/hugovk>>
- * Drop support for EOL Python 2.6

- * Tim Bell <<https://github.com/timb07>>
- * Bugfix for responses with Content-Type: message/* logging warnings

- * Justin Bramley <<https://github.com/jbramleycl>>
- * Add ability to handle multiple Content-Encodings

- * Katsuhiko YOSHIDA <<https://github.com/kyoshidajp>>
- * Remove Authorization header
regardless of case when redirecting to cross-site

- * James Meickle <<https://permadeath.com/>>
- * Improve handling of Retry-After header

- * Chris Jerdonek <chris.jerdonek@gmail.com>
- * Remove a spurious TypeError from the exception chain inside
HTTPConnectionPool._make_request(), also for BaseExceptions.

- * Jorge Lopez Silva <<https://github.com/jalopezsilva>>
- * Added support for forwarding requests through HTTPS proxies.

- * Benno Rice <benno@jeamland.net>
- * Allow cadata parameter to be passed to underlying ``SSLContext.load_verify_locations()``.

- * Keiichi Kobayashi <abok.1k@gmail.com>
- * Rename VerifiedHTTPSConnection to HTTPSConnection

- * Himanshu Garg <garg_himanshu@outlook.com>
- * DOC & LICENSE Update

- * Hod Bin Noon <bin.noon.hod@gmail.com>
- * Test improvements

- * Chris Olufson <tycarac@gmail.com>
- * Fix for connection not being released on HTTP redirect and response not preloaded

- * [Bastiaan Bakker] <<https://github.com/bastiaanb>>
- * Support for logging session keys
via environment variable ``SSLKEYLOGFILE`` (Python 3.8+)

- * [Ezzeri Esa] <<https://github.com/savarin>>
- * Ports and extends on types from typeshed

* [Your name or handle] <[email or website]>

* [Brief summary of your changes]

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1.42 fdisk 2.37.2

1.42.1 Available under license :

```
NR START  END SECTORS SIZE NAME UUID
 1  32 7679  7648 3.7M  8f8378c0-01
 2 7680 16383  8704 4.3M  8f8378c0-02
 5 7936 12799  4864 2.4M
 6 12544 16127  3584 1.8M
```

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1.43 gopkg.in-tomb 2.0.0-20161208151619-d5d1b5820637

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1.44 gopkg.in-yaml 3.0.0-20210107192922-496545a6307b

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1.48 ubuntu-keyring 2021.03.26

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<michael.vogt@canonical.com>

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1.49 gopkg.in-retry 1.0.3

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1.50 snapcore-bolt 1.3.2-0.20210908134111-63c8bfcf7af8

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1.51 gvalkov-golang-evdev 0.0.0-20191114124502-287e62b94bcb

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1.52 canonical-go-sp800.90a-drbg 0.0.0-20210314144037-6eeb1040d6c3

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1.53 godbus 0.0.0-20190726142602-4481cbc300e2

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1.54 gopkg.in-macaroon 1.0.0-20150121114231-ab3940c6c165

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1.55 canonical-go-tpm2 0.0.0-

20210827151749-f80ff5afff61

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1.56 snapcore-go-gettext 0.0.0-20191107141714-82bbea49e785

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1.57 canonical-tcglog-parser 0.0.0-20210824131805-69fa1e9f0ad2

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1.58 mvo5-goconfigparser 0.0.0-20200803085309-72e476556adb

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1.59 canonical-go-sp800.108-kdf 0.0.0-20210314145419-a3359f2d21b9

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1.60 sensible-utils 0.0.17

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1.61 python-zipp 1.0.0-3

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1.62 go-systemd 0.0.0-20180511133405-39ca1b05acc7

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1.64 pytz 2022.1

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as the successor of the GNU Library Public License, version 2, hence the
version number 2.1.]

@end display

@subheading Preamble

The licenses for most software are designed to take away your
freedom to share and change it. By contrast, the GNU General Public
Licenses are intended to guarantee your freedom to share and change
free software---to make sure the software is free for all its users.

This license, the Lesser General Public License, applies to some
specially designated software---typically
libraries---of the Free
Software Foundation and other authors who decide to use it. You can use
it too, but we suggest you first think carefully about whether this
license or the ordinary General Public License is the better strategy to
use in any particular case, based on the explanations below.

When we speak of free software, we are referring to freedom of use,
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you have the freedom to distribute copies of free software (and charge
for this service if you wish); that you receive source code or can get
it if you want it; that you can change the software and use pieces of it
in new free programs; and that you are informed that you can do these
things.

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distributors to deny you these rights or to ask you to surrender these
rights. These restrictions translate to certain responsibilities for
you if you distribute copies of the library
or if you modify it.

For example, if you distribute copies of the library, whether gratis
or for a fee, you must give the recipients all the rights that we gave
you. You must make sure that they, too, receive or can get the source
code. If you link other code with the library, you must provide
complete object files to the recipients, so that they can relink them
with the library after making changes to the library and recompiling
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Most GNU software, including some libraries, is covered by the ordinary GNU General Public License. This license, the GNU Lesser General Public License, applies to certain designated libraries, and is quite different from the ordinary General Public License. We use this license for certain libraries in order to permit linking those libraries into non-free programs.

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We call this license the `Lesser` General Public License because it does *Less* to protect the user's freedom than the ordinary General Public License. It also provides other free software developers *Less* of an advantage over competing non-free programs. These disadvantages are the reason we use the ordinary General Public License for many libraries. However, the Lesser license provides advantages in certain special circumstances.

For example, on rare occasions, there may be a special need to encourage the widest possible use of a certain library, so that it becomes a de-facto standard. To achieve this, non-free programs must be allowed to use the library. A more frequent case is that a free library does the

same job as widely used non-free libraries. In this case, there is little to gain by limiting the free library to free software only, so we use the Lesser General Public License.

In other cases, permission to use a particular library in non-free programs enables a greater number of people to use a large body of free software. For example, permission to use the GNU C Library in non-free programs enables many more people to use the whole GNU operating system, as well as its variant, the GNU/Linux operating system.

Although the Lesser General Public License is Less protective of the users' freedom, it does ensure that the user of a program that is linked with the Library has the freedom and the wherewithal to run that program using a modified version of the Library.

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@enumerate 0

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``Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means

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@item

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You must

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the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

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@end enumerate

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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

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If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

@item

A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a ``work that uses the Library''. Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a ``work that uses the Library'' with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a ``work that uses the library''. The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a ``work that uses the Library'' uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise,
if the work is a derivative of the Library, you may
distribute the object code for the work under the terms of Section 6.
Any executables containing that work also fall under Section 6,
whether or not they are linked directly with the Library itself.

@item

As an exception to the Sections above, you may also combine or
link a ``work that uses the Library" with the Library to produce a
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modification of the work for the customer's own use and reverse
engineering for debugging such modifications.

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during execution displays copyright notices, you must include the
copyright notice for the Library among them, as well as a reference
directing the user to the copy of
this License. Also, you must do one
of these things:

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@item

Accompany the work with the complete corresponding
machine-readable source code for the Library including whatever
changes were used in the work (which must be distributed under
Sections 1 and 2 above); and, if the work is an executable linked
with the Library, with the complete machine-readable ``work that
uses the Library", as object code and/or source code, so that the
user can modify the Library and then relink to produce a modified
executable containing the modified Library. (It is understood
that the user who changes the contents of definitions files in the
Library will not necessarily be able to recompile the application
to use the modified definitions.)

@item

Use a suitable shared library mechanism for linking with the Library. A
suitable mechanism is one that (1) uses at run time a copy of the
library already present on the user's computer system, rather than
copying library functions into the executable,
and (2) will operate
properly with a modified version of the library, if the user installs
one, as long as the modified version is interface-compatible with the
version that the work was made with.

@item

Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

@item

If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

@item

Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

@end enumerate

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@enumerate a

@item

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@item

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@end enumerate

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@end enumerate

@subheading END OF TERMS AND CONDITIONS

@page

@subheading How to Apply These Terms to Your New Libraries

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To apply these terms, attach the following notices to the library. It is safest to attach them to the start of each source

file to most effectively convey the exclusion of warranty; and each file should have at least the ``copyright" line and a pointer to where the full notice is found.

```
@smallexample
@var{one line to give the library's name and an idea of what it does.}
Copyright (C) @var{year} @var{name of author}
```

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```
@end
smallexample
```

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```
@smallexample
Yoyodyne, Inc., hereby disclaims all copyright interest in the library
`Frob' (a library for tweaking knobs) written by James Random Hacker.
```

```
@var{signature of Ty Coon}, 1 April 1990
Ty Coon, President of Vice
@end smallexample
```

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=head1 NAME

List::Compare::Base::_Auxiliary - Internal use only

=head1 VERSION

This document refers to version 0.55 of List::Compare::Base::_Auxiliary. This version was released August 16 2020.

=head1 SYNOPSIS

This module contains subroutines used within List::Compare and List::Compare::Functional. They are not intended to be publicly callable.

=head1 AUTHOR

James E. Keenan (jkeen@cpa.org). When sending correspondence, please include 'List::Compare' or 'List-Compare' in your subject line.

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=cut

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=head1 NAME

List::Compare::Base::_Engine - Internal use only

=head1 VERSION

This document refers to version 0.55 of List::Compare::Base::_Engine.

This version was released August 16 2020.

=head1 SYNOPSIS

This module contains subroutines used within List::Compare and List::Compare::Functional. They are not intended to be publicly callable.

=head1 AUTHOR

James E. Keenan (jkeenan@cpan.org). When sending correspondence, please include 'List::Compare' or 'List-Compare' in your subject line.

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=encoding utf-8

=head1 NAME

List::Compare - Compare elements of two or more lists

=head1 VERSION

This document refers to version 0.55 of List::Compare. This version was released August 16 2020.

=head1 SYNOPSIS

The bare essentials:


```
@Llist = qw(abel abel baker camera delta edward fargo golfer);
@Rlist = qw(baker camera delta delta edward fargo golfer hilton);
```

```
$lc = List::Compare->new(\@Llist, \@Rlist);
```

```
@intersection = $lc->get_intersection;
@union = $lc->get_union;
```

... and so forth.

```
=head1 DISCUSSION: Modes and Methods
```

```
=head2 Regular Case: Compare Two Lists
```

```
=over 4
```

```
=item * Constructor: C<new()>
```

Create a `List::Compare` object. Put the two lists into arrays (named or anonymous) and pass references to the arrays to the constructor.

```
@Llist = qw(abel abel baker camera delta edward fargo golfer);
@Rlist = qw(baker camera delta delta edward fargo golfer hilton);
```

```
$lc = List::Compare->new(\@Llist,
\@Rlist);
```

By default, `List::Compare`'s methods return lists which are sorted using Perl's default `C<sort>` mode: ASCII-betical sorting. Should you not need to have these lists sorted, you may achieve a speed boost by constructing the `List::Compare` object with the `unsorted` option:

```
$lc = List::Compare->new('-u', \@Llist, \@Rlist);
```

or

```
$lc = List::Compare->new('--unsorted', \@Llist, \@Rlist);
```

```
=item * Alternative Constructor
```

If you prefer a more explicit delineation of the types of arguments passed to a function, you may use this 'single hashref' kind of constructor to build a `List::Compare` object:

```
$lc = List::Compare->new( { lists => [\@Llist, \@Rlist] } );
```

or

```
$lc = List::Compare->new( {  
    lists => [ \@Llist, \@Rlist ],  
    unsorted => 1,  
} );
```

```
=item * C<get_intersection()>
```

Get those items which appear at least once in both lists (their intersection).

```
@intersection = $lc->get_intersection;
```

```
=item * C<get_union()>
```

Get those items which appear at least once in either list (their union).

```
@union = $lc->get_union;
```

```
=item * C<get_unique()>
```

Get those items which appear (at least once) only in the first list.

```
@Lonly = $lc->get_unique;  
@Lonly = $lc->get_Lonly; # alias
```

```
=item * C<get_complement()>
```

Get those items which appear (at least once) only in the second list.

```
@Ronly = $lc->get_complement;  
@Ronly = $lc->get_Ronly; # alias
```

```
=item * C<get_symmetric_difference()>
```

Get those items which appear at least once in either the first or the second list, but not both.

```
@LorRonly = $lc->get_symmetric_difference;  
@LorRonly = $lc->get_syndiff; # alias  
@LorRonly = $lc->get_LorRonly; # alias
```

```
=item * C<get_bag()>
```

Make a bag of all those items in both lists. The bag differs from the union of the two lists in that it holds as many copies of individual elements as appear in the original lists.

```
@bag = $lc->get_bag;
```

=item * Return references rather than lists

An

alternative approach to the above methods: If you do not immediately require an array as the return value of the method call, but simply need a I<reference> to an (anonymous) array, use one of the following parallel methods:

```
$intersection_ref = $lc->get_intersection_ref;  
$union_ref       = $lc->get_union_ref;  
$Lonly_ref       = $lc->get_unique_ref;  
$Lonly_ref       = $lc->get_Lonly_ref;      # alias  
$Ronly_ref       = $lc->get_complement_ref;  
$Ronly_ref       = $lc->get_Ronly_ref;      # alias  
$LorRonly_ref    = $lc->get_symmetric_difference_ref;  
$LorRonly_ref    = $lc->get_syndiff_ref;    # alias  
$LorRonly_ref    = $lc->get_LorRonly_ref;   # alias  
$bag_ref         = $lc->get_bag_ref;
```

=item * C<is_LsubsetR()>

Return a true value if the first argument passed to the constructor ('L' for 'left') is a subset of the second argument passed to the constructor ('R' for 'right').

```
$LR = $lc->is_LsubsetR;
```

Return

a true value if R is a subset of L.

```
$RL = $lc->is_RsubsetL;
```

=item * C<is_LequivalentR()>

Return a true value if the two lists passed to the constructor are equivalent, I<i.e.> if every element in the left-hand list ('L') appears at least once in the right-hand list ('R') and I<vice versa>.

```
$eqv = $lc->is_LequivalentR;  
$eqv = $lc->is_LeqvIntR;      # alias
```

=item * C<is_LdisjointR()>

Return a true value if the two lists passed to the constructor are disjoint, I<i.e.> if the two lists have zero elements in common (or, what is the same thing, if their intersection is an empty set).

```
$disj = $lc->is_LdisjointR;
```

```
=item * C<print_subset_chart()>
```

Pretty-print a chart showing whether one list is a subset of the other.

```
$lc->print_subset_chart;
```

```
=item * C<print_equivalence_chart()>
```

Pretty-print a chart showing whether the two lists are equivalent (same elements found at least once in both).

```
$lc->print_equivalence_chart;
```

```
=item * C<is_member_which()>
```

Determine

in I<which> (if any) of the lists passed to the constructor a given string can be found. In list context, return a list of those indices in the constructor's argument list corresponding to lists holding the string being tested.

```
@memb_arr = $lc->is_member_which('abel');
```

In the example above, C<@memb_arr> will be:

```
( 0 )
```

because C<'abel'> is found only in C<@A1> which holds position C<0> in the list of arguments passed to C<new()>.

In scalar context, the return value is the number of lists passed to the constructor in which a given string is found.

As with other List::Compare methods which return a list, you may wish the above method returned a (scalar) reference to an array holding the list:

```
$memb_arr_ref = $lc->is_member_which_ref('baker');
```

In the example above, C<\$memb_arr_ref> will be:

```
[ 0, 1 ]
```

because C<'baker'> is found in C<@Llist> and C<@Rlist>, which hold positions C<0> and C<1>, respectively, in the list of arguments passed

to C<new()>.

B<Note:> methods C<is_member_which()> and C<is_member_which_ref> test only one string at a time and hence take only one argument. To test more than one string at a time see the next method, C<are_members_which()>.

```
=item * C<are_members_which()>
```

Determine in I<which> (if any) of the lists passed to the constructor one or more given strings can be found. The strings to be tested are placed in an array (named or anonymous); a reference to that array is passed to the method.

```
$memb_hash_ref =  
  $lc->are_members_which([ qw| abel baker fargo hilton zebra | ]);
```

I<Note:> In versions of List::Compare prior to 0.25 (April 2004), the strings to be tested could be passed as a flat list. This is no longer possible; the argument must now be a reference to an array.

The return value is a reference to a hash of arrays. The key for each element in this hash is the string being tested. Each element's value is a reference to an anonymous array whose elements are those indices in the constructor's argument list corresponding to lists holding the strings being tested. In the examples above, C<\$memb_hash_ref> will be:

```
{  
  abel  => [ 0 ],  
  baker => [ 0, 1 ],  
  fargo => [ 0, 1 ],  
  hilton => [ 1 ],  
  zebra => [ ],  
};
```

B<Note:> C<are_members_which()> can take more than one argument; C<is_member_which()> and C<is_member_which_ref()> each take only one argument. Unlike those two methods, C<are_members_which()> returns a hash reference.

```
=item * C<is_member_any()>
```

Determine whether a given string can be found in I<any> of the lists passed as arguments to the constructor. Return 1 if a specified string can be found in any of the lists and 0 if not.

```
$found = $lc->is_member_any('abel');
```

In the example above, C<\$found> will be C<1> because C<'abel'> is found in one or more of the lists passed as arguments to C<new()>.

=item * C<are_members_any()>

Determine whether a specified string or strings can be found in I<any> of the lists passed as arguments to the constructor. The strings to be tested are placed in an array (named or anonymous); a reference to that array is passed to C<are_members_any>.

```
$memb_hash_ref = $lc->are_members_any([ qw| abel baker fargo hilton zebra | ]);
```

I<Note:> In versions of List::Compare prior to 0.25 (April 2004), the strings to be tested could be passed as a flat list. This is no longer possible; the argument must now be a reference to an array.

The return value is a reference to a hash where an element's key is the string being tested and the element's value is 1 if the string can be found in I<any> of the lists and 0 if not. In the examples above, C<\$memb_hash_ref> will be:

```
{
  abel  => 1,
  baker => 1,
  fargo => 1,
  hilton => 1,
  zebra => 0,
};
```

C<zebra>'s value is C<0> because C<zebra> is not found in either of the lists passed as arguments to C<new()>.

=item * C<get_version()>

Return
current List::Compare version number.

```
$vers = $lc->get_version;
```

=back

=head2 Accelerated Case: When User Only Wants a Single Comparison

=over 4

=item * Constructor C<new()>

If you are certain that you will only want the results of a I<single> comparison, computation may be accelerated by passing C<'a'> or

C<!--accelerated> as the first argument to the constructor.

```
@Llist = qw(abel abel baker camera delta edward fargo golfer);
@Rlist = qw(baker camera delta delta edward fargo golfer hilton);

$lca = List::Compare->new('-a', \@Llist, \@Rlist);
```

or

```
$lca = List::Compare->new('--accelerated', \@Llist, \@Rlist);
```

As with List::Compare's Regular case, should you not need to have a sorted list returned by an accelerated List::Compare method, you may achieve a speed boost by constructing the accelerated List::Compare object with the unsorted option:

```
$lca = List::Compare->new('-u', '-a', \@Llist, \@Rlist);
```

or

```
$lca = List::Compare->new('--unsorted',
'--accelerated', \@Llist, \@Rlist);
```

=item * Alternative Constructor

You may use the 'single hashref' constructor format to build a List::Compare object calling for the Accelerated mode:

```
$lca = List::Compare->new( {
  lists => [\@Llist, \@Rlist],
  accelerated => 1,
} );
```

or

```
$lca = List::Compare->new( {
  lists => [\@Llist, \@Rlist],
  accelerated => 1,
  unsorted => 1,
} );
```

=item * Methods

All the comparison methods available in the Regular case are available to you in the Accelerated case as well.

```
@intersection = $lca->get_intersection;
@union        = $lca->get_union;
```

```

@Lonly      = $lca->get_unique;
@Ronly      = $lca->get_complement;
@LorRonly   = $lca->get_symmetric_difference;
@bag        = $lca->get_bag;
$intersection_ref = $lca->get_intersection_ref;
$union_ref  = $lca->get_union_ref;
$Lonly_ref  = $lca->get_unique_ref;

$Ronly_ref  = $lca->get_complement_ref;
$LorRonly_ref = $lca->get_symmetric_difference_ref;
$bag_ref    = $lca->get_bag_ref;
$LR         = $lca->is_LsubsetR;
$RL         = $lca->is_RsubsetL;
$eqv       = $lca->is_LequivalentR;
$disj      = $lca->is_LdisjointR;
            $lca->print_subset_chart;
            $lca->print_equivalence_chart;
@memb_arr   = $lca->is_member_which('abel');
$memb_arr_ref = $lca->is_member_which_ref('baker');
$memb_hash_ref = $lca->are_members_which(
            [ qw| abel baker fargo hilton zebra | ]);
$found     = $lca->is_member_any('abel');
$memb_hash_ref = $lca->are_members_any(
            [ qw| abel baker fargo hilton zebra | ]);
$vers      = $lca->get_version;

```

All the aliases for methods available in the Regular case are available to you in the Accelerated case as well.

=back

=head2

Multiple Case: Compare Three or More Lists

=over 4

=item * Constructor C<new(>

Create a List::Compare object. Put each list into an array and pass references to the arrays to the constructor.

```

@Al  = qw(abel abel baker camera delta edward fargo golfer);
@Bob  = qw(baker camera delta delta edward fargo golfer hilton);
@Carmen = qw(fargo golfer hilton icon icon jerky kappa);
@Don  = qw(fargo icon jerky);
@Ed   = qw(fargo icon icon jerky);

$lcm = List::Compare->new(\@Al, \@Bob, \@Carmen, \@Don, \@Ed);

```


As with List::Compare's Regular case, should you not need to have a sorted list returned by a List::Compare method, you may achieve a speed boost by constructing the object with the unsorted option:

```
$lcm = List::Compare->new('-u', \@Al, \@Bob, \@Carmen, \@Don, \@Ed);
```

or

```
$lcm = List::Compare->new('--unsorted', \@Al, \@Bob, \@Carmen, \@Don, \@Ed);
```

=item * Alternative Constructor

You may use the 'single hashref' constructor format to build a List::Compare object to process three or more lists at once:

```
$lcm = List::Compare->new( {  
  lists => [\@Al, \@Bob, \@Carmen, \@Don, \@Ed],  
} );
```

or

```
$lcm = List::Compare->new( {  
  lists => [\@Al, \@Bob, \@Carmen, \@Don, \@Ed],  
  unsorted => 1,  
} );
```

=item * Multiple Mode Methods Analogous to Regular and Accelerated Mode Methods

Each List::Compare method available in the Regular and Accelerated cases has an analogue in the Multiple case. However, the results produced usually require more careful specification.

B<Note:> Certain of the following methods available in List::Compare's Multiple mode take optional numerical arguments where those numbers represent the index position of a particular list in the list of arguments passed to the constructor. To specify this index position correctly,

=over 4

=item *

start the count at C<0> (as is customary with Perl array indices); and

=item *

do I<not> count any unsorted option (C<'u'> or

C<'--unsorted'>) preceding
the array references in the constructor's own argument list.

=back

Example:

```
$lcmex = List::Compare->new('--unsorted', \@alpha, \@beta, \@gamma);
```

For the purpose of supplying a numerical argument to a method which optionally takes such an argument, C<'--unsorted'> is skipped, C<@alpha> is C<0>, C<@beta> is C<1>, and so forth.

=over 4

=item * C<get_intersection()>

Get those items found in I<each> of the lists passed to the constructor (their intersection):

```
@intersection = $lcm->get_intersection;
```

=item * C<get_union()>

Get those items found in I<any> of the lists passed to the constructor (their union):

```
@union = $lcm->get_union;
```

=item * C<get_unique()>

To get those items which appear only in I<one particular list,> provide C<get_unique()> with that list's index position in the list of arguments passed to the constructor (not counting any C<'-u'> or C<'--unsorted'> option).

Example: C<@Carmen> has index position C<2> in the constructor's C<@_>.

To get elements unique to C<@Carmen>:

```
@Lonly = $lcm->get_unique(2);
```

If no index position is passed to C<get_unique()> it will default to 0 and report items unique to the first list passed to the constructor.

=item * C<get_complement()>

To get those items which appear in any list I<other than one particular

list,> provide C<get_complement()> with that list's index position in the list of arguments passed to the constructor (not counting any C<'-u'> or C<'--unsorted'> option).

Example: C<@Don> has index position C<3> in the constructor's C<@_>. To get elements not found in C<@Don>:

```
@Ronly = $lcm->get_complement(3);
```

If no index position is passed to C<get_complement()> it will default to 0 and report items found in any list other than the first list passed to the constructor.

```
=item * C<get_symmetric_difference()>
```

Get those items each of which appears in I<only one> of the lists passed to the constructor (their symmetric_difference);

```
@LorRonly = $lcm->get_symmetric_difference;
```

```
=item  
* C<get_bag()>
```

Make a bag of all items found in any list. The bag differs from the lists' union in that it holds as many copies of individual elements as appear in the original lists.

```
@bag = $lcm->get_bag;
```

```
=item * Return reference instead of list
```

An alternative approach to the above methods: If you do not immediately require an array as the return value of the method call, but simply need a I<reference> to an array, use one of the following parallel methods:

```
$intersection_ref = $lcm->get_intersection_ref;  
$union_ref       = $lcm->get_union_ref;  
$Lonly_ref       = $lcm->get_unique_ref(2);  
$Ronly_ref       = $lcm->get_complement_ref(3);  
$LorRonly_ref    = $lcm->get_symmetric_difference_ref;  
$bag_ref         = $lcm->get_bag_ref;
```

```
=item * C<is_LsubsetR()>
```

To determine whether one particular list is a subset of another list passed to the constructor, provide C<is_LsubsetR()> with the index position of the presumed subset (ignoring

any unsorted option), followed
by the index position of the presumed superset.

Example: To determine whether C<@Ed> is a subset of C<@Carmen>, call:

```
$LR = $lcm->is_LsubsetR(4,2);
```

A true value (C<1>) is returned if the left-hand list is a subset of the
right-hand list; a false value (C<0>) is returned otherwise.

If no arguments are passed, C<is_LsubsetR()> defaults to C<(0,1)> and
compares the first two lists passed to the constructor.

```
=item * C<is_LequivalentR()>
```

To determine whether any two particular lists are equivalent to each
other, provide C<is_LequivalentR> with their index positions in the
list of arguments passed to the constructor (ignoring any unsorted option).

Example: To determine whether C<@Don> and C<@Ed> are equivalent, call:

```
$eqv = $lcm->is_LequivalentR(3,4);
```

A true value (C<1>) is returned if the lists are equivalent; a false value
(C<0>) otherwise.

If no arguments are passed, C<is_LequivalentR> defaults to C<(0,1)> and
compares the first two
lists passed to the constructor.

```
=item * C<is_LdisjointR()>
```

To determine whether any two particular lists are disjoint from each other
(I<i.e.,> have no members in common), provide C<is_LdisjointR> with their
index positions in the list of arguments passed to the constructor
(ignoring any unsorted option).

Example: To determine whether C<@Don> and C<@Ed> are disjoint, call:

```
$disj = $lcm->is_LdisjointR(3,4);
```

A true value (C<1>) is returned if the lists are equivalent; a false value
(C<0>) otherwise.

If no arguments are passed, C<is_LdisjointR> defaults to C<(0,1)> and
compares the first two lists passed to the constructor.

```
=item * C<print_subset_chart()>
```

Pretty-print a chart showing the subset relationships among the various source lists:

```
$lcm->print_subset_chart;
```

=item * C<print_equivalence_chart()>

Pretty-print a chart showing the equivalence relationships among the various source lists:

```
$lcm->print_equivalence_chart;
```

=item * C<is_member_which()>

Determine

in I<which> (if any) of the lists passed to the constructor a given string can be found. In list context, return a list of those indices in the constructor's argument list (ignoring any unsorted option) corresponding to i lists holding the string being tested.

```
@memb_arr = $lcm->is_member_which('abel');
```

In the example above, C<@memb_arr> will be:

```
( 0 )
```

because C<'abel'> is found only in C<@A1> which holds position C<0> in the list of arguments passed to C<new()>.

=item * C<is_member_which_ref()>

As with other List::Compare methods which return a list, you may wish the above method returned a (scalar) reference to an array holding the list:

```
$memb_arr_ref = $lcm->is_member_which_ref('jerky');
```

In the example above, C<\$memb_arr_ref> will be:

```
[ 3, 4 ]
```

because C<'jerky'> is found in C<@Don> and C<@Ed>, which hold positions C<3> and C<4>, respectively, in the list of arguments passed to C<new()>.

B<Note:> methods C<is_member_which()> and C<is_member_which_ref> test only

one string at a time and hence take only one argument. To test more than one string at a time see the next method, C<are_members_which()>.

=item * C<are_members_which()>

Determine in C<which> (if any) of the lists passed to the constructor one or more given strings can be found. The strings to be tested are placed in an anonymous array, a reference to which is passed to the method.

```
$memb_hash_ref =  
  $lcm->are_members_which([ qw| abel baker fargo hilton zebra | ]);
```

I<Note:> In versions of List::Compare prior to 0.25 (April 2004), the strings to be tested could be passed as a flat list. This is no longer possible; the argument must now be a reference to an anonymous array.

The return value is a reference to a hash of arrays. The key for each element in this hash is the string being tested. Each element's value is a reference to an anonymous array whose elements are those indices in the constructor's argument list corresponding to lists holding the strings being tested.

In the two examples above, C<\$memb_hash_ref> will be:

```
{  
  abel  => [ 0      ],  
  baker => [ 0, 1    ],  
  fargo => [ 0, 1, 2, 3, 4 ],  
  hilton => [ 1, 2    ],  
  zebra => [        ],  
};
```

B<Note:> C<are_members_which()> can take more than one argument; C<is_member_which()> and C<is_member_which_ref()> each take only one argument. C<are_members_which()> returns a hash reference; the other methods return either a list or a reference to an array holding that list, depending on context.

=item * C<is_member_any()>

Determine whether a given string can be found in I<any> of the lists passed as arguments to the constructor.

```
$found = $lcm->is_member_any('abel');
```

Return C<1> if a specified string can be found in I<any> of the lists and C<0> if not.

In the example above, C<\$found> will be C<1> because C<'abel'> is found in one

or more of the lists passed as arguments to C<new()>.

```
=item * C<are_members_any()>
```

Determine

whether a specified string or strings can be found in I<any> of the lists passed as arguments to the constructor. The strings to be tested are placed in an array (anonymous or named), a reference to which is passed to the method.

```
$memb_hash_ref = $lcm->are_members_any([ qw| abel baker fargo hilton zebra | ]);
```

I<Note:> In versions of List::Compare prior to 0.25 (April 2004), the strings to be tested could be passed as a flat list. This is no longer possible; the argument must now be a reference to an anonymous array.

The return value is a reference to a hash where an element's key is the string being tested and the element's value is 1 if the string can be found in C<any> of the lists and 0 if not.

In the two examples above, C<\$memb_hash_ref> will be:

```
{
  abel  => 1,
  baker => 1,
  fargo => 1,
  hilton => 1,
  zebra => 0,
};
```

C<zebra>'s value will be C<0> because C<zebra> is not found in any of the lists passed as arguments to C<new()>.

```
=item * C<get_version()>
```

Return current List::Compare version number:

```
$vers = $lcm->get_version;
```

```
=back
```

```
=item * Multiple Mode Methods Not Analogous to Regular and Accelerated Mode Methods
```

```
=over 4
```

```
=item * C<get_nonintersection()>
```

Get those items found in I<any> of the lists passed to the constructor which

do I<not> appear in I<all> of the lists (I<i.e.,> all items except those found in the intersection of the lists):

```
@nonintersection = $lcm->get_nonintersection;
```

```
=item * C<get_shared()>
```

Get those items which appear in more than one of the lists passed to the constructor (I<i.e.,> all items except those found in their symmetric difference);

```
@shared = $lcm->get_shared;
```

```
=item * C<get_nonintersection_ref()>
```

If you only need a reference to an array as a return value rather than a full array, use the following alternative methods:

```
$nonintersection_ref = $lcm->get_nonintersection_ref;
```

```
$shared_ref = $lcm->get_shared_ref;
```

```
=item
```

```
* C<get_unique_all()>
```

Get a reference to an array of array references where each of the interior arrays holds the list of those items I<unique> to the list passed to the constructor with the same index position.

```
$unique_all_ref = $lcm->get_unique_all();
```

In the example above, C<\$unique_all_ref> will hold:

```
[
  [ qw| abel | ],
  [ ],
  [ qw| jerky | ],
  [ ],
  [ ],
]
```

```
=item * C<get_complement_all()>
```

Get a reference to an array of array references where each of the interior arrays holds the list of those items in the I<complement> to the list passed to the constructor with the same index position.

```
$complement_all_ref = $lcm->get_complement_all();
```


In the example above, C<\$complement_all_ref> will hold:

```
[
  [ qw| hilton icon jerky | ],
  [ qw| abel icon jerky | ],
  [ qw| abel baker camera delta edward | ],
  [ qw| abel baker camera delta edward jerky | ],
  [ qw| abel baker camera delta edward
jerky | ],
]
```

=back

=back

=head2 Multiple Accelerated Case: Compare Three or More Lists but Request Only a Single Comparison among the Lists

=over 4

=item * Constructor C<new()>

If you are certain that you will only want the results of a single comparison among three or more lists, computation may be accelerated by passing C<'a'> or C<'--accelerated'> as the first argument to the constructor.

```
@Al = qw(abel abel baker camera delta edward fargo golfer);
@Bob = qw(baker camera delta delta edward fargo golfer hilton);
@Carmen = qw(fargo golfer hilton icon icon jerky kappa);
@Don = qw(fargo icon jerky);
@Ed = qw(fargo icon icon jerky);
```

```
$lcma = List::Compare->new('-a',
  \@Al, \@Bob, \@Carmen, \@Don, \@Ed);
```

As with List::Compare's other cases, should you not need to have a sorted list returned by a List::Compare method, you may achieve a speed boost by constructing the object with the unsorted option:

```
$lcma = List::Compare->new('-u',
  '-a',
  \@Al, \@Bob, \@Carmen, \@Don, \@Ed);
```

or

```
$lcma = List::Compare->new('--unsorted', '--accelerated',
  \@Al, \@Bob, \@Carmen, \@Don, \@Ed);
```

As was the case with List::Compare's Multiple mode, do not count the unsorted option (C<'--u'> or C<'--unsorted'>) or the accelerated option (C<'--a'> or C<'--accelerated'>) when determining the index position of a particular list in the list of array references passed to the constructor.

Example:

```
$lcmaex = List::Compare->new('--unsorted', '--accelerated',
    \@alpha, \@beta, \@gamma);
```

=item * Alternative Constructor

The 'single hashref' format may be used to construct a List::Compare object which calls for accelerated processing of three or more lists at once:

```
$lcmaex = List::Compare->new( {
    accelerated => 1,
    lists      => [\@alpha, \@beta, \@gamma],
} );
```

or

```
$lcmaex = List::Compare->new( {
    unsorted   => 1,
    accelerated => 1,
    lists      => [\@alpha, \@beta, \@gamma],
} );
```

=item * Methods

For the purpose of supplying a numerical argument to a method which optionally takes such an argument, C<'--unsorted'> and C<'--accelerated'> are skipped, C<@alpha> is C<0>, C<@beta> is C<1>, and so forth. To get a list of those items unique to C<@gamma>, you would call:

```
@gamma_only = $lcmaex->get_unique(2);
```

=back

=head2 Passing Seen-hashes to the Constructor Instead of Arrays

=over 4

=item * When Seen-Hashes Are Already Available to You

Suppose that in a particular Perl program, you had to do extensive munging of data from an external source and that, once you had correctly parsed a line

of data, it was easier to assign that datum to a hash than to an array.
More specifically, suppose that you used each datum as the key to an element
of a lookup table in the form of a I<seen-hash>:

```
my %Llist = (  
  abel  => 2,  
  baker => 1,  
  camera => 1,  
  delta => 1,  
  edward  
=> 1,  
  fargo => 1,  
  golfer => 1,  
);
```

```
my %Rlist = (  
  baker  => 1,  
  camera => 1,  
  delta  => 2,  
  edward => 1,  
  fargo  => 1,  
  golfer => 1,  
  hilton => 1,  
);
```

In other words, suppose it was more convenient to compute a lookup table
I<implying> a list than to compute that list explicitly.

Since in almost all cases List::Compare takes the elements in the arrays
passed to its constructor and I<internally> assigns them to elements in a
seen-hash, why shouldn't you be able to pass (references to) seen-hashes
I<directly> to the constructor and avoid unnecessary array
assignments before the constructor is called?

```
=item * Constructor C<new()>
```

You can now do so:

```
$lsh = List::Compare->new(\%Llist, \%Rlist);
```

```
=item * Methods
```

I<All> of List::Compare's output methods are supported I<without further
modification> when references to seen-hashes are passed to the constructor.

```
@intersection  = $lsh->get_intersection;  
@union         = $lsh->get_union;  
@Lonly        = $lsh->get_unique;
```

```

@Ronly      = $lcsch->get_complement;
@LorRonly   = $lcsch->get_symmetric_difference;
@bag        = $lcsch->get_bag;
$intersection_ref = $lcsch->get_intersection_ref;
$union_ref  = $lcsch->get_union_ref;
$Lonly_ref  = $lcsch->get_unique_ref;
$Ronly_ref  = $lcsch->get_complement_ref;
$LorRonly_ref = $lcsch->get_symmetric_difference_ref;
$bag_ref    = $lcsch->get_bag_ref;
$LR         = $lcsch->is_LsubsetR;
$RL         = $lcsch->is_RsubsetL;
$seqv      = $lcsch->is_LequivalentR;
$disj      = $lcsch->is_LdisjointR;
            $lcsch->print_subset_chart;
            $lcsch->print_equivalence_chart;
@memb_arr   = $lsch->is_member_which('abel');
$memb_arr_ref = $lsch->is_member_which_ref('baker');
$memb_hash_ref = $lsch->are_members_which(
                [ qw| abel baker fargo hilton zebra | ] );
$found      = $lsch->is_member_any('abel');
$memb_hash_ref = $lsch->are_members_any(
                [ qw| abel baker fargo hilton zebra | ] );
$vers       = $lcsch->get_version;
$unique_all_ref = $lcsch->get_unique_all();
$complement_all_ref = $lcsch->get_complement_all();

```

=item * Accelerated Mode and Seen-Hashes

To accelerate processing when you want only a single comparison among two or more lists, you can pass C<'a'> or C<'--accelerated'> to the constructor before passing references to seen-hashes.

```
$lcscha = List::Compare->new('-a', \%Llist, \%Rlist);
```

To compare three or more lists simultaneously, pass three or more references to seen-hashes. Thus,

```
$lcschm = List::Compare->new(\%Alpha, \%Beta, \%Gamma);
```

will generate meaningful comparisons of three or more lists simultaneously.

=item * Unsorted Results and Seen-Hashes

If you do not need sorted lists returned, pass C<'-u'> or C<'--unsorted'> to the constructor before passing references to seen-hashes.

```
$lcschu = List::Compare->new('-u', \%Llist, \%Rlist);
```

```
$lcshau = List::Compare->new('-u', '-a', \%Llist, \%Rlist);
$lcshmu = List::Compare->new('--unsorted', \%Alpha, \%Beta, \%Gamma);
```

As was true when we were using List::Compare's Multiple and Multiple Accelerated modes, do not count any unsorted or accelerated option when determining the array index of a particular seen-hash reference passed to the constructor.

=item * Alternative Constructor

The 'single hashref' form of constructor is also available to build List::Compare objects where seen-hashes are used as arguments:

```
$lcshu = List::Compare->new( {
    unsorted => 1,
    lists    => [\%Llist, \%Rlist],
} );
```

```
$lcshau = List::Compare->new( {
    unsorted  => 1,
    accelerated => 1,
    lists     => [\%Llist, \%Rlist],
} );
```

```
$lcshmu = List::Compare->new( {
    unsorted => 1,
    lists    => [\%Alpha, \%Beta, \%Gamma],
} );
```

=back

=head1 DISCUSSION: Principles

=head2 General Comments

List::Compare is an object-oriented implementation of very common Perl code (see "History, References and Development" below) used to determine interesting relationships between two or more lists at a time. A List::Compare object is created and automatically computes the values needed to supply List::Compare methods with appropriate results. In the current implementation List::Compare methods will return new lists containing the items found in any designated list alone (unique), any list other than a designated list (complement), the intersection and union of all lists and so forth. List::Compare also has (a) methods to return Boolean values indicating whether one list is a subset of another and whether any two lists are equivalent to each other (b) methods to pretty-print very simple charts displaying the subset and equivalence relationships among lists.

Except for List::Compare's C<get_bag()> method, B<multiple instances of an element in a given list count only once with respect to computing the intersection, union, etc. of the two lists.> In particular, List::Compare considers two lists as equivalent if each element of the first list can be found in the second list and I<vice versa>. 'Equivalence' in this usage takes no note of the frequency with which elements occur in either list or their order within the lists. List::Compare asks the question: I<Did I see this item in this list at all?> Only when you use C<List::Compare::get_bag()> to compute a bag holding the two lists do you ask the question: How many times did this item occur in this list?

=head2 List::Compare Modes

In its current implementation List::Compare has four modes of operation.

=over 4

=item *

Regular Mode

List::Compare's Regular mode is based on List::Compare v0.11 -- the first version of List::Compare released to CPAN (June 2002). It compares only two lists at a time. Internally, its initializer does all computations needed to report any desired comparison and its constructor stores the results of these computations. Its public methods merely report these results.

This approach has the advantage that if you need to examine more than one form of comparison between two lists (I<e.g.,> the union, intersection and symmetric difference of two lists), the comparisons are pre-calculated. This approach is efficient because certain types of comparison presuppose that other types have already been calculated. For example, to calculate the symmetric difference of two lists, one must first determine the items unique to each of the two lists.

=item *

Accelerated Mode

The current implementation of List::Compare offers you the option of getting even faster results I<provided> that you only need the result from a I<single> form of comparison between two lists. (I<e.g.,> only the union -- nothing else). In the Accelerated mode, List::Compare's initializer does no computation and its constructor stores only references

to the two source lists. All computation needed to report results is deferred to the method calls.

The user selects this approach by passing the option flag `C<'a'` to the constructor before passing references to the two source lists.

`List::Compare` notes the option flag and silently switches into Accelerated mode. From the perspective of the user, there is no further difference in the code or in the results.

Benchmarking suggests that `List::Compare`'s Accelerated mode (a) is faster than its Regular mode when only one comparison is requested; (b) is about as fast as Regular mode when two comparisons are requested; and (c) becomes considerably slower than Regular mode as each additional comparison above two is requested.

=item *

Multiple Mode

`List::Compare` now offers the possibility of comparing three or more lists at a time. Simply store the extra lists in arrays and pass references to those arrays to the constructor. `List::Compare` detects that more than two lists have been passed to the constructor and silently switches into Multiple mode.

As described in the Synopsis above, comparing more than two lists at a time offers you a wider, more complex palette of comparison methods.

Individual items may appear in just one source list, in all the source lists, or in some number of lists between one and all. The meaning of 'union', 'intersection' and 'symmetric difference' is conceptually unchanged when you move to multiple lists because these are properties of all the lists considered together. In contrast, the meaning of 'unique', 'complement', 'subset' and 'equivalent' changes because these are properties of one list compared with another or with all the other lists combined.

`List::Compare` takes this complexity into account by allowing you to pass arguments to the public methods requesting results with respect to a specific list (for `C<get_unique()` and `C<get_complement(>>`) or a specific pair of lists (for `C<is_LsubsetR()` and `C<is_LequivalentR(>>`).

`List::Compare` further takes this complexity into account by offering the new methods `C<get_shared(>>` and `C<get_nonintersection(>>` described in the Synopsis above.

=item *

Multiple Accelerated Mode

Beginning with version 0.25, introduced in April 2004, `List::Compare` offers the possibility of accelerated computation of a single comparison among three or more lists at a time. Simply store the extra lists in arrays and pass references to those arrays to the constructor preceded by the `C<-a>` argument as was done with the simple (two lists only) accelerated mode. `List::Compare` detects that more than two lists have been passed to the constructor and silently switches into Multiple Accelerated mode.

=item *

Unsorted Option

When `List::Compare` is used to return lists representing various comparisons of two or more lists (I<e.g.>, the lists' union or intersection), the lists returned are, by default, sorted using Perl's default `C<sort>` mode: ASCII-betical sorting. Sorting produces results which are more easily human-readable but may entail a performance cost.

Should you not need sorted results, you can avoid the potential performance cost by calling `List::Compare`'s constructor using the unsorted option. This is done by calling `C<-u>` or `C<--unsorted>` as the first argument passed to the constructor, I<i.e.>, as an argument called before any references to lists are passed to the constructor.

Note that if are calling `List::Compare` in the Accelerated or Multiple Accelerated mode I<and> wish to have the lists returned in unsorted order, you I<first> pass the argument for the unsorted option (`C<-u>` or `C<--unsorted>`) and I<then> pass the argument for the Accelerated mode (`C<-a>` or `C<--accelerated>`).

=back

=head2 Miscellaneous Methods

It would not really be appropriate to call `C<get_shared()>` and `C<get_nonintersection()>` in Regular or Accelerated mode since they are conceptually based on the notion of comparing more than two lists at a time. However, there is always the possibility that a user may be comparing only two lists (accelerated or not) and may accidentally call one of those two methods. To prevent fatal run-time errors and to caution you to use a more appropriate method, these two methods are defined for Regular and Accelerated modes so as to return suitable results but also generate a carp message that advise you to re-code.

Similarly, the method `C<is_RsubsetL()` is appropriate for the Regular and Accelerated modes but is not really appropriate for Multiple mode. As a defensive maneuver, it has been defined for Multiple mode so as to return suitable results but also to generate a carp message that advises you to re-code.

In `List::Compare` v0.11 and earlier, the author provided aliases for various methods based on the supposition that the source lists would be referred to as 'A' and 'B'. Now that you can compare more than two lists at a time, the author feels that it would be more appropriate to refer to the elements of two-argument lists as the left-hand and right-hand elements. Hence, we are discouraging the use of methods such as `C<get_Aonly()`, `C<get_Bonly()` and `C<get_AorBonly()` as aliases for `C<get_unique()`, `C<get_complement()` and `C<get_symmetric_difference()`. However, to guarantee backwards compatibility for the vast audience of Perl programmers using earlier versions of `List::Compare` (all 10e1 of you) these and similar methods for subset relationships are still defined.

=head2 `List::Compare::SeenHash` Discontinued Beginning with Version 0.26

Prior to v0.26, introduced April 11, 2004, if a user wished to pass references to seen-hashes to `List::Compare`'s constructor rather than references to arrays, he or she had to call a different, parallel module: `List::Compare::SeenHash`. The code for that looked like this:

```
use List::Compare::SeenHash;
```

```
my %Llist = (  
    abel => 2,  
    baker => 1,  
    camera => 1,  
    delta => 1,  
    edward => 1,  
    fargo => 1,  
    golfer => 1,  
);
```

```
my %Rlist = (  
    baker => 1,  
    camera => 1,  
    delta => 2,  
    edward => 1,  
    fargo => 1,  
    golfer => 1,  
    hilton => 1,  
);
```

```
my $lcs = List::Compare::SeenHash->new(\%Llist, \%Rlist);
```

B<List::Compare::SeenHash is deprecated beginning with version 0.26.> All its functionality (and more) has been implemented in List::Compare itself, since a user can now pass I<either> a series of array references I<or> a series of seen-hash references to List::Compare's constructor.

To simplify future maintenance of List::Compare, List::Compare::SeenHash.pm will no longer be distributed with List::Compare, nor will the files in the test suite which tested List::Compare::SeenHash upon installation be distributed.

Should you still need List::Compare::SeenHash, use version 0.25 from CPAN, or simply edit your Perl programs which used List::Compare::SeenHash. Those scripts may be edited quickly with, for example, this editing command in Unix text editor F<vi>:

```
:1,$s/List::Compare::SeenHash/List::Compare/gc
```

=head2 A Non-Object-Oriented Interface: List::Compare::Functional

Version 0.21 of List::Compare introduced List::Compare::Functional, a functional (I<i.e.>, non-object-oriented) interface to list comparison functions. List::Compare::Functional supports the same functions currently supported by List::Compare. It works similar to List::Compare's Accelerated and Multiple Accelerated modes (described above), but it does not require use of the C<'a'> flag in the function call.

List::Compare::Functional will return unsorted comparisons of two lists by passing C<'u'> or C<'--unsorted'> as the first argument to the function. Please see the documentation for List::Compare::Functional to learn how to import its functions into your main package.

=head1 ASSUMPTIONS AND QUALIFICATIONS

The program was created with Perl 5.6. The use of I<h2xs> to prepare the module's template installed C<require 5.005_62;> at the top of the module. This has been commented out in the actual module as the code appears to be compatible with earlier versions of Perl; how earlier the author cannot say. In particular, the author would like the module to be installable on older versions of MacPerl. As is, the author has successfully installed the module on Linux, Windows 9x and Windows 2000. See L<<http://testers.cpan.org/show/List-Compare.html>> for a list of other systems on which this version of List::Compare has been tested and installed.

=head1 HISTORY, REFERENCES AND DEVELOPMENT

=head2 The Code Itself

List::Compare is based on code presented by Tom Christiansen & Nathan Torkington in I<Perl Cookbook> L<<http://www.oreilly.com/catalog/cookbook/>> (a.k.a. the 'Ram' book), O'Reilly & Associates, 1998, Recipes 4.7 and 4.8.

Similar

code is presented in the Camel book: I<Programming Perl>, by Larry Wall, Tom Christiansen, Jon Orwant.

L<<http://www.oreilly.com/catalog/ppperl3/>>, 3rd ed, O'Reilly & Associates, 2000. The list comparison code is so basic and Perl-ish that I suspect it may have been written by Larry himself at the dawn of Perl time. The C<get_bag()> method was inspired by Jarkko Hietaniemi's Set::Bag module and Daniel Berger's Set::Array module, both available on CPAN.

List::Compare's original objective was simply to put this code in a modular, object-oriented framework. That framework, not surprisingly, is taken mostly from Damian Conway's I<Object Oriented Perl>

L<<http://www.manning.com/Conway/index.html>>, Manning Publications, 2000.

With the addition of the Accelerated, Multiple and Multiple Accelerated modes, List::Compare expands considerably in both size and capabilities. Nonetheless, Tom and Nat's I<Cookbook> code still lies at its core: the use of hashes as look-up tables to record elements seen in lists.

Please note: List::Compare is not concerned with any concept of 'equality' among lists which hinges upon the frequency with which, or the order in which, elements appear in the lists to be compared. If this does not meet your needs, you should look elsewhere or write your own module.

=head2 The Inspiration

I realized the usefulness of putting the list comparison code into a module while preparing an introductory level Perl course given at the New School University's Computer Instruction Center in April-May 2002. I was comparing lists left and right. When I found myself writing very similar functions in different scripts, I knew a module was lurking somewhere. I learned the truth of the mantra "Repeated Code is a Mistake" from a 2001 talk by Mark-Jason Dominus L<<http://perl.plover.com/>> to the New York Perlmongers L<<http://ny.pm.org/>>. See L<<http://www.perl.com/pub/a/2000/11/repair3.html>>.

The first public presentation of this module took place at Perl Seminar New

York L<<http://groups.yahoo.com/group/perlsemny>> on May 21, 2002. Comments and suggestions were provided there and since by Glenn Maciag, Gary Benson, Josh Rabinowitz, Terrence Brannon and Dave Cross.

The placement in the installation tree of Test::ListCompareSpecial came

as a result of a question answered by Michael Graham in his talk "Test::More to Test::Extreme" given at Yet Another Perl Conference::Canada in Ottawa, Ontario, on May 16, 2003.

In May-June 2003, Glenn Maciag made valuable suggestions which led to changes in method names and documentation in v0.20.

Another presentation at Perl Seminar New York in October 2003 prompted me to begin planning List::Compare::Functional.

In a November 2003 Perl Seminar New York presentation, Ben Holtzman discussed the performance costs entailed in Perl's C<sort> function. This led me to ask, "Why should a user of List::Compare pay this performance cost if he or she doesn't need a human-readable list as a result (as would be the case if the list returned were used as the input into some other function)?" This led to the development of List::Compare's unsorted option.

An April 2004 offer by Kevin Carlson to write an article for I<The Perl Journal> (L<<http://tpj.com>>) led me to re-think whether a separate module (the former List::Compare::SeenHash) was truly needed when a user wanted to provide the constructor with references to seen-hashes rather than references to arrays. Since I had already adapted List::Compare::Functional to accept both kinds of arguments, I adapted List::Compare in the same manner. This meant that List::Compare::SeenHash and its related installation tests could be deprecated and deleted from the CPAN distribution.

A remark by David H. Adler at a New York Perlmongers meeting in April 2004 led me to develop the 'single hashref' alternative constructor format, introduced in version 0.29 the following month.

Presentations at two different editions of Yet Another Perl Conference (YAPC) inspired the development of List::Compare versions 0.30 and 0.31. I was selected to give a talk on List::Compare at YAPC::NA::2004 in Buffalo. This spurred me to improve certain aspects of the documentation. Version 0.31 owes its inspiration to one talk at the Buffalo YAPC and one earlier talk at YAPC::EU::2003 in Paris. In Paris I heard Paul Johnson speak on his CPAN module Devel::Cover and on coverage analysis more generally. That material was over my head at that time, but in Buffalo I heard Andy Lester discuss Devel::Cover as part of his discussion of testing and of the Phalanx project (L<<http://qa.perl.org/phalanx>>). This time I got it, and when I returned from Buffalo I applied Devel::Cover to List::Compare and wrote additional tests to improve its subroutine and statement coverage. In addition, I added two new methods, C<get_unique_all> and C<get_complement_all>. In writing these two methods, I followed a model of test-driven development much more so than in earlier versions

of List::Compare and my other CPAN modules. The result?
List::Compare's test suite grew by over 3300 tests to nearly 23,000 tests.

At the Second New York Perl Hackathon (May 02 2015), a project was created to request performance improvements in certain List::Compare functions ([L<https://github.com/nyperlmongers/nyperlhackathon2015/wiki/List-Compare-Performance-Improvements>](https://github.com/nyperlmongers/nyperlhackathon2015/wiki/List-Compare-Performance-Improvements)). Hackathon participant Michael Rawson submitted a pull request with changes to List::Compare::Base::_Auxiliary. After these revisions were benchmarked, a patch embodying the pull request was accepted, leading to CPAN version 0.53.

=head2 If You Like List::Compare, You'll Love ...

While preparing this module for distribution via CPAN, I had occasion to study a number of other modules already available on CPAN. Each of these modules is more sophisticated than List::Compare -- which is not surprising since all that List::Compare originally aspired to do was to avoid typing Cookbook code repeatedly. Here is a brief description of the features of these modules. (B<Warning:> The following discussion is only valid as of June 2002. Some of these modules may have changed since then.)

=over 4

=item *

Algorithm::Diff - Compute 'intelligent' differences between two files/lists ([L<http://search.cpan.org/dist/Algorithm-Diff/>](http://search.cpan.org/dist/Algorithm-Diff/))

Algorithm::Diff is a sophisticated module originally written by Mark-Jason Dominus, later maintained by Ned Konz, now maintained by Tye McQueen. Think of the Unix C<diff> utility and you're on the right track. Algorithm::Diff exports methods such as C<diff>, which "computes the smallest set of additions and deletions necessary to turn the first sequence into the second, and returns a description of these changes." Algorithm::Diff is mainly concerned with the sequence of elements within two lists. It does not export functions for intersection, union, subset status, etc.

=item *

Array::Compare - Perl extension for comparing arrays ([L<http://search.cpan.org/dist/Array-Compare/>](http://search.cpan.org/dist/Array-Compare/))

Array::Compare, by Dave Cross, asks whether two arrays are the same or different by doing a C<join> on each string with a separator character and comparing the resulting strings. Like List::Compare, it is an object-oriented module. A sophisticated feature of

Array::Compare is that it allows you to specify how 'whitespace' in an array (an element which is undefined, the empty string, or whitespace within an element) should be evaluated for purpose of determining equality or difference. It does not directly provide methods for intersection and union.

=item *

Data::Compare - compare perl data structures
([L<http://search.cpan.org/dist/Data-Compare/>](http://search.cpan.org/dist/Data-Compare/))

This library compares Perl data structures recursively. Comes recommended by Slaven Rezi!

=item *

List::Util - A selection of general-utility list subroutines
([L<http://search.cpan.org/dist/Scalar-List-Utils/>](http://search.cpan.org/dist/Scalar-List-Utils/))

List::Util, by Graham Barr, exports a variety of simple, useful functions for operating on one list at a time. The C<min> function returns the lowest numerical value in a list; the C<max> function returns the highest value; and so forth. List::Compare differs from List::Util in that it is object-oriented and that it works on two strings at a time rather than just one -- but it aims to be as simple and useful as List::Util. List::Util will be included in the standard Perl distribution as of Perl 5.8.0.

Lists::Util ([L<http://search.cpan.org/dist/List-MoreUtils/>](http://search.cpan.org/dist/List-MoreUtils/)), by Tassilo von Parseval, building on code by Terrence Brannon, provides methods which extend List::Util's functionality.

=item *

Quantum::Superpositions
([L<http://search.cpan.org/dist/Quantum-Superpositions/>](http://search.cpan.org/dist/Quantum-Superpositions/)), originally by Damian Conway, now maintained by Steven Lembark is useful if, in addition to comparing lists, you need to emulate quantum supercomputing as well.
Not for the eigen-challenged.

=item *

Set::Scalar - basic set operations
([L<http://search.cpan.org/dist/Set-Scalar/>](http://search.cpan.org/dist/Set-Scalar/))

Set::Bag - bag (multiset) class
(L<<http://search.cpan.org/dist/Set-Bag/>>)

Both

of these modules are by Jarkko Hietaniemi. Set::Scalar has methods to return the intersection, union, difference and symmetric difference of two sets, as well as methods to return items unique to a first set and complementary to it in a second set. It has methods for reporting considerably more variants on subset status than does List::Compare. However, benchmarking suggests that List::Compare, at least in Regular mode, is considerably faster than Set::Scalar for those comparison methods which List::Compare makes available.

Set::Bag enables one to deal more flexibly with the situation in which one has more than one instance of an element in a list.

=item *

Set::Array - Arrays as objects with lots of handy methods (including set comparisons) and support for method chaining.
(L<<http://search.cpan.org/dist/Set-Array/>>)

Set::Array, by Daniel Berger, now maintained by Ron Savage, "aims to provide built-in methods for operations that people are always asking how to do, and which already exist in languages like Ruby." Among the many methods in this module are some for intersection, union, etc. To install Set::Array, you must first install the Want module, also available on CPAN.

=back

=head1 ADDITIONAL CONTRIBUTORS

=over 4

=item * Syohei YOSHIDA

Pull request accepted May 22 2015.

=item * Paulo Custodio

Pull request accepted June 07 2015, correcting errors in C<_subset_subengine()>.

=back

=head1 BUGS

There are no bug reports outstanding on List::Compare as of the most recent

CPAN upload date of this distribution.

=head1 SUPPORT

Please report any bugs by mail to C<bug-List-Compare@rt.cpan.org>
or through the web interface at L<http://rt.cpan.org>.

=head1 AUTHOR

James E. Keenan (jkeenan@cpan.org). When sending correspondence, please include 'List::Compare' or 'List-Compare' in your subject line.

Creation date: May 20, 2002. Last modification date: August 16 2020.

Development repository: L<https://github.com/jkeenan/list-compare>

=head1

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=cut

Found in path(s):

* /opt/cola/permits/1317245570_1651089925.14/0/liblist-compare-perl-0-55-orig-tar-gz/List-Compare-0.55/lib/List/Compare.pm

No license file was found, but licenses were detected in source scan.

abstract: 'Compare elements of two or more lists'

author:

- 'James E Keenan (jkeenan@cpan.org)'

build_requires:

Capture::Tiny: '0'

ExtUtils::MakeMaker: '0'

Test::Simple: '0.1'

configure_requires:

ExtUtils::MakeMaker: '0'

dynamic_config: 1

generated_by: 'ExtUtils::MakeMaker version 7.44, CPAN::Meta::Converter version 2.150010'

license: perl

meta-spec:

url: <http://module-build.sourceforge.net/META-spec-v1.4.html>

version: '1.4'

name: List-Compare

no_index:

directory:

- t

- inc

resources:

bugtracker: <https://rt.cpan.org/Public/Dist/Display.html?Name=List-Compare>

homepage: <http://thenceforward.net/perl/modules/List-Compare/>

repository: <https://github.com/jkeenan/list-compare.git>

version: '0.55'

x_serialization_backend: 'CPAN::Meta::YAML version 0.018'

Found in path(s):

* /opt/cola/permits/1317245570_1651089925.14/0/liblist-compare-perl-0-55-orig-tar-gz/List-Compare-0.55/META.yml

No license file was found, but licenses were detected in source scan.

List::Compare - Compare elements of two or more lists

This document refers to version 0.55 of List::Compare. This version was released August 16 2020.

To install this module on your system, place the tarball archive file in a temporary directory and call the following:

```
% gunzip List-Compare-0.55.tar.gz
```

```
% tar xf List-Compare-0.55.tar
% cd List-Compare-0.55
% perl Makefile.PL
% make
% make test
% make install
```

If during installation you wish to view more information on test results, substitute the following for the sixth line in the sequence of commands above:

```
% make test TEST=VERBOSE
```

If you are installing this module over any earlier version, you may substitute the following for the last line in the sequence of commands above:

```
% make install UNINST=1
```

If you are installing this module on a Win32 system with 'nmake', substitute 'nmake' for 'make' in the sequence of commands above.

The author has found that trying to install this distribution with

(a) older (pre-6.16) versions of ExtUtils::MakeMaker, (b) on older versions of Perl (e.g., 5.6.0), and (c) on older Linux distributions (e.g., RedHat Linux 7.3) can result in a situation where the module's Plain Old Documentation, when transformed into manual pages, is not automatically placed in the optimal location for reading thru 'man' and 'info' (even though it reads perfectly through 'perldoc'). If you experience this problem, issue the following at the command line (adapted from a suggestion by Michael Schwern on the module-authors mailing list):

```
% perl Makefile.PL INSTALLSITEMAN3DIR=/usr/share/man/man3
```

List::Compare uses the Carp module which is part of the standard Perl distribution. Other than that, there are no module dependencies in this version of List::Compare.

Certain methods in this version of List::Compare are included solely for backwards compatibility with earlier versions and are deprecated. When called, they print warning messages via Carp. In earlier versions of List::Compare these warning messages would appear when you called 'make test' as part of the installation process. This was harmless but annoying and has been fixed.

Beginning with version 0.25 in April 2004, there is a modification to the interface of two methods/functions: `are_members_which()` and `are_members_any()`. Whereas previously the strings to be tested could be passed to the subroutine either as a flat list or via a reference to an anonymous array, now those items must be passed via reference to an anonymous array.

Beginning with version 0.26 in April 2004, the functionality previously found in `List::Compare::SeenHash` has been incorporated directly into `List::Compare`. Hence, `List::Compare::SeenHash` and the test suite files associated with it have been deprecated and are no longer included in the CPAN distribution. Please see the `List::Compare` documentation for further details.

In sending e-mail to the author, please put "List::Compare" or "List-Compare" in the subject line.

Author: James E. Keenan (jkeenan@cpan.org).
Originally created May 20, 2002.

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Found in path(s):

* /opt/cola/permits/1317245570_1651089925.14/0/liblist-compare-perl-0-55-orig-tar-gz/List-Compare-0.55/README

No license file was found, but licenses were detected in source scan.

=head1 NAME

List::Compare::Functional - Compare elements of two or more lists

=head1 VERSION

This document refers to version 0.55 of List::Compare::Functional. This version was released August 16 2020. The first released version of List::Compare::Functional was v0.21. Its version numbers are set to be consistent with the other parts of the List::Compare distribution.

=head2 Notice of Interface Changes

Certain significant changes to the interface to List::Compare::Functional were made with the introduction of Version 0.25 in April 2004. The documentation immediately below reflects those changes, so if you are first using this module with that or a later version, simply read and

follow the documentation below. If, however, you used `List::Compare::Functional` prior to that version, see the discussion of interface changes farther below: April 2004 Change of Interface.

=head1 SYNOPSIS

=head2 Getting Started

`List::Compare::Functional`
exports no subroutines by default.

```
use List::Compare::Functional qw(:originals :aliases);
```

will import all publicly available subroutines from `List::Compare::Functional`. The model for importing just one subroutine from `List::Compare::Functional` is:

```
use List::Compare::Functional qw( get_intersection );
```

It will probably be most convenient for the user to import functions by using one of the two following export tags:

```
use List::Compare::Functional qw(:main :mainrefs);
```

The assignment of the various comparison functions to export tags is discussed below.

For clarity, we shall begin by discussing comparisons of just two lists at a time. Farther below, we shall discuss comparisons among three or more lists at a time.

=head2 Comparing Two Lists Held in Arrays

=over 4

=item *

Given two lists:

```
@Llist = qw(abel abel baker camera delta edward fargo golfer);  
@Rlist = qw(baker camera delta delta edward fargo golfer hilton);
```

=item *

Get those
items which appear at least once in both lists (their intersection).

```
@intersection = get_intersection( [ \@Llist, \@Rlist ] );
```

Note that you could place the references to the lists being compared into a named array and then pass `C<get_intersection()>` a reference to that array.

```
@to_be_compared = ( \@Llist, \@Rlist );
@intersection = get_intersection( \@to_be_compared );
```

Beginning with version 0.29 (May 2004), `List::Compare::Functional` now offers an additional way of passing arguments to its various functions. If you prefer to see a more explicit delineation among the types of arguments passed to a function, pass a single hash reference which holds the lists being compared in an anonymous array which is the value corresponding to key `C<lists>`:

```
@intersection = get_intersection( {
  lists => [ \@Llist, \@Rlist ],
} );
```

=item *

Get those items which appear at least once in either list (their union).

```
@union = get_union( [ \@Llist, \@Rlist ] );
```

or

```
@union
= get_union( { lists => [ \@Llist, \@Rlist ] } );
```

=item *

Get those items which appear (at least once) only in the first list.

```
@Lonly = get_unique( [ \@Llist, \@Rlist ] );
```

or

```
@Lonly = get_unique( { lists => [ \@Llist, \@Rlist ] } );
```

=item *

Get those items which appear (at least once) only in the second list.

```
@Ronly = get_complement( [ \@Llist, \@Rlist ] );
```

or

```
@Ronly = get_complement( { lists => [ \@Llist, \@Rlist ] } );
```

=item *

```
@LorRonly = get_symmetric_difference( [ \@Llist, \@Rlist ] );
```

```
@LorRonly = get_syndiff( [ \@Llist, \@Rlist ] );    # alias
```

or

```
@LorRonly = get_symmetric_difference( { lists => [ \@Llist, \@Rlist ] } );
```

=item *

Make a bag of all those items in both lists. The bag differs from the union of the two lists in that it holds as many copies of individual elements as appear in the original lists.

```
@bag = get_bag( [ \@Llist, \@Rlist ] );
```

or

```
@bag = get_bag( { lists => [ \@Llist, \@Rlist ] } );
```

=item *

An alternative

approach to the above functions: If you do not immediately require an array as the return value of the function call, but simply need a [I<reference>](#) to an (anonymous) array, use one of the following parallel functions:

```
$intersection_ref = get_intersection_ref(    [ \@Llist, \@Rlist ] );  
$union_ref       = get_union_ref(         [ \@Llist, \@Rlist ] );  
$Lonly_ref       = get_unique_ref(        [ \@Llist, \@Rlist ] );  
$Ronly_ref       = get_complement_ref(    [ \@Llist, \@Rlist ] );  
$LorRonly_ref    = get_symmetric_difference_ref( [ \@Llist, \@Rlist ] );  
$LorRonly_ref    = get_syndiff_ref(       [ \@Llist, \@Rlist ] );  
                # alias  
$bag_ref         = get_bag_ref(           [ \@Llist, \@Rlist ] );
```

or

```
$intersection_ref =  
  get_intersection_ref(    { lists => [ \@Llist, \@Rlist ] } );  
$union_ref        =  
  get_union_ref(          { lists => [ \@Llist, \@Rlist  
] } );  
$Lonly_ref         =  
  get_unique_ref(        { lists => [ \@Llist, \@Rlist ] } );
```

```

$Ronly_ref    =
  get_complement_ref(      { lists => [ \@Llist, \@Rlist ] } );
$LorRonly_ref  =
  get_symmetric_difference_ref( { lists => [ \@Llist, \@Rlist ] } );
$LorRonly_ref  =
  get_syndiff_ref(        { lists => [ \@Llist, \@Rlist ] } );
# alias
$bag_ref      =
  get_bag_ref(           { lists => [ \@Llist, \@Rlist ] } );

```

=item *

Return a true value if the first list ('L' for 'left') is a subset of the second list ('R' for 'right').

```
$LR = is_LsubsetR( [ \@Llist, \@Rlist ] );
```

or

```
$LR = is_LsubsetR( { lists => [ \@Llist, \@Rlist ] } );
```

=item *

Return a true value if R is a subset of L.

```
$RL = is_RsubsetL( [ \@Llist, \@Rlist ] );
```

or

```
$RL = is_RsubsetL( { lists => [ \@Llist, \@Rlist ] } );
```

=item *

Return a true value if L and R are equivalent, I<i.e.,> if every element in L appears at least once in R and I<vice versa>.

```

$seqv = is_LequivalentR( [ \@Llist, \@Rlist ] );
$seqv = is_LeqvIntR( [ \@Llist, \@Rlist ] );      # alias

```

or

```
$seqv = is_LequivalentR( { lists => [ \@Llist, \@Rlist ] } );
```

=item *

Return a true value if L and R are disjoint, I<i.e.,> if L and R have no common elements.

```
$disj = is_LdisjointR( [ \@Llist, \@Rlist ] );
```

or

```
$disj = is_LdisjointR( { lists => [ \@Llist, \@Rlist ] } );
```

=item *

Pretty-print a chart showing whether one list is a subset of the other.

```
print_subset_chart( [ \@Llist, \@Rlist ] );
```

or

```
print_subset_chart( { lists => [ \@Llist, \@Rlist ] } );
```

=item *

Pretty-print a chart showing whether the two lists are equivalent (same elements found at least once in both).

```
print_equivalence_chart( [ \@Llist, \@Rlist ] );
```

or

```
print_equivalence_chart( { lists => [ \@Llist, \@Rlist ] } );
```

=item *

Determine in I<which> (if any) of the lists a given string can be found.

In list context,

return a list of those indices in the argument list

corresponding to lists holding the string being tested.

```
@memb_arr = is_member_which( [ \@Llist, \@Rlist ] , [ 'abel' ] );
```

or

```
@memb_arr = is_member_which( {  
  lists => [ \@Llist, \@Rlist ], # value is array reference  
  item => 'abel',             # value is string  
} );
```

In the example above, C<@memb_arr> will be:

```
( 0 )
```


because C<'abel'> is found only in C<@Al> which holds position C<0> in the list of arguments passed to C<new()>.

=item *

As with other List::Compare::Functional functions which return a list, you may wish the above function returned a (scalar) reference to an array holding the list:

```
$memb_arr_ref = is_member_which_ref( [ \@Llist, \@Rlist ], [ 'baker' ] );
```

or

```
$memb_arr_ref = is_member_which_ref( {  
  lists => [ \@Llist, \@Rlist ], # value is array reference  
  item => 'baker',           # value is string  
} );
```

In the example above, C<\$memb_arr_ref> will be:

```
[ 0, 1 ]
```

because C<'baker'> is found in C<@Llist> and C<@Rlist>, which hold positions C<0> and C<1>, respectively, in the list of arguments passed to C<new()>.

B<Note:> functions C<is_member_which()> and C<is_member_which_ref> test only one string at a time and hence take only one argument. To test more than one string at a time see the next function, C<are_members_which()>.

=item *

Determine in C<which> (if any) of the lists passed as arguments one or more given strings can be found. The lists beings searched are placed in an array, a reference to which is the first argument passed to C<are_members_which()>. The strings to be tested are also placed in an array, a reference to which is the second argument passed to that function.

```
$memb_hash_ref =  
  are_members_which( [ \@Llist, \@Rlist ],  
                    [ qw| abel baker fargo hilton zebra | ]  
                  );
```

or

```
$memb_hash_ref = are_members_which( {  
  lists => [
```

```
\@Llist, \@Rlist ],          # value is arrayref
  items => [ qw| abel baker fargo hilton zebra | ], # value is arrayref
} );
```

The return value is a reference to a hash of arrays. The key for each element in this hash is the string being tested. Each element's value is a reference to an anonymous array whose elements are those indices in the constructor's argument list corresponding to lists holding the strings being tested. In the examples above, C<\$memb_hash_ref> will be:

```
{
  abel  => [ 0 ],
  baker => [ 0, 1 ],
  fargo => [ 0, 1 ],
  hilton => [ 1 ],
  zebra => [ ],
};
```

Note: C<are_members_which()> can take more than one argument; C<is_member_which()> and C<is_member_which_ref()> each take only one argument. Unlike those functions, C<are_members_which()> returns a hash reference.

=item *

Determine whether a given string can be found in I<any> of the lists passed as arguments. Return C<1> if a specified string can be found in any of the lists and C<0> if not.

```
$found = is_member_any( [ \@Llist, \@Rlist ], [ 'abel' ] );
```

or

```
$found = is_member_any( {
  lists => [ \@Llist, \@Rlist ], # value is array reference
  item  => 'abel',             # value is string
} );
```

In the example above, C<\$found> will be C<1> because C<'abel'> is found in one or more of the lists passed as arguments to C<new()>.

=item *

Determine whether a specified string or strings can be found in I<any> of the lists passed as arguments. The lists being searched are placed in an array, a reference to which is the first argument passed to C<are_members_any()>. The strings to be tested are also placed in an array, a reference to which is the second argument passed to that function.

```
$memb_hash_ref =
  are_members_any( [ \@Llist, \@Rlist ],
    [ qw| abel baker fargo hilton zebra | ]
  );
```

or

```
$memb_hash_ref = are_members_any(
  {
    lists => [ \@Llist, \@Rlist ],      # value is arrayref
    items => [ qw| abel baker fargo hilton zebra | ], # value is arrayref
  } );
```

The return value is a reference to a hash where an element's key is the string being tested and the element's value is C<1> if the string can be found in I<any> of the lists and C<0> if not. In the examples above, C<\$memb_hash_ref> will be:

```
{
  abel  => 1,
  baker => 1,
  fargo => 1,
  hilton => 1,
  zebra => 0,
};
```

C<zebra>'s value is C<0> because C<zebra> is not found in either of the lists passed as arguments to C<are_members_any()>.

=item *

Return current List::Compare::Functional version number.

```
$vers = get_version;
```

=back

=head2 Comparing Three or More Lists Held in Arrays

Given five lists:

```
@Al  = qw(abel abel baker camera delta edward fargo golfer);
@Bob  = qw(baker camera delta delta edward fargo golfer hilton);
@Carmen
= qw(fargo golfer hilton icon icon jerky kappa);
@Don  = qw(fargo icon jerky);
@Ed   = qw(fargo icon icon jerky);
```

=over 4

=item *

Get those items which appear at least once in I<each> list (their intersection).

```
@intersection = get_intersection( [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ] );
```

or

```
@intersection = get_intersection( {  
  lists => [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ],  
} );
```

=item *

Get those items which appear at least once in I<any> of the lists (their union).

```
@union = get_union( [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ] );
```

or

```
@union = get_union( {  
  lists => [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ],  
} );
```

=item *

To get those items which are unique to a particular list, provide C<get_unique()> with two array references. The first holds references to the arrays which in turn hold the individual lists being compared. The second holds the index position in the first reference of the particular list under consideration. Example:

To get elements unique to C<@Carmen>:

```
@Lonly = get_unique(  
  [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ],  
  [ 2 ]  
);
```

or

```
@Lonly = get_unique( {  
  lists => [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ], # value is arrayref  
  item => 2, # value is number  
} );
```

If no index position is passed to C<get_unique()> it will default to C<0>

and report items unique to the first list passed to the function. Hence,

```
@Lonly = get_unique( [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ] );
```

is same as:

```
@Lonly = get_unique( [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ], [ 0 ] );
```

=item *

Should you need to identify the items unique to I<each> of the lists under consideration, call C<get_unique_all> and get a reference to an array of array references:

```
$unique_all_ref = get_unique_all(
  [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ]
);
```

or

```
$unique_all_ref = get_unique_all( {
  lists => [ \@Al,
  \@Bob, \@Carmen, \@Don, \@Ed ],
} );
```

=item *

To get those items which appear only in lists I<other than> one particular list, pass two array references to the C<get_complement()> function. The first holds references to the arrays which in turn hold the individual lists being compared. The second holds the index position in the first reference of the particular list under consideration. Example: to get all the elements found in lists other than C<@Don>:

```
@Ronly = get_complement(
  [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ],
  [ 3 ]
);
```

or

```
@Ronly = get_complement( {
  lists => [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ], # value is arrayref
  item => 3, # value is number
} );
```

If no index position is passed to C<get_complement()> it will default to C<0> and report items found in all lists I<other than> the first list passed to

C<get_complement()>.

```
@Lonly = get_complement( [  
\@Al, \@Bob, \@Carmen, \@Don, \@Ed ] );
```

is same as:

```
@Lonly = get_complement( [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ], [ 0 ] );
```

=item *

Should you need to identify the items not found in I<each> of the lists under consideration, call C<get_complement_all> and get a reference to an array of array references:

```
$complement_all_ref = get_complement_all(  
  [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ]  
);
```

or

```
$complement_all_ref = get_complement_all( {  
  lists => [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ],  
} );
```

=item *

Get those items which do I<not> appear in I<more than one> of several lists (their symmetric_difference);

```
@LorRonly = get_symmetric_difference( [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ] );  
@LorRonly = get_syndiff( [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ] ); # alias
```

or

```
@LorRonly = get_symmetric_difference( {  
  lists => [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ],  
} );
```

=item *

Get those items found in I<any> of several lists which do I<not> appear in C<all> of the lists (I<i.e.,> all items except those found in the intersection of the lists):

```
@nonintersection = get_nonintersection(  
  [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ] );
```

or

```
@nonintersection = get_nonintersection( {  
  lists => [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ],  
} );
```

=item *

Get those items which appear in I<more than one> of several lists
(I<i.e.,> all items except those found in their symmetric difference);

```
@shared = get_shared( [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ] );
```

or

```
@shared = get_shared( {  
  lists => [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ],  
} );
```

=item *

Make a bag of every item found in every list. The bag differs from the union of the two lists in that it holds as many copies of individual elements as appear in the original lists.

```
@bag = get_bag( [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ] );
```

or

```
@bag = get_bag( {  
  lists => [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ],  
}  
);
```

=item *

An alternative approach to the above functions: If you do not immediately require an array as the return value of the function, but simply need a I<reference> to an array, use one of the following parallel functions:

```
$intersection_ref = get_intersection_ref(  
  [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ] );  
$union_ref       = get_union_ref(  
  [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ] );  
$Lonly_ref       = get_unique_ref(  
  [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ] );  
$Ronly_ref       = get_complement_ref(  
  [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ] );
```

```

                [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ] );
$LorRonly_ref    = get_symmetric_difference_ref(
                [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ] );
$LorRonly_ref    = get_syndiff_ref(      # alias
                [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ] );
$nonintersection_ref = get_nonintersection_ref(
                [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ] );
$shared_ref      = get_shared_ref(
                [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ] );
$bag_ref         = get_bag_ref(
                [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ] );

```

=item *

To determine whether one particular list is a subset of another of the lists passed to the function, pass to `C<is_LsubsetR()` two array references. The first of these is a reference to an array of array references, the arrays holding the lists under consideration. The second is a reference to a two-element array consisting of the index of the presumed subset, followed by the index position of the presumed superset. A true value (`C<1>`) is returned if the first (left-hand) element in the second reference list is a subset of the second (right-hand) element; a false value (`C<0>`) is returned otherwise.

Example: To determine whether `C<@Ed>` is a subset of `C<@Carmen>`, call:

```

$LR = is_LsubsetR(
    [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ],
    [ 4, 2 ]
);

```

or

```

$LR = is_LsubsetR( {
    lists => [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ], # value is arrayref
    pair  => [ 4, 2 ],                               # value is arrayref
} );

```

If only the first reference (to the array of lists) is passed to `C<is_LsubsetR>`, then the function's second argument defaults to `C<(0,1)>` and compares the first two lists passed to the constructor. So,

```

$LR = is_LsubsetR([ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ] );

```

... is equivalent to:

```

$LR = is_LsubsetR([ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ], [0,1] );

```


=item *

To reverse the order in which the particular lists are evaluated for superset/subset status, call C<is_RsubsetL>:

```
$RL = is_RsubsetL([ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ], [2,4] );
```

or

```
$RL = is_RsubsetL( {  
  lists => [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ],  
  pair => [ 2, 4 ],  
} );
```

=item *

List::Compare::Functional

considers two lists to be equivalent if every element in one list appears at least once in R and I<vice versa>.

To determine whether one particular list passed to the function is equivalent to another of the lists passed to the function, provide C<is_LequivalentR()> with two array references.

The first is a reference to an array of array references, the arrays holding the lists under consideration. The second of these is a reference to a two-element array consisting of the two lists being tested for equivalence. A true value (C<1>) is returned if the lists are equivalent; a false value (C<0>) is returned otherwise.

Example: To determine whether C<@Don> and C<@Ed> are equivalent, call:

```
$eqv = is_LequivalentR(  
  [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ],  
  [3,4]  
);
```

```
$eqv = is_LeqvIntR(           # alias  
  [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ],  
  [3,4]  
);
```

or

```
$eqv = is_LequivalentR( {  
  items => [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ],  
  pair => [3,4],  
} );
```

If no arguments are passed, `C<is_LequivalentR>` defaults to `C<[0,1]>` and compares the first two lists passed to the function. So,

```
$seqv = is_LequivalentR( [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ] );
```

... translates to:

```
$seqv = is_LequivalentR( [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ], [0,1] );
```

=item *

To determine whether any two of the lists passed to the function are disjoint from one another (I<i.e.,> have no common members), provide `C<is_LdisjointR()` with two array references.

The first is a reference to an array of array references, the arrays holding the lists under consideration. The second of these is a reference to a two-element array consisting of the two lists being tested for disjointness. A true value (`C<1>`) is returned if the lists are disjoint; a false value (`C<0>`) is returned otherwise.

Example: To determine whether `C<@Don>` and `C<@Ed>` are disjoint, call:

```
$disj = is_LdisjointR(
    [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ],
    [3,4]
);
```

or

```
$disj = is_LdisjointR( {
    items => [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ],
    pair => [3,4]
} );
```

=item *

Pretty-print a chart showing the subset relationships among the various source lists:

```
print_subset_chart( [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ] );
```

or

```
print_subset_chart( { lists => [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ] } );
```

=item *

Pretty-print a chart showing the equivalence relationships among the various source lists:

```
print_equivalence_chart( [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ] );
```

or

```
print_equivalence_chart( { lists => [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ] } );
```

=item *

Determine in I<which> (if any) of several lists a given string can be found. Pass two array references, the first of which holds references to arrays holding the lists under consideration, and the second of which holds a single-item list consisting of the string being tested.

```
@memb_arr = is_member_which(  
    [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ],  
    [ 'abel' ]  
);
```

or

```
@memb_arr = is_member_which( {  
    lists => [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ], # value is arrayref  
    item => 'abel', # value is string  
} );
```

In list context, return a list of those indices in the function's argument list corresponding to lists holding the string being tested. In the example above, C<@memb_arr> will be:

```
( 0 )
```

because C<'abel'> is found only in C<@Al> which holds position C<0> in the list of arguments passed to C<is_member_which()>.

=item *

As with other List::Compare::Functional functions which return a list, you may wish the above function returned a reference to an array holding the list:

```
$memb_arr_ref = is_member_which_ref(  
    [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ],  
  
    [ 'jerky' ]  
);
```

or

```
$memb_arr_ref = is_member_which_ref( {  
  lists => [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ], # value is arrayref  
  item => 'jerky', # value is string  
} );
```

In the example above, C<\$memb_arr_ref> will be:

```
[ 3, 4 ]
```

because C<'jerky'> is found in C<@Don> and C<@Ed>, which hold positions C<3> and C<4>, respectively, in the list of arguments passed to C<is_member_which()>.

B<Note:> functions C<is_member_which()> and C<is_member_which_ref> test only one string at a time and hence take only one element in the second array reference argument. To test more than one string at a time see the next function, C<are_members_which()>.

=item *

Determine in C<which> (if any) of several lists one or more given strings can be found. Pass two array references, the first of which holds references to arrays holding the lists under consideration, and the second of which holds a list of the strings being tested.

```
$memb_hash_ref = are_members_which(  
  [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ],  
  [ qw| abel baker fargo hilton zebra | ]  
);
```

or

```
$memb_hash_ref = are_members_which( {  
  lists => [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ], # value is arrayref  
  items => [ qw| abel baker fargo hilton zebra | ], # value is arrayref  
} );
```

The return value is a reference to a hash of arrays. In this hash, each element's value is a reference to an anonymous array whose elements are those indices in the argument list corresponding to lists holding the strings being tested. In the two examples above, C<\$memb_hash_ref> will be:

```
{
```

```

    abel  => [ 0      ],
    baker => [ 0, 1    ],
    fargo => [ 0, 1, 2, 3, 4 ],
    hilton => [ 1, 2   ],
    zebra => [        ],
};

```

B<Note:> C<are_members_which()> tests more than one string at a time. Hence, its

second array reference argument can take more than one element.

C<is_member_which()> and C<is_member_which_ref()> each take only one element in their second array reference arguments. C<are_members_which()> returns a hash reference; the other functions return either a list or a reference to an array holding that list, depending on context.

=item *

Determine whether a given string can be found in I<any> of several lists.

Pass two array references, the first of which holds references to arrays holding the lists under consideration, and the second of which holds a single-item list of the string being tested.

```

$found = is_member_any(
    [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ],
    [ 'abel' ]
);

```

or

```

$found = is_member_any( {
    lists => [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ], # value is arrayref
    item  => 'abel',                               # value is string
} );

```

The return value is C<1> if a specified string can be found in I<any> of the lists and C<0> if not. In the example above, C<\$found> will be C<1> because C<abel> is found in one or more of the lists passed as arguments to C<is_member_any()>.

=item *

Determine whether a specified string or strings can be found in I<any> of several lists. Pass two array references, the first of which holds references to arrays holding the lists under consideration, and the second of which holds a list of the strings being tested.

```

$memb_hash_ref = are_members_any(

```

```

    [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ],
    [ qw| abel baker fargo hilton zebra | ]
);

```

or

```

$memb_hash_ref = are_members_any( {
    lists => [ \@Al, \@Bob, \@Carmen, \@Don, \@Ed ], # value is arrayref
    items => [ qw| abel baker fargo hilton zebra | ], # value is arrayref
} );

```

The return value is a reference to a hash where an element's key is the string being tested and the element's value is C<1> if the string can be found in any of the lists and C<0> if not. In the example above, C<\$memb_hash_ref> will be:

```

{
    abel  => 1,
    baker => 1,
    fargo => 1,
    hilton => 1,
    zebra => 0,
};

```

C<zebra>'s value is C<0> because C<zebra> is not found in any of the lists passed as arguments to C<are_members_any()>.

=item *

Return current List::Compare::Functional version number:

```

$vers = get_version;

```

=back

=head2 Comparing Lists Held in Seen-Hashes

What is a seen-hash? A seen-hash is a typical Perl implementation of a look-up table: a hash where the value for a given element represents the number of times the element's key is observed in a list. For the purposes of List::Compare::Functional, what is crucial is whether an item is observed in a list or not; how many times the item occurs in a list is, I<with one exception,> irrelevant. (That exception is the C<get_bag()> function and its fraternal twin C<get_bag_ref()>.

In this case only, the key in each element of the seen-hash is placed in the bag the number of times indicated by the value of that element.) The value of an element in a List::Compare seen-hash must be

a positive integer, but whether that integer is 1 or 1,000,001 is immaterial for all List::Compare::Functional functions I<except> forming a bag.

The two lists compared above were represented by arrays; references to those arrays were passed to the various List::Compare::Functional functions. They could, however, have been represented by seen-hashtables such as the following and passed in exactly the same manner to the various functions.

```
%Llist = (  
  abel => 2,  
  baker => 1,  
  camera => 1,  
  delta => 1,  
  edward => 1,  
  fargo => 1,  
  golfer => 1,  
);  
%Rlist = (  
  baker => 1,  
  camera => 1,  
  delta => 2,  
  edward => 1,  
  fargo => 1,  
  golfer => 1,  
  hilton => 1,  
);  
  
@intersection  
= get_intersection( [ \%Llist, \%Rlist ] );  
@union = get_union( [ \%Llist, \%Rlist ] );  
@complement = get_complement( [ \%Llist, \%Rlist ] );
```

and so forth.

To compare three or more lists simultaneously, provide the appropriate List::Compare::Functional function with a first array reference holding a list of three or more references to seen-hashtables. Thus,

```
@union = get_intersection( [ \%Alpha, \%Beta, \%Gamma ] );
```

The 'single hashref' format for List::Compare::Functional functions is also available when passing seen-hashtables as arguments. Examples:

```
@intersection = get_intersection( {  
  lists => [ \%Alpha, \%Beta, \%Gamma ],  
} );
```

```
@Ronly = get_complement( {
```

```

    lists => [ \%Alpha, \%Beta, \%Gamma ],
    item => 3,
} );

$LR = is_LsubsetR( {
    lists => [ \%Alpha, \%Beta, \%Gamma ],
    pair => [ 4, 2 ],
} );

$memb_hash_ref = are_members_any( {
    lists => [ \%Alpha, \%Beta, \%Gamma ],

    items => [ qw| abel baker fargo hilton zebra | ],
} );

```

=head2 Faster Results with the Unsorted Option

By default, `List::Compare::Function` functions return lists sorted in Perl's default ASCII-betical mode. Sorting entails a performance cost, and if you do not need a sorted list and do not wish to pay this performance cost, you may call the following `List::Compare::Function` functions with the 'unsorted' option:

```

@intersection = get_intersection(      '-u', [ \@Llist, \@Rlist ] );
@union       = get_union(            '-u', [ \@Llist, \@Rlist ] );
@Lonly       = get_unique(           '-u', [ \@Llist, \@Rlist ] );
@Ronly       = get_complement(       '-u', [ \@Llist, \@Rlist ] );
@LorRonly    = get_symmetric_difference('-u', [ \@Llist, \@Rlist ] );
@bag         = get_bag(              '-u', [ \@Llist, \@Rlist ] );

```

For greater readability, the option may be spelled out:

```

@intersection = get_intersection('--unsorted', [ \@Llist,
\@Rlist ] );

```

or

```

@intersection = get_intersection( {
    unsorted => 1,
    lists   => [ \@Llist, \@Rlist ],
} );

```

Should you need a reference to an unsorted list as the return value, you may call the unsorted option as follows:

```

$intersection_ref = get_intersection_ref(
    '-u', [ \@Llist, \@Rlist ] );
$intersection_ref = get_intersection_ref(

```



```
'--unsorted', [ \@Llist, \@Rlist ] );
```

=head1 DISCUSSION

=head2 General Comments

List::Compare::Functional is a non-object-oriented implementation of very common Perl code used to determine interesting relationships between two or more lists at a time. List::Compare::Functional is based on the same author's List::Compare module found in the same CPAN distribution.

List::Compare::Functional is closely modeled on the "Accelerated" mode in List::Compare.

For a discussion of the antecedents of this module, see the discussion of the history and development of this module in the documentation to List::Compare.

=head2 List::Compare::Functional's Export Tag Groups

By default, List::Compare::Functional exports no functions. You may import individual functions into your main package but may find it more convenient to import via export tag groups. Four such groups are currently defined:

```
use List::Compare::Functional qw(:main)
use List::Compare::Functional qw(:mainrefs)
use List::Compare::Functional qw(:originals)
use List::Compare::Functional qw(:aliases)
```

=over 4

=item *

Tag group C<:main> includes what, in the author's opinion, are the six List::Compare::Functional subroutines mostly likely to be used:

```
get_intersection()
get_union()
get_unique()
get_complement()
get_symmetric_difference()
is_LsubsetR()
```

=item *

Tag group C<:mainrefs> includes five of the six subroutines found in C<:main> -- all except C<is_LsubsetR()> -- in the form in which they return references to arrays rather than arrays

proper:

```
get_intersection_ref()
get_union_ref()
get_unique_ref()
get_complement_ref()
get_symmetric_difference_ref()
```

=item *

Tag group C<:originals> includes all List::Compare::Functional subroutines in their 'original' form, I<i.e.>, no aliases for those subroutines:

```
get_intersection
get_intersection_ref
get_union
get_union_ref
get_unique
get_unique_ref
get_unique_all
get_complement
get_complement_ref
get_complement_all
get_symmetric_difference
get_symmetric_difference_ref
get_shared
get_shared_ref
get_nonintersection
get_nonintersection_ref
is_LsubsetR
is_RsubsetL
is_LequivalentR
is_LdisjointR
is_member_which
is_member_which_ref
are_members_which
is_member_any
are_members_any
print_subset_chart
print_equivalence_chart
get_bag
get_bag_ref
```

=item *

Tag group C<:aliases> contains all List::Compare::Functional subroutines which are aliases for subroutines

found in tag group C<:originals>. These are provided simply for less typing.

```
get_symdiff
get_symdiff_ref
is_LeqvlntR
```

=back

=head2 April 2004 Change of Interface

B<Note:> You can skip this section unless you used List::Compare::Functional prior to the release of Version 0.25 in April 2004.

Version 0.25 initiated a significant change in the interface to this module's various functions. In order to be able to accommodate comparisons among more than two lists, it was necessary to change the type of arguments passed to the various functions. Whereas previously a typical List::Compare::Functional function would be called like this:

```
@intersection = get_intersection( \@Llist, \@Rlist ); # SUPERSEDED
```

... now the references to the lists being compared must now be placed within a wrapper array (anonymous or named), a reference to which is now passed to the function, like so:

```
@intersection = get_intersection( [ \@Llist, \@Rlist ] );
```

... or, alternatively:

```
@to_be_compared = ( \@Llist, \@Rlist );
@intersection = get_intersection( \@to_be_compared );
```

In a similar manner, List::Compare::Functional functions could previously take arguments in the form of references to 'seen-hashes' instead of references to arrays:

```
@intersection = get_intersection( \%h0, \%h1 );
```

(See above for discussion of seen-hashes.) Now, those references to seen-hashes must be placed within a wrapper array (anonymous or named), a reference to which is passed to the function, like so:

```
@intersection = get_intersection( [ \%h0, \%h1 ] );
```

Also, in a similar manner, some List::Compare::Functional functions previously took arguments in addition to the lists being compared.

These arguments were simply passed as scalars, like this:

```
@memb_arr = is_member_which(\@Llist, \@Rlist, 'abel');
```

Now these arguments must also be placed within a wrapper array (anonymous or named), a reference to which is now passed to the function, like so:

```
@memb_arr = is_member_which(  
[ \@Llist, \@Rlist ], [ 'abel' ] );
```

... or, alternatively:

```
@to_be_compared = (\@Llist, \@Rlist);  
@opts = ( 'abel' );  
@memb_arr = is_member_which( \@to_be_compared, \@opts );
```

As in previous versions, for a speed boost the user may provide the C<'-'> or C<'--unsorted'> option as the I<first> argument to some List::Compare::Functional functions. Using this option, the C<get_intersection()> function above would appear as:

```
@intersection = get_intersection( '-' , [ \@Llist, \@Rlist ] );
```

... or, alternatively:

```
@intersection = get_intersection( '--unsorted', [ \@Llist, \@Rlist ] );
```

The arguments to I<any> List::Compare::Functional function will therefore consist possibly of the unsorted option, and then of either one or two references to arrays, the first of which is a reference to an array of arrays or an array of seen-hashes.

=head1 AUTHOR

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Creation date: May 20, 2002. Last modification date: August 16 2020.

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=cut

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* /opt/cola/permits/1317245570_1651089925.14/0/liblist-compare-perl-0-55-orig-tar-gz/List-Compare-

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#

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```

```
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1.68 tdb 1.46.5

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#

This is a Makefile stub which handles the creation of BSD shared
libraries.

```

#
# In order to use this stub, the following makefile variables must be defined.
#
# BSDLIB_VERSION = 1.0
# BSDLIB_IMAGE = libce
# BSDLIB_MYDIR = et
# BSDLIB_INSTALL_DIR = $(SHLIBDIR)
#

all:: image

real-subdirs:: Makefile
@echo " MKDIR pic"
@mkdir -p pic

BSD_LIB = $(BSDLIB_IMAGE).so.$(BSDLIB_VERSION)
BSDLIB_PIC_FLAG = -fpic

image: $(BSD_LIB)

$(BSD_LIB): $(OBJS)
(cd pic; ld -Bshareable -o $(BSD_LIB) $(LDFLAGS_SHLIB) $(OBJS))
$(MV) pic/$(BSD_LIB) .
$(RM) -f ../$(BSD_LIB)
(cd ..; $(LN) $(LINK_BUILD_FLAGS) \
`echo $(my_dir) | sed -e 's;lib/;;'"/$(BSD_LIB) $(BSD_LIB)`)

install-shlibs install:: $(BSD_LIB)
@echo " INSTALL_PROGRAM $(BSDLIB_INSTALL_DIR)/$(BSD_LIB)"
@$(INSTALL_PROGRAM) $(BSD_LIB) \
$(DESTDIR)$$(BSDLIB_INSTALL_DIR)/$(BSD_LIB)
@-$(LDCONFIG)

install-strip: install

install-shlibs-strip:: install-shlibs

uninstall-shlibs uninstall::
$(RM) -f $(DESTDIR)$$(BSDLIB_INSTALL_DIR)/$(BSD_LIB)

clean::
$(RM)
-rf pic
$(RM) -f $(BSD_LIB)
$(RM) -f ../$(BSD_LIB)
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Index: tdbsa/tdb.c

--- tdbsa.orig/tdb.c

+++ tdbsa/tdb.c

@@ -4,11 +4,11 @@ Rev: 23371

Last Changed Date: 2007-06-06 20:14:06 -0400 (Wed, 06 Jun 2007)

*/

/*

- Unix SMB/CIFS implementation.
- + trivial database library - standalone version

- trivial database library - private includes
-
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Appendix: How to Apply These Terms to Your New Programs

If you develop a new program, and you want it to be of the greatest possible use to the public, the best way to achieve this is to make it free software which everyone can redistribute and change under these terms.

To do so, attach the following notices to the program. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

<one line to give the program's name and a brief idea of what it does.>

Copyright (C) 19yy <name of author>

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Also add information on how to contact you by electronic and paper mail.

If the program is interactive, make it output a short notice like this when it starts in an interactive mode:

```
Gnomovision version 69, Copyright (C) 19yy name of author
Gnomovision comes with ABSOLUTELY NO WARRANTY;
for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.
```

The hypothetical commands ``show w'` and ``show c'` should show the appropriate parts of the General Public License. Of course, the commands you use may be called something other than ``show w'` and ``show c'`; they could even be mouse-clicks or menu items--whatever suits your program.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a "copyright disclaimer" for the program, if necessary. Here is a sample; alter the names:

```
Yoyodyne, Inc., hereby disclaims all copyright interest in the program
`Gnomovision' (which makes passes at compilers) written by James Hacker.
```

```
<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
```

This General Public License does not permit incorporating your program into proprietary programs. If your program is a subroutine library, you may consider

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Theodore Ts'o
23-June-2007

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Version 2, June 1991

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- b) You must cause any work that you distribute or publish, that in whole or in part contains or is derived from the Program or any part thereof, to be licensed as a whole at no charge to all third parties under the terms of this License.
- c) If the modified program normally reads commands interactively when run, you must cause it, when started running for such interactive use in the most ordinary way, to print or display an announcement including an appropriate copyright notice and a notice that there is no warranty (or else, saying that you provide a warranty) and that users may redistribute the program under these conditions, and telling the user how to view a copy of this License. (Exception: if the Program itself is interactive but does not normally print such an announcement, your work based on the Program is not required to print an announcement.)

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entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Program.

In addition, mere aggregation of another work not based on the Program with

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3. You may copy and distribute the Program (or a work based on it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you also do one of the following:

a) Accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange; or,

b) Accompany it with a written offer, valid for at least three years, to give any third party, for a charge no more than your cost of physically performing source distribution, a complete machine-readable copy of the corresponding source code, to be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange; or,

c) Accompany it with the information you received as to the offer to distribute corresponding source code. (This alternative is allowed only for noncommercial distribution and only if you received the program in object code or executable form with such an offer, in accord with Subsection b above.)

The source code for a work means the preferred form of the work for making modifications to it. For an executable work, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the executable. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

If distribution of executable or object code is made

by offering

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To do so, attach the following notices to the program. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

```
<one line to give the program's name and a brief idea of what it does.>  
Copyright (C) <year> <name  
of author>
```

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Also add information on how to contact you by electronic and paper mail.

If the program is interactive, make it output a short notice like this when it starts in an interactive mode:

```
Gnomovision version 69, Copyright (C) year name of author
Gnomovision
comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.
```

The hypothetical commands `show w' and `show c' should show the appropriate parts of the General Public License. Of course, the commands you use may be called something other than `show w' and `show c'; they could even be mouse-clicks or menu items--whatever suits your program.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a "copyright disclaimer" for the program, if necessary. Here is a sample; alter the names:

```
Yoyodyne, Inc., hereby disclaims all copyright interest in the program
`Gnomovision' (which makes passes at compilers) written by James Hacker.
```

```
<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
```

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[This is the first released version of the library GPL. It is numbered 2 because it goes with version 2 of the ordinary GPL.]

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Most GNU software, including some libraries, is covered by the ordinary GNU General Public License, which was designed for utility programs. This license, the GNU Library General Public License, applies to certain designated libraries. This license is quite different from the ordinary one; be sure to read it in full, and don't assume that anything in it is the same as in the ordinary license.

The reason we have a separate public license for some libraries is that they blur the distinction we usually make between modifying or adding to a program and simply using it. Linking a program with a library, without changing the library, is in some sense simply using the library, and is analogous to running a utility program or application program. However, in a textual and legal sense, the linked executable is a combined work, a derivative of the original library, and the ordinary General Public License treats it as such.

Because of this blurred distinction, using the ordinary General Public License for libraries did not effectively promote software sharing, because most developers did not use the libraries. We concluded that weaker conditions might promote sharing better.

However, unrestricted linking of non-free programs would deprive the users of those programs of all benefit from the free status of the libraries themselves. This Library General Public License is intended to permit developers of non-free programs to use free libraries, while preserving your freedom as a user of such programs to change the free libraries that are incorporated in them. (We have not seen how to achieve this as regards changes in header files, but we have achieved it as regards changes in the actual functions of the Library.) The hope is that this will lead to faster development of free libraries.

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"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities

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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library

creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also compile or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

- a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then

relink to produce a modified

executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

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This package was added to the e2fsprogs debian source package by Theodore Ts'o <tytso@mit.edu> on Sat Mar 15 15:33:37 EST 2003

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Version 3, 29 June 2007

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any

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If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the

Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6.

Any executables

containing that work also fall under Section 6,

whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

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a) Accompany the work with the complete corresponding machine-readable

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changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user

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For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

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1.77 libnsl 1.3.0-2build2

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1.78 libffi 3.4.2-4

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Version 3, 29 June 2007

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```
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```
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1.81 libseccomp 2.5.3-2ubuntu2

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1.82 findutils 4.8.0-1ubuntu3

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1.83 attr 2.5.1-1build1

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1.87 audit 3.0.7-1build1

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1.89 pcre 8.39-13ubuntu0.22.04.1

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Written by: Philip Hazel
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1.90 coreutils 8.32-4.1ubuntu1

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The

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1.93 sysv-init 3.01-1ubuntu1

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```
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1.94 util-linux 2.37.2-4ubuntu3

1.94.1 Available under license :

NR	START	END	SECTORS	SIZE	NAME	UUID
1	32	7679	7648	3.7M	8f8378c0-01	
2	7680	16383	8704	4.3M	8f8378c0-02	
5	7936	12799	4864	2.4M		
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WEV @@ WEV[B "1
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1.95 bzip2 1.0.8-5build1

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1.96 sed 4.8-1ubuntu2

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1.97 keyutils 1.6.1-2ubuntu3

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1.99 lz4 1.9.3-2build2

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Upstream-Contact: Yann Collet <Cyan4973@github.com>

Source: <https://github.com/lz4/lz4>

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/* run-parts: run a bunch of scripts in a directory

*

* Debian run-parts program

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/* ischroot: detect if running in a chroot

*

* Debian ischroot program

* Copyright (C) 2011 Aurelien Jarno <aurel32@debian.org>

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* /opt/cola/permits/1343603013_1655136462.2288256/0/debianutils-5-5-orig-tar-xz/debianutils-5.5/po4a/pl/run-parts.8

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1.101 zstd 1.4.8+dfsg-3build1

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1.102 acl 2.3.1-1

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If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

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The

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1.105 debconf 1.5.79ubuntu1

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1.106 dash

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1.107 cdebconf 0.261ubuntu1

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1.112 selinux 3.3-1build2

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1.113 libxcrypt 4.4.27-1

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1.114 x-xerrors 0.0.0-20220609144429-65e65417b02f

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1.115 libassuan 2.5.5-1build1

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Files:

include/bsd/sys/tree.h
man/fparsefn.3bsd
man/tree.3bsd
src/fparsefn.c

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Files:

include/bsd/readpassphrase.h
man/readpassphrase.3bsd
man/strncpy.3bsd
man/strtonum.3bsd
src/arc4random.c
src/arc4random_linux.h
src/arc4random_openbsd.h
src/arc4random_uniform.c
src/arc4random_unix.h
src/arc4random_win.h

src/closefrom.c
src/freezero.c
src/getentropy_aix.c
src/getentropy_bsd.c
src/getentropy_hpux.c
src/getentropy_hurd.c
src/getentropy_linux.c
src/getentropy_osx.c
src/getentropy_solaris.c
src/getentropy_win.c
src/readpassphrase.c
src/reallocarray.c
src/recallocarray.c
src/strlcat.c
src/strncpy.c

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Files:

src/inet_net_pton.c

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Files:

src/setproctitle.c

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Files:

src/explicit_bzero.c

src/chacha_private.h

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Files:

man/mdX.3bsd

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1.117 libmd 1.0.4-1build1

1.117.1 Available under license :

Format: <https://www.debian.org/doc/packaging-manuals/copyright-format/1.0/>

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src/sha2.c

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src/rmd160.c

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src/md2.c

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Files:

man/rmd160.3

man/sha1.3

man/sha2.3

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Files:

man/mdX.3

src/helper.c

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src/md4.c

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Todd C. Miller

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This code implements the MD4 message-digest algorithm.

The algorithm is due to Ron Rivest. This code was written by Colin Plumb in 1993, no copyright is claimed.

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Todd C. Miller modified the MD5 code to do MD4 based on RFC 1186.

Files:

include/md5.h

src/md5.c

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include/sha1.h

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1.118 liblocale-gettext-perl 1.07-4build3

1.118.1 Available under license :

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abstract: 'Perl bindings for POSIX i18n gettext functions'

author:

- 'Kim Vandry <vandry.ORG>'

build_requires:

ExtUtils::MakeMaker: 0

configure_requires:

ExtUtils::MakeMaker: 0

dynamic_config: 1

generated_by: 'ExtUtils::MakeMaker version 6.66, CPAN::Meta::Converter version 2.120921'

license: perl

meta-spec:

url: <http://module-build.sourceforge.net/META-spec-v1.4.html>

version: 1.4

name: Locale-gettext

no_index:

directory:

- t

- inc

requires: {}

resources:

license: <http://dev.perl.org/licenses/>

repository: <https://github.com/vandry/Perl-Locale-gettext>

version: 1.07

Found in path(s):

* /opt/cola/permits/1343982498_1655185891.8647282/0/liblocale-gettext-perl-1-07-orig-1-tar-gz/Locale-gettext-1.07/META.yml

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Locale::gettext

version 1.07

This is a perl5 module quickly written to gain access to the C library functions for internationalization. They work just like the C versions.

As of version 1.04, an object oriented interface more suitable to native Perl programs is available.

Locale::gettext is Copyright 1996..2005 by Kim Vandry <vandry@TZoNE.ORG>. All rights reserved.

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Changes

1.07 Fix test failures caused by \$LANGUAGE being set

1.06 Bugfix: #104667 Makefile.PL libraries need to be listed after .o files
Bugfix: #104668 ensure availability of locale API, correct typo in documentation
Add META.yml (Fixes #91921)

1.05 Bugfix: [cpan #13042] useless #ifdef should be #if
Bugfix: [cpan #13044] make test fails when using POSIX locale

1.04 Add several
functions provided by the GNU gettext library
Create object oriented interface

1.03 Fix error in README file

1.02 Include a License

1.01 Changed from "gettext" to "Locale::gettext" (i.e. moved under Locale::) on the advice of several people

Small "lint" fix from schwern@starmedia.net

1.00 Initial version

TODO

A TIEHASH interface

Here's a quick tutorial.

Note that your vendor's implementation of these functions may be a bit different, but I think that in general these are quite standard POSIX functions.

Kim Vandry <vandry@TZoNE.ORG>
Mlink Internet <<http://www.Mlink.NET>>
July 1996

INTERNATIONALIZING YOUR PROGRAM

Step 1

If you've already written your code, you need to wrap the `gettext()` function around all of the text strings. Needless to say, this is much easier if you do it while you write.

```
# create object for oo interface
my $d = Locale::gettext->domain("my_program");
```

```
print "Welcome to my program\n";
```

```
# oo
print $d->get("Welcome
to my program"), "\n";
```

```
# traditional
print gettext("Welcome to my program"), "\n";
```

Note that you probably don't want to include that newline in the `gettext()` call, nor any formatting codes such as HTML tags. The argument to `gettext()` is the text string in the default language or locale. This is known as the C locale and should probably be usually English.

Step 2

Do the appropriate initializations at the beginning of your program:

```
#
use POSIX; # for setlocale()
```

```

use Locale::gettext;
#
# The following statement initializes the locale handling
# code in the C library. Normally, it causes it to read
# in the environment variables that determine the current
# locale.
#
# The first parameter is the category you would
# like to initialize locale information for. You can use
# LC_ALL for this, which will set locale information for
# all categories, including LC_CTYPE, LC_TIME, LC_NUMERIC,
# etc..
#
# I recommend that you set only LC_MESSAGES (text strings)
# or LC_CTYPE (character
# sets) and LC_TIME (time
# conventions) too at most. You may find that if you set
# LC_NUMERIC or some other categories, you will start
# outputting decimal numbers with strange thousand separators
# and decimal points and they will be unparseable in
# other countries.
#
# The second parameter is the locale name. If it is an
# empty string, then this information will be fetched from
# environment variables.
#
# Note that setlocale() will cause every part of your
# program to start operating in the new, non default (C)
# locale, including C library functions. So don't be
# surprised if POSIX::ctime returns "Montag, 22. Juli 1996,
# 12:08:25 Uhr EDT" instead of "Mon Jul 22 12:08:25 EDT 1996"
# If you set LC_TIME or LC_ALL using setlocale().
#
setlocale(LC_MESSAGES, "");
#
# Decide on a unique identifier that will distinguish your
# program's text strings in the LC_MESSAGES database. This
# would usually be the name of your program
#
# By default, locale information is found in OS dependant
#
# system directories such as /usr/lib/locale, or any directory
# found in the $PATH-like environment variable $NLSPATH.
# I recommend that you do _not_ install files in /usr. If
# your program is installed in a directory tree such as
# /opt/my_package_name/{bin,man,lib,etc}, then you could
# use /opt/my_package_name/locale to store locale information
# specific to your program, or you could put in somewhere

```

```
# in /usr/local/lib.
#
# Wherever you put it, if it is not one of the default
# directories, you will need to call bindtextdomain() to
# tell the library where to find your files. The first
# parameter is your database's identifier that you chose
# above.
#
# oo interface:

my $d = Locale::gettext->domain("my_domain");
$d->dir("/opt/my_package_name/locale");

# traditional interface:
bindtextdomain("my_domain", "/opt/my_package_name/locale");
textdomain("my_domain");

# That's it for the initializations
```

Step 3

Test to see if your program still works after all these
mods :-)

Step 4

TRANSLATE!

Read msgfmt(1) for details on this. Basically, for each locale
other than the default, you need to create a file like this:
(Note: I do not speak German, I'm making an attempt here :-)
Call this file with the .po extension.

```
--BEGIN
domain "my_domain"

msgid "Welcome to my program"
msgstr "Willkommen in mein Program"

msgid "Help"
msgstr "Hilfe"
--END
```

The "msgid" parameter must match exactly the argument to the
gettext() function, and "msgstr" is the corresponding translation.

You can use the `xgettext(1)` utility to initially construct this file from all of the `gettext()` calls in your source code. It was designed for C but it works OK with perl.

Step 5

Compile the .po file

```
$ msgfmt my_file.po
```

This will create a file called `my_domain.mo` (default `messages.mo`) which you should place in the `<locale>/LC_MESSAGES/my_domain.mo` subdirectory of either a system default directory, a directory in `$NLSPATH`, or the directory argument to `bindtextdomain()`.

Replace

`<locale>` with the name of the locale for which this file is created.

For example:

```
$ mkdir -p /opt/my_package/locale/de/LC_MESSAGES
$ mkdir -p /opt/my_package/locale/fr/LC_MESSAGES
$ cd /path/to/my/source/code
$ cd de
$ msgfmt my_domain.po
$ mv my_domain.mo /opt/my_package/locale/de/LC_MESSAGES
$ cd ../fr
$ msgfmt my_domain.po
$ mv my_domain.mo /opt/my_package/locale/fr/LC_MESSAGES
```

Step 6

Test it out

```
$ my_program
Welcome to my program
$ LANG=fr my_program
Bienvenue à mon programme
$ LANG=de my_program
Willkommen in mein Program
```

(Or, set only the messages category instead of the whole locale)

```
$ LC_MESSAGES=fr
$ export LC_MESSAGES
$ my_program
```

Bienvenue à mon programme

Found in path(s):

* /opt/cola/permits/1343982498_1655185891.8647282/0/liblocale-gettext-perl-1-07-orig-1-tar-gz/Locale-gettext-1.07/README

1.119 gdbm 1.23-1

1.119.1 Available under license :

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Version 3, 29 June 2007

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1.125 patch 2.7.6-7build2

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Version 3, 29 June 2007

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```

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1.127 pinentry 1.1.1-1build2

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abstract: Algorithm::Diff with XS core loop

author: Audrey Tang <cpan@audreyt.org>

distribution_type: module

generated_by: Module::Install version 0.67

license: perl

meta-spec:

url: <http://module-build.sourceforge.net/META-spec-v1.3.html>

version: 1.3
name: Algorithm-Diff-XS
no_index:
directory:
- inc
- t
requires:
Algorithm::Diff: 1.19
perl: 5.6.0
version: 0.01

Found in path(s):

* /opt/cola/permits/1343982714_1655185987.637082/0/libalgorithm-diff-xs-perl-0-04-orig-1-tar-gz/Algorithm-Diff-XS-0.04/META.yml

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/*

ppport.h -- Perl/Pollution/Portability Version 3.06_01

Automatically created by Devel::PPPort running under
perl 5.008008 on Wed Oct 22 22:33:39 2008.

Do NOT edit this file directly! -- Edit PPPort_pm.PL and the
includes in parts/inc/ instead.

Use 'perldoc ppport.h' to view the documentation below.

SKIP

=pod

=head1 NAME

ppport.h - Perl/Pollution/Portability version 3.06_01

=head1 SYNOPSIS

perl ppport.h [options] [source files]

Searches current directory for files if no [source files] are given

--help show short help

--patch=file write one patch file with changes

--copy=suffix write changed copies with suffix
 --diff=program use diff program and options

 --compat-version=version
 provide compatibility with Perl version
 --cplusplus accept C++ comments

 --quiet don't output anything except fatal errors
 --nodiag don't show diagnostics
 --nohints don't show hints
 --nochanges don't suggest changes
 --nofilter don't filter input files

 --list-provided list provided API
 --list-unsupported list unsupported API
 --api-info=name show Perl API portability information

=head1 COMPATIBILITY

This version of F<ppport.h> is designed to support operation with Perl installations back to 5.003, and has been tested up to 5.9.3.

=head1 OPTIONS

=head2 --help

Display a brief usage summary.

=head2 --patch=I<file>

If this option is given, a single patch file will be created if any changes are suggested. This requires a working diff program to be installed on your system.

=head2 --copy=I<suffix>

If this option is given, a copy of each file will be saved with the given suffix that contains the suggested changes. This does not require any external programs.

If neither C<--patch> or C<--copy> are given, the default is to simply print the diffs for each file. This requires either C<Text::Diff> or a C<diff> program to be installed.

=head2 --diff=I<program>

Manually set the diff program and options to use. The default

is to use C<Text::Diff>, when installed, and output unified context diffs.

=head2 --compat-version=I<version>

Tell F<ppport.h> to check for compatibility with the given Perl version. The default is to check for compatibility with Perl version 5.003. You can use this option to reduce the output of F<ppport.h> if you intend to be backward compatible only up to a certain Perl version.

=head2 --cplusplus

Usually, F<ppport.h> will detect C++ style comments and replace them with C style comments for portability reasons. Using this option instructs F<ppport.h> to leave C++ comments untouched.

=head2 --quiet

Be quiet. Don't print anything except fatal errors.

=head2 --nodiag

Don't output any diagnostic messages. Only portability alerts will be printed.

=head2 --nohints

Don't output any hints. Hints often contain useful portability notes.

=head2 --nochanges

Don't suggest any changes. Only give diagnostic output and hints unless these are also deactivated.

=head2 --nofilter

Don't filter the list of input files. By default, files not looking like source code (i.e. not *.xs, *.c, *.cc, *.cpp or *.h) are skipped.

=head2 --list-provided

Lists the API elements for which compatibility is provided by F<ppport.h>. Also lists if it must be explicitly requested, if it has dependencies, and if there are hints for it.

=head2 --list-unsupported

Lists the API elements that are known not to be supported by F<ppport.h> and below which version of Perl they probably won't be available or work.

=head2 --api-info=I<name>

Show portability information for API elements matching I<name>.

If I<name> is surrounded by slashes, it is interpreted as a regular expression.

=head1 DESCRIPTION

In order for a Perl extension (XS) module to be as portable as possible across differing versions of Perl itself, certain steps need to be taken.

=over 4

=item *

Including this header is the first major one. This alone will give you access to a large part of the Perl API that hasn't been available in earlier Perl releases. Use

```
perl ppport.h --list-provided
```

to see which API elements are provided by ppport.h.

=item *

You should avoid using deprecated parts of the API. For example, using global Perl variables without the C<PL_> prefix is deprecated. Also, some API functions used to have a C<perl_> prefix. Using this form is also deprecated. You can safely use the supported API, as F<ppport.h> will provide wrappers for older Perl versions.

=item *

If you use one of a few functions that were not present in earlier versions of Perl, and that can't be provided using a macro, you have to explicitly request support for these functions by adding one or more C<#define>s in your source code before the inclusion of F<ppport.h>.

These functions will be marked C<explicit> in the list shown by

C<--list-provided>.

Depending on whether you module has a single or multiple files that use such functions, you want either C<static> or global variants.

For a C<static> function, use:

```
#define NEED_function
```

For a global function, use:

```
#define NEED_function_GLOBAL
```

Note that you mustn't have more than one global request for one function in your project.

Function	Static Request	Global Request
eval_pv()	NEED_eval_pv	NEED_eval_pv_GLOBAL
grok_bin()	NEED_grok_bin	NEED_grok_bin_GLOBAL
grok_hex()	NEED_grok_hex	NEED_grok_hex_GLOBAL
grok_number()	NEED_grok_number	NEED_grok_number_GLOBAL
grok_numeric_radix()	NEED_grok_numeric_radix	NEED_grok_numeric_radix_GLOBAL
grok_oct()	NEED_grok_oct	NEED_grok_oct_GLOBAL
newCONSTSUB()	NEED_newCONSTSUB	NEED_newCONSTSUB_GLOBAL
newRV_noinc()	NEED_newRV_noinc	NEED_newRV_noinc_GLOBAL
sv_2pv_nolen()	NEED_sv_2pv_nolen	NEED_sv_2pv_nolen_GLOBAL
sv_2pvbyte()	NEED_sv_2pvbyte	NEED_sv_2pvbyte_GLOBAL
sv_catpvf_mg()	NEED_sv_catpvf_mg	NEED_sv_catpvf_mg_GLOBAL
sv_catpvf_mg_nocontext()	NEED_sv_catpvf_mg_nocontext	NEED_sv_catpvf_mg_nocontext_GLOBAL
sv_setpvf_mg()	NEED_sv_setpvf_mg	NEED_sv_setpvf_mg_GLOBAL
sv_setpvf_mg_nocontext()	NEED_sv_setpvf_mg_nocontext	NEED_sv_setpvf_mg_nocontext_GLOBAL
vnewSVpvf()	NEED_vnewSVpvf	NEED_vnewSVpvf_GLOBAL

To avoid namespace conflicts, you can change the namespace of the explicitly exported functions using the C<DPPP_NAMESPACE> macro.

Just C<#define> the macro before including C<ppport.h>:

```
#define DPPP_NAMESPACE MyOwnNamespace_  
#include "ppport.h"
```

The default namespace is C<DPPP_>.

=back

The good thing is that most of the above can be checked by running F<ppport.h> on your source code. See the next section for

details.

=head1 EXAMPLES

To verify whether `F<ppport.h>` is needed for your module, whether you should make any changes to your code, and whether any special defines should be used, `F<ppport.h>` can be run as a Perl script to check your source code. Simply say:

```
perl ppport.h
```

The result will usually be a list of patches suggesting changes that should at least be acceptable, if not necessarily the most efficient solution, or a fix for all possible problems.

If you know that your XS module uses features only available in newer Perl releases, if you're aware that it uses C++ comments, and if you want all suggestions as a single patch file, you could use something like this:

```
perl ppport.h --compat-version=5.6.0 --cplusplus --patch=test.diff
```

If you only want your code to be scanned without any suggestions for changes, use:

```
perl ppport.h --nochanges
```

You can specify a different `C<diff>` program or options, using the `C<--diff>` option:

```
perl ppport.h --diff='diff -C 10'
```

This would output context diffs with 10 lines of context.

To display portability information for the `C<newSVpv<n>>` function, use:

```
perl ppport.h --api-info=newSVpv<n>
```

Since the argument to `C<--api-info>` can be a regular expression, you can use

```
perl ppport.h --api-info=/_nomg$/
```

to display portability information for all `C<_nomg>` functions or

```
perl ppport.h --api-info=//
```

to display information for all known API elements.

=head1 BUGS

If this version of F<ppport.h> is causing failure during the compilation of this module, please check if newer versions of either this module or C<Devel::PPPport> are available on CPAN before sending a bug report.

If F<ppport.h> was generated using the latest version of C<Devel::PPPport> and is causing failure of this module, please file a bug report using the CPAN Request Tracker at L<<http://rt.cpan.org/>>.

Please include the following information:

=over 4

=item 1.

The complete output from running "perl -V"

=item 2.

This file.

=item 3.

The name and version of the module you were trying to build.

=item 4.

A full log of the build that failed.

=item 5.

Any other information that you think could be relevant.

=back

For the latest version of this code, please get the C<Devel::PPPport> module from CPAN.

=head1 COPYRIGHT

Version 3.x, Copyright (c) 2004-2005, Marcus Holland-Moritz.

Version 2.x, Copyright (C) 2001, Paul Marquess.

Version 1.x, Copyright (C) 1999, Kenneth Albanowski.

This program is free software; you can redistribute it and/or modify it under the same terms as Perl itself.

=head1 SEE ALSO

See L<Devel::PPPort>.

=cut

use strict;

```
my %opt = (  
  quiet  => 0,  
  diag   => 1,  
  hints  => 1,  
  changes => 1,  
  cplusplus => 0,  
  filter => 1,  
);
```

```
my($ppport) = $0 =~ /([\w.]+)$/;  
my $LF = '(?:\r\n|[\r\n])'; # line feed  
my $HS = "[\t]";          # horizontal whitespace
```

```
eval {  
  require Getopt::Long;  
  Getopt::Long::GetOptions(\%opt, qw(  
    help quiet diag! filter! hints! changes! cplusplus  
    patch=s copy=s diff=s compat-version=s  
    list-provided list-unsupported api-info=s  
  )) or usage();  
};
```

```
if ($@ and grep /^-/, @ARGV) {  
  usage() if "@ARGV" =~ /^--?h(?:elp)?$/;  
  die "Getopt::Long not found. Please don't use any options.\n";  
}
```

```
usage() if $opt{help};
```

```
if (exists $opt{'compat-version'}) {  
  my($r,$v,$s) = eval { parse_version($opt{'compat-version'}) };  
  if ($@) {
```

```

    die "Invalid version number format: '$opt{'compat-version'}'\n";
}
die "Only Perl 5 is supported\n" if $r != 5;
die "Invalid version number: $opt{'compat-version'}\n"
if $v >= 1000 || $s >= 1000;
$opt{'compat-version'} = sprintf "%d.%03d%03d", $r, $v, $s;
}
else {
    $opt{'compat-version'} = 5;
}

```

```
# Never use C comments in this file!!!!
```

```

my $ccs = '!.*';
my $cce = '.*!';
my $rcs = quotemeta $ccs;
my $rce = quotemeta $cce;

```

```

my %API = map { /^(\w+)\|([^\|]*)\|([^\|]*)\|(\w*)$/
    ? ( $1 => {
        ($2          ? ( base  => $2 ) : ()),
        ($3          ? ( todo  => $3 ) : ()),
        (index($4, 'v') >= 0 ? ( varargs => 1 ) : ()),
        (index($4, 'p') >= 0 ? ( provided => 1 ) : ()),
        (index($4, 'n') >= 0 ? ( nothxarg => 1 ) : ()),
    } )
    : die "invalid spec: $_" } qw(

```

```

AvFILLp|5.004050||p
AvFILL|||
CLASS|||n
CX_CURPAD_SAVE|||
CX_CURPAD_SV|||
CopFILEAV|5.006000||p
CopFILEGV_set|5.006000||p
CopFILEGV|5.006000||p
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CopFILE_set|5.006000||p
CopFILE|5.006000||p
CopSTASHPV_set|5.006000||p
CopSTASHPV|5.006000||p
CopSTASH_eq|5.006000||p
CopSTASH_set|5.006000||p
CopSTASH|5.006000||p
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CvSTASH|||
CvWEAKOUTSIDE|||
DEFSV|5.004050||p

```

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ENTER||
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FREEMPS||
GIMME_V|5.004000|n
GIMME||n
GROK_NUMERIC_RADIX|5.007002||p
G_ARRAY||
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IS_NUMBER_IN_UV|5.007002||p
IS_NUMBER_NAN|5.007003||p
IS_NUMBER_NEG|5.007002||p
IS_NUMBER_NOT_INT|5.007002||p
IVSIZE|5.006000||p
IVTYPE|5.006000||p
IVdf|5.006000||p
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MY_CXT_INIT|5.007003||p
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NVef|5.006001||p
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NVgf|5.006001||p
Newc||
Newz||
New||
Nullav||
Nullch||
Nullcv||
Nullhv||
Nullsv||
ORIGMARK||
PAD_BASE_SV||
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PAD_COMPNAME_FLAGS||
PAD_COMPNAME_GEN_set||
PAD_COMPNAME_GEN||
PAD_COMPNAME_OURSTASH||
PAD_COMPNAME_PV||
PAD_COMPNAME_TYPE||
PAD_RESTORE_LOCAL||
PAD_SAVE_LOCAL||
PAD_SAVE_SETNULLPAD||
PAD_SETSV||
PAD_SET_CUR_NOSAVE||
PAD_SET_CUR||
PAD_SV1||
PAD_SV||
PERL_BCDVERSION|5.009003||p
PERL_GCC_BRACE_GROUPS_FORBIDDEN|5.008001||p
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PERL_LONG_MAX|5.004000||p
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PERL_MAGIC_backref|5.007002||p
PERL_MAGIC_bm|5.007002||p
PERL_MAGIC_collxfrm|5.007002||p
PERL_MAGIC_dbfile|5.007002||p
PERL_MAGIC_dbline|5.007002||p
PERL_MAGIC_defelem|5.007002||p
PERL_MAGIC_envelem|5.007002||p

PERL_MAGIC_env|5.007002||p
PERL_MAGIC_ext|5.007002||p
PERL_MAGIC_fm|5.007002||p
PERL_MAGIC_glob|5.007002||p
PERL_MAGIC_isaelem|5.007002||p
PERL_MAGIC_isa|5.007002||p
PERL_MAGIC_mutex|5.007002||p
PERL_MAGIC_nkeys|5.007002||p
PERL_MAGIC_overload_elem|5.007002||p
PERL_MAGIC_overload_table|5.007002||p
PERL_MAGIC_overload|5.007002||p
PERL_MAGIC_pos|5.007002||p
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PERL_MAGIC_regdata|5.007002||p
PERL_MAGIC_regdatum|5.007002||p
PERL_MAGIC_regex_global|5.007002||p
PERL_MAGIC_shared_scalar|5.007003||p
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PERL_MAGIC_sv|5.007002||p
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PERL_MAGIC_tied|5.007002||p
PERL_MAGIC_utf8|5.008001||p
PERL_MAGIC_uvar_elem|5.007003||p
PERL_MAGIC_uvar|5.007002||p
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PERL_REVISION|5.006000||p
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PERL_SCAN_DISALLOW_PREFIX|5.007003||p
PERL_SCAN_GREATER_THAN_UV_MAX|5.007003||p
PERL_SCAN_SILENT_ILLDIGIT|5.008001||p
PERL_SHORT_MAX|5.004000||p
PERL_SHORT_MIN|5.004000||p
PERL_SUBVERSION|5.006000||p
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PERL_UCHAR_MIN|5.004000||p
PERL_UINT_MAX|5.004000||p
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PL_defgv|5.004050||p
PL_diehook|5.004050||p
PL_dirty|5.004050||p
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PL_rsfp|5.004050||p
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PL_stack_sp|5.004050||p
PL_stdinv|5.004050||p
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SvUTF8_on|5.006000|
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SvUVX|5.004000|p
SvUV_nomg|5.009001|p
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SvUVx|5.004000|p
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UNDERBAR|5.009002|p
UVSIZE|5.006000|p
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```

yywarn|||
);

if
(exists $opt{'list-unsupported'}) {
my $f;
for $f (sort { lc $a cmp lc $b } keys %API) {
next unless $API{$f}{todo};
print "$f ", '!x(40-length($f)), " ", format_version($API{$f}{todo}), "\n";
}
exit 0;
}

# Scan for possible replacement candidates

my(%replace, %need, %hints, %depends);
my $replace = 0;
my $hint = "";

while (<DATA>) {
if ($hint) {
if (m{^\s*\s(?:\s*)\s*$})
{
$hints{$hint} ||= ""; # suppress warning with older perls
$hints{$hint} .= "$1\n";
}
else {
$hint = "";
}
}
$hint = $1 if m{^\s*$rcs\sHint:\s+(\w+)\s*$};

$replace = $1 if m{^\s*$rcs\s+Replace:\s+(\d+)\s+$rcce\s*$};
$replace{$2} = $1 if $replace and m{^\s*\s*define\s+(\w+)(?:\s*([\^]*))?\s+(\w+)};
$replace{$2} = $1 if m{^\s*\s*define\s+(\w+)(?:\s*([\^]*))?\s+(\w+).*rcs\s+Replace\s+$rcce};
$replace{$1} = $2 if m{^\s*$rcs\s+Replace (\w+) with (\w+)\s+$rcce\s*$};

if (m{^\s*$rcs\s+(\w+)\s+depends\s+on\s+(\w+(\s*,\s*\w+)*)\s+$rcce\s*$}) {
push @{$depends{$1}}, map { s/\s+//g; $_ } split /,/, $2;
}

$need{$1} = 1 if m{^#\s+defined\(\NEED_\s+(\w+)(?:\s*_GLOBAL)?\)};
}

if (exists $opt{'api-info'}) {
my $f;
my $count = 0;
my $match = $opt{'api-info'} =~ m!^(.*/)! ? $1 : "\Q$opt{'api-info'}\E\$";

```

```

for $f (sort { lc $a cmp lc $b } keys %API) {
    next unless $f =~ /$match/;
    print "\n=== $f ===\n\n";
    my $info
= 0;
    if ($API{$f}{base} || $API{$f}{todo}) {
        my $base = format_version($API{$f}{base} || $API{$f}{todo});
        print "Supported at least starting from perl-$base.\n";
        $info++;
    }
    if ($API{$f}{provided}) {
        my $todo = $API{$f}{todo} ? format_version($API{$f}{todo}) : "5.003";
        print "Support by $ppport provided back to perl-$todo.\n";
        print "Support needs to be explicitly requested by NEED_$f.\n" if exists $need{$f};
        print "Depends on: ", join(', ', @{$depends{$f}}), ".\n" if exists $depends{$f};
        print "$hints{$f}" if exists $hints{$f};
        $info++;
    }
    unless ($info) {
        print "No portability information available.\n";
    }
    $count++;
}
if ($count > 0) {
    print "\n";
}
else {
    print "Found no API matching '$opt{ 'api-info' }'. \n";
}
exit 0;
}

if (exists $opt{ 'list-provided' }) {
    my $f;
    for $f (sort { lc $a cmp lc $b } keys %API) {
        next unless $API{$f}{provided};
        my @flags;
        push @flags,
'explicit' if exists $need{$f};
        push @flags, 'depend' if exists $depends{$f};
        push @flags, 'hint' if exists $hints{$f};
        my $flags = @flags ? ' [' . join(', ', @flags) . ']' : "";
        print "$f$flags\n";
    }
    exit 0;
}

my @files;

```

```

my @srcext = qw( xs c h cc cpp );
my $srcext = join '|', @srcext;

if (@ARGV) {
    my %seen;
    @files = grep { -f && !exists $seen{$_} } map { glob $_ } @ARGV;
}
else {
    eval {
        require File::Find;
        File::Find::find(sub {
            $File::Find::name =~ /\.$srcext$/i
            and push @files, $File::Find::name;
        }, '.');
    };
    if ($?) {
        @files = map { glob ".*$_" } @srcext;
    }
}

if (!@ARGV || $opt{filter}) {
    my(@in, @out);
    my %xsc = map { /(.*)\.xs$/ ? ("1.c" => 1, "1.cc" => 1) : () } @files;
    for (@files) {
        my $out = exists $xsc{$_} || /\bQ$ppport\E$/i || !/\.$srcext$/i;
        push @ { $out ? \@out : \@in }, $_;
    }
    if (@ARGV && @out) {
        warning("Skipping the following files (use --nofilter to avoid this):\n| ",
        join "\n| ", @out);
    }
    @files = @in;
}

unless (@files) {
    die "No input files given!\n";
}

my(%files, %global, %revreplace);
%revreplace = reverse %replace;
my $filename;
my $patch_opened = 0;

for $filename (@files) {
    unless (open IN, "<$filename") {
        warn "Unable to read from $filename: $!\n";
        next;
    }
}

```

```

info("Scanning $filename ...");

my $c = do { local $/; <IN> };
close IN;

my %file = (orig => $c, changes => 0);

# temporarily remove C comments from the code
my @ccom;
$c =~ s{
  (
    [^"/]+
    |
    (?:"[^\\"]*(?:\\.[^\\"])*" [^"/]*)+
    |
    (?:'[^\\"]*(?:\\.[^\\"])*' [^"/]*)+
  )
  |
  (/ (?
    \*[^\*]*\*(?:[^\$ccs][^\*]*\*)* /
    |
    /[\r\n]*
  ))
}{
  defined $2 and push @ccom, $2;
  defined $1 ? $1 : "$ccs$#ccom$cce";
}egsx;

$file{ccom} = \@ccom;
$file{code} = $c;
$file{has_inc_ppport} = ($c =~ /#.include.*\Q$ppport\E/);

my $func;

for $func (keys %API) {
  my $match = $func;
  $match .= "|$revreplace{$func}" if exists $revreplace{$func};
  if ($c =~ /\b(?:Perl_)?($match)\b/) {
    $file{uses_replace}{$1}++ if exists $revreplace{$func} && $1 eq $revreplace{$func};
    $file{uses_Perl}{$func}++ if $c =~ /\bPerl_{$func}\b/;
    if (exists $API{$func}{provided}) {
      if (!exists $API{$func}{base} || $API{$func}{base} > $opt{'compat-version'}) {
        $file{uses}{$func}++;
        my @deps = rec_depend($func);
        if (@deps) {
          $file{uses_deps}{$func} = \@deps;
          for (@deps) {

```

```

    $file{uses}{$_} = 0 unless exists $file{uses}{$_};
  }
}
for ($func, @deps) {
  if (exists $need{$_}) {
    $file{needs}{$_} = 'static';
  }
}
}
}
if (exists $API{$func}{todo} && $API{$func}{todo} > $opt{'compat-version'}) {
  if ($c =~ /\b$func\b/) {
    $file{uses_todo}{$func}++;
  }
}
}
}
}
}

```

```

while ($c =~
/^\$HS*#$HS*define$HS+(NEED_(\w+?)(_GLOBAL?))\b/mg) {
  if (exists $need{$2}) {
    $file{defined $3 ? 'needed_global' : 'needed_static'}{$2}++;
  }
  else {
    warning("Possibly wrong #define $1 in $filename");
  }
}
}

```

```

for (qw(uses needs uses_todo needed_global needed_static)) {
  for $func (keys %{$file{$_}}) {
    push @{$global{$_}{$func}}, $filename;
  }
}
}

```

```

$files{$filename} = \%file;
}

```

```

# Globally resolve NEED_'s
my $need;
for $need (keys %{$global{needs}}) {
  if (@{$global{needs}{$need}} > 1) {
    my @targets = @{$global{needs}{$need}};
    my @t = grep $files{$_}{needed_global}{$need}, @targets;
    @targets = @t if @t;
    @t = grep /\.xs$/i, @targets;
    @targets = @t if @t;
    my $target = shift @targets;
    $files{$target}{needs}{$need} = 'global';
  }
}

```



```

for (@{$global{needs}{$need}}) {
    $files{$_}{needs}{$need} = 'extern' if $_ ne $target;
}
}
}

for $filename (@files) {
exists $files{$filename} or next;

info("=== Analyzing $filename
===");

my %file = %{$files{$filename}};
my $func;
my $c = $file{code};

for $func (sort keys %{$file{uses_Perl}}) {
if ($API{$func}{varargs}) {
    my $changes = ($c =~ s{\b(Perl_$func\s*(\s*)(?!aTHX_?)()\|[\^\\s])*)}
        { $1 . ($2 eq ' ' ? 'aTHX' : 'aTHX_ ') . $2 }ge);
    if ($changes) {
        warning("Doesn't pass interpreter argument aTHX to Perl_$func");
        $file{changes} += $changes;
    }
}
else {
    warning("Uses Perl_$func instead of $func");
    $file{changes} += ($c =~ s{\bPerl_$func(\s*)((\s*aTHX_?)?\s*}
        {$func$1(}g);
}
}

for $func (sort keys %{$file{uses_replace}}) {
    warning("Uses $func instead of $replace{$func}");
    $file{changes} += ($c =~ s/\b$func\b/$replace{$func}/g);
}

for $func (sort keys %{$file{uses}}) {
    next unless $file{uses}{$func}; # if it's only a dependency
    if (exists $file{uses_deps}{$func}) {
        diag("Uses $func, which
depends on ", join(', ', @{$file{uses_deps}{$func}}));
    }
    elsif (exists $replace{$func}) {
        warning("Uses $func instead of $replace{$func}");
        $file{changes} += ($c =~ s/\b$func\b/$replace{$func}/g);
    }
    else {

```

```

    diag("Uses $func");
}
hint($func);
}

for $func (sort keys %{$file{uses_todo}}) {
    warning("Uses $func, which may not be portable below perl ",
        format_version($API{$func}{todo}));
}

for $func (sort keys %{$file{needed_static}}) {
    my $message = "";
    if (not exists $file{uses}{$func}) {
        $message = "No need to define NEED_$func if $func is never used";
    }
    elsif (exists $file{needs}{$func} && $file{needs}{$func} ne 'static') {
        $message = "No need to define NEED_$func when already needed globally";
    }
    if ($message) {
        diag($message);
        $file{changes} += ($c =~ s/^\$HS*#\$HS*define\$HS+NEED_$func\b.*$LF//mg);
    }
}

for $func (sort keys %{$file{needed_global}}) {
    my $message =
";
    if (not exists $global{uses}{$func}) {
        $message = "No need to define NEED_{$func}_GLOBAL if $func is never used";
    }
    elsif (exists $file{needs}{$func}) {
        if ($file{needs}{$func} eq 'extern') {
            $message = "No need to define NEED_{$func}_GLOBAL when already needed globally";
        }
        elsif ($file{needs}{$func} eq 'static') {
            $message = "No need to define NEED_{$func}_GLOBAL when only used in this file";
        }
    }
    if ($message) {
        diag($message);
        $file{changes} += ($c =~ s/^\$HS*#\$HS*define\$HS+NEED_{$func}_GLOBAL\b.*$LF//mg);
    }
}

$file{needs_inc_ppport} = keys %{$file{uses}};

if ($file{needs_inc_ppport}) {
    my $pp = "";

```

```

for $func (sort keys % { $file{needs} }) {
    my $type = $file{needs}{$func};
    next if $type eq 'extern';
    my $suffix = $type eq 'global' ? '_GLOBAL' : '';
    unless (exists $file{"needed_$type"}{$func}) {
        if ($type eq 'global') {
            diag("Files [ @ { $global{needs} } { $func } ]
need $func, adding global request");
        }
        else {
            diag("File needs $func, adding static request");
        }
        $pp .= "#define NEED_$func$suffix\n";
    }
}

if ($pp && ($c =~ s/^(?=$HS*#$HS*define$HS+NEED_\w+)/$pp/m)) {
    $pp = ";
    $file{changes}++;
}

unless ($file{has_inc_ppport}) {
    diag("Needs to include '$ppport'");
    $pp .= qq(#include "$ppport"\n)
}

if ($pp) {
    $file{changes} += ($c =~ s/^(($HS*#$HS*define$HS+NEED_\w+.*?)/$1$pp/ms)
        || ($c =~ s/^(?=$HS*#$HS*include.*\Q$ppport\E)/$pp/m)
        || ($c =~ s/^(($HS*#$HS*include.*XSUB.*\s*?)/$1$pp/m)
        || ($c =~ s/^\/$pp/);
}
}
else {
    if ($file{has_inc_ppport}) {
        diag("No need to include '$ppport'");
        $file{changes} += ($c =~ s/^(($HS*?#$HS*include.*\Q$ppport\E.*?)$LF//m);
    }
}

# put back in our C comments
my $ix;
my $cpc = 0;
my @ccom = @ { $file{ccom} };
for
$ix (0 .. $#ccom) {
    if (!$opt{plusplus} && $ccom[$ix] =~ s!^/!!) {

```

```

$cppc++;
$file{changes} += $c =~ s/$rccs$ix$rcce/$ccs$com[$ix] $cce/;
}
else {
    $c =~ s/$rccs$ix$rcce/$com[$ix]/;
}
}

if ($cppc) {
    my $s = $cppc != 1 ? 's' : '';
    warning("Uses $cppc C++ style comment$s, which is not portable");
}

if ($file{changes}) {
    if (exists $opt{copy}) {
        my $newfile = "$filename$opt{copy}";
        if (-e $newfile) {
            error("$newfile' already exists, refusing to write copy of '$filename'");
        }
        else {
            local *F;
            if (open F, ">$newfile") {
                info("Writing copy of '$filename' with changes to '$newfile'");
                print F $c;
                close F;
            }
            else {
                error("Cannot open '$newfile' for writing: $!");
            }
        }
    }
    elsif (exists $opt{patch} || $opt{changes}) {
        if (exists $opt{patch}) {
            unless ($patch_opened) {
                if (open PATCH, ">$opt{patch}")
            {
                $patch_opened = 1;
            }
            else {
                error("Cannot open '$opt{patch}' for writing: $!");
                delete $opt{patch};
                $opt{changes} = 1;
                goto fallback;
            }
        }
        mydiff(\*PATCH, $filename, $c);
    }
    else {

```

```

fallback:
    info("Suggested changes:");
    mydiff(\*STDOUT, $filename, $c);
}
}
else {
    my $s = $file{changes} == 1 ? " : 's';
    info("$file{changes} potentially required change$s detected");
}
}
else {
    info("Looks good");
}
}

```

```

close PATCH if $patch_opened;

```

```

exit 0;

```

```

sub mydiff
{
    local *F = shift;
    my($file, $str) = @_ ;
    my $diff;

    if (exists $opt{diff}) {
        $diff = run_diff($opt{diff}, $file, $str);
    }

    if (!defined $diff and can_use("Text::Diff")) {
        $diff = Text::Diff::diff($file, \$str, { STYLE => 'Unified' });
        $diff = <<<HEADER . $diff;
        --- $file
        +++ $file.patched
        HEADER
    }

    if (!defined $diff) {
        $diff =
        run_diff('diff -u', $file, $str);
    }

    if (!defined $diff) {
        $diff = run_diff('diff', $file, $str);
    }

    if (!defined $diff) {

```

```

    error("Cannot generate a diff. Please install Text::Diff or use --copy.");
    return;
}

print F $diff;

}

sub run_diff
{
    my($prog, $file, $str) = @_;
    my $tmp = 'dppptemp';
    my $suf = 'aaa';
    my $diff = "";
    local *F;

    while (-e "$tmp.$suf") { $suf++ }
    $tmp = "$tmp.$suf";

    if (open F, ">$tmp") {
        print F $str;
        close F;

        if (open F, "$prog $file $tmp |") {
            while (<F>) {
                s/^Q$tmp\E/$file.patched/;
                $diff .= $_;
            }
            close F;
            unlink $tmp;
            return $diff;
        }

        unlink $tmp;
    }
    else {
        error("Cannot open '$tmp' for writing: $!");
    }

    return undef;
}

sub can_use
{
    eval "use @_";
    return $@ eq "";
}

```

```

sub rec_depend
{
my $func = shift;
my %seen;
return () unless exists $depends{$func};
grep !$seen{$_}++, map { ($_, rec_depend($_)) } @{$depends{$func}};
}

```

```

sub parse_version
{
my $ver = shift;

if ($ver =~ /^(d+)\.(d+)\.(d+)$/) {
return ($1, $2, $3);
}
elsif ($ver !~ /^(d+)\.[d_]+$/) {
die "cannot parse version '$ver'\n";
}

```

```
$ver =~ s/_//g;
```

```
$ver =~ s/$/000000/;
```

```
my($r,$v,$s) = $ver =~ /(\d+)\.(\d{3})(\d{3})/;
```

```
$v = int $v;
```

```
$s = int $s;
```

```

if ($r < 5 || ($r == 5 && $v < 6)) {
if ($s % 10) {
die "cannot parse version '$ver'\n";
}
}

```

```
return ($r, $v, $s);
```

```
}
```

```
sub format_version
```

```
{
```

```
my $ver = shift;
```

```
$ver =~ s/$/000000/;
```

```
my($r,$v,$s) = $ver =~ /(\d+)\.(\d{3})(\d{3})/;
```

```
$v = int $v;
```

```
$s = int $s;
```

```
if ($r < 5 || ($r == 5 && $v < 6)) {
```

```
if ($s % 10) {
```

```

    die "invalid version '$ver'\n";
}
$s /= 10;

$ver = sprintf "%d.%03d", $r, $v;
$s > 0 and $ver .= sprintf "_%02d", $s;

return $ver;
}

return sprintf "%d.%d.%d", $r, $v, $s;
}

sub info
{
    $opt{quiet} and return;
    print @_, "\n";
}

sub diag
{
    $opt{quiet} and return;
    $opt{diag} and print @_, "\n";
}

sub warning
{
    $opt{quiet} and return;
    print "*** ", @_, "\n";
}

sub error
{
    print "*** ERROR: ", @_, "\n";
}

my %given_hints;
sub hint
{
    $opt{quiet} and return;
    $opt{hints} or return;
    my $func = shift;
    exists $hints{$func} or return;
    $given_hints{$func}++ and return;
    my $hint = $hints{$func};
    $hint =~ s/^/ /mg;
    print " --- hint for $func ---\n", $hint;
}

```



```

sub usage
{
my($usage) = do { local(@ARGV,$/)=($0); <> } =~ /^=head\d$HS+SYNOPSIS\s*^(.*)\s*^=/ms;
my %M = ( 'T' => '*' );
$usage =~ s/^\s*perl\s+\S+/$^X $0/;
$usage =~ s/([A-Z])<([>]+)>/M{$1}$2M{$1}/g;

```

```
print <<ENDUSAGE;
```

Usage: \$usage

See perldoc \$0 for details.

ENDUSAGE

```

exit 2;
}

```

```

__DATA__
*/

```

Found in path(s):

```
* /opt/cola/permits/1343982714_1655185987.637082/0/libalgorithm-diff-xs-perl-0-04-orig-1-tar-gz/Algorithm-Diff-XS-0.04/ppport.h
```

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=head1 NAME

Algorithm::Diff::XS - Algorithm::Diff with XS core loop

=head1 SYNOPSIS

```

# Drop-in replacement to Algorithm::Diff, but "compact_diff"
# and C<LCSidx> will run much faster for large data sets.
use Algorithm::Diff::XS qw( compact_diff LCSidx );

```

=head1 DESCRIPTION

This module is a simple re-packaging of Joe Schaefer's excellent but not very well-known L<Algorithm::LCS> with a drop-in interface that simply re-uses the installed version of the L<Algorithm::Diff> module.

Note that only the C<LCSidx> function is optimized in XS at the moment, which means only C<compact_diff> will get significantly faster for large data sets, while C<diff> and C<sdiff> will run in identical speed as C<Algorithm::Diff>.

=head1 BENCHMARK

	Rate	Algorithm::Diff	Algorithm::Diff::XS
Algorithm::Diff	14.7/s	--	-98%
Algorithm::Diff::XS	806/s	5402%	
	--		

The benchmarking script is as below:

```
my @data = ([qw/a b d/ x 50], [qw/b a d c/ x 50]);
cmpthese( 500, {
  'Algorithm::Diff' => sub {
    Algorithm::Diff::compact_diff(@data)
  },
  'Algorithm::Diff::XS' => sub {
    Algorithm::Diff::XS::compact_diff(@data)
  },
});
```

=head1 SEE ALSO

L<Algorithm::Diff>, L<Algorithm::LCS>.

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=cut

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```
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```

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NAME

Algorithm::Diff::XS - Algorithm::Diff with XS core loop

SYNOPSIS

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# Drop-in replacement to Algorithm::Diff, but "compact_diff"
# and C<LCSidx> will run much faster for large data sets.
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DESCRIPTION

This module is a simple re-packaging of Joe Schaefer's excellent but not very well-known Algorithm::LCS with a drop-in interface that simply re-uses the installed version of the Algorithm::Diff module.

Note that only the "LCSidx" function is optimized in XS at the moment, which means only "compact_diff" will get significantly faster for large data sets, while "diff" and "sdiff" will run in identical speed as "Algorithm::Diff".

BENCHMARK

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    Algorithm::Diff::compact_diff(@data)
  },
  'Algorithm::Diff::XS' => sub {
    Algorithm::Diff::XS::compact_diff(@data)
  },
});
```

SEE ALSO

Algorithm::Diff, Algorithm::LCS.

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```
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#+TITLE: List of code with permissive licenses as used by GnuPG.  
#+STARTUP: showall
```

* DNS resolver (dirmngr/dns.c)

dns.c - Recursive, Reentrant DNS Resolver.

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* Regular
expression support

regex/jimregex.[ch]:

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Subsequently modified by:

1986 John Gilmore hoptoad!gnu

1987 James A. Woods ames!jaw

1993 Christopher Seiwald seiwald@vix.com

2000, 2002 Christopher Seiwald <seiwald@perforce.com>

2010 Steve Bennett <steveb@workware.net.au>

2020 NIIBE Yutaka <gniibe@fsij.org>

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1.131 libfido2 1.10.0-1

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1.132 libedit 3.1-20210910-1build1

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1.133 iproute 5.15.0-1ubuntu2

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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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1.140 icu 70.1-2

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## Commands to generate dependency files
GEN_DEPS.c= $(CC) -E -MM $(DEFS) $(CPPFLAGS)
GEN_DEPS.cc= $(CXX) -E -MM $(DEFS) $(CPPFLAGS)

## Flags for position independent code
SHAREDLIBCFLAGS = -fPIC
SHAREDLIBCXXFLAGS = -fPIC
SHAREDLIBCPPFLAGS = -DPIC

## Additional flags when building libraries and with threads
THREADSCPPFLAGS = -D_REENTRANT
LIBCPPFLAGS =

## Compiler switch to embed a runtime search path
LD_RPATH=
LD_RPATH_PRE= -Wl,-rpath,

## Compiler switch to embed a library name
LD_SONAME = -Wl,-soname -Wl,$(notdir $(MIDDLE_SO_TARGET))

## Shared library options
LD_SOOPTIONS= -Wl,-Bsymbolic

## Shared object suffix
SO = so

## Non-shared intermediate object suffix
```

STATIC_O = ao

Compilation

rules

%. \$(STATIC_O): \$(srcdir)/%.c

\$(COMPILE.c) \$(STATICCPPFLAGS) \$(STATICCFLAGS) -o \$@ \$<

%.o: \$(srcdir)/%.c

\$(COMPILE.c) \$(DYNAMICCPPFLAGS) \$(DYNAMICCFLAGS) -o \$@ \$<

%. \$(STATIC_O): \$(srcdir)/%.cpp

\$(COMPILE.cc) \$(STATICCPPFLAGS) \$(STATICCXXFLAGS) -o \$@ \$<

%.o: \$(srcdir)/%.cpp

\$(COMPILE.cc) \$(DYNAMICCPPFLAGS) \$(DYNAMICCXXFLAGS) -o \$@ \$<

Dependency rules

%.d: \$(srcdir)/%.c

@echo "generating dependency information for \$<"

@\$(SHELL) -ec '\$(GEN_DEPS.c) \$< \

| sed "s^\(\$*\)\.o[:]*/1.o \$@ :/g" > \$@; \

[-s \$@] || rm -f \$@'

%.d: \$(srcdir)/%.cpp

@echo "generating dependency information for \$<"

@\$(SHELL) -ec '\$(GEN_DEPS.cc) \$< \

| sed "s^\(\$*\)\.o[:]*/1.o \$@ :/g" > \$@; \

[-s \$@] || rm -f \$@'

Versioned libraries rules

%. \$(SO).\$(SO_TARGET_VERSION_MAJOR): %. \$(SO).\$(SO_TARGET_VERSION)

\$(RM) \$@ && ln -s \${<F} \$@

%. \$(SO): %. \$(SO).\$(SO_TARGET_VERSION_MAJOR)

\$(RM) \$@ && ln -s \${*F}. \$(SO).\$(SO_TARGET_VERSION) \$@

Bind internal references

LDflags that pkgdata will use

BIR_LDFLAGS= -Wl,-Bsymbolic

Dependencies [i.e. map files] for the final library

BIR_DEPS=

Remove shared library 's'

STATIC_PREFIX_WHEN_USED =

STATIC_PREFIX =

End BSD-specific setup

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1.141 libcbor 0.8.0-2ubuntu1

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1.142 nghttp2 1.43.0-1build3

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Upstream-Name: nghttp2

Upstream-Contact: Tatsuhiro Tsujikawa <t-tujikawa@users.sourceforge.net>

Source: <https://github.com/tatsuhiro-t/nghttp2>

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1.143 e2fsprogs 1.46.5-2ubuntu1.1

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```
#
# This is a Makefile stub which handles the creation of BSD shared
# libraries.
#
# In order to use this stub, the following makefile variables must be defined.
#
# BSDLIB_VERSION = 1.0
# BSDLIB_IMAGE = libce
# BSDLIB_MYDIR = et
# BSDLIB_INSTALL_DIR = $(SHLIBDIR)
#
```

all:: image

```
real-subdirs:: Makefile
@echo " MKDIR pic"
@mkdir -p pic
```

```
BSD_LIB = $(BSDLIB_IMAGE).so.$(BSDLIB_VERSION)
BSDLIB_PIC_FLAG = -fpic
```

image: \$(BSD_LIB)

```
$(BSD_LIB): $(OBJS)
(cd pic; ld -Bshareable -o $(BSD_LIB) $(LDFLAGS_SHLIB) $(OBJS))
$(MV) pic/$(BSD_LIB) .
$(RM) -f ../$(BSD_LIB)
(cd ..; $(LN) $(LINK_BUILD_FLAGS) \
`echo $(my_dir) | sed -e 's;lib/;;'"/$(BSD_LIB) $(BSD_LIB))
```

```
install-shlibs install:: $(BSD_LIB)
@echo " INSTALL_PROGRAM $(BSDLIB_INSTALL_DIR)/$(BSD_LIB)"
@$(INSTALL_PROGRAM) $(BSD_LIB) \
$(DESTDIR)$$(BSDLIB_INSTALL_DIR)/$(BSD_LIB)
@-$(LDCONFIG)
```

install-strip: install

install-shlibs-strip:: install-shlibs

uninstall-shlibs uninstall::

```
$(RM) -f $(DESTDIR)$BSDLIB_INSTALL_DIR/$BSD_LIB
```

clean::

```
$(RM)
```

```
-rf pic
```

```
$(RM) -f $(BSD_LIB)
```

```
$(RM) -f ../$(BSD_LIB)
```

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Index: tdbsa/tdb.c

--- tdbsa.orig/tdb.c

+++ tdbsa/tdb.c

@@ -4,11 +4,11 @@ Rev: 23371

Last Changed Date: 2007-06-06 20:14:06 -0400 (Wed, 06 Jun 2007)

*/

/*

- Unix SMB/CIFS implementation.
+ trivial database library - standalone version

- trivial database library - private includes

-

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Gadi Oxman, August 1995

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```

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```
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'Gnomovision' (which makes passes at compilers) written by James Hacker.
```

```
<signature of Ty Coon>, 1 April 1989  
Ty Coon, President of Vice
```

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Theodore Ts'o
23-June-2007

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```
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```

```
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This package was added to the e2fsprogs debian source package by Theodore Ts'o <tytso@mit.edu> on Sat Mar 15 15:33:37 EST 2003

It is part of the main e2fsprogs distribution, which can be found at:

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/*

* Marko Kiiskila carnil@cs.tut.fi

*

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1.145 base-files 12ubuntu4.2

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Because of this blurred distinction, using the ordinary General Public License for libraries did not effectively promote software sharing, because most developers did not use the libraries. We concluded that weaker conditions might promote sharing better.

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```
<one line to give the program's name and a brief idea of what it does.>  
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```

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```
Gnomovision version 69, Copyright (C) 19xx name of author
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.
```

The hypothetical commands `show w' and `show c' should show the appropriate parts of the General Public License.

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```
Yoyodyne, Inc., hereby disclaims all copyright interest in the
program `Gnomovision' (a program to direct compilers to make passes
at assemblers) written by James Hacker.
```

```
<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
```

That's all there is to it!

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The

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To apply these terms, attach the following notices to the library. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the ``copyright" line and a pointer to where the full notice is found.

@smallexample

@var{one line to give the library's name and an idea of what it does.}

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@end

smallexample

Also add information on how to contact you by electronic and paper mail.

You should also get your employer (if you work as a programmer) or your

school, if any, to sign a ``copyright disclaimer" for the library, if necessary. Here is a sample; alter the names:

```
@smallexample
```

```
Yoyodyne, Inc., hereby disclaims all copyright interest in the library  
'Frob' (a library for tweaking knobs) written by James Random Hacker.
```

```
@var{signature of Ty Coon}, 1 April 1990
```

```
Ty Coon, President of Vice
```

```
@end smallexample
```

That's all there is to it!

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Version 2, June 1991

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Finally, any free program is threatened constantly by software patents. We wish to avoid the danger that redistributors of a free program will individually obtain patent licenses, in effect making the program proprietary. To prevent this, we have made it clear that any patent must be licensed for everyone's free use or not licensed at all.

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The source code for a work means the preferred form of the work for making modifications to it. For an executable work, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the executable. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

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the "copyright" line and a pointer to where the full notice is found.

<one line to give the program's name and a brief idea of what it does.>

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Also add information on how to contact you by electronic and paper mail.

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```
Gnomovision version 69, Copyright (C) year name of author
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute
it
under certain conditions; type `show c' for details.
```

The hypothetical commands `show w' and `show c' should show the appropriate
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be called something other than `show w' and `show c'; they could even be
mouse-clicks or menu items--whatever suits your program.

You should also get your employer (if you work as a programmer) or your
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necessary. Here is a sample; alter the names:

```
Yoyodyne, Inc., hereby disclaims all copyright interest in the program
`Gnomovision' (which makes passes at compilers) written by James Hacker.
```

<signature of Ty Coon>, 1 April 1989

Ty Coon, President of Vice

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Version 2.1, February 1999

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When a program is linked with a library, whether statically or using a shared library, the combination of the two is legally speaking a combined work, a derivative of the original library. The ordinary General Public License therefore permits such linking only if the entire combination fits its criteria of freedom. The Lesser General Public License permits more lax criteria for linking other code with the library.

We call this license the "Lesser" General Public License because it does Less to protect the user's freedom than the ordinary General Public License. It also provides other free software developers Less of an advantage over competing non-free programs. These disadvantages are the reason we use the ordinary General Public License for many libraries. However, the Lesser license provides advantages in certain special circumstances.

For example, on rare occasions, there may be a special need to encourage the widest possible use of a certain library, so that it becomes a de-facto standard. To achieve this, non-free programs must be allowed to use the library. A more frequent case is that a free library does the same job as widely used non-free libraries. In this case, there is little to gain by limiting the free library to free software only, so we use the Lesser General Public License.

In other cases, permission to use a particular library in non-free programs enables a greater number of people to use a large body of free software. For example, permission to use the GNU C Library in non-free programs enables many more people to use the whole GNU operating system, as well as its variant, the GNU/Linux operating system.

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"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

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- a) The modified work must itself be a software library.
- b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.
- c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.
- d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that,

in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public

License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.

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This option is useful when you wish to copy part of the code of

the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

- a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)
- b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.
- c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.
- d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.
- e) Verify that the user has already received a copy of these

materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally

distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

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* misrepresented as being the original software.
*
* 4. This notice may not be removed or altered.
*/

Found in path(s):

* /opt/cola/permits/1402400301_1661782874.918154/0/lsof-4-93-2-dfsg-orig-1-tar-xz/lsof-4.93.2/dialects/darwin/libproc/dlsof.h

* /opt/cola/permits/1402400301_1661782874.918154/0/lsof-4-93-2-dfsg-orig-1-tar-xz/lsof-4.93.2/dialects/darwin/libproc/dfile.c

No license file was found, but licenses were detected in source scan.

Making and Installing Lsof 4

```
*****
| The latest release of lsof is always available via anonymous ftp |
| from lsof.itap.purdue.edu. Look in pub/tools/unix/lsof.      |
*****
```

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=====

Pre-built Lsof Binaries

=====

Avoid using pre-built Lsof binaries if you can; build your own instead.

I do not support Lsof binaries built and packaged by third parties nor Lsof binaries built from anything but the latest Lsof revision. (See the Bug Reports section for more information on the details of Lsof support.)

One important reason for those support restrictions is that when Lsof is built its Configure script tunes Lsof to the features available on the building system, often embodied in supporting header files and libraries. If the building system doesn't have support for a particular feature, Lsof won't be built to support the feature on any system.

The Veritas VxFS file system is a good example of a feature that requires build-time support.

UNIX dialect version differences -- Solaris 8 versus 9, AIX 4.3.3

vesus 5.2, etc. -- can also render a pre-built lsof binary useless on a different version. So can kernel bit size.

There are so many potential pitfalls to using an lsof binary improperly that I strongly recommend lsof be used only where it is built.

```
=====
Making Lsof
=====
```

```
$ cd <lsof source directory>
$ ./Configure <your dialect's abbreviation>
$ make
```

(Consult the 00FAQ and 00XCONFIG files of the lsof distribution for information about using make command invocations and environment variables to override lsof default Makefile strings.)

This lsof distribution can be used with many UNIX dialects. However, it must be configured specifically for each dialect. Configuration is done in three ways: 1) by changing definitions in the machine.h header file of the UNIX dialect of interest; 2) by defining environment variable values prior to calling Configure (see the 00XCONFIG file, the Environment Variables and Environment Variables Affecting the Configure Script sections of this file); and 3) by running the Configure shell script found in the top level of the distribution directory.

You may not need to change any machine.h definitions, but you might want to look at them anyway. Pay particular attention to the definitions that are discussed in the Security section of this file. Please read that section.

The Configure script calls three other scripts in the lsof distribution: AFSConfig; Inventory; and Customize. The AFSConfig script is called for selected dialects (AIX, HP-UX, NEXTSTEP, and Solaris) to locate AFS header files and determine the AFS version. See The AFSConfig Script section of this file for more information.

The Inventory script checks the completeness of the lsof distribution. Configure calls Inventory after it has accepted the dialect abbreviation, but before it configures the top-level directory for the dialect. See The Inventory Script section of this file for more information.

Configure calls the Customize script after it has configured the top-level lsof directory for the declared dialect. Customize helps you modify some of the important compile-time definitions of machine.h. See the The Customize Script section.

You should also think about where you will install lsof and its man page, and whom you will let execute lsof. Please read the Installing Lsof section of this file for information on installation considerations.

Once you have inspected the machine.h file for the dialect for which you want to build lsof, and made any changes you need, run the Configure script, supplying it with the abbreviation for the dialect. (See the following table.) Configure selects the appropriate options for the dialect and runs the Mksrc shell script in the dialect sub-directory to construct the appropriate source files in the top-level distribution directory.

Configure may also run the MkKernOpts script in the dialect sub-directory to propagate kernel build options to the dialect Makefile. This is done for only a few dialects -- e.g., DC/OSx, and Reliant UNIX.

Configure creates a dialect-specific Makefile. You may want to inspect or edit this Makefile to make it conform to local conventions. If you want the Makefile to install lsof and its man page, you will have to create an appropriate install rule.

Lsof may be configured using UNIX dialect abbreviations from the following table. Alternative abbreviations are indicated by a separating `|'. For example, for SCO OpenServer you can use either the `osr" or the `sco" abbreviation:

```
$ Configure osr
or
$ Configure sco
```

Abbreviations UNIX Dialect

aix	IBM AIX 5.[23] and 5.3-ML1 using IBM's C Compiler
aixgcc	IBM AIX 5.[12] and 5.3-ML1 using gcc
darwin	Apple Darwin 7.x and 8.x for Power Macintosh systems
decosf	DEC OSF/1, Digital UNIX, Tru64 UNIX 4.0 and 5.1
digital_unix	Digital UNIX, DEC OSF/1, Tru64 UNIX 4.0 and 5.1

du Digital UNIX, DEC OSF/1, Tru64 UNIX 4.0 and 5.1
 freebsd FreeBSD 4.x, 4.1x, 5.x and [67].x
 hpux HP-UX 11.00, 11.11 and 11.23, using HP's C
 Compiler, both /dev/kmem-based and PSTAT-based
 hpuxgcc HP-UX 11.00, 11.11 and 11.23, using gcc, both
 /dev/kmem-based and PSTAT-based
 linux Linux 2.1.72 and above for x86-based systems
 netbsd NetBSD 1.[456], 2.x and 3.x
 next NEXTSTEP 3.[13]
 nextstep NEXTSTEP 3.[13]
 ns NEXTSTEP 3.[13]
 nxt NEXTSTEP 3.[13]
 openbsd OpenBSD
 2.[89] and 3.[0-9]
 openstep OPENSTEP 4.x
 os OPENSTEP 4.x
 osr SCO OpenServer Release 5.0.6, using the C compiler
 from the SCO developer's kit
 osrgcc SCO OpenServer Release 5.0.6, using gcc
 osr6 SCO Openserver 6.0.0, using the SCO C compiler
 sco SCO OpenServer Release 5.0.6, using the C compiler
 from the SCO developer's kit
 scogcc SCO OpenServer Release 5.0.6, using gcc
 solaris Solaris 2.x, 7, 8, 9 and 10 using gcc
 solarisc Solaris 2.x, 7, 8, 9 and 10 using Sun's cc
 tru64 Tru64 UNIX, DEC OSF/1, Digital UNIX 4.0 and 5.1
 unixware SCO|Caldera UnixWare 7.1.4
 uw SCO|Caldera UnixWare 7.1.4

If you have an earlier version of a dialect not named in the above list, lsof may still work on your system. I have no way of testing that myself. Try configuring for the named dialect -- e.g., if you're using Solaris 2.1, try configuring for Solaris 2.5.1.

After you have configured lsof for your UNIX dialect and have selected options

via the Customize script (See the The Customize Script section.) , use the make command to build lsof -- e.g.,

\$ make

Other Configure Script Options

=====

There are three other useful options to the Configure script besides the dialect abbreviation:

-clean may be specified to remove all traces of a dialect configuration, including the Makefile, symbolic links, and library files.

-h may be specified to obtain a list of
-help Configure options, including dialect abbreviations.

-n may be specified to stop the Configure script from calling the Customize and Inventory scripts.

Caution: -n also suppresses the AFSConfig step.

Environment Variables

=====

Lsof configuration, building, and execution may be affected by environment variable settings. See the Definitions That Affect Compilation section in the 00PORTING file, the General Environment Variables section in the 00XCONFIG file, the Dialect-Specific Environment Variables section in the 00XCONFIG file, and the Environment Variables Affecting the Configure Script section of this file for more information.

Note in the General Environment Variables section of the 00XCONFIG file that there are five environment variables that can be used to pre-define values in lsof's -v output: LSOF_BLDCMT, LSOF_HOST, LSOF_LOGNAME, LSOF_SYSINFO, and LSOF_USER.

Security

=====

If the symbol HASSECURITY is defined, a security mode is enabled, and lsof will allow only the root user to list all open files.

Non-root users may list only open files whose processes have the same user ID as the real user ID of the lsof process (the one that its user logged on with).

However, if HASNOSOCKSECURITY is also defined, anyone may list anyone else's open socket files, provided their listing is enabled with the "-i" option.

Lsof is distributed with the security mode disabled -- HASSECURITY is not defined. (When HASSECURITY is not defined, the definition of HASNOSOCKSECURITY has no meaning.) You can enable the security mode by defining HASSECURITY in the Makefile or in the machine.h header file for the specific dialect you're using -- e.g. dialects/aix/machine.h.

The Customize script, run by Configure when it has finished its work, gives you the opportunity to define HASSECURITY and HASNOSOCKSECURITY. (See the The Customize Script section.)

The lsof -h output indicates the state HASSECURITY and HASNOSOCKSECURITY had when lsof was built, reporting:

```
"Only root can list all files;"
if HASSECURITY was defined and HASNOSOCKSECURITY wasn't
defined;
```

```
"Only root can list all files, but anyone can list socket files."
if HASSECURITY and HASNOSOCKSECURITY were both defined;
```

```
"Anyone can list all files;"
if HASSECURITY wasn't defined. (The definition of
HASNOSOCKSECURITY doesn't matter when HASSECURITY isn't
defined.)
```

You should carefully consider the implications of using the default security mode.

When lsof is compiled in the absence of the HASSECURITY definition, anyone who can execute lsof may be able to see the presence of all open files. This may allow the lsof user to observe open files -- e.g., log files used to track intrusions -- whose presence you would rather not disclose.

As distributed, lsof writes a user-readable and user-writable device cache file in the home directory of the real user ID executing lsof. There are other options for constructing the device cache file path, and they each have security implications.

The 00DCACHE file in the lsof distribution discusses device cache file path construction in great detail. It tells how to disable the various device cache file path options, or how to disable the entire device cache file feature by removing the HASDCACHE definition from the dialect's machine.h file. There is also information on the device cache file feature in the 00FAQ file. (The 00DCACHE and 00FAQ files are part of the lsof distribution package.)

The

Customize script, run by Configure after it has finished its work, gives you the opportunity to change the compile-time options related to the device cache file. (See The Customize Script section.)

Since lsof may need setgid or setuid-root permission (See the Setgid Lsof Dialects and Setuid-root Lsof Dialects sections.), its security should always be viewed with skepticism. Lest the setgid and setuid-root permissions allow lsof to read kernel name list or memory files, declared with the -k and -m options, that the lsof user can't normally access, lsof uses access(2) to establish its real user's authority to read such files when it can't surrender its power before opening them. This change was added at the suggestion of Tim Ramsey.

Lsof surrenders setgid permission on most dialects when it has gained access to the kernel's memory devices. There are exceptions to this rule, and some lsof implementations need to run setuid-root. (The Setgid Lsof Dialects and Setuid-root Lsof Dialects sections contains a list of lsof implementations and the permissions recommended in the distribution's Makefiles.)

The surrendering of setgid permission is controlled by the WILLDROPGID definition in the dialect machine.h header files.

In the end you must judge for yourself and your installation the risks that lsof presents and restrict access to it according to your circumstances and judgement.

Run-time Warnings

=====

Lsof can issue warning messages when it runs -- e.g., about the state of the device cache file, about an inability to access an NFS file system, etc. Issuance of warnings are enabled by default in the lsof distribution.

Issuance of warnings may be disabled by default by defining WARNINGSTATE in the dialect's machine.h. The Customize script may also be used to change the default warning message issuance state. (See The Customize Script section.)

The ``-w" option description of the ``-h" option (help) output will indicate the default warning

issuance state. Whatever the state may be, it can be reversed with ``-w".

Device Access Warnings

=====

When lsof encounters a /dev (or /devices) directory, one of its sub-directories, or one of their files that it cannot access with opendir(3) or stat(2), it issues a warning message and continues. lsof will be more likely to issue such a warning when it has been installed with setgid(<some group name>) permission; it won't have trouble if it has been installed with setuid(root) permission or is being run under the root login.

The lsof caller can inhibit or enable the warning with the -w option, depending on the issuance state of run-time warnings. (See the Run-time Warnings section.)

The warning messages do not appear when lsof obtains device information from a device cache file that it has built and believes to be current or when warning message issuance is disabled by default. (See the "Caches -- Name and Device" section for more information on the device cache file.)

The lsof builder can inhibit the warning by disabling the definition of WARNDEVACCESS in the dialect's machine.h or disable all warnings by defining WARNINGSTATE. WARNDEVACCESS is defined by default for most dialects. However, some dialects have some device directory elements that are private -- e.g., HP-UX -- and it is more convenient for the lsof user if warning messages about them are inhibited.

Output from lsof's -h option indicates the status of WARNDEVACCESS. If it was defined when lsof was compiled, this message will appear:

```
/dev warnings = enabled
```

If WARNDEVACCESS was not defined when lsof was compiled, this message will appear instead:

```
/dev warnings = disabled
```

The Customize script, run by Configure after it has finished its work, gives you the opportunity to change the WARNDEVACCESS definition. (See The Customize Script section.)

NFS Blocks

=====

Lsof is susceptible to NFS blocks when it tries to lstat() mounted file systems and when it does further processing -- lstat() and readlink() -- on its optional file and file system arguments.

Lsof tries to avoid being stopped completely by NFS blocks by doing the lstat() and readlink() functions in a child process, which returns the function response via a pipe. The lsof parent limits the wait for data to arrive in the pipe with a SIGALRM, and, if the alarm trips, terminates the child process with a SIGINT and a SIGKILL.

This is as reliable and portable a method for breaking NFS deadlocks as I have found, although it still fails under some combinations of NFS version, UNIX dialect, and NFS file system mount options. It generally succeeds when the "intr" or "soft" mount options are used; it generally fails when the "hard" mount option is used.

When lsof cannot kill the child process, a second timeout causes it to stop waiting for the killed child to complete. While the second timeout allows lsof to complete, it may leave behind a hung child process. Unless warnings are inhibited by default or with the -w option, lsof reports the possible hung child.

NFS block handling was updated with suggestions made by Andreas Stolcke. Andreas suggested using the alternate device numbers that appear in the mount tables of some dialects when it is not possible to stat(2) the mount points.

The -b option was added to direct lsof to avoid the stat(2) and readlink(2) calls that might block on NFS mount points and always use the alternate device numbers. If warning message issuance is enabled and you don't want warning messages about what lsof is doing, use the -w option, too.

The -O option directs lsof to avoid doing the potentially blocking operations in child processes. Instead, when -O is specified, lsof does them directly. While this consumes far less system overhead, it can cause lsof to hang, so I advise you to use -O sparingly.

Caches -- Name and Device

=====

Robert Ehrlich suggested that lsof obtain path name components for open files from the kernel's name cache. Where possible, lsof dialect implementations do that. The -C option inhibits kernel name cache examination.

Since AFS apparently does not use the kernel's name cache, where lsof supports AFS it is unable to identify AFS files with path name components.

Robert also suggested that lsof cache the information it obtains via stat(2) for nodes in /dev (or /devices) to reduce subsequent running time. Lsof does that, too.

In the default distribution the device cache file is stored in .lsof_hostname, mode 0600, in the home directory of the login of the user ID that executes lsof. The suffix, hostname, is the first component of the host's name returned by gethostname(2). If lsof is executed by a user ID whose home directory is NFS-mounted from several hosts, the user ID's home directory may collect several device cache files, one for each host from which it was executed.

Lsof senses accidental or malicious damage to the device cache file with extensive integrity checks, including the use of a 16 bit CRC. It also tries to sense changes in /dev (or /devices) that indicate the device cache file is out of date.

There are other options for forming the device cache file path. Methods the lsof builder can use to control and employ them are documented in the separate 00DCACHE file of the lsof distribution.

Raw Sockets

=====

On many UNIX systems raw sockets use a separate network control block structure. Display of files for applications using raw sockets -- ping, using ICMP, for example -- need special support for displaying their information. This support is so dialect-specific and information to provide it so difficult to find that not all dialect revisions of lsof handle raw sockets completely.

Other Compile-time Definitions

=====

The machine.h and dlsof.h header files for each dialect contains

definitions that affect the compilation of lsof. Check the Definitions That Affect Compilation section of the 00PORTING file of the lsof distribution for their descriptions. (Also see The Customize Script section.)

The AFSConfig Script

=====

Lsof supports AFS on some combinations of UNIX dialect and AFS version. See the AFS section of this document for a list of supported combinations.

When configuring for dialects where AFS is supported, the Configure script calls the AFSConfig script to determine the location of AFS header files and the AFS version. Configure will not call AFSConfig, even for the selected dialects, unless the file /usr/vice/etc/ThisCell exists.

The AFS header file location is recorded in the AFSHeaders file; version, AFSVersion. Once these values have been recorded, Configure can be told to skip the calling of AFSConfig by specifying its (Configure's) -n option.

The Inventory Script

=====

The lsof distribution contains a script, called Inventory, that checks the distribution for completeness. It uses the file 00MANIFEST in the distribution as a reference point.

After the Configure script has accepted the dialect abbreviation, it normally calls the Inventory script to make sure the distribution is complete.

After Inventory has run, it creates the file ".ck00MAN" in the top-level directory to record for itself the fact that the inventory has been check. Should Inventory be called again, it senses this file and asks the caller if another check is in order, or if the check should be skipped.

The -n option may be supplied to Configure to make it bypass the calling of the Inventory script. (The option also causes Configure to avoid calling the Customize script.)

The lsof power user may want to define (touch) the file ".neverInv".
Configure avoids calling the Inventory script when ".neverInv"
exists.

The Customize Script

=====

Normally when the Configure script has finished its work, it calls
another shell script in the lsof distribution called Customize.
(You can tell Configure to bypass Customize
with its -n option.)

Customize leads you through the specification of these important
compile-time definitions for the dialect's machine.h header file:

HASDCACHE device cache file control
 HASENVDC device cache file environment
 variable name
 HASPERSDC personal device cache file path
 format
 HASPERSDCPATH name of environment variable that
 provides an additional component
 of the personal device cache file
 path
 HASSYSDC system-wide device cache file path
HASKERNIDCK the build-time to run-time kernel
 identity check
HASSECURITY the security option
HASNOSOCKSECURITY the open socket listing option whe
 HASSECURITY is defined
WARNDEVACCESS /dev (or /devices) warning message
 control
WARNINGSTATE warning message issuance state

The Customize script accompanies its prompting for entry of new
values for these definitions with brief descriptions of each of
them. More information on these definitions may be found in this
file or
in the 00DCACHE and 00FAQ files of the lsof distribution.

You don't need to run Customize after Configure. You can run it
later or you can edit machine.h directly.

The -n option may be supplied to Configure to make it bypass the
calling of the Customize script. (The option also causes Configure
to avoid calling the Inventory script.)

The lsof power user may want to define (touch) the file ".neverCust".
Configure avoids calling the Customize script when ".neverCust"
exists.

Customize CAUTION: the Customize script works best when it is
applied to a newly configured lsof source base -- i.e., the machine.h
header file has not been previously modified by the Customize
script. If you have previously configured lsof, and want to rerun
the Customize script, I recommend you clean out the previous
configuration and create a new one:

```
$ Configure -clean
$ Configure <dialect_abbreviation>
...
Customize in response to the Customize script prompts.
```

Cautions

=====

Lsof is a tool that
is closely tied to the UNIX operating system
version. It uses header files that describe kernel structures and
reads kernel structures that typically change from OS version to
OS version, and even within a version as vendor patches are applied.

DON'T TRY TO USE AN LSOF BINARY, COMPILED FOR ONE UNIX OS VERSION,
ON ANOTHER. VENDOR PATCHES INFLUENCE THE VERSION IDENTITY.

On some UNIX dialects lsof versions may be even more restricted by
architecture type.

The bottom line is use lsof where you built it. If you intend to
use a common lsof binary on multiple systems, make sure all systems
run exactly the same OS version and have exactly the same patches.

Warranty

=====

Lsof is provided as-is without any warranty of any kind, either
expressed or implied, including, but not limited to, the implied
warranties of merchantability and fitness for a particular purpose.
The entire risk as to the quality and performance of lsof is with
you. Should lsof prove defective, you assume the cost
of all
necessary servicing, repair, or correction.

License

=====

Lsof has no license. Its use and distribution are subject to these terms and conditions, found in each lsof source file. (The copyright year in or format of the notice may vary slightly.)

```
/*
 * Copyright 2002 Purdue Research Foundation, West Lafayette,
 * Indiana 47907. All rights reserved.
 *
 * Written by Victor A. Abell
 *
 * This software is not subject to any license of the American
 * Telephone and Telegraph Company or the Regents of the
 * University of California.
 *
 * Permission is granted to anyone to use this software for
 * any purpose on any computer system, and to alter it and
 * redistribute it freely, subject to the following
 * restrictions:
 *
 * 1. Neither the authors nor Purdue University are responsible
 *    for any consequences of the use of this software.
 *
 * 2. The origin of this software must not be misrepresented,
 *    either by explicit claim or by omission. Credit to the
 *    authors and Purdue University must appear in documentation
 *    and sources.
 *
 * 3. Altered versions must be plainly marked as such, and must
 *    not be misrepresented as being the original software.
 *
 * 4. This notice may not be removed or altered.
 */
```

Bug Reports

=====

Now that the obligatory disclaimer is out of the way, let me hasten to add that I accept lsof bug reports and try hard to respond to them. I will also consider and discuss requests for new features, ports to new dialects, or ports to new OS versions.

PLEASE DON'T SEND BUG REPORTS ABOUT LSOF TO THE UNIX DIALECT OR DIALECT OPTION VENDOR.

At worst such bug reports will confuse the vendor; at best, the vendor will forward the bug report to me.

PLEASE DON'T SEND BUG REPORTS ABOUT LSOF BINARIES BUILT OR DISTRIBUTED BY SOMEONE ELSE, BECAUSE I CAN'T SUPPORT THEM.

Before you send me a bug report, please do these things:

- * Make sure you try the latest lsof revision.

- + Download the latest revision from:

`ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof`

- + Verify the signatures of what you have downloaded;

- + While connected to `lsof.itap.purdue.edu`, check for patches:

`ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/patches`

- + If patches exist, install them in the latest revision you just downloaded. Then build the latest revision and see if it fixes your bug.

- * If you're having trouble compiling lsof with gcc, try the UNIX dialect vendor's compiler. I don't have access to gcc on all test systems, so my support for it is hit-and-miss, and so is my ability to respond to gcc compilation problem reports.

- * Check the lsof frequently asked questions file, 00FAQ, to see if there's a question and answer relevant to your problem.

- * Make sure you're running the lsof you think you are

by

checking the path to it with `which(1)`. When in doubt, use an absolute path to lsof. Make sure that lsof binary has sufficient permissions to do what you ask, including internal permissions given it (e.g., restrictions on what files lsof may report for whom) during its build.

When you send a bug report, make sure you include output from your running of lsof's Configure script. If you were able to compile a running lsof, please also include:

- * Output from `which(1)` that shows the absolute path to the

Isof binary in question;

* Output from running Isof with its -h and -v options at Isof's absolute path;

* Output from "ls -l" directed to Isof's absolute path.

If you weren't able to compile a running Isof, please send me: the compiler error output; identification of the Isof revision you're using (contents of the Isof version.c file); identification of your system (full uname output or output from whatever other tool identifies the system); and compiler identification (e.g., gcc -v output).

Either set of output will help me understand how Isof was configured and what UNIX dialect and Isof revision is involved.

Please send all bug reports, requests, etc. to me via e-mail at <abe@purdue.edu>. Make sure "Isof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

The 00FAQ File

=====

The Isof distribution contains an extensive frequently asked questions file on Isof features and problems. I recommend you consult it before sending me e-mail. Use your favorite editor or pager to search 00FAQ -- e.g., supplying as a search argument some fixed text from an Isof error message.

The Isof-l Mailing List

=====

Information about Isof, including notices about the availability of new revisions, may be found in mailings of the Isof-l listserv. For more information about it, including instructions on how to subscribe, read the 00LSOF-L file of the Isof distribution.

Field Output Example Scripts

=====

Example AWK and Perl 4 or 5 scripts for post-processing Isof field output are locate in the scripts sub-directory of the Isof distribution. The scripts sub-directory contains a 00README file with information

about the scripts.

Field Output C Library

=====

The lsof test suite (See "Testing Lsof."), checks basic lsof operations using field output. The test suite has its own library of C functions for common test program operations, including processing of field output. The library or selections of its functions could be adapted for use by C programs that want to process lsof field output. See the library in the file LTlib.c in the tests/ sub-directory

Testing Lsof

=====

Lsof has an automated test suite in the tests/ sub-directory that can be used to test some basic lsof features -- once lsof has been configured and made. Tests are arranged in three groups: basic tests that should run on all dialects; standard tests that should run on all dialects; and optional tests that may not run on all dialects or may need special resources to run. See 00TEST for more information.)

CAUTION!!! Before you attempt to use the test suite make sure that the lsof you want to test can access the necessary kernel resources -- e.g., /dev/mem, /dev/kmem, /proc, etc. Usually you want to test the lsof you just built, so this is an important check. (See 00TEST.)

To run the basic and standard tests, using the lsof in the parent directory of tests/, do this:

```
$ cd tests
$ make test
  or $ make std
  or $ make standard
```

The basic and standard tests may be run as silently as possible, using the lsof in the parent directory of tests/, with:

```
$ cd tests
$ make auto
```

This is the "automatic" test mode, designed for use by scripts that

build lsof. The caller is expected to test the make exit code to determine if the tests succeeded. The caller should divert standard output and standard error to /dev/null to suppress make's error exit message.

The optional tests may be run, using the lsof in the parent directory of tests/, with:

```
$ cd tests
$ make opt
  or $ make optional
```

It's possible to execute individual tests, too. See the 00TEST file of this distribution for more information on the tests, what they do, and how to run and possibly customize each test.

It's possible to run the tests, using an lsof other than the one in the parent directory of /tests, too. See 00TEST for information about using the LT_LSOF_PATH environment variable to do that.

```
=====
Dialect Notes
=====
```

AFS
===

Lsof recognizes AFS files on the following combinations of UNIX dialect and AFS versions:

- AIX 4.1.4 (AFS 3.4a)
- Linux 1.2.13 (AFS 3.3)
- NEXTSTEP 3.2 (AFS 3.3) (untested on recent lsof revisions)
- Solaris 2.6 (AFS 3.4a)
- Ultrix 4.2 RISC (AFS 3.2b) (no longer available)

Lsof has not been tested under other combinations -- e.g. HP-UX 10.10 and AFS 3.4a -- and probably won't even compile there. Often when a UNIX dialect version or AFS version changes, the new header files come into conflict, causing compiler objections.

AIX
===

Specify the aix Configure abbreviation for AIX 4.1.[45], 4.2[.1], 4.3[.123], 5L, and 5.[123].

Specify aixgcc on AIX above 4.1 to use the gcc compiler. (Gcc can't be used to compile lsof on AIX 4.1 and below because of kernel structure alignment differences between it and xlc.) Gcc results sometimes depend on the version of the gcc compiler that is used.

Compilation of lsof with gcc on AIX 4.3[.123], 5L, and 5.[123] has been sparsely tested with varying degrees of success: it has been reported to succeed on AIX 4.3.3 and 32 bit Power AIX 5.1; to fail on ia64 AIX 5.1 and 64 bit Power AIX 5.1; and to succeed on 32 and 64 bit Power AIX 5.2. Lsof compilation with gcc hasn't been tested on AIX 5.3.

At revision 4.61 and above lsof is configured and built to match the bit size of the kernel of Power architecture AIX 5.1 systems. Lsof binaries built for 32 and 64 bit kernels are not interchangeable. See 00FAQ for more information.

The Configure script uses /usr/bin/oslevel to determine the AIX version for AIX less than 5 and ``uname -rv" for AIX 5 and higher. If /usr/bin/oslevel isn't executable on AIX less than 5, the Configure script issues a warning message and uses ``uname -rv" to determine the AIX version.

When Configure must use ``uname -rv" on AIX less than 5 to determine the AIX version, the result will lack a correct third component -- e.g., the `4' of ``4.1.4". If your AIX less than 5 system lacks an executable oslevel, I suggest you edit the Configure-produced Makefile and complete the _AIXV definition in the CFGF string.

By default lsof avoids using the kernel's readx() function, causing it to be unable to report information on some text and library file references. The ``-X" option allows the lsof user to ask for the information readx() supplies.

Lsof avoids readx() to avoid the possibility of triggering a kernel problem, known as the Stale Segment ID kernel bug. Kevin Ruderman reported this bug to me. The bug shows up when the kernel's dir_search() function hangs, hanging the application process that called it so completely that the application process can neither be killed nor stopped. The hang is the consequence of another process (perhaps lsof) making legitimate use of the kernel's readx() function to access the kernel memory that dir_search() is examining. IBM has indicated they have no plans to fix the bug.

A fuller discussion of this bug may be found in the 00FAQ file of the lsof distribution. There you will find a description of the Stale Segment ID bug, the APAR on it, and a discussion of the sequence of events that exposes it.

I added the `--X` function so you can tell lsof to use `readx()`, but if you use `--X`, you should be alert to its possibly serious side effects. Although `readx()` is normally disabled, its state is controlled with the `HASXOPT`, `HASXOPT_ROOT`, and `HASXOPT_VALUE` definitions in `dialects/aix/machine.h`, and you can change its default state by changing those definitions. You can also change `HASXOPT_ROOT` via the `Customize` script.

You can also compile lsof with `readx()` use permanently enabled or disabled -- see the comments about the definitions in the `dialects/aix/machine.h` header file. You may want to permanently disable lsof's use of `readx()` if you plan to make lsof publicly executable. You can also restrict `-X` to processes whose real UID is root by defining `HASXOPT_ROOT`.

I have never seen lsof cause the Stale Segment ID bug to occur and haven't had a report that it has, but I believe there is a possibility it could.

AFS support for AIX was added with help help from Bob Cook and Jan Tax who provided test systems.

Henry Grebler and David J. Wilson helped with lsof for AIX 4.2.

Bill Pemberton provided an AIX 4.3 test system. Andrew Kephart and Tom Weaver provided AIX 4.3 technical assistance. Niklas Edmundsson did 4.3.1 testing. Doug Crabill provided an AIX 4.3.2 test system. Jeff W. Stewart provided an AIX 4.3.3 test system.

The SMT file type for AIX 4.1.[45], 4.2[.1], and 4.3[.12] is my fabrication. See the 00FAQ file more information on it.

Loc Le and Nasser Momtaheni of IBM provided test systems for AIX 5L and 5.1. Lsof for AIX 5L and 5.1 needs `setuid-root` permission to process the `-X` option on systems whose architecture type is `ia64`.

Dale Talcott of Purdue provided AIX 5.1 and 5.2 test systems. Dale and John Jackson of Purdue provided an AIX 5.3 test system.

Apple Darwin

=====

The Apple Darwin port was provided by Allan Nathanson for version 1.2. Allan also arranged for access to a test system for maintenance and regression testing. Dale Talcott provided a test system, too.

Allan supplied patches for updates to 1.4, 5.x, 6.x, 7.x and 8.x.

BSDI BSD/OS

=====

As of lsof revision 4.77 support for BSDI BSD/OS has been discontinued.

Lsof revision 4.76 with BSDI BSD/OS support may be found on lsof.itap.purdue.edu in `pub/tools/unix/lsof/src`.

DEC OSF/1, Digital UNIX, Tru64 UNIX

=====

Robert Benites, Dean Brock, Angel Li, Dwight McKay, Berkley Shands, Ron Young and Steve Wilson have kindly provided test systems. Jeffrey Mogul has provided technical assistance. Dave Morrison and Lawrence MacIntyre did Digital UNIX V3.2 testing.

Lsof supports the ADVFS/MSFS layered file system product. Lsof can locate all the open files of an ADVFS/MSFS file system when its path is specified, provided the file system is listed in `/etc/fstab` with an `advfs` type. (This `/etc/fstab` caveat applies only to Digital UNIX 2.0.) At Digital UNIX 4.0 and Tru64 UNIX, using code provided by David Brock, lsof 4.20 and above can locate ADVFS file paths.

Testing of lsof on DEC OSF/1 and Digital UNIX 4.0 ended with lsof revision 4.74. Hence, the lsof documentation has dropped the claim that it works there.

For a distribution of lsof 4.74 that was tested on DEC OSF/1 and Digital UNIX 4.0, check `pub/tools/unix/lsof/OLD/src` on the lsof ftp home, lsof.itap.purdue.edu.

Lsof revisions past 4.74 have only been tested on Tru64 UNIX 5.1.

FreeBSD

=====

Bill Bormann of Purdue University provided access to several FreeBSD test systems. Ade Barkah, John Clear, Ralph Forsythe, Michael Haro, Kurt Jaeger, and William McVey have also provided FreeBSD test systems.

The FreeBSD distribution header files are augmented by header files in the `dialects/freebsd/include` directory.

Larry Rosenman maintains the `lsf` FreeBSD port package.

HP-UX

=====

`lsf` has two HP-UX bases: `/dev/kmem` for HP-UX 11.0 and earlier; and `PSTAT` for HP-UX 11.11 and later. The `lsf` Configure script will pick the appropriate base.

To use the CCITT x.25 socket support for HP-UX, you must have the x.25 header files in `/etc/conf/x25`

Pasi Kaara helped with the HP-UX port, especially with its CCITT x.25 socket support.

Richard

Allen provided HP-UX 10.x and 11.x test systems, as did Mark Bixby, and Elias Halldor Agustsson. Marc Winkler helped test the 10.20 port. Richard J. Rauenzahn provided a 64 bit HP-UX 11 test system and an HP-UX 11.11 development system.

AFS support for HP-UX was added thanks to help from Chaskiel Moses Grundman, who provided a test system.

The `/dev/kmem`-based HP-UX 11.00 support is extremely fragile. It depends on privately developed kernel structure definitions. (See `.../dialects/hpux/hpux11` for the header files making the definitions.) Those header files and their definitions will not be updated by HP-UX 11.00 patches, making it likely that any patch changing a kernel structure critical to `lsf` will break `lsf` in some way.

It's possible to build a 64 bit `lsf` for 64 bit HP-UX 11.00 with `gcc`, but you must have a `gcc` compiler capable of producing 64 bit executables. See the `00FAQ` file for more information.

The `PSTAT`-based `lsf` for HP-UX 11.11 and later is much more solid.

I

am indebted to the vision of HP for providing an `lsf` kernel API through the `PSTAT` implementation. Specifically I appreciate the

help of HP staff members Carl Davidson, Louis Huemiller, Rich Rauenzahn, and Sailu Yallapragada that made PSTAT-based HP-UX lsof possible.

IPv6

=====

lsof has IPv6 support that has been tested for these UNIX dialects: AIX 4.3.x; Apple Darwin 5.[12] and 6.0; the INRIA and KAME FreeBSD IPv6 implementations; PSTAT-based HP-UX; /proc-based Linux; the INRIA and KAME NetBSD implementations; and Solaris 8 and 9. lsof has IPv6 support that hasn't been tested for: OpenBSD (KAME); OpenUNIX 8; Tru64 Unix 5.[01]; and UnixWare 7.1.[34].

Please let me know if your UNIX dialect has IPv6 support and I'll see if it can be supported by lsof.

Linux

=====

Tim Korb, Steve Logue, Joseph J. Nuspl Jr., and Jonathan Sergent have provided Linux test systems.

Michael Shields helped add and test automatic handling of ELF/COFF form names in /System.map, Marty Leisner and Keith Parks have helped test many lsof revisions. Marty has provided valuable suggestions, Linux hints, and code, too.

The 00FAQ file gives some Linux tips, including information on coping with system map file problems.

To determine the state of the Linux 2.1.x C library lseek() function, the lsof Configure script runs a test program that must have permission to read /dev/kmem. The test determines if the lseek() function properly handles kernel offsets, which appear to be negative because their high order bit is set. If the lseek() test reveals a faulty lseek(), Configure activates the use of a private lseek() function for kernel offset positioning. See the Linux problems section of the 00FAQ file of the lsof distribution for more information.

NetBSD

=====

Greg Earle and Paul Kranenburg have assisted with the NetBSD ports. Paul has provided test systems. Ray Phillips provided a NetBSA Alpha test system. Andrew Brown also provided a test system.

The NetBSD dialect version of lsof is compiled using the dialect sources it shares with OpenBSD in the n+obsd dialect sub-directory.

NEXTSTEP and OPENSTEP

=====

Virtual memory header files that allow lsof to display text references were derived from the contents of /usr/include/vm of NEXTSTEP 2.0. NeXT did not ship the virtual memory header files with other NEXTSTEP or OPENSTEP versions.

You may use the RC_FLAGS environment variable to declare compiler options outside the Makefile. A common use of this variable is to define the architecture types to be included in a "fat" executable. See the comments in dialects/next/Makefile for an example.

OpenBSD

=====

David Mazieres has provided OpenBSD test systems. The OpenBSD dialect version of lsof is compiled using the dialect sources it shares with NetBSD in the n+obsd dialect sub-directory.

Kenneth Stailey has provided OpenBSD testing and advice.

John Dzuber (Zube) reports, "lsof 4.33 compiles and runs on OpenBSD 2.3 for the pmax architecture (decstation 3100)."

I have not tested lsof on OpenBSD 3.8, but David Mazieres reports revision 4.76 worked on OpenBSD 3.8.

Pyramid DC/OSx and Reliant UNIX

=====

As of lsof revision 4.52 support for all Pyramid dialects has been discontinued. Lsof revision 4.51 with Pyramid support may be obtained upon request. Send the request to abe@purdue.edu.

These two UNIX dialects are very similar and share dialect-specific

source files from the pyramid sub-directory.

The Reliant Unix Pyramid C compiler issues warning messages that I haven't found a convenient way to suppress. You can ignore warning messages about casts and conversions that lose bits. The message "warning: undefining __STDC__" is intentionally caused by the lsof MkKernOpts configuration script to suppress warning messages about cast and conversion problems in standard system header files, such as <stdio.h> and <string.h>.

Bruce Beare and Kevin Smith provided test systems.

Caldera OpenUNIX

=====

Larry

Rosenman provided an OpenUNIX 8 test system. Matthew Thurmaier provided technical assistance, along with these people from Caldera: Jack Craig, Robert Lipe, and Bela Lubkin.

Robert Lipe supplied changes to lsof for OpenUNIX 8.0.1. Those changes were also incorporated in UnixWare 7.1.3 when it became the release name for OpenUNIX 8.0.1.

Support for lsof on OpenUNIX ended at lsof revision 4.74. The last lsof revision, 4.74, tested on OpenUNIX, may be found at the lsof "home" ftp site, lsof.itap.purdue.edu, in pub/tools/unix/lsof/OLD/src.

SCO OpenServer

=====

Dion Johnson, Bela Lubkin, and Nathan Peterson of SCO gave me copies of SCO OpenServer and the SCO OpenServer Development System 3.0 and provided technical advice for the lsof port.

Hugh Dickins, Bela Lubkin, Craig B. Olofson, and Nathan Peterson provided version 5.0 and gave technical advice for porting lsof to it. Bela provided the 5.0.4 changes. D. Chris Daniels provided a 5.0.4 test system, Lee Penn provided one for 5.0.5, and John Dubois for 5.0.6.

The <netdb.h> header file was accidentally omitted from some SCO OpenServer Development System releases. The Configure script will sense its absence and substitute an equivalent from the BSD distribution. The BSD <netdb.h> and the <sys/cdefs.h> header file

it includes are located in the dialects/os/include sub-directory tree.

To compile lsof from its distribution sources you must have the TCP/IP and NSF headers in /usr/include. While those are optional OpenServer packages, I have access to no system that doesn't have them, so I'm unable to build lsof for such a configuration. However, it should be possible to modify the lsof Configure script and sources so lsof would compile and work without those optional packages.

If you have an OpenServer system configured without the TCP/IP and NFS packages, and want to tackle the job of building lsof for it, contact me via e-mail at <abe@purdue.edu>. I'll identify the Configure script, header file, and source file changes you will need to make. (Caution: this is not a simple task, or I would have already done it.)

The optional osrgcc and scogcc Configure abbreviations construct Makefiles for compiling lsof with gcc.

The UnixWare 7.1.4 sources are used for OpenServer Release 6.0.0. Hence there is a separate Configure abbreviation for it, "osr6". Richard of SCO provided a test system and technical assistance.

SCO|Caldera UnixWare

=====

D. Chris Daniels, John Hughes, Ken Laing, Andrew Merrill, Lee Penn, and Matthew Thurmaier provided test systems. Bela Lubkin provided technical assistance. Larry Rosenman provided 7.1.[34] test systems.

Solaris 2.x, 7, 8, 9 and 10

=====

SEE THE CAUTIONS SECTION OF THIS DOCUMENT.

The latest Solaris revision of lsof 4 might work under Solaris 2.[1-4] and 2.5.[1] and 7 but hasn't been tested there. I have no test systems for those Solaris versions.

Lsof will compile with gcc and the Sun C compiler under Solaris.

If you want to use the Sun compiler, use the solarisc compiler abbreviation. If you use a gcc version less than 2.8 on Solaris,

make sure the gcc-specific includes have been updated for your version of Solaris -- i.e., run the gcc fixincludes script.

Solaris 7, 8, 9 and 10 support for 64 bit kernels depends on a Sun WorkShop or Forte C compiler version that supports the "-xarch=v9" flag -- usually 5.0 or greater. Gcc versions 2.95 and above *may* be configured and built for 64 bit support, but it takes some extra work, the resulting compiler may be fragile, and the gcc developers discourage it. I've built 64 bit capable gcc compilers for Solaris 7, 8 and 9 from gcc versions 2.95 through 3.0.1 and produced working lsof executables with them. More information on 64 bit gcc for Solaris may be found in the 00FAQ file.

Solaris 10 ZFS support is questionable, because Sun does not distribute the ZFS kernel structure definition header files. The lsof Configure script and source code use some risky work-arounds. ZFS file system support was made possible with help from Horst Scheuermann.

Dave Curry and Steve Kirsch provided resources for Solaris 2.x ports. Casper Dik and Gerry Singleton consulted and provided valuable assistance.

Henry Katz, Joseph Kowalski, Charles Stephens, Mike Sullivan, and Mike Tracy provided technical assistance.

AFS support was added to Solaris lsof with help from Curt Freeland, Heidi Hornstein, Michael L. Lewis, Terry McCoy, Phillip Moore, and Sushila R. Subramanian.

Casper Dik provided valuable assistance for the Solaris 8 support.

Sun has graciously provided me access to BETA versions of Solaris 2.5, 2.6, 7, 8, and 9.

John Dzuberá provided Solaris 7 and 8 test systems.

Mike Miscevic provided Solaris 10 test systems.

Ultrix
=====

As of lsof revision 4.52 support for Ultrix is no longer available, because I no longer have an Ultrix test system.

Terry Friedrichsen, Dwight McKay, and Jeffrey Mogul helped me

with
this port.

DECnet support was added to Ultrix lsof with the help of John Beacom, who kindly provided a test system. The Configure script decides that DECnet support is available if /usr/lib/libdnet.a and /usr/include/netdnet/dn.h exist and are readable.

Veritas VxFS and VxVM

=====

Lsof supports some versions of Veritas VxFS and VxVM on some UNIX dialects. Consult the lsof Configure script for the specific dialect, and consult the lsof dialect-specific source files for the UNIX dialect of interest. Veritas support will usually be found in a source file named dnode[1-9].c.

Since Veritas rarely has a version number that can be extracted with shell commands, lsof doesn't use it. Instead, when lsof supports Veritas, the Configure script will form compile-time definitions starting with HASVXFS. Check the lsof 00PORTING documentation file for more information.

Lsof Veritas support requires that the supporting Veritas header files be installed -- e.g., in /usr/include/sys/fs.

(The location
will depend in the dialect's header file conventions.)

Some information on lsof support for Veritas extensions may be found in the lsof 00DIST file. (The ChangeLog file points to 00DIST.)

Chris Kordish and Andy Thomas have provided Solaris VxFS test systems.

=====

User-contributed Dialect Support

=====

There are some user-contributed dialect versions of lsof; more information on them can be found at:

<ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/contrib>

Check the 00INDEX file there for details.

=====
Dialects No Longer Supported
=====

Because I don't have access to test systems, these UNIX dialects are no longer supported by lsof:

CDC EP/IX
/dev/kmem-based Linux
MIPS RISC/os
Motorola V/88
Pyramid DC/OSx
Pyramid Reliant UNIX
Sequent DYNIX
SGI IRIX
SunOS 4.x
Ultrix
UnixWare below 7.0

Remnants of the support lsof once provided for these dialects may be found in:

<ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/OLD/dialects>

=====
Installing Lsof
=====

The distributed Makefiles do not have actions that will install lsof. I've come to the conclusion there is no standard for installing lsof or its man page, so I no longer distribute make rules for installing them. You should adjust the Makefile for your local preferences.

The Makefile does have an install rule that will cause lsof to compile by virtue of its dependency clause. Some Makefiles also have a dependency that causes the production of a man page that is ready to install. However, the actions of the install rule will not cause the lsof executable or its man page to be installed in any UNIX system-wide directory.

Instead, after the compilation and optional man page production are completed, the install rule will produce a brief description of what actions you might add to the install rule. The description will suggest the possible

modes, ownerships, permissions, and destinations your install rule might employ to install the lsof executable and man page.

As you form your install rule, keep in mind that lsof usually needs some type of special permission to do its job. That may be permission to read memory devices such as /dev/kmem, /dev/mem, or /dev/swap, or it may be authorization to read entries in the /proc file system.

Memory device access can usually be provided by setting the modes of the lsof executable so that its effective group identifier when it runs is the same as the group that has permission to read the memory devices -- i.e., it is setgid-group. The privileged group is usually kmem, sys, or system.

Don't overlook using ACLs -- e.g., on AIX or Solaris 8 -- to give lsof permission to access memory devices. ACLs, coupled to a separate group like kmem, can be safer than giving lsof setgid authorization to a commonly used system group.

When lsof needs to read /proc file system entries, it must be installed with modes that make its effective user identifier root when it runs -- i.e., it must be setuid-root. If lsof must be installed setuid-root (only the AIX 5L, PSTAT-based HP-UX, and /proc-based Linux, ports need such power.), then access to memory devices is automatic (or not needed in the case of /proc-based Linux).

Your choice of permissions for lsof may also be affected by your desire to allow anyone to use it or your need to restrict its usage to specific individuals. You will have to be guided by local policy and convention in this case.

The next two sections, Setgid Lsof Dialect Versions and Setuid-root Lsof Dialect Versions, list recommended install permissions.

The system directory where you install the lsof executable is also open to choice. A traditional place for a tool like lsof is /usr/local/etc, but recent changes in directory structure organization suggest that somewhere in /opt may be more suitable.

Bear one other factor in mind when choosing a location for the lsof executable -- it usually is a shared executable, requiring access to shared libraries. Thus, locations like /sbin or /usr/sbin are probably unsuitable.

Once you've chosen a location for the executable you may find that the location for the man page follows -- e.g., if the executable goes in /usr/local/etc, then the man page goes in /usr/local/man. If the executable location doesn't imply a location for the man page, you'll have to let local custom guide you.

Setuid-root Lsof Dialect Versions

=====

These dialect versions should be installed with setuid-root permission -- i.e., the lsof binary should be owned by root and its setuid execution bit (04000) should be set.

AIX 5L and above for full use of the -X option
Apple Darwin 8.x for Power Macintosh systems
PSTAT-based HP-UX 11.11 and 11.23
/proc-based Linux (generally 2.1.72 and above)

Setgid Lsof Dialect Versions

=====

These dialect versions should be installed with setgid permission, owned by the group that can read kernel memory devices such as /dev/drum, /dev/kmem, /dev/ksyms, /dev/mem, /dev/swap. ACLs may be another mechanism (e.g., under AIX or Solaris 8) you can use to grant read permission to the kernel memory devices.

AIX 4.1.[45], 4.2[.1], and 4.3[.123]
Apple Darwin 7.x for Power Macintosh systems
DEC OSF/1, Digital UNIX, Tru64 UNIX 2.0, 3.2, 4.0, and 5.[01]
FreeBSD 2.1.6, 2.2[.x], 3.x, 4.x, 5.x, [6789].x and 1[012].x
NetBSD 1.[456], 2.x and 3.x
NEXTSTEP 3.[13]
OpenBSD 2.[89] and 3.[0-9]
OPENSTEP 4.x
Caldera OpenUNIX 8
SCO OpenServer 5.0.[46]
SCO UnixWare 7.0 and 7.1.[0134]
Solaris 2.6, 8, 9 and 10
Ultrix 4.2 (no longer available)

=====

Porting Lsof 4 to a New UNIX Dialect

=====

If you're brave enough to consider this, look at the 00PORTING file. Please contact me before you start. I might be able to help you or even do the port myself.

Don't overlook

the contrib/ directory in pub/tools/unix/lsof on my ftp server, lsof.itap.purdue.edu. It contains user-contributed ports of lsof to dialects I don't distribute, because I can't test new revisions of lsof on them.

=====

Quick Start to Using lsof

=====

For information on how to get started quickly using lsof, consult the 00QUICKSTART file of the lsof distribution. It cuts past the formal density of the lsof man page to provide quick examples of using lsof to solve common open file display problems.

=====

Cross-configuring lsof

=====

Using environment variables it is possible to Configure (and possibly build) lsof for one UNIX dialect on a different one -- e.g., you are running Configure on a Linux 2.3 system and you want to Configure and build lsof for Linux 2.4.

See the 00XCONFIG file of the lsof distribution for a discussion of how to do this.

=====

Environment

Variables Affecting the Configure Script

=====

Configure script actions can be modified by introducing values to the script via environment variables. In many cases the environment variable values take the place of test operations the Configure script makes.

For more information on environment variables that can affect Configure, consult the 00XCONFIG file of the lsof distribution. See the General Environment Variables sections for descriptions of ones that affect all dialects. Consult the Dialect-Specific

Environment Variables section for ones that might affect the dialect you are trying to configure.

Vic Abell <abe@purdue.edu>
February 14, 2018

Found in path(s):

* /opt/cola/permits/1402400301_1661782874.918154/0/lsof-4-93-2-dfsg-orig-1-tar-xz/lsof-4.93.2/00README
No license file was found, but licenses were detected in source scan.

Notes for the distribution of lsof version 4

```
*****
| The latest release of lsof is always available from
| https://github.com/lsof-org/lsof/releases
|
| From 4.92.1, git is introduced to manage changes.
| You can consult the details of changes with git.
*****
```

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4.40, January 25, 1999
4.41, February 27, 1999
4.42, March 30, 1999
4.43,
May 11, 1999
4.44, June 24, 1999
4.45, July 30, 1999
4.46, October 23, 1999
4.47, November 29, 1999
4.48, January 14, 2000
4.49, April 3, 2000
4.50, June 29, 2000

4.51, August 21, 2000
4.52, November 8, 2000
4.53, December 6, 2000
4.54, January 19, 2001
4.55, February 15, 2001
4.56, May 3, 2001
4.57, July 19, 2001
4.58, September 13, 2001
4.59, October 20, 2001
4.60, November 9, 2001
4.61, January 22, 2002
4.62, March 7, 2002
4.63, April 23, 2002
4.64, June 26, 2002
4.65, October 10, 2002
4.66, December 22, 2002
4.67, March 27, 2003
4.68, June 18, 2003
4.69, October 16, 2003
4.70, January 16, 2004
4.71, March 11, 2004
4.72, July 13, 2004
4.73, October 21, 2004
4.74, January 17, 2005
4.75, May 16, 2005
4.76, August 30, 2005
4.77, April 10, 2006
4.78, April 24, 2007
4.79, April 15, 2008
4.80, May 12, 2008
4.81, October 21, 2008
4.82, March 25, 2009
4.83, January 18, 2010
4.84, July 29, 2010
4.85, September
27, 2011
4.86, April 10, 2012
4.87, January 2, 2013
4.88, October 13, 2014
4.89, July 7, 2015
4.90, February 14, 2018
4.91, March 26, 2018
4.92, May 5, 2018

Dialects Supported

=====

Lsof (for LiSt Open Files) lists files opened by processes on selected Unix systems. Version 4 is a source reorganization of version 3, itself a major revision of version 2. Version 4 has been tested on:

Apple Darwin 9 and Mac OS X 10.[567]
FreeBSD 10.3, 11.0 and 12.0 for AMD64-based systems
Solaris 9

(The `pub/tools/unix/lsof/contrib` directory on `lsof.itap.purdue.edu` contains information on other ports.)

If your favorite Unix dialect is not in the list, or if your version of it is more recent than the ones listed, please contact me at `<abe@purdue.edu>`.

Version 3 of Lsof was tested on:

AIX 3.2.5, 4.1.[1234], and 4.2
BSDI BSD/OS 2.0, 2.0.1, and 2.1 for x86-based systems
DC/OSx 1.1 for Pyramid systems
Digital UNIX (DEC OSF/1) 2.0, 3.0, 3.2, and 4.0
EP/IX 2.1.1 for
the CDC 4680
FreeBSD 1.1.5.1, 2.0, 2.0.5, 2.1, 2.1.5 for x86-based
systems
HP-UX 8.x, 9.x, 10.01, 10.10, and 10.20
IRIX 5.2, 5.3, 6.0, 6.0.1, and 6.[124]
Linux through 2.0.27 for x86-based systems
NetBSD 1.0, 1.1, and 1.2 for x86 and SPARC-based
systems
NEXTSTEP 2.1 and 3.[0123]
OpenBSD 1.2 and 2.0 for x86-based systems
Reliant UNIX 5.43 for Pyramid systems
RISC/os 4.52 for MIPS R2000-based systems
SCO OpenServer Release 1.1, 3.0, and 5.0.x for x86-based
systems
SCO UnixWare 2.1 and 2.1.1 for x86-based systems
Sequent PTX 2.1.[1569], 4.0.[23], 4.1.[024], 4.2[.1],
and 4.3
Solaris 2.[12345], 2.5.1, and 2.6-Beta
SunOS 4.1.x
Ultrix 4.2, 4.3, 4.4, and 4.5

Version 3 and its predecessor, version 2, may be found at:

`ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/OLD`

How Lsof Works

=====

Using available kernel data access methods -- getproc(), getuser(), kvm_*(), nlist(), pstat(), read(), readx(), /proc -- lsof reads process table entries, task table entries, user areas and file pointers to reach the underlying structures that describe files opened by processes.

Lsof interprets most file node structures -- advfsnodes, autonodes, cnodes, cdrnodes, devnodes, fifonodes, gnodes, hsnodes, inodes, mfsnodes, pcnodes, procnodes, rnodes, snodes, specnodes, s5inodes, tmpnodes. It understands NFS connections. It recognizes FIFOs, multiplexed files, Unix and Internet sockets. It knows about streams. It understands /proc file systems for some dialects. On many dialects it recognizes execution text and library references. It knows about AFS on some Unix dialects.

Lsof Output

=====

The lsof output describes:

- * the identification number of the process (PID) that has opened the file;
- * the process group identification number (PGID) of the process (optional);
- * the process identification number of the parent process (PPID) (optional);
- * the command the process is executing;
- * the owner of the process;
- * for all files in use by the process, including the executing text file and the shared libraries it is using:
- * the file descriptor number of the file, if applicable;
- * the file's access mode;
- * the file's lock status;

- * the file's device numbers;
- * the file's inode number;
- * the file's size or offset;
- * the name of the file system containing the file;
- * any available components of the file's path name;
- * the names of the file's stream components;
- * the file's local and remote network addresses;
- * the TLI network (typically UDP) state of the file;
- * the TCP state, read queue length, and write queue length of the file;
- * the file's TCP window read and write lengths (Solaris only);
- * other file or dialect-specific values.

Getting Started Quickly

=====

If you want to get started using lsof quickly, or see some examples of how lsof can be used, consult the 00QUICKSTART file of the lsof distribution.

The 00QUICKSTART file won't help you build or install lsof, but it will cut through the density of the lsof man page, giving you more readily an idea of what you can do with lsof.

For information on building and installing lsof, consult the 00README file of the lsof distribution.

Limiting, Filtering, and Selecting Lsof Output

=====

Lsof accepts options to limit, filter, and select its output. These are the possible criteria:

- * Process ID (PID) number -- to list the open files for a given

process;

- * Process Group ID (PGID) -- to list the open files for all the processes of a given process group;
- * User ID number or login name -- to list the open files for all the processes of a given user;
- * Internet address -- to list the open files using a given Internet address (host name), protocol, or port (number or name); or to list all open Internet files;
- * command name;
- * file descriptor name or number;
- * list all open NFS files;
- * list all open Unix domain socket files;
- * list all uses of a specific file;
- * list all open files on a file system.

Selection options are normally ORed -- i.e., an open file meeting any of the criteria is listed. The selection options may be ANDed so that an open file will be listed only if it meets all the criteria.

In the absence of any selection criteria, lsof lists files open to all processes.

Parsing Lsof Output with Another Program

=====

The lsof -F option directs it to produce "field" output that can easily be parsed by another program. The lsof distribution contains sample awk, perl 4, and perl 5 scripts in its scripts subdirectory that show how to post-process field output.

Repeat Mode

=====

Lsof can be directed to produce output, delay for a specified time, then repeat the output, cycling until stopped by an interrupt

or
quit signal. This mode is useful for monitoring the status of some
file operation -- e.g., an ftp transfer or a tape backup operation.

Repeat mode is more efficient when combined with lsof's selection
options, since they limit lsof overhead.

It's possible to use lsof's field output options to supply repeat
mode output to another process for its manipulation. The scripts
subdirectory of the lsof distribution has sample Perl scripts
showing how to consume lsof repeat mode output from a pipe.

Distribution Restrictions

=====

Lsof may be used and distributed freely, subject to these limitations:

1. Neither the author nor Purdue University is responsible for
any consequences of the use of this software.
2. The origin of this software must not be misrepresented, either
by explicit claim or by omission. Credit to the author and
Purdue University must appear in documentation and sources.
3. Altered versions must be plainly marked as such, and must
not
be misrepresented as being the original software.
4. This notice may not be removed from or altered in the lsof source
files.

Cautions

=====

Lsof is a tool that is closely tied to the Unix operating system
version. It uses header files that describe kernel structures and
reads kernel structures that typically change from OS version to
OS version.

**DON'T TRY TO USE AN LSOF BINARY, COMPILED FOR ONE UNIX OS VERSION,
ON ANOTHER.**

On some Unix dialects, notably SunOS and Solaris, lsof versions
may be even more restricted by architecture type. An lsof binary,
compiled for SunOS 4.1.3 on a sun4c machine, for example, won't
work on a sun4m machine.

AN LSOF BINARY, COMPILED FOR ONE SOLARIS 1.X ARCHITECTURE, ISN'T GUARANTEED TO WORK ON A DIFFERENT SOLARIS 1.X ARCHITECTURE.

Distribution Contents

=====

The lsof distribution is checked for completeness when it is constructed and by the Inventory script when you run the Configure script. (See The Inventory Script section of the 00README file of this distribution.)

Lsof is organized in these parts:

- * The main lsof directory, containing common sources, configuration and setup scripts and three subdirectories: dialects/, lib/, and scripts/.

Lsof is compiled in the main lsof directory after configuration. The selected dialect sources are copied or linked from the specified subdirectory. (Symbolic linking is the standard method.)

Common lsof definitions may be found in lsof.h; common function prototypes, proto.h; and common storage, store.c.

- * The dialects/ subdirectory contains subdirectories with sources specific to UNIX dialect implementations -- e.g., the dialects/sun/ subdirectory contains sources for the SunOS (Solaris 1.x) and Solaris (2.x) implementations of lsof. The dialects subdirectories also contain Makefiles and scripts for assisting dialect source configuration.

Dialect

configuration definitions may be found in dlsof.h; other dialect definitions, dlsof.h; dialect prototypes, dproto.h; and dialect storage, dstore.c.

- * The lib/ subdirectory contains sources for common lsof functions. Not all dialects use the functions -- some have their own versions of them. The lib/ functions are enabled and customized with #define's in the dialect machine.h header files.

- * The scripts/ subdirectory contains sample scripts for processing lsof field (-F) output. The scripts are written

in AWK, Perl 4, and Perl 5.

The 00PORTING file of the lsof distribution has more information on lsof components, configuration, and construction.

Warranty

=====

Lsof is provided as-is without any warranty of any kind, either expressed or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. The entire risk as to the quality and performance of lsof is with you. Should lsof prove defective, you assume the cost of all necessary servicing, repair, or correction.

Bug Reports

=====

Now that the obligatory disclaimer is out of the way, let me hasten to add that I accept lsof bug reports and try hard to respond to them. I will also consider and discuss requests for new features, ports to new dialects, or ports to new OS versions.

PLEASE DON'T SEND A BUG REPORT ABOUT LSOF TO THE UNIX DIALECT VENDOR.

At worst such a bug report will confuse the vendor; at best, the vendor will forward the bug report to me.

Please send all bug reports, requests, etc. to me via email at <abe@purdue.edu>.

The lsof-l Mailing List

=====

Information about lsof, including notices about the availability of new revisions, may be found in mailings of the lsof-l listserv. For more information about it, including instructions on how to subscribe, read the 00LSOF-L file of the lsof distribution.

Version 3 Release Notes

=====

See

00DIST in the last lsof 3 revision 3.88, for its complete set of release notes. Lsof revision 3.88 may be found at:

<ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/OLD>

3.0 May 24, 1994

This is the first official release of lsof 3.

...

3.88 February 17, 1997

```
+=====+
| This is the last version 3 revision. |
+=====+
```

Added documentation files -- 00.README.FIRST[_<version>] and 00RELEASE.SUMMARY_<version> -- to the distribution.

What's new in Version 4

=====

The main goal of version 4 was to eliminate the confusing common/fragment source file technique. Changing the version number also provided an opportunity to restart the numbering, which at 3.88 had risen to a large value.

The sources that appeared in the dialects/common subdirectory of version 3 in fragment files have been incorporated into the version 4 liblsof.a library as *.c files. This results in significant changes

to many source files, scripts, and Makefiles of all dialect versions. It allows elimination of some source files -- ddev.c, dfile.c, dmnt.c -- for dialects now obtaining functions from liblsof.a that formerly came from making dialect source files by combining fragment files.

The version 4 liblsof.a sources are stored in the lib/ subdirectory of the main lsof directory. The liblsof.a functions are activated and conditioned in their source files by values #define'd in the dialect dlsof.h and machine.h header files.

Dialects that provide a private version of a library function refrain from #define'ing the symbol that would activate the library function code.

Version 4 Release Notes

=====

4.0 February 24, 1997

+-----+
| This is the first lsof 4 revision. |
+-----+

Reorganized sources: eliminated code fragment files
and created a library in their place. Modified or
deleted

many dialect source and header files.

Changed documentation accordingly.

Added a warning to sgi/Makefile and 00FAQ that advises
against using the IRIX C compiler -n32 option when
compiling lsof. Thanks go to Peter Ilieve
<peter@memex.co.uk> for bringing this to my attention.

Dropped IRIX 5.2 in mid-stream, because my 5.2 test
system was upgraded to 5.3.

4.01 March 3, 1997

Added TFS support for Pyramid dialects.

Added test to Configure and to the IRIX dnode.c
for the different cnode struct that appears in
<cache/fs/cache/fs.h> on the 6.2 IMPACT distribution.
Heddy Boubaker <boubaker@amfou.cenatls.cena.dgac.fr>
alerted me to the cnode change and helped test this
lsof adjustment.

Shut down the lsof child process before doing a -r
sleep(). A comment from Dan Mercer <dam@mmm.com>
prompted this.

4.02 March 21, 1997

Based on a report from Pasi Kaara <Pasi.Kaara@atk.tpo.fi>,
disabled HP-UX CCIT support in lsof for HP-UX
versions 10 and above.

Pasi's report also led to
changes in the HP-UX machine.h to support use of
gcc to compile lsof for HP-UX 10.20 and warnings
against using `cc -Aa` or `gcc -ansi` to compile
lsof under HP-UX 10.x.

With help from Richard Allen <ra@hp.is> taught HP-UX 10.x lsof to name file systems better by using the virtual file system device number. Elias Halldor Agustsson <elias@rhi.hi.is> provided a test system.

Changed NEXTSTEP and UNIXWARE Makefiles to use safer quoting when generating version.h. The change was suggested by Bob Farmer <ucs_brf@unx1.shsu.edu>.

Added SHELL=/bin/sh string to all Makefiles.

Added support for Linux 2.1.28 on a test system, kindly provided by Jonathan Sergent <sergent@purdue.edu>. Configure tests the Linux 2.1.x's C library lseek() function for proper handling of kernel offsets. If lseek() appears suspect, Configure activates the use of a private lseek() function. Changed the private nlist() function to nlist_private() and taught it to use the query_module() syscall in place of the deprecated get_kernel_syms() one. Added rudimentary AX.25 support for Pierfrancesco Caci <ik5pvx@infogroup.it> who helped test it. Updated the old get_kernel_syms() code to recognize and skip module name entries.

Prompted by Marty Leisner <leisner@sdsp.mc.xerox.com>, eased the requirement that service name lookup for the -i option be accompanied by a protocol name. The name is not needed if both TCP and UDP names yield the same port number.

Added xusers.awk script from Dan Mercer <damercer@mmm.com> to the distribution scripts/ subdirectory.

Changed Configure script to use LSOF_VERS for all UNIX dialect version numbers and to pass LSOF_VERS to the dialect Mksrc functions. Also added the ability for a dialect stanza to declare a different dialect Makefile source. Modified dialect Mksrc files -- e.g., linux and sun -- accordingly.

Added support for BSD/OS 3.0 with help from Jim Reid <jim@mpn.cp.philips.com>. Terry Kennedy <TERRY@spcvxa.spc.edu> kindly provided a test

system. During the port corrected a bug that prevented proper handling of revoked files.

4.03 April 7, 1997

At the suggestion of Dan Mercer <damercer@mmm.com>, made HP-UX building of lsof aware of differences between the HP-UX bundled and unbundled C compilers.

Added the ability for the lsof builder to define the default warning message issuance state. By default the issuance of warning messages is disabled; defining WARNINGSTATE in machine.h disables it. The Customize script was updated to handle WARNINGSTATE. Dan Mercer suggested this.

Eliminated compiler complaint about improperly cast get_NI_value() argument in ncache_load() in lib/rnch.c.

Corrected zeromem() argument error in SCO dproc.c.
Sped up parent directory cache lookup slightly.

Updated for PTX 4.4, including additional VxFS (EFS) file system support.

4.04 April 17, 1997

At the suggestion of Bela Lubkin <belal@sco.COM> changed device cache handling to be more tolerant of a device cache file whose [cm]times are older than the ones on /dev or /devices. The change required adding information to Solaris device cache file clone lines, so the first time lsof 4.04 is run under Solaris it will complain about a bad cached clone device in a previous device cache file, then regenerate it.

Added boot file path detection for SCO OSR 5 and above, based on information supplied by Bela.

Fixed two bugs in DEC OSF/1 lsof -- an error in reporting locks and a missing continue statement in readdev() after a failure to open a directory. Jan Ole Suhr <josuhr@informatik.tu-clausthal.de> reported the second bug and supplied a fix.

Fixed XFS problems with IRIX 6.2 by abandoning the idea that SGI will distribute XFS header files and defining an lsof-private xfs_inode structure. John

Paul Morrison <John.Paul.Morrison@MultiActive.com>
helped develop
and test the 5.3 definition. John
R. Vanderpool <fish@daacdev1.gsfc.nasa.gov> helped
develop and test the 6.2 definition.

Remove obsolete comments about common/*.frag files.

Updated Linux lsof for Linux version 2.1.35.

4.04 April 18, 1997

Supplement Regenerated the 4.04 distribution to correct a non-
device-cache #define misplacement in the Solaris and
SunOS dlsof.h. Alexandre Oliva <oliva@dcc.unicamp.br>
reported the problem.

4.05 April 24, 1997

Corrected an error in 00DCACHE.

Made sure SCO /etc/ps/booted.systems is closed.

Based on an observation by Bela Lubkin <belal@sco.COM>
that the lsof child had needless file descriptors
open, closed all but the open pipes between the
lsof parent and child.

Decommissioned CDC EP/IX support; I no longer have a
test system.

Based on a suggestion from Patrick Connor
<connor@phreak.csd.sgi.com>, added -xansi to CFLAGS
for IRIX 5.3 and 6.[234].

Also at Patrick's suggestion changed Configure to
propagate
exact SunOS 4.1.x version to the main
and library Makefiles. This allowed the sunos413
and sunos413cc Configure abbreviations to be
shortened to sunos and sunoscc.

Updated obsolete argument uses (-H changed to -n)
in count_pf.perl* and watch_a_file.perl scripts.

Adjusted Solaris 2.6 lsof for Beta_Update with tips
from Casper Dik <casper@holland.Sun.COM>.

Fixed a Solaris 2.4 TCP address reporting bug.

4.06 April 30, 1997

Added a step to the Makefile clean rules that does a make clean in the lib subdirectory; suggested by Casper Dik <casper@holland.Sun.COM>. (Configure's -clean argument already did this.)

Fixed an incorrect awk argument in the sunos*)
Configure stanza, reported by Alexandre Oliva <oliva@dcc.unicamp.br>.

Added CD9660 (aka ISO) file system support to FreeBSD, NetBSD, and OpenBSD with mods and help from Kenneth Stailey <kstailey@disclosure.com>. (BSDI already had CD9660 support.) While at it, added file descriptor system support to BSDI and FreeBSD.

Added /kern file system support to OpenBSD. The support wasn't extended to BSDI, FreeBSD, or NetBSD, because it requires Kenneth Stailey's changes to /sys/miscfs/kernfs/kernfs.h.

Updated IRIX 6.3 support after getting access to a test system, provided by John Paul Morrison <John.Paul.Morrison@MultiActive.com>. Improved the handling of IRIX 5.1 and greater FIFOs.

4.07 May 12, 1997

Based on AIX problem reports from David Capshaw <David.Capshaw@SEMATECH.Org>, changed the aix* Configure script stanza to avoid -bnolibpath for gcc (which the GNU loader doesn't grok) and AIX below 4.1.4 (where -bnolibpath hasn't been tested or is known to be unimplemented), and to refuse to use gcc for compiling lsof in AIX versions below 4.1 (because of possible structure alignment problems). Updated 00FAQ appropriately.

Added OpenBSD support for EXT2FS. This support has yet to be tested.

Tested lsof under OpenBSD 2.1.

Activated
/kern file system support for NetBSD when Configure senses that /sys/miscfs/kernfs/kernfs.h defines the kern_target structure. This support

has not been tested under NetBSD, although it has been tested under OpenBSD.

Made some simple changes to the BSDI machine.h, suggested by Jeffrey C. Honig <jch@bsd.com>.

Improved handling of alternate dialect Configure abbreviations -- aix and aixgcc, hpux and hpuxgcc, solaris and solariscc, and sunos and sunoscc.

4.08 May 23, 1997

Cleaned up dialect Makefile's, starting with a suggestion from Christopher Schanzle <chris@cam.nist.gov>.

Improved Configure's -clean processing.

Corrected bugs in Solaris lock reporting.

Changed NetBSD Configure stanza to put -I/usr/include before -I/sys.

4.09 June 1, 1997

Adjusted for latest FreeBSD 3.0 release. This required adding a new kernel name cache module for reading BSD-form hashed kernel name cache entries, rnmh.c, to the lsof library, and adding a #define to each machine.h to select it.

Activated rnmh.c for BSDI 2.1, BSDI 3.0, NetBSD 1.2, and OpenBSD 2.1.

4.10 June 8, 1997

Adjusted for Linux 2.1.x (x > 35) kernels with hashed task structure pointers. Marty Leisner <leisner@sdsp.mc.xerox.com> and Jonathan Sergent <sergent@io.com> tested the adjustment.

Replaced readdev() stat() calls with lstat() to reduce device table and cache entries with the same device number and inode values. Added code to remove all remaining duplicates. This fixes a Linux problem reported by Jonathan Sergent and makes device node name output predictable.

Corrected a bug in UnixWare stream file handling that prevented searching for the stream file by its associated character device name.

Added Pyramid code to determine Reliant UNIX clone major device number differently from that of DC/OSx.

4.11 June 12, 1997

Changed Configure to sense that the PTX `inp_[fl]addr` members of the `inpcb` structure of `<netinet/in_pcb.h>` have a struct type and set `HASINADDRSTR` for use in PTX `dnode.c` and `dsock.c` tests.

Changed PTX version 4.1.4 tests to use 4.1.3 instead. Carson Wilson `<carson@mcs.com>` reported the need to do this and tested the change.

Fixed a block device table indexing bug in `lib/rdev.c`, reported by Carson Wilson. The same bug was squashed in `pyramid/ddev.c`.

Added code to the Pyramid Reliant UNIX `kread()` function to compensate for an address boundary error in the kernel's `/dev/kmem` driver.

Verified that `lsof` compiles and works under AIX 4.2.1. Added an AIX test for the presence of NFS header files, defined `HAS_NFS` and adjusted AIX dialect sources accordingly.

Based on a suggestion from Gaylord Holder `<holder@phy.ucsf.EDU>`, added DEC OSF/1 code to auto-detect the booted file, whence kernel symbol addresses are obtained.

4.12 June 24, 1997

Corrected a device number sign extension problem in the reading and writing of device cache file.

The problem was reported by Bela Lubkin `<belal@sco.com>` and he suggested a fix.

Fixed an SCO stream device lookup problem. The report and solution came from Bela Lubkin

Enhanced the `Configure` script to enable cross-configuration of `lsof`, based on suggestions from Marty Leisner `<leisner@sdsp.mc.xerox.com>`. A new documentation file, `00XCONFIG`, describes the process.

Made Pyramid OBJFS support conditional on the presence of supporting header files. Corrected the Pyramid MkKernOpts script so it generates the necessary -D's for the Nile/Jolt architecture. Richard Coley <rcoley@pyra.co.uk> helped.

Added another IRIX xfs_inode variant for 6.2, 32 bits, no XFS rollup patch.

Tested under UnixWare 2.1.2.

4.13 July 9, 1997

Taught Pyramid lsof to grok ttyfs vnodes with help from Richard Coley <rcoley@pyra.co.uk>. Fixed some minor bugs in Pyramid FIFO reporting. Eliminated use of the Pyramid UCB compatibility library at Richard's suggestion.

Eliminated reporting of "strange" inode numbers for SCO OSR 3.2v5.0.x HPPS files with help from Bela Lubkin <belal@sco.com>

Modified port to service name lookup to use a small number of getservbyport() calls before reading the entire map with getservent(). Changed port reporting to represent a zero as `*' to be consistent with other prt number reporting tools like netstat. Casper Dik <casper@holland.Sun.COM> suggested these changes -- the getserv*() one to improve performance for large NIS service name maps.

Changed all readdev() functions to make the absence of block devices a warning instead of a fatal error after Brian Redman <ber@ms.com> reported his IRIX 6.4 system had no block devices. (It really did have block devices, but readdev()'s lstat() use caused it to miss them in a directory symbolically linked from /dev/dsk->/hw/disk.) Fixed Brian's real problem by changing the IRIX readdev() to use stat() on /dev nodes if a Configure test shows /hw is readable. Extended the potential to do the same to all readdev() functions.

For consistency and convenience changed some Configure abbreviations and dialect subdirectory names: "decosf" abbreviation and "osf" dialect

subdirectory name to "du"; "netbsd" dialect subdirectory name to "n+obsd"; "next3" abbreviation and "next" dialect subdirectory name to "ns"; "sco" abbreviation and dialect subdirectory name to "osr"; "sgi" dialect subdirectory name to "irix"; and "unixware" abbreviation and dialect subdirectory name to "uw".

Added #if/#endif clauses to the AIX rmdupdev() function to avoid clone processing for AIX versions less than 4.1.4. The problem was reported by Toralf Foerster <toralf.foerster@io-warnemuende.de>, who supplied corrective code.

Added support for new style NetBSD inode with i_ffs and i_e2fs union members.

Improved Configure and 00FAQ information on Digital UNIX configuration subdirectory with suggestions from Brad Krebs <brad@EECS.Berkeley.EDU>.

4.14 July 22, 1997

Reorganized the Solaris handling of the inode structure header file, ufs_inode.h, to eliminate VxFS structure definition conflicts for Solaris 2.4, based on information from Greg Earle <earle@netbsd4me.jpl.nasa.gov>.

Cleaned up some typos and confusion in Configure's help output, based on comments from Bela Lubkin <belal@sco.com>

Added a 00DIALECTS file, containing UNIX dialect version numbers, that can be used by Configure and the man page.

4.15 August 15, 1997

Aligned `Configure -help` output better. Removed Configure's 2.6 Beta test adjustments.

Added improved Solaris VxFS configuration and handling, based on information from Greg Earle <earle@netbsd4me.jpl.nasa.gov>.

Added socket state -- TCO or TPI -- for socket files at the suggestion of Ian Fitchet <I.D.Fitchet@ftel.co.uk>.

4.16 September 25, 1997

Added reporting of TCP/TPI queue lengths and window sizes ala netstat to NAME column.

Added -T option

to select or de-select TCP/TPI info reporting.

(Window sizes are only reported for Solaris.)

Fixed anomalies along the way in SIZE/OFF processing for some dialects.

Fixed service name argument processor to allow minus signs as part of the name. Consequently this disallows names with embedded minus signs from being specified as the start of a range.

Added 00FAQ entries explaining why lsof won't find a file being edited with vi, why window sizes aren't reported for all dialects, and what the "no more information" message means.

Forced Pyramid CC to be /usr/ccs/bin/cc to avoid accidental use of the BSD variant in /usr/ucb/cc.

Added support for Linux glibc2, including a Configure test; cross-Configure support (00XCONFIG); and much unfortunate and risky sleight-of-hand in lsof Linux dialect header and source files, forced upon lsof by incompatibilities between Linux kernel and glibc2 header files.

Included in scripts/identd.perl5

a Perl 5 implementation

of an identd server, using lsof, provided by Kapil

Chowksey <kchowksey@hss.hns.com>.

Updated IRIX 6.4 xfs_inode guess.

4.17 October 14, 1997

Added -V option for verbose search result reporting.

Verbose reports are prepared for failure to locate file names, command names, Internet addresses or files, login names, NFS files, PIDs, PGIDs, and UIDs.

Augmented Linux NFS file test to cope with kernels whose NFS code is in a loadable module. Need for the test was pointed out by Jonathan Sergent <sergent@csociety.ecn.purdue.edu>. The change required that Linux have private dmnt.c source,

Completed a Linux 2.1.57 port on a system provided by Jonathan Sergent.

4.18 October 25, 1997

Eliminated memory leaks in alloc_lfile(), lkup_port(), and NEXTSTEP's process_text() function.

Added recognition of OpenBSD 2.2 in Configure, supplied by Kenneth Stailey <kstailey@disclosure.com>.

Consolidated print_file() functions to use the one in lib/prtf.c. Made it configurable and changed it to size print columns dynamically.

!!! WARNING !!!

WITH DYNAMICALLY SIZED PRINT COLUMNS LSOFF 4.18 PRODUCES OUTPUT SIGNIFICANTLY DIFFERENT FROM THAT OF PREVIOUS REVISIONS. LINES ARE GENERALLY SHORTER AND THERE IS GENERALLY LESS BLANK SPACE BETWEEN COLUMNS AND THE ITEMS IN THEM. THERE ARE NO LONGER ANY SPACES BETWEEN DEVICE NUMBER ELEMENTS, ONLY COMMAS.

!!! WARNING !!!

Added special types and print specification modifiers for file size and offset to handle UNIX dialects with 64 bit sizes and offsets. Paul Eggert <eggert@twinsun.com> reported the need for this addition.

With Paul Eggert's help picked lint from the lsof library, the main level lsof sources, and the Sun dialect sources.

Added documentation, including the file 00LSOFF-L, about the lsof-l LISTSERV.

Added support for Reliant UNIX on the RM600. Bob Passarella <rmpassar@pyramid.com> supplied the changes. Kevin Smith <kevin@pyramid.com> helped arrange test systems. While incorporating Bob's changes, modified lib/rnch.c to handle kernel ncache structs whose name is accessed via a char *, rather

than in a char array.

Changed #include order of <sys/socketvar.h> for Solaris 2.x. W. Richard Stevens <rstevens@kohala.com> pointed out the need to do this.

4.19 October 30, 1997

Changed Pyramid Reliant RM600 proc scan to skip SSYS (p_flag) processes, since they don't seem to have a readable u_cdir vnode.

Enabled Pyramid Reliant UNIX kread() work-around for DC/OSx, too, since its read(/dev/kmem) kernel driver seems to share the page boundary bug this work-around circumvents.

Changed SzOffFtm_d and SzOffFtm_dv (new formats at 4.18 to print size and offset) from signed to unsigned. Setting them signed at 4.18 was an oversight.

Plugged a memory leak that caused the loss of 130 bytes per repeat-mode pass. Fixed it with a simple work-around in main(). Lionel Cons <Lionel.Cons@cern.ch> reported the leak.

4.20 November 11, 1997

Tested under BSDI 3.1.

Added support for Reliant UNIX Mesh IPC files with help from Billy Ho <bho@pyramid.com>.

Added support to Digital UNIX lsof that uses the libmsfs tag_to_path() function (when it exists) to look up AdvFS path names. The idea and sample code came from Dean Brock <brock@cs.unca.edu>. Converted Dean's code into more general purpose support for private name cache lookups via the HASPRIVNMCACHE #define in the dialect machine.h file and code conditional on it in the printname() function.

Taught Digital UNIX lsof to recognize NFS3 file systems. Corrected Digital UNIX lsof DEVICE column alignment.

4.21 December 1, 1997

Squashed bug, introduced at revision 4.18, that

resulted in double reporting of each selected PID when terse mode (-t) was specified.

Corrected minor bug, also introduced at 4.18, that might cause an extra print_proc() pass when one PID has been specified.

Added -R to lsof options in scripts/idrlogin.perl*. The option should have been there -- it was supposed to be mandatory for PGID reporting -- but a bug, corrected in revision 4.18, previously made -R unnecessary.

Enabled configuring for BSDI BSD/OS 4.0 per a suggestion from Jeff Honig <jch@bsd.com>.

Enabled replacement of scoff_t with off64_t (scoff_t is used to type r_size and r_localsize in the rnode struct) for IRIX 5.3 systems that have the NFS kernel rollup patch (1477). This compensates for SGI's failure to distribute an updated <sys/fs/rnode.h> with their patch.

Validated under Linux 2.0.3[12], Linux 2.1.64, and NetBSD 1.3.

Added FreeBSD root directory reporting, courtesy of Dan Nelson <dnelson@emsphone.com>.

4.22 December 15, 1997

Made adjustments for Linux 2.1.7[02].

Improved NAME information for Linux UNIX domain sockets.

Added option +|-M to control the reporting of portmapper registration information in square brackets after the TCP or UDP port or service name. Kenneth Stailey <kstailey@disclosure.com> suggested the feature and provided sample code from OpenBSD. Reporting is disabled by default in the distribution and may be enabled with +M; if lsof is compiled with HASPMAPENABLED (e.g., from machine.h), reporting will be enabled by default and can be disabled with -M.

Changed the -w option to +|-w to match the syntax of the +|-M option and to eliminate any options that flip meaning when a symbol is defined at compile time. For both +|-M and +|-w, specifying '-' when the default state is disabled or specifying '+' when the default state is enabled causes no problems.

!!!WARNING The -w option has changed in lsof 4.22. WARNING!!!

Made the +|- prefix legal for most options, but didn't document it in the man page or help panel. Most options that disable something -- e.g., -b, -C, -n, -P -- now disable when the prefix is '-' and enable when it is '+'. Since the states these options disable are enabled by default, I chose to avoid documentation complexity and confusion by not mentioning that they can be used with the '+' prefix.

Condensed the help panel.

Made sure Digital UNIX Configure stanza puts normal include path (e.g., /usr/include) before system include paths.

Added IPX socket information reporting to Linux with help from Jonathan Sergent <sergent@purdue.edu>.

4.23 January 16, 1998

Fixed conflict arising from the quondam replacement of the Sun Solaris <netdb.h> with a BIND/BSD version.

With help from Jonathan Sergent <sergent@purdue.edu> developed a /proc file system based Linux lsof. It needs some Linux 2.1.x release to work -- I'm not sure which, but I tested under 2.1.72, 2.1.76, and 2.1.79. The Configure script selects special sources for this lsof, so the full lsof distribution now contains both /dev/kmem and /proc based sources for Linux lsof. An optional kernel mod, written by Jonathan, enhances the /proc-based lsof ability to recognize IPX socket files. Reorganized and augmented the Linux sections in 00FAQ to explain the two types of Linux lsof.

Defined DOSTAT_FUNCTION for dostat() in misc.c to select the function, stat() or lstat(), it will use. DOSTAT_FUNCTION is normally undefined, defaults to lstat(), and is only defined for the /proc-based Linux lsof in its dlsof.h.

Made conditional on the presence of IRIX 6.4 XFS rollup patch #6 an XFS node change introduced in revision 4.16. Identified the patch with help from John R. Vanderpool <fish@daacdev1.gsfc.nasa.gov>.

Added NFS node compensation for NetBSD 1.3. The code and suggestion for it was supplied by Jean-Luc Richier <richier@imag.fr>.

Added diagnostic messages to the /dev/kmem-based Linux Mksrc script to report errors during the construction of the kernel name cache header file, kncache.h. Added 00FAQ information on kncache.h.

Added a new Linux test host, running 2.0.33 and Glibc, provided by Steve Logue <stevell@mail.cdsnet.net>.

Ported to PTX 4.1.3 and 4.4.2. Adjusted lib/rnch.c for 4.4.2 to allow customization of additional ncache struct element names.

4.24 January 28, 1998

Changed /proc-based Linux lsof offset test to use "/" instead of "/etc/passwd".

To assist Jim Mintha <jim@geog.ubc.ca> with the packaging of lsof for Debian Linux, added a DEBIAN_LINUX_LSOF #define to trigger the activation of special system map file location code in the /dev/kmem-based dproc.c.

Applied modification to dialects/bsd/dlsof.h from Ingimar Robertson <iar@skyrr.is>, enabling lsof to compile for BSDI BSD/OS 2.0.

Corrected a documentation error in 00DCACHE, pointed out by Thomas Anders <anders@hmi.de>. The error was created when the -V option was added at lsof 4.17.

Made IRIX 5.3 through 6.3 lsof aware of IRIX SCSI tape devices (e.g., /dev/tape). Dave Olson of SGI

and Randolph J.
Herber of FNAL provided valuable
advice, and Igor Schein <ischein@air-boston.com>
helped test.

Added a machine.h symbol (NEVER_HASDCACHE) that
prevents Customize from offering to change HASDCACHE.
The symbol may appear anywhere in machine.h --
e.g., in a comment. Included the symbol in a
comment of the HASDCACHE section of the /proc-based
Linux lsof machine.h, and accompanied it with
warnings against #define'ing HASDCACHE. Did the
same thing for WARNDEVACCESS (NEVER_WARNDEVACCESS
is the suppressant.)

4.25 February 7, 1998

Corrected an IRIX mis-cast of file offset (position).
Igor Schein <ischein@air-boston.com> reported the
problem. This was offered as a patch to 4.24.
Picked some lint Igor pointed out.

At Igor's suggestion added an optional decimal
digit size argument to the -o option. This argument
specifies how many file offset decimal digits can
follow "0t" before lsof switches to a "0x..." form.
The argument size specification doesn't
count the
two characters of the "0t". A size of 0 means
unlimited. The default is OFFDECDIG (8), preserving
compatibility with existing lsof output; it can be
changed by the lsof builder. When size is specified
with -o it does not force offset display; -o without
a size still must be used to do that.

Added an IRIX 6.2, 32 bit system, XFS node patch,
courtesy of Ulrich Bernhard <rzubu@rzu.unizh.ch>.

For my own convenience enabled Configure to use
/usr/local/bin/gcc for NEXTSTEP. This allows
circumvention of a gcc 2.8.0 ranlib problem on
my test 3.1 `040 cube.

Added flags recommended by the RISC/os and Ultrix
compilers for the updated (and longer) main.c.

Updated FreeBSD cd9660_node.h Configure test.

4.26 February 17, 1998

Added shared process group processing for IRIX 5.3, and IRIX 6.1 and above, based on investigation of a bug report from Igor Schein <ischein@air-boston.com>. Igor helped test this addition.

Improved handling of file system name arguments.

It's now done in a manner similar to fuser. The -f argument forces path names to be considered as simple files, rather than as file system names. The +f flag forces them to be considered as file system names. Normally path arguments are considered file system names when they match a mounted-on directory in the system's mount table, or when they match a mounted file system's block device. Igor Schein helped test this change.

Igor also suggests that the proper compilation of the IRIX 6.4 proc structure after patch 2536 has been installed may need -DPIOMEMOPS. So lsof's MkKernOpts script was updated to propagate that option from CCOPTS in /var/sysgen/system/irix.sm, even though patch 2536 doesn't add -DPIOMEMOPS to it. Added a 00FAQ item on this patch.

Added a fatal warning message about names forced to be file system names (with +f) that have no match in the mount table.

Improved the -V message for files and file systems for which no open files were found. Added reporting of /proc file and file system search failures.

Did some code reorganization to combine the multiple ck_file_arg() functions into one. Moved the new function from the library to the top level and put it in arg.c; moved the usage function from arg.c to a new top-level source file, usage.c, to balance top-level source file size. The new usage.c depends on version.h; arg.c no longer does.

Added flag recommended by the DU compiler for the updated (and longer) main.c.

4.27 March 6, 1998

At the request of Igor Schein <ischein@air-boston.com> added a conditional repeat mode option, using the

`+' prefix to the `r' option. +r operates as does -r with the exception that it exits the first time no open files have been listed during a cycle. The exit code will be zero when any open files have been listed; one, if none were ever listed.

Ported lsof to HP-UX 11.0 with the help of Richard Allen. This port hasn't been tested on a 64 bit kernel; I'm sure it won't work there without more mods. It may not work on PA 2 architectures; I've only tested it under PA 1 and a separate, busy tester reported PA 2 problems that I've been unable to investigate.

In anticipation of getting access to a 64 bit HP-UX kernel and the pending start of the Solaris 2.7 Beta test (It will have 64 bit kernel addressing.), started adding support for 64 bit kernel pointers. This includes: ubiquitous use of the KA_T cast for kernel pointers; a format to print them, KA_T_FMT_X; a function to print them, print_kptr(); and modifications to most kernel-related functions -- e.g., process_file(), process_node(), process_socket(), readvfs() -- to process kernel addresses as KA_T types.

Fixed minor bug in handling path name arguments that end with a `/'.

Removed support for RISC/os; its test system is no longer available.

Made modifications to insure that lsof output doesn't contain non-printable characters. All such characters are now printed in the printf form "\x%02x". Several new common functions were installed in misc.c to support "safe" printing. This second major modification in 4.27 to common and dialect code could have introduced bugs not yet detected.

4.28 March 10, 1998

Refined unprintable format to use \b, \f, \r, \n, \t, and ^* (for CTRL) forms. Corrected omission of safestrprt() use for field output command name. These changes were offered as patches to 4.27.

Made space an unprintable character (\x20) in the COMMAND column; printable elsewhere, including the NAME column, field output, and error messages.

Made sure FD column is parseable as a single entity -- i.e., has no embedded space. Thus, if the access mode is unknown but there is a known lock mode, (a very rare case) the access mode will be printed as `-'.

Picked lint with gcc 2.8.0 under Solaris 2.6.

With the help of Dave Olson of SGI identified a proc struct element that should have been added to <sys/proc.h> by IRIX 6.4 patch 2536. Added a work-around for it to the lsof Configure script. Igor Schein <ischein@air-boston.com> identified that the patch caused a proc structure length complaint from lsof. Removed an obsolete 00FAQ item on the patch, installed at lsof 4.26, explaining that no solution was yet available.

Added a 00FAQ item on how BIND installs its own header files, including <netdb.h>, which may cause the rpercent struct definition to vanish. Solaris has an automatic lsof work-around, but that hasn't been (and probably can't be) propagated to all dialects supported by lsof. The 00FAQ item recommends re-installation of the vendor header files that BIND has replaced. (Others include <rpercent.h>, <sys/bitypes.h>, and <sys/ctypes.h>.)

Made AIX AFS fixes.

4.29 March 26, 1998

Corrected bug in Internet address matching. The matching formerly stopped if the foreign address matched, thus failing to check the local address for a match. That led to a possible false "Internet address not located" warning (i.e., in response to -V) about the local address, when both foreign and local addresses were specified with -i. This correction was offered as a patch to 4.28.

Changed readmnt() usage in an attempt to defer

mount readlink() and stat() delays until they are necessary.

Corrected two bugs in the Digital UNIX readdev() function. Made the correction available as a patch to 4.28 and regenerated the 4.28 DU binaries.

Added a missing argument to a print-kptr() call in the HP-UX dsock.c. The missing argument causes a fatal gcc error. The problem was reported by Eyal Shaynis <eyal.shaynis@telrad.co.il>. The fix was offered as a 4.28 patch.

Adjusted for Digital UNIX 4.0D; the spec_node structure is now defined in <sys/specdev.h>. Kris Chandrasekhar <Kris.Chandrasekhar@digital.com> identified the need for the adjustment.

Incorporated a bug fix from Brian McAllister <mcallister@mit.edu> to the DU readmnt() function. This fix was offered as a patch to 4.28.

Added "safe" printing to a SunOS clone device error message.

Corrected bug in tabling of Linux /proc-based lock info.

Corrected bug in handling of SunOS TLI streams. Dan Farmer <zen@trouble.org> reported the problem.

Added a Solaris 2.6 work-around to keep the BIND <sys/bitypes.h> from colliding with the Solaris <sys/int_types.h>.

Strengthened the Configure test for /proc-based Linux lsof, based on a report from Marty Leisner <leisner@sdsp.mc.xerox.com>.

Tested on OpenBSD 2.3.

Made AIX changes that allow use with 3.2.5. The changes were suggested and tested by Brett Hogden <hogden@rge.com>.

Added Solaris 2.6 AFS support. Disabled reporting of some node numbers for Solaris 2.5 and above open

AFS files. The node number computation algorithms used for SunOS 4.1.x and Solaris less than 2.5 no longer always work under Solaris 2.5 and above.

4.30 April 9, 1998

Corrected a pid structure member naming error for UnixWare < 2.1.2. The problem was reported by Richard van Meurs <vanmeurs.anva@atriserv.nl>. He supplied the correction. This was offered as a patch to 4.29.

Had a report from Igor Schein <ischein@air-boston.com> that IRIX 6.4 patch 2839 is another SGI kernel patch, along with 2536, that changes the size of the proc structure in the kernel without changing the proc structure in <sys/proc.h>. Upon further investigation found that the effect of these patches on the proc structure is not consistent. Therefore, dropped the Configure patch test for IRIX 6.4 and made the code in irix/dproc.c slightly more tolerant of proc structure size differences for IRIX 6.4. Igor help test the change.

Corrected Solaris >= 2.5 AFS inode number generation. Craig Everhart <Craig_Everhart@transarc.com> helped find the cause of the problem. This was offered as a patch to 4.29.

Refined the Linux /dev/kmem-based glibc evasion for the timeval structure to make it work with glibc version 2.0.7. This required defining a new global symbol, TIMEVAL_LSOF, default timeval, that the /dev/kmem-based Linux lsof can set to its private glibc timeval name, distinct from the kernel timeval name.

Added support for Alpha to the /dev/kmem-based Linux lsof. Alexandre Oliva <oliva@dcc.unicamp.br> provided a test system. Added an item to 00FAQ about lsof, the Alpha processor, and Linux.

Added a 00FAQ item about lsof year 2000 compliance. Basically it says lsof is probably compliant, because its only date or time computations are done with time_t values, but I haven't done any specific Y2K validation. I don't have plans to do any.

Added support for UnixWare 7. Chris Daniels <chrisd@dlpco.com> provided a test system and Don Draper <dond@sco.COM> provided technical information. Added BFS and SFS file system support to lsof for UW 2.1.[12] and 7.

Updated Solaris VxFS support for VxFS 3.2.1. Greg Earle <earle@netbsd4me.jpl.nasa.gov> reported the need for the update. Greg and Roger Klorese <rogerk@veritas.com> provided technical information. Scott McClung <mcclung@primenet.com> tested.

Changed IRIX XFS patch detection in anticipation of learning there are multiple XFS patches for IRIX 6.4 that require different versions of the lsof-invented xfs_inode structure.

4.31 April 21, 1998

Added a VxFS #if/#endif wrap to a section of the HP-UX dnode.c that wasn't properly protected. The problem was reported by Peter Klosky <PKlosky@bdm.com>. This was offered as a patch to 4.30.

Added support for Solaris 2.7 (first Beta release). Mike Sullivan <Mike.Sullivan@Eng.Sun.COM> provided technical advice and helped test. Charles Stephens <cfs@jurassic.eng.Sun.COM> also helped test.

Fixed bug in /proc-based Linux that caused it to access /proc/mounts excessively. Marty Leisner <leisner@sdsp.mc.xerox.com> provided a syscall trace that identified the bug. The fix was offered as a patch to 4.30.

Adjusted the IRIX 6.4 private structure definition for the XFS node to accommodate patch 2970. Igor Schein <ischein@air-boston.com> identified the patch and the required adjustment.

4.32 May 11, 1998

Corrected Solaris 2.7 code for reporting PCFS (floppy disk) node numbers. Casper Dik <casper@holland.sun.com> supplied the fix. The fix was offered as a patch to 4.31.

Corrected a bug in conditional repeat mode handling pointed out by Igor Schein <ischein@air-boston.com>. This was offered as a patch to 4.31.

Improved reporting of AIX open(/dev/memory device) errors.

Corrected a Solaris < 2.5 KA_T declaration error, pointed out by Robert Kiessling <robert@easynet.de>. Changed KA_T from a #define to a typedef for all dialects to prevent future problems of this kind.

Changed the sample Perl 5 script big_brother.perl5 to report a four digit year from localtime().

Added support for AIX 4.3[.1]. Bill Pemberton <wfp5p@tigger.itc.virginia.edu> provided a test system. Andrew Kephart <akephart@austin.ibm.com> and Tom Weaver <tvweaver@austin.ibm.com> provided technical assistance. Niklas Edmundsson <nikke@ing.umu.se> did 4.3.1 testing.

Added -qmaxmem option to CFLAGS for an AIX compilation with an xlc version 4.x compiler.

Adjusted Linux socket handling for changes in the AX25 members of the sock struct. Richard Green <rtg@tir.com> pointed out the problem. Tested /dev/kmem-based lsof under Linux 2.0.34.

4.33 May 22, 1998

Added generic IPv6 support to common lsof sources and specific IPv6 support to AIX sources. Andrew Kephart <akephart@austin.ibm.com> supplied the additions and helped with testing. Bill Pemberton <wfp5p@tigger.itc.virginia.edu> provided a test system. The modification affected sources for every dialect, whether it supports IPv6 or not, by changing the interfaces to the common Internet address function ent_inaddr().

Added support for the NetBSD UVM virtual memory system. Paul Kranenburg <pk@cs.few.eur.nl> supplied technical details.

Bracketed HP-UX 11 use of <sys/spinlock.h> with

#if/#endif _KERNEL.

Corrected printing of PCB address in DEVICE column for IRIX.

4.34 June 26, 1998

Updated 00FAQ to discuss TCP and UDP ports private to the AIX kernel and 00README to describe how ACLs can be used to give lsof permission to read the kernel memory devices. Add information to 00FAQ and 00README about other OpenBSD architectures where lsof is reported to compile and run. Added section to 00FAQ discussing how an incorrect loader path environment variable value can prevent lsof from loading correctly.

Improved Solaris namefs and doorfs support so that it is now possible to search for an open VDOOR file by the path name of its fattached file system object.

Igor Schein <igor@txc.com> requested the ability to do such a search. Even with the change, lsof can't always identify path names for open VDOOR files.

Also at Igor's request, improved reporting of information on open Solaris VCHR files that share a common vnode, and Solaris UNIX domain socket files.

Corrected print_kptr() argument error in PTX dnode.c, reported by Mark Price <mprice@sequent.com>. Compensated for ncache element naming differences, introduced at PTX 4.4.2; Kurtis D. Rader <krader@sequent.com> reported the problem.

Changed output column title from INODE to NODE to better reflect the column's contents of node IDs for more than just inodes.

Improved Configuration and processing for Solaris AFS. Corrected AIX AFS 3.4 afs_rwlock_t simulation.

Corrected a cast problem with two AIX knlist() calls, thus quieting an AIX 4.2.1 compiler argument type warning. Jon Champlin <champlin@us.ibm.com> reported the problem.

Added support to most dialect versions (exception: /proc-based Linux) to warn when the identity of the kernel where lsof was compiled doesn't match the running identity. The warning can be suppressed with -w. Note: determining AIX state requires calling oslevel, a potentially slow operation. Jon Champlin <champlin@us.ibm.com> suggested this addition.

!!!! WARNING !!!! !!!! WARNING !!!! !!!! WARNING !!!!

Those using the lsof cross-configuration capability (see 00XCONFIG), should be aware that the kernel identity test feature introduces two new basic cross configuration environment variables, LSOF_ARCH and LSOF_VSTR.

!!!! WARNING !!!! !!!! WARNING !!!! !!!! WARNING !!!!

Identified a situation where a Solaris UNIX domain socket name is known and can be searched for by name; added the necessary code.

4.35 July 17, 1998

Made the kernel identity check an option with the HASKERNIDCK #define in machine.h. Enabled altering of HASKERNIDCK with the Customize script. Added a clause to the help output that indicates the build-time HASKERNIDCK status.

Added more information to the NAME column for Solaris UNIX domain sockets. Made them searchable by their clone device path name. Igor Schein <igor@txc.com> requested this.

Completed the HP-UX 11 port with support for its optional 64 bit kernel. Rich Rauenzahn <rrouenza@cup.hp.com> provided a test system. Corrected errors with HP-UX 11 lock reporting and private kernel structure and type definitions. Added support for HP-UX NFS3 files.

Limited mount table warnings -- e.g., when -b is used -- to one set per mount point.

Fixed some mount table scanning and usage bugs,

including one in Solaris, reported by Kjetil Torgrim Homme <kjetilho@ifi.uio.no>.

4.36 August 4, 1998

Made corrections and additions to IPv6 support and to AF_ROUTE socket handling, supplied by Jean-Luc Richier <Jean-Luc.Richier@imag.fr>. Jean-Luc's additions provide IPv6 support for the Inria IPv6 implementations on FreeBSD and NetBSD.

Fixed two Solaris 2.5, 2.5.1, 2.6 and 2.7 TCP and UDP host name or IP address reporting bugs, reported by James Mathiesen <James-Mathiesen@deshaw.com>. This fix was offered as a patch to 4.35.

Updated the Customize script to cause ENTER to use all defaults. Amir J. Katz <amir@ndsoft.com> suggested this and helped test the changes.

Updated Solaris ICMP and IP stream handling, based on a report from Igor Schein <igor@txc.com>.

Fixed a bug in the Digital UNIX mount table handling, reported by Bob Ward <bward@thehartford.com>. While working on the bug, found and updated some obsolete AdvFS code. This fix was offered as a patch to 4.35.

4.37 September 15, 1998

Deactivated SGI IRIX support and archived revision 4.36 sources and binaries in pub/tools/unix/lsof/OLD.

Improved performance of FD searching. This was offered as a patch to 4.36.

Amir J. Katz <amir@ndsoft.com> pointed out that ranlib isn't needed for AIX or Solaris. Made appropriate Configure script changes.

Fixed a file offset reporting bug for HP-UX VCHR and VBLK device nodes located on a VxFS root. Doug Siebert <douglas-siebert@iowa.edu> reported the bug. The fix was offered as a patch to 4.36.

Resolved an HP-UX root device name reporting bug, partly caused by an out-dated local copy of the

<sys/mount.h> mount structure, by generating a local header file with the structure that can be compiled without needing `_KERNEL` defined. Doug Siebert also reported this bug.

Changed some dialect source code -- Digital UNIX, Solaris, SunOS, and UnixWare -- to make more consistent with `ps` the user ID `ls` reports in the `USER` column. Added a FAQ entry about it. Igor Schein <igor@txc.com> reported the Solaris and SunOS `ls` inconsistencies with what `ps(1)` reports.

Ported `ls` to Pyramid ReliantUNIX 5.44.

Added brackets as comments to `case`, `do`, `done`, `else`, `endif`, `esac`, `if`, and `while` statements in `Configure` to assist in navigating its clauses.

Added more Linux 2.0.x `glibc` work-arounds.

Added support for UnixWare 7.0.1.

Ralph Forsythe <ralph@contact-paging.com> provided a new FreeBSD test system.

4.38 November 25, 1998

Added support for recent FreeBSD 3.0 distributions. A 3.0 test system was provided by David O'Brien <obrien@NUXI.com>. This was offered as a patch to 4.37.

Updated the `scripts/idrlogin.perl*` files to look for `sshd` processes in addition to `rlogind` and `telnetd` ones.

Added support for DU 5.0 Beta. Berkley Shands <berkley@cs.wustl.edu> provided a test system.

Added support for OpenBSD 2.4 with changes supplied by Kenneth Stailey <kstailey@disclosure.com>.

Changed the Solaris 2.7 tests and documentation to Solaris 7.

Made some changes to the header files for NEXTSTEP 3.3 and added support for OPENSTEP 4.x with help from Michael A. Hovan III <mhovan@BLaCKSMITH.com>

and

Carl Lindberg <Carl_Lindberg@BLaCKSMITH.com>.

The combined dialect subdirectory is named n+os.

One of Carl's changes propagates RC_CFLAGS to the library Makefile. Timothy J. Luoma <luomat@peak.org> helped test under NEXTSTEP 3.3 and OPENSTEP 4.2.

Made UW 7.x version sensitive to the presence of ptf7038. Added peer PCB address to Unix domain socket Name column, even when a path name has been located. Information for these changes was supplied by Francis Le Bourse <flebourse@intelcom.fr>. Lee Penn <lee@dlpco.com> provided a test system.

Tested lsof under OSR 5.0.5 on a test system also provided by Lee Penn.

Made path name argument processing more tolerant of errors per a suggestion from Julian Gordon <julian@cadence.com>.

Acquired a new UnixWare 2.x test system, generously provided by Computer Classroom, Inc. -- Matthew Thurmaier <matt@compclass.com>, Ken Laing <ken@compclass.com>, and Andrew Merrill <andrew@compclass.com>. Updated Configure to accept a UnixWare version of 2.1.3.

Updated kmem-based lsof for Linux 2.0.36.

Updated NetBSD sources for a change in a UVM virtual mapping header file.

Corrected a cache allocation bug in Sun format kernel name cache handling. The bug only shows up when the kernel name cache is inaccessible.

4.39 December 29, 1998

Corrected problems with large device number handling for 64 bit Solaris 7. The problems were reported by Steve Bellenot <bellenot@math.fsu.edu>. Steve helped test the fixes. The fixes were offered as two patches to lsof 4.38.

Improved FreeBSD Configure operations for header files that must be obtained from the kernel source tree, based on a suggestion from David O'Brien

<obrien@NUXI.com>.

For Bela Lubkin <filbo@deephought.armory.com> made optional with +f[cfn] the display of file structure address, shared use count, and node structure address. /proc-based Linux doesn't implement this feature, because it doesn't read kernel structures from kernel memory. Modified the PTX -X option to take advantage of the new file structure display option. Added shared.perl5 to the scripts/ subdirectory to provide an example of how +f[fn] might be used to track shared file descriptors and files.

Added more /dev/kmem-based Linux glibc evasions, provided by Jeff Johnson <jbj@redhat.com> and Maciej Lesniewski <nimir@kis.p.lodz.pl>. Jeff helped test them on various Linux architectures.

Tested on AIX 4.3.2; no changes were required. Doug Crabill <dgc@purdue.edu> provided a test system.

Fixed -c option to detect missing command name when following option begins with `+'.

4.40 January 25, 1999

Added support for using the CDS compiler for Reliant Unix 5.44 and above. Made Reliant Unix MIPC support optional, dependent on the presence of <sys/mipc.h>.

Based on a report from Michael Schmitz <MSchmitz@lbl.gov> that /dev/kmem-based lsof misbehaves on a Linux 2.0.x m68k kernel without module support, made the absence of query_module() or get_kernel_syms() Linux kernel support a fatal error. Updated relevant sections of 00FAQ to reflect the change.

Added the ability to force the Linux Configure stanza to use the /proc or /dev/kmem source base via a LINUX_BASE environment variable specification. This is a cross-configuration assist.

Added "+D <dir>" and "+d <dir>" options for directory searching. +D searches the entire tree, starting at <dir>, including <dir>, its contents, and its

subdirectory branches; +d searches only <dir> and its contents, but not its subdirectory branches. Improved lsof's searching of the specified name list to compensate for anticipated long lists from +d and +D.

Made an egrep in the Solaris Configure stanza usable by the standard and XPG4 egrep's. Kenneth Stailey <kstailey@disclosure.com> pointed out the improvement.

Fixed bugs in /dev/kmem-based Linux and UnixWare Unix domain socket name searching.

Changed a Linux Alpha #include to be conditional on the presence of its named header file, so that lsof will compile on Red Hat 5.1 and 5.2 (Linux kernel 2.0.35) where the header file is absent. The problem was reported by Alexandre Oliva <oliva@dcc.unicamp.br>.

Fixed an AIX 4.3+ bug in procinfo struct space allocation, reported by Jeff Stewart <jws@purdue.edu>. This was offered as a patch to 4.39.

Added an lstatsafely() function to offer the same isolation for lstat() calls that statsafely() offers for stat() calls. This made DOSTAT_FUNCTION no longer necessary, so deleted it.

With help from Laurent P. Montaron <lpm@sequent.com> ported lsof to PTX 4.4.4. Laurent did a monumental job of identifying TCP/IP changes by their TCP version, rather than by their PTX (With mix 'n match PTX and TCP/IP versions, the PTX version often has no bearing on the TCP/IP version.), and changed the Configure script and pre-processor #if/#else/#endif blocks to match. He also updated Unix domain socket handling for PTX TCP/IP versions 4.5 and above.

Updated CLIENT handle acquisition of fill_portmap() in print.c to use the more modern RPC function clnt_create() in place of clnttcp_create() where possible. PTX 4.4.4 requires clnt_create().

4.41 February 27, 1999

Added FreeBSD 3.1 and 4.0 support with help from Sheldon Hearn <axl@iafrica.com>, David O'Brien <obrien@NUXI.com>, and John Polstra <jdp@polstra.com>.

Corrected bungled AIX 4.3+ patch that went into lsof 4.40.

Reorganized the Configure script to improve Makefile construction. A specific impetus for this was to allow FreeBSD system-wide make flags to be propagated to the lsof Makefiles, but other goals were to make sure that the DEBUG= make entry can over-ride standard CFLAGS values, and to better manage the identification of compilers and their versions.

Two compiler-related values may now be supplied in environment variables:

1) the compiler path in LSOF_CC; and 2) the compiler version in LSOF_CCV. 00XCONFIG documents them.

Added support for Pyramid Reliant Unix bsdafs, msockfs, and sockfs file systems.

Added an optional LSOF_CINFO string to Configure, producing a CINFO string in selected Makefiles, producing a #define LSOF_CINFO in selected version.h header files. The purpose of this is to allow Configure the option to propagate information to the lsof -v output. It is now used for Linux to identify the code base, and for HP-UX 10.30 and 11.0 and Solaris 7 to identify the kernel bit size.

Added system information to NEXTSTEP and OPENSTEP -v output, from the second line of hostinfo's output.

Fixed a login name buffer overflow problem in the processing of -u option values. This was offered as a patch to 4.40. **!!!THIS IS A SERIOUS STACK OVERFLOW BUG; A LINUX EXPLOIT EXISTS FOR IT THAT OPENS A BASH SHELL WITH LSOF'S AUTHORITY -- E.G, SETGID(KMEM) POWER!!!**

Improved the Solaris mount table filter so the volume manager's fake mount point, "/vol", is ignored and doesn't supplant "/" in NAME column path assemblies. Igor Schein <igor@txc.com> reported

this bug and provided important help in finding it. This was offered as a patch to 4.40.

Changed the Linux /dev/kmem-based lock ownership test to answer a problem reported by Tom Christiansen <tchrist@jherereg.perl.com>. This was offered as a patch to 4.40.

Installed an HP-UX 11 patch, suggested by Kevin Vajk <kvajk@cup.hp.com>, that adjusts a private lsof kernel header file, derived via Q4, to correspond to an HP-UX patch bundle.

Made NetBSD 1.3I sockproto structure adjustment.

4.42 March 30, 1999

Fixed a typo in the HP-UX dfile.c that caused +fF and +fN output controls to swap effect.

Enabled for OpenBSD 2.5 per notice from Kenneth Stailey <kstailey@kstailey.tzo.com>

Made more VM accommodations for FreeBSD 4.0.

Improved file system search reporting to include path name components when they're available, instead of mindlessly reporting the file system name in the NAME column. Guy Dallaire <gdallair@geocities.com> brought the need for this change to my attention.

Updated Solaris 2.6 VxFS for Veritas Oracle Database Edition 2.0, VxFS version 3.3, and VxVm version 2.5.4, based on a report from Chris Kordish <chris.kordish@East.Sun.COM>. Chris kindly provided a test system.

Improved HP-UX ipc_s patch detection in Configure, response in ../dialects/hpux/hpux11/ipc_s.h, and documentation in 00FAQ, Kevin Vajk <kvajk@cup.hp.com> helped test.

Added to Customize the option to suppress HASKERNIDCK selection for specified dialects. Suppressed it for /proc-based Linux lsof, and removed its test and code from there. Tin Le <tin@netimages.com> alerted me to the need for this update.

Ported to official Digital UNIX 5.0 release.

Changed DU lsof to use the knlist(3) function when no kernel file has been specified with -k. This change was suggested by Erich Wimmer <Erich.Wimmer@digital.com>.

Updated Configure for latest NetBSD (1.3I?) with UVM support the default.

4.43 May 11, 1999

Corrected a typo in the Solaris gcc discussion in 00FAQ. Made changes to the Solaris 2.5[.1] private tcp_s structure. Both changes were done in response to reports from Igor Schein <igor@txc.com>, who tested the Solaris 2.5 change.

Made more IPv6 adjustments to lsof for Tru64 UNIX (Digital UNIX) 5.0, based on information obtained from Compaq by Berkley Shands <berkley@cs.wustl.edu>.

Corrected HP-UX error message about HP-UX 11 q4 usage. Amir Katz <amir@ndsoft.com> reported the correction.

Fixed a Glibc 2.1 conflict in /proc-based Linux lsof.

Fixed a man page typo reported by Vlad Harchev <hvv@hippo.ru>.

Changed some Solaris 2.7 references to Solaris 7 in Configure and 00EXPORTING.

Added a Solaris example to the echo statements that are the install rule in the SunOS/Solaris Makefile.

Added a field to the file structure output -- FILE-FLAG (file structure open flags, f_flag[s], and process file flags, typically u_pofile) -- enabled with +f[gG]. Its field output character is 'G'.

Figured out another piece of the HP-UX 11 patched ipc_s structure puzzle with the help of Keith Kalet <KEITH_KALET@HP-USA-om41.om.hp.com>.

Fixed a PTX real vnode to real inode interpretation

bug.

Added link count to lsof output. Eric Dumazet <dumazet@risgw.ris.fr> requested and helped test it. The new +L option enables and filters it. Its field output character is `k'.

Updated Configure script to recognize NetBSD 1.4.

Updated AFSConfig to handle default answers to questions.

Incorporated patch from Jonathan Sergent <sergent@io.com> that enables /proc-based Linux lsof to run on both 32 and 64 bit kernels.

Updated Configure script with a patch from David O'Brien <obrien@NUXI.com> that recognizes FreeBSD 3.2.

4.44 June 24, 1999

Corrected use of nlink member of hsnode for SunOS 4.1.x High Sierra File System files. John Dzuber <zube@tlaloc.stat.colostate.edu> reported the problem and helped test the fix. Also fixed a SunOS segmentation fault bug. These fixes were offered as a patch to 4.43.

Improved handling of /proc-based Linux UNIX PCB address.

Fixed a NEXTSTEP and OPENSTEP bug that made repeat option (-r) processing malfunction. This fix was offered as a patch to 4.43.

Fixed Configure so it doesn't use -O in the Cflags for the bundled HP-UX C compiler. Jim Ankenbrandt <jankenbrandt@penton.com> reported the problem.

Corrected output ordering of parent PID and process group ID when both -R and -g are specified.

Enhanced the pdev.c and pdvn.c library modules for wider use. These dialect versions use the new library modules: DEC OSF/1, Digital UNIX, and Tru64 UNIX; Pyramid DC/OSx and Reliant UNIX; SCO OSR and UnixWare; and

Sequent PTX.

Added basic clone device support to /dev/kmem-based HP-UX lsof for HP-UX 10.30 and higher.

Added raw socket support to /proc-based Linux lsof.

Changed NODE-ADDR column title to NODE-ID in anticipation of using more general identification information in the column.

Ported to UnixWare 7.1, using a test system kindly provided by Matt Thurmaier <matt@compclass.com> and Don Draper <dond@sco.com>.

Updated for NetBSD 1.4C VM changes, and a new current and root working directory structure.

Made minor adjustment for latest Tru64 UNIX 5.0 Beta release.

4.45 July 30, 1999

Fixed quoting problem in DEC OSF/1, Digital Unix, and Tru64 UNIX Makefile's install rule. The problem was reported by Berkley Shands <berkley@cs.wustl.edu>. Fixed bug in Tru64 UNIX 4 lsof that caused FDs to be skipped. These fixes were offered in a patch to 4.44.

Fixed a repeat-mode /proc-based Linux lsof bug, reported by Sami Farin <sfarin@ratol.fi>. This was offered as a patch to 4.44.

Picked lint, some reported by Sami Farin.

Corrected a 00DCACHE documentation error in a sample shell script. The problem was reported by Chad R. Larson <chad@larsons.org>. Changed commented-out entries in machine.h files so they require more thought and work when the comments are removed, based on a remark by Chad.

Compensated for the practice of Solaris 7 and above to record the dev= value in /etc/mnttab in 32 bit mode, even on 64 bit systems. This was offered as a patch to 4.44.

Added a C library test for /proc-based Linux lsof, so that the #include files can be adjusted for a non-Glibc environment. The need for this was reported by Andrew Hill <andrewh@tirin.openworld.co.uk>. This was offered as a patch to 4.44.

Added support for Auspex LFS 1.8.1 and 1.9.2 to SunOS 4.1.4 lsof. The support was requested by Quentin Fennessy <quentin@dvorak.amd.com>, who provided information and did testing.

Enabled IPv6 support code for NetBSD and OpenBSD, conditional on Configure script tests. Wolfgang Rupprecht <wolfgang@wsrcc.com> supplied the NetBSD code and tested it. The OpenBSD code I constructed has been compiled but not tested.

Updated the identd Perl 5 script, based on a report from Wendy Lin <af5@taiyang.cc.purdue.edu> that the space in its response line in front of the user name violates RFC 1413.

Added IPv6 support to /proc-based Linux lsof. Jonathan Sergent <sergent@ETLA.NET> and Andrew Thomas Sydelko <sydelko@ecn.purdue.edu> kindly provided a test system.

Updated man page description of AIX multiplexed files to indicate that they might be /dev/ptc or /dev/pts, depending on the AIX version. The correction was suggested by Onno van der Linden <onno@simplex.nl>.

Sylvain Robitaille <syl@alcor.concordia.ca> reports lsof passes his Y2K tests.

4.46 October 23, 1999

Corrected /proc-based Linux lsof to detect that an IPv6 address is a mapped IPv4 address. The problem was reported and analyzed by Arkadiusz Miskiewicz <misiek@misiek.eu.org>, who also tested the fix.

Added a libc5 library /dev/kmem-based Linux lsof circumvention, supplied by Jason Lingohr <lingman@lucid.net.au>.

Corrected a bug in -t (terse) AIX output, reported by Wendy Lin <af5@taiyang.cc.purdue.edu>. I introduced the bug at revision 4.43 when adding FILE_FLAG reporting. This was offered as a patch to 4.45.

Added a work-around for a problem in the OpenBSD 2.3 <sys/pipe.h> header file. Volker Borchert <bt@teknon.de> provided and tested it.

Improved description of cross-building lsof for a 64 bit Solaris 7 system on a 32 bit system with suggestions from Phillip Edwards <Philip.Edwards@sn.wpafb.af.mil>.

Fixed a gawk POSIX-mode pattern error in the Linux /dev/kmem-based Mksrc script, based on a tip from Ambrose C. Li <acli@mingpaoxpress.com>.

Fixed a bug in the Tru64 UNIX IPv6 handling, courtesy of a report from Casper Dik <casper@holland.sun.com>.

Enabled support for OpenBSD 2.6.

Enabled support for BSDI BSD/OS 4.1, based on a report from Jeffrey C Honig <jch@bsd.com> that only a Configure script change is necessary.

Enabled Configure script to use gcc for building lsof for a 64 bit Solaris 7 and 8 kernels, if the gcc version is 2.95 or above.

Improved -i option handling for systems with IPv6 support so that it will search for a host name in both IPv4 and IPv6 families, when that is possible. As a companion modification, changed -V processing to report a single error when a multiple host name match is requested. Casper Dik <casper@holland.Sun.COM> helped test.

Fixed a DEC OSF/1, Digital UNIX, Tru64 UNIX repeat mode bug, reported by Mayer Ilovitz <mayer@cooper.edu>. Mayer helped test the fix. The fix was offered as a patch to 4.45.

Changed Solaris socket file recognition scheme, so it is (nearly) the same through Solaris 8, where the

previous
clone device scheme no longer works.

With significant assistance from Casper Dik, added support for Solaris 8 Beta and Beta refresh. The IPv6 support in Solaris 8 is still in some flux, so there are temporary compensations for the differences between Beta IPv6 support and Beta refresh IPv6 support. Casper and I hope those differences disappear by FCS.

Improved the delivery of information on Solaris 2.5.1, 2.6, 7, and 8 door files.

Fixed a repeat mode bug that surfaces when /etc/passwd changes between cycles. The bug report and diagnostic help were supplied by Igor Schein <igor@txc.com>. The fix was offered as a patch to 4.45.

Added support for INRIA IPv6 to NetBSD. Jean-Luc Richier <Jean-Luc.Richier@imag.fr> provided patches and a test system on which to verify them.

Added support for AIX 4.3.3. Jeff W. Stewart <jws@anaconda.cc.purdue.edu> provided a test system.

Made adjustments for FreeBSD 4.0-current.

Improved reporting of information for AIX sockets that lack protocol control blocks.

4.47 November 29, 1999

Based on a query from Jean-Pierre Radley <jpr@jpr.com>, changed the lsof top-level Makefile to propagate CFGF to the library Makefile. (DEBUG was already being propagated.) Added osrgcc and scogcc Configure abbreviations (to use gcc) for Jean-Pierre.

In response to a query from Igor Schein <igor@txc.com>, improved the Configure script test for Solaris 7 and 8 that decides if the compiler can produce 64 bit executables.

Made an ugly hack, based on making a private rnode structure definition from q4 output, to compensate for HP-UX 10.20 and lower recent NFS3 patches. HP didn't supply an updated <nfs/rnode.h> with the

patches. The problem was reported by Will Partain <partain@mekb2.sps.mot.com>. Elias Halldor Agustsson <elias@hi.is> helped identify the patches as PHNE_18173, PHNE_19426, PHNE_19937, and PHNE_20091, and provided a test system.

Switched BSDI test system from 2.1 and 3.1 to 4.0.1, courtesy of Terry Kennedy <terry@tmk.com>.

Added some more dev_t hacks for Alpha FreeBSD 4.0.

Added support for IPv6 on BSD 4.x. The support hasn't yet been tested, just compiled.

Added support for the mnt file system (mntfs or /etc/mnttab) on Solaris 8. Tested on Solaris 8 BETA-Refresh.

Made selection of optional fields (e.g., PPID with -FR) in a field output specification select the optional field, too, so that the option selector for the field (e.g., -R) isn't also required. This change was made in response to an inquiry from John DuBois <spcedt@armory.com>. This may require some revision to scripts that parse all field output; two scripts in the lsof distribution's scripts/ subdirectory had to be updated.

Corrected handling of Linux IPv4 addresses mapped in IPv6 addresses.

Tested under OpenBSD 2.6.

4.48 January 14, 2000

Modified -i argument processing of colon-separated IPv6 addresses to recognize an IPv4 address mapped in an IPv6 address and handle it as an IPv4 address. This was offered as a patch to 4.47.

Added a defined symbol (NOWARNBLKDEV) to control (inhibit) the issuance of a warning when no block devices are found. This was done anticipating its need in FreeBSD 4.x, but that dialect version no longer has any block devices, so HASBLKDEV was disabled for it instead. NOWARNBLKDEV was left in place for possible use in the future.

Enabled KAME IPv6 Configure support for FreeBSD when <netinet6/in6.h> is found.

Disabled use of gcc to compile lsof for 64 bit HP-UX 11.

Updated Configure to recognize FreeBSD 3.4.

Based on suggestions from Bernt Christandl <beb@MPA-Garching.MPG.DE> improved AFS configuration for AIX and Solaris, and updated AIX AFS 3.5 support. Johannes Tax <tax@bluedog.oit.unc.edu>, Hung T. Pham <hung_pham@unc.edu>, and Curt Freeland <curt@grumpy.cse.nd.edu> provided test systems.

Updated lsof's private rnode definition for AIX 4.3.3, since IBM still doesn't ship the <oncpus/nfs/rnode.h> header file and the rnode structure definition in <nfs/rnode.h> doesn't match what the kernel uses. This was offered as a patch to 4.47.

Weakened the test in the Linux /proc-based lsof of the field count of data lines in /proc/net/{tcp,udp}. It appears that recent 2.3.x Linux kernels have added untitled fields to these files. The bug report came from Gabor Liptak <gaborliptak@usa.net>.

Adjusted for a FreeBSD 4.0 change in the definition of [_]KERNEL. David O'Brien <obrien@NUXI.com> reported the problem and provided a test system.

Removed the HASPPID bracket from fppid (the -R option state variable) so that the field select table will compile even when HASPPID is not defined. This problem was introduced at revision 4.47 with code that causes some field output characters to set option states. The problem was reported by David Bacon <bacon@birch.eecs.lehigh.edu>.

4.49 April
3, 2000

Made clearer in man page that "Lxx" FDs are AIX loader table references. Also updated the 00FAQ discussion of the Stale Segment ID bug to include AIX 4.3.x.

Modified support for NetBSD 1.4Q to include the <sys/buf.h> header file to cope with an MFS change.

Added support for OpenBSD UVM virtual memory.

Added support for AIX systems with > 2GB of memory. Chris Sylvain <csylvain@itg.ummc.umaryland.edu> reported the problem and provided the solution. Chris also supplied some minor code cleanup. This was offered as a patch to 4.48.

Based on new information from Igor Schein <igor@txc.com> made additional compensation in Configure script for 64 bit Solaris 7 and 8 gcc.

Added some 00FAQ info on the effect ordering of the +fg and -FG options has on output format.

Improved NetBSD IPv6 configuration, based on a suggestion from Thomas Klausner <wiz@danbala.ifoer.tuwien.ac.at>. Added code to convert IPv4-mapped-in-IPv6 addresses to IPv4 addresses.

Updated the information in 00FAQ and the HP-UX 11 binary directory README files on the HP-UX 11 ipis_s patch with new information supplied by Eric McWhorter <emcwhorter@xisis.xerox.com>.

Added documentation on changes to HASFSTYPE and HASNCACHE, and the new HASPRIVPRIPP.

Adjusted Configure for FreeBSD 5.0. Made additional, necessary changes to Configure and the BSDI sources to eliminate load errors.

Added KAME IPv6 support to FreeBSD at the request of Ollivier Robert <roberto@eurocontrol.fr>, who provided a test system.

Corrected the script that generates the CHECKSUMS files for binaries to correctly name the detached PGP certificate. The documentation bug was reported by Michael Hennecke <hennecke@rz.uni-karlsruhe.de>.

4.50 June 29, 2000

Added a NetBSD alpha test host, courtesy of Ray Phillips <r.phillips@mailbox.uq.edu.au>. An lsof 4.49 binary, built on Ray's 1.4.1 system was made available prior to the 3.50 release.

Upgraded the system map file tests in /dev/kmem-based Linux lsof, making the use of DEBIAN_LINUX_LSOF unnecessary. Tested the changes on a system made available by Vincent Kujala <kujala@geog.ubc.ca> and Jim Mintha <jim@ic.uva.nl>.

Forced AIX to use the large-file-enabled versions of lstat (lstat64) and stat (stat64) if <sys/stat.h> contains stat64. This should allow lsof to stat() AIX files > 2GB even when the builder has not defined the "large file enabled programming environment." Configure tests <sys/stat.h> and puts -DHASSTAT64 in the Makefile's CFLAGS to make this happen. Fernando A.B. Whitaker <whitaker@cenapad.unicamp.br> reported the problem. This was offered as a patch to 4.48.

Enabled Configure script to handle OpenBSD 2.7. Angelos D. Keromytis <angelos@dsl.cis.upenn.edu> reported the availability of OpenBSD 2.7 and supplied the Configure script patch.

Improved handling of DOOR and fattach()'d files in Solaris.

Changed message about missing kernel symbol file from "not yet determined" to "none found".

Updated FreeBSD, NetBSD, NEXTSTEP, OpenBSD, and OPENSTEP support to report "no PCB" and the values of the SO_CANTSENDMORE and SO_CANTRCVMORE state flags when a socket structure has no inpcb pointer. This modification was made to AIX lsof at revision 4.46. Added an entry to 00FAQ about sockets that have no inpcb pointer.

Upgraded support for FreeBSD 5.0-CURRENT. Ben Smithurst <ben@scientia.demon.co.uk> supplied patches and did testing. David O'Brien <obrien@NUXI.com> supplied a test system. The update included dropping the Fctty part of file descriptor file system

support, conditional on a Configure script test.
I propagated those changes to BSDI, NetBSD, and
OpenBSD in anticipation of their having the
modification in the future. David also arranged
with Michael Haro <mharo@area51.fremont.ca.us> for
a FreeBSD 3.4 test system.

In response to an lsof 3.72
bug report from Jim Mewes
<jim@corp.phone.com>, added more kernel address
filtering to the lsof function, kread(), that reads
Solaris kernel data.

In response to a report from Marc Duponcheel
<marc@offline.be>, added tests to the /proc-based
Linux lsof to ignore file systems of types "autofs"
and "pipfs".

Based on a report and information supplied by Casper
Dik <casper@holland.Sun.COM>, updated the ncache_load()
function in lib/rnch.c with new code that deals
with a post Solaris 8 change in kernel name cache
(DNLC) handling. Casper tested the update, which
should be invisible to Solaris versions without
the new DNLC code.

Added support for Solaris VxFS QIO files, based on
a report from Kieran Broadfoot <kieran.broadfoot@gs.com>.
Kieran help test the support.

Added support for PTX 4.4.6 and 4.5[.1] with help
from the usual cast of good people at Sequent.

Added support for 64 bit file sizes and offsets on
BSDI, FreeBSD, NetBSD, and OpenBSD,
based on a
report from Dan Nelson <dnelson@emsphone.com>.
Dan supplied a patch and did FreeBSD testing.

Added Configure script recognition of NetBSD 1.5,
based on a report from Andrew Brown <atatat@atadot.net>.
Thomas Klausner <wiz@danbala.ifoer.tuwien.ac.at> updated
the NetBSD port package to use a pre-release of this
addition.

At the last minute saw a notice via deja.com's
UseNet search service that FreeBSD 3.5 had been
released and lsof didn't grok it. Added recognition

of 3.5 to lsof's Configure script, but didn't have the opportunity to test lsof on 3.5.

4.51 August 21, 2000

Added Configure script support for the upcoming Solaris 9 release based on suggestions from Casper Dik <Casper.Dik@holland.sun.com>.

Changed sample Perl scripts to assume that /usr/local/bin/perl is Perl 5 and Perl 4 may be found in /usr/local/bin/perl4.

Updated Configure to recognize FreeBSD 4.1 and made a FreeBSD pre-release distribution available.

Bela Lubkin

<belal@sco.COM> tested lsof on the upcoming SCO OSR 5.0.6 release and reports that lsof appears to work properly.

Updated the AIX compiler test in Configure to recognize its version 5.

Updated AIX 4.3.3 support with automatic recognition of the proper rnode structure, based on machine bit width. Also added code to detect when processing the -X option that lsof has been compiled with the "other" AIX 4.3.3 user structure and to apply compensations. When a compensation method works, it's applied during subsequent -X processing; when none works, further -X processing is disabled.

Added Tru64 UNIX 5.1 support. Updated Tru64 UNIX library text file support to recognize new kernel support for AdvFS library files. Berkley Shands <berkley@cs.wustl.edu> and Klaus Saggerer USG [saggerer@zk3.dec.com] helped put me in contact with Chang Song <song@zk3.dec.com>, the developer of 5.1's new kernel name cache and he helped me develop new code in lsof to access it.

Corrected reporting of PTX fattach()'d address.

Changed Configure and dlsof.h for NetBSD and OpenBSD to use /usr/include/uvm header files when available.

Andrew Brown <atatat@atadot.net>, Thomas Klausner <wiz@danbala.ifoer.tuwien.ac.at>, and Wolfgang

Rupprecht <wolfgang@wsrcc.com> pointed out the need to do this for NetBSD. Andrew provided access to a NetBSD 1.5 system for verifying the changes.

Installed snprintf() support, including a private version in the lsof library for those UNIX dialects without the function. Changed all sources to use it instead of sprintf() and strcpy().

Fixed a memory leak in the readvfs() functions of BSDI, DEC/OSF1, Digital UNIX, FreeBSD, NetBSD, OpenBSD, and Tru64 UNIX.

Tested on Linux 2.4.

Modified the Pyramid MkKernOpts script to compensate for `uname -s` configuration alternatives. Robert Dahlem <Robert.Dahlem@ffm2.siemens.de> supplied the modification.

Obtained access to an FCS Solaris 8 64 bit system and built lsof on it, using Sun Workshop C 5.0 and gcc 2.96 20000814 (experimental). Both compilers produce a working lsof.

4.52 November 8, 2000

Completed work on an HP-UX 11.11 port that uses a pstat(2) interface provided by HP. To distinguish it from its predecessors for HP-UX, this lsof version is called PSTAT-based and the predecessor versions are now called /dev/kmem-based. I am indebted to the far-sightedness and support of these good people at HP for making PSTAT-based lsof possible: Carl Davidson, Louis Huemiller, Rich Rauenzahn, and Sailu Yallapragada. The PSTAT-based sources are in lsof_4.52/dialects/hpux/pstat, the /dev/kmem-based ones in lsof_4.52/dialects/hpux/kmem.

Ported to IBM Monterey for Merced|Itanium, aka AIX 5L. It configures via the Configure script's "aix" abbreviation and has been tested on AIX 5L Beta 3. Jay Beck, Steve Dibbell, Loc Le, Nasser Momtaheni, and Malcom Zung of IBM provided generous support. Since AIX 5L is still in Beta testing, this port can't be considered complete.

Added Configure support for OpenBSD 2.8. David Mazieres <dm@cs.nyu.edu> provided a test system.

Based on a report from Marc Christensen <marc@mecworks.com> added sockfs to the mount scan exemption list for /proc-based Linux lsof.

Added large file, CDFS, and DOSFS for UnixWare 7.x. Added UnixWare device memory mapping support. All UnixWare changes were supplied by Eric Dumazet <edumazet@cosmosbay.com> Eric also supplied some miscellaneous bug fixes.

Deferred name cache loading until printname() needs to use the name cache.

Terminated Pyramid, SunOS 4.1.x, and Ultrix support, because test systems are no longer available. Final Pyramid and Ultrix source code distributions for lsof revision 4.51 may be found on lsof.itap.purdue.edu in pub/tools/unix/lsof/OLD/src. The no longer supported SunOS 4.1.x source code is still distributed with the Solaris source code.

Added code to set Solaris node address to real vnode address, when applicable.

John Speno <speno@lopan.isc-net.upenn.edu> provided information that enabled me to update the Tru64 AdvFS (MSFS) node definition for AdvFS version 5.

Added Tru64 5.x CFS support with help from Kris Chandrasekhar <Kris.Chandrasekhar@compaq.com>, Diane Lebel <lebel@zk3.dec.com>, and John Speno. The support only provides information about cached file attributes.

Installed a Configure patch for HP-UX 11 supplied by Kenneth Stailey <kstailey@disclosure.com> that adds another command to q4 input.

Tested on FreeBSD 4.2.

Will Day <willday@rom.oit.gatech.edu> and Frank Winkler <frank.winkler@germany.sun.com> graciously supplied Solaris 8 binaries.

Added Solaris 9 text file support, supplied by Casper Dik <Casper.Dik@holland.sun.com>.

4.53 December 6, 2000

Added the AIX 5L j2_lock.h to the distribution with a Configure script step to use it when it's missing from /usr/include/j2.

Removed SunOS 4.1.x support.

Removed Linux 2.0.x /dev/kmem support.

Fixed VBLK and VCHR special device file reporting to handle /dev information more accurately.

Added a Apple Darwin / Mac OS X 1.2 port, provided by Allan Nathanson <ajn@apple.com>. Allan also arranged for a test system so I can maintain this port. An additional test system was provided by Dale Talcott.

Dropped claims of support for all UnixWare versions except 7.1.0, since that is the only version on which I can test lsof. Even though lsof 4.53 is deprecated for UnixWare 2.1.3, installed a patch for it with testing done by A. Channing Clark <clark.channing@heb.com>.

Dropped claims of support for all SCO OpenServer versions except 5.0.5, since that is the only version on which I can test lsof.

4.54 January 19, 2001

Added compensation for a change that made the FreeBSD mount structure invisible. I can only test back to 3.2 and the compensation works there, so it's been #ifdef'd for 3.2 and above. David O'Brien <obrien@FreeBSD.org> provided the necessary clue.

Based on a report from Valdis Kletnieks <Valdis.Kletnieks@vt.edu>, changed all IPv6 support to report a TYPE of IPv6 for sockets with IPv4 addresses mapped in IPv6 addresses. The previous lsof behavior was to report their TYPE as IPv4.

Restored the Linux Glibc test to Configure, removed at revision 4.53, based on a report from John Dzuberka <zube@cs.colostate.edu>, that RedHat Linux 6.0 still needs the test.

Made setting of link count for Solaris more selective.

Limited Readlink() recursion to MAXSYMLINKS. The bug was reported by Jan Dvorak <johnnydog@go.cz>.

Dropped the *claim* that lsof runs on Solaris 2.5.1. It may well do so, but I no longer have access to a test system.

Fixed an #endif comment typo, reported by Igor Schein.

Fixed a typo in a cast for a Tru64 UNIX 5.1 function and updated Configure for Tru64 UNIX 5.0 and 5.1 with information from Jesse Perry <jesse.perry@compaq.com>.

Corrected non-fatal typos in the AdvFS support in dnode.c for Tru64 UNIX.

Added msdos file system support for NetBSD and OpenBSD. Andrew Brown <atatat@atatdot.net> requested and helped test it.

4.55 February 15, 2001

Based on a report from Bernd Eckenfels <eck@lina.inka.de> added support in lsof for files in /proc/<PID>/maps that have been deleted.

Changed PGRP output title to PGID, conforming to the most common current abbreviation for Process Group ID (PGID). While some systems continue to use *pgrp for internal kernel variable names, most systems that support the display of PGID via ps(1) now title it PGID. The lsof -g and -fg options operations are unchanged in function; only titles and descriptions have changed. Also changed internal variable names from *PGRP and *pgrp to *PGID and *pgid where possible.

Dropped the *claim* that lsof runs on HP-UX 9.x. It may well do so, but I no longer have access to a test system.

In response to a suggestion from Jeff Howie <jeff.howie@federated.ca> added support for command name selection by regular expression. A new form of the -c option value is use to identify and specify a regular expression.

Restore the *claim* that lsof works on UnixWare 7.0, since I re-acquired a test system.

4.56 May 3, 2001

Corrected some problems Amir Katz <Amir_Katz@bmc.com> found with Insure++, one in lib/dvch.c, the rest in Solaris sources. Amir's report also helped me find an error in an snpf() call that caused (the unsupported) Solaris 2.5.1 lsof to crash. Wally Winzer, Jr. <wally.winzer@ChampUSA.COM> helped test.

Added support for UnixWare 7.1.1 and above in-kernel UNIX sockets. John Hughes <john@Calva.COM> kindly provided code and access to a test system. John also provided a test system and advice for adding UnixWare 7.1.1 NonStop Cluster and CFS support. More help with that effort came from Kurt Gollhardt (SCO), Barbara Howe (SCO), Bela Lubkin (SCO), and Dewan Rashid <Dewan.Rashid@ir.com>.

Archived a set of compilation hints (patches) from Bill Melvin <Bill.Melvin@esc.edu> that make it possible to compile the old, unsupported lsof 3.08 sources on UnixWare 1.x without NFS or CDFS support.

Installed support supplied by Allan Nathanson <ajn@apple.com> for the Darwin "Gold Master" release, Mac OS X 10.0 (aka Darwin 1.3 in its public source version). Added Allan's CVS repository suggestions to the script that gets additional header files from an open source repository.

Tested an HP-UX 11.11 kernel patch from Sailu Yallapragada that enables reporting of TCP/IP information for telnetd processes that use the telnet multiplexor. I don't yet know the kernel patch ID.

Made the Solaris inclusion of <inet/mi.h> conditional on the Solaris version. (It's apparently not needed

at 2.6 and above.) Bill Watson <bill.watson@uk.sun.com>
brought
this to my attention.

Added alternate Linux 2.4.x lock extent test, supplied
by Jim Mintha <jim@ic.uva.nl>.

Rearranged the lines and pre-processor tests in
regex.h, lib/regex.c, and lib/snrf.c so that undef
can be used to eliminate copyright and GPL statements
when the files aren't being used for a particular
dialect. (USE_LIB_* definitions in a dialect's
machine.h header file determine if one or more of
those three files are to be used.)

Added preliminary support for Solaris 8 with VxFS
3.4. This support will be refined as I get
information from Veritas about how they will
distribute the kernel header files lsof needs.
Those header files were omitted from the standard
VxFS 3.4 distribution. Technical assistance and
testing were provided by Calle Dybedahl <cdy@algonet.se>,
Gary Millen <gary.millen@veritas.com>, Rainer Orth
<ro@TechFak.Uni-Bielefeld.DE>, Peter C. Vernam
<pvernam@draper.com>, and Donna Yobs
<Donna.Yobs@veritas.com>

Tested
on FreeBSD 4.3-STABLE.

Dropped the *claim* that lsof works on UNIX dialects
where I no longer have test systems: BSDI 2.1,
3.[01] and 4.0; DEC OSF/1, Digital UNIX and True
64 UNIX 2.0 and 3.2; FreeBSD 2.1.[67], 2.2[.x],
3.[012345] and 4.[01]; HP-UX 10.20; NetBSD 1.[234];
SCO OpenServer 5.0.5; and SCO UnixWare 7.0

Tested on Solaris 9 BETA, s81_36.

4.57 July 19, 2001

Help (-h) and version (-v) output now have URLs
for the newly created and timeliest lsof FAQ
(00FAQ in the lsof distribution) at:

<ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/FAQ>

and the man page for the current lsof distribution
at:

ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/lsof_man

Based on a report from Steve Laubscher
<slaubs@woodward.com>, modified dlsof.h for PTX
4.6[.1] to avoid a temporary dnlc_t definition
needed at PTX 4.5.1.

Corrected test for old Linux kernels in Configure.
Henri Karrenbeld <ishtar@cal044202.student.utwente.nl>
brought
the error to my attention. Limited Linux
claims to 2.1.72 and above in the documentation.

Improved HP-UX 11 Configure stanza and stream socket
handling.

Constructed a work-around for the HP-UX 11 optional
OnlineJFS package. The work-around sadly requires
lsof to have a private version of the vx_inode
structure, since the OnlineJFS package doesn't
update <sys/fs/vx_inode.h>. Troyan Krastev
<Troyan.Krastev@ricoh-usa.com> brought the bug to
my attention and Michael Bracewell
<michael@ra.TSS.PeachNet.EDU> provided a test system
where I developed the work-around.

Added locale support to lsof's isprint() test,
based on a suggestion from Dan Mercer <damercer@mmm.com>.
lsof will use setlocale(), when that function and
its supporting <locale.h> header file are available.

Added OpenBSD 2.9 support.

Based on a report from Aaron Rhodes <arhodes@psionic.com>
and with testing help from Aaron, made the lsof
4.56 revision compile and work on OpenBSD 2.6.
While
that OpenBSD version is no longer supported,
Aaron's report exposed a Configure script bug
affecting OpenBSD versions lsof does support.

Updated for FreeBSD 5.0-CURRENT. Szilveszter Adam
<sziszi@petra.hos.u-szeged.hu> help test. The lsof
FreeBSD ports packager, David O'Brien <obrien@FreeBSD.org>,
assisted.

Tested on AIX 5.1. Loc Le and Nasser Momtaheni of

IBM provided test systems.

4.58 September 13, 2001

Added options to safestrprt() and safestrprtn() to surround the string with "" and to suppress the printing of an ending '\n'. Use of these functions in device cache file error message reporting answers a suggestion for better error reporting from John Jackson <jrj@purdue.edu>.

Fixed a Solaris 2.6 and above problem related to searching for "large" (O_LARGEFILE) files by name; lsof was using the wrong version of [l]stat(2). The bug was reported by Daniel Trinkle <trinkle@cs.purdue.edu>.

Added AIX 4.1.4 and above XTI socket support.

Added OSR Xenix Shared Data and Semaphore file type support with modifications supplied by Bela Lubkin.

Updated OPENSTEP support with modifications from Carl E. Lindberg <lindberg@clindberg.org>. The changes enable the correct reporting of executable and library open files ("txt" type).

Limited claims of OpenServer support to the versions where I currently test, 5.0.4 and 5.0.6. (Lsof probably works on 5.0.5.)

Enabled processing of -C option for PSTAT-based HP-UX lsof.

Enabled and tested on FreeBSD 4.4.

Corrected a file system test example in 00QUICKSTART, based on a report from Jun Biao WANG <>wangjunb@cn.ibm.com>.

Made available for re-distribution a user-contributed port of lsof 4.51 to Reliant UNIX 5.45. Thomas Mauterer <Thomas.Mauterer@philosys.de> contributed the port.

4.59 October 20, 2001

With the closing of the Sequent Synergy Links Lab by IBM, terminated lsof support for PTX. The last tested PTX lsof revision, 4.58,

is available on
lsof.itap.purdue.edu in .../lsof/OLD/src.

Adjusted for FreeBSD 5.0-CURRENT NFS header file changes, based on a report from Jos Backus <josb@cncdsl.com>.

Corrected a bug in the way Linux lsof identifies the owner of a process. Lionel Cons <lionel.cons@cern.ch> reported the problem and tested the fix. Added code to avoid stat(2) calls on regular Linux files whenever possible. Lionel reported the need to do this (AFS files) and tested the new code.

Added new output field for raw device number in hex. The field is identified with 'r'. This field is NOT selected when -F or -F0 is specified so that its appearance won't disturb existing scripts that process field output.

Added support for OpenUNIX 8. A test system was provided by Larry Rosenman <ler@lerctr.org>. Matthew Thurmaier <matt@compclass.com> and many people from Caldera provided technical assistance.

Added an additional UVM test to the NetBSD Configure stanza. Andrew Brown <atatat@atatdot.net> supplied the test; it recognizes NetBSD 1.5Y UVM changes to the vnode structure recently committed by Chuck Silvers.

Applied Configure and get-xnu-headers.sh script changes supplied by Allan Nathanson <ajn@apple.com> for Darwin 1.4.

Added for Bela Lubkin <belal@mammoth.ca.caldera.com> OSR-specific environment variables to supply values to the Configure script. The variables are described in 00XCONFIG.

Added an IP version selector to the -i option parameters.

4.60 November 9, 2001

Added special handling to and corrected bugs in the matching of IPv4 in IPv6 addresses to -i6:<...> selectors.

Made 00FAQ corrections and updates, based on discussions with Igor Schein <igor@txc.com>.

Modified Configure script to detect a 64 bit capable gcc compiler and permit it to be used to build 64 bit (PA-RISC 2) lsof for HP-UX 11.00. Tested with HP's gcc package, which Rich Rauenzahn of HP kindly installed on a test system at HP. Stefan Marquardt <stefan.marquardt@hagebau.de> helped test.

Made lsof's method of killing its child process more robust, based on a suggestion from Bela Lubkin <belal@caldera.com>.

Modified all dialect Makefile segments to accept select -v #define's from the environment -- a builder's comment, host, logname, system information and user name. This was done for Bela Lubkin, so he can "tune" the -v output when he packages lsof in the upcoming Caldera OSR 5.0.7 release.

Changed Perl scripts in scripts/ to put the lsof path consistently in \$LSOF. Also added a fix from Bela Lubkin to scripts/big_brother.perl5 that allows it to tolerate SCO OSR "ago" clauses in open UDP file information. Strengthened emphasis in scripts/00README that the scripts are examples that shouldn't be expected to run on all UNIX dialects without modification.

At Bela Lubkin's suggestion changed the device cache file format examples in 00DCACHE and 00FAQ to avoid "%U% ". That's an SCCS escape sequence.

Added support for OpenBSD 3.0.

Added +DAportable to CFLAGS for 32 bit HP-UX 11. Amir Katz <Amir_Katz@bmc.com> suggested the addition.

4.61 January 22, 2002

Updated field output example Perl scripts in the scripts/ subdirectory to discover the lsof path, starting at .. and proceeding through the PATH environment variable's directories.

Added minor OSR Configure script fixes, provided by Bela Lubkin <belal@caldera.com>.

In response to a report from Joshua Wright <Joshua.Wright@jwu.edu> modified NetBSD and OpenBSD Configure stanzas and sources so that lsof can be built when there is no system source tree (e.g., /usr/src/sys).

In response to a report from Peter Valchev <pvalchev@openbsd.org> improved the UVM test in the OpenBSD Configure stanza.

Updated Configure script to recognize FreeBSD 4.5.
Updated for FreeBSD 5.0 procs and pseudofs changes.

Updated HP-UX stanza to see if the compiler named in the LSOFF_CC environment variable is the bundled compiler. If it is, "-O" is omitted from the compiler flags.

Updated Digital UNIX 4.x and Tru64 UNIX error message related to kernel name list failures. Added an FAQ section about how a kloadsrv daemon failure can cause knlist(3) to fail. The condition was reported by Douglas B. Jones <douglas@gpc.peachnet.edu>

Based on a report from Mark W. Eichin <eichin@thok.org> made Linux lsof capable of handling and reporting file sizes greater than 32 bits.

Tested on Solaris 9 BETA-Refresh.

Corrected a bug in the matching of IPv4 addresses, mapped in IPv6 addresses, to an IPv4 parameter to an -i option.

Ported to 64 bit Power AIX 5.1 kernel with advice from David Clissold <cliss@austin.ibm.com> and Marc Stephenson <marc@austin.ibm.com>, and on a test system provided by Loc Le <lple@us.ibm.com>.

4.62 March 7, 2002

Updated 00README to reflect the usefulness of gcc for building AIX lsof. Documented a report from Brian L. Gentry <BGentry@nationsrent.com> of success

on AIX 4.3.3. I documented my success on 32 bit Power AIX 5.1 and my lack of success on ia64 AIX 5.1 and 64 bit Power AIX 5.1.

Improved UnixWare >=7.1.1 reporting of UNIX socket NAME field information for NonStop Cluster systems with a patch provided by John Hughes <john@Calva.COM>. Offered John's improvement as a patch to lsof 4.61.

Corrected bugs in handling of open files on block devices by OSR lsof. The bugs were reported by Bela Lubkin <filbo@deephought.armory.com>.

Fixed bug in writing >32 bit device numbers for block devices to the device cache file.

Added support for reporting block special nodes not in /dev (or /devices). That required "like device special" be changed to "like block special" and "like character special". (00FAQ was updated.)

Based on a report from Peter Valchev <pvalchev@openbsd.org> improved the definition of the source for NetBSD and OpenBSD kernel symbols (the nlist() source file). NetBSD now defaults to getbootfile(3) if it is available, /netbsd otherwise. OpenBSD now defaults to /dev/ksyms if it is available, /bsd otherwise.

Made possible compilation under BSD/OS (BSDI) 5.0 with changes to Configure, dialects/bsdi/dlsof, dialects/bsdi/dproc.c and lib/rnmh.c. The changes were suggested by Steven Hinkle <hinkle@bsdi.com>. Note that these changes do not substantiate a claim that lsof works on BSDI 5.0, because I haven't tested it there.

Updated OpenUNIX private <sys/fs/memfs_mnode.h>, based on a report from Larry Rosenman <ler@lerctr.org> that it had been updated by Caldera patch OU800PK3. Unfortunately the patch only corrects some of the problems with the header file, so it is still necessary to distribute a private patched version of it with the lsof sources.

Applied a man page correction reported by Frederic Delanoy <max_ok@yahoo.com>.

Corrected cast bugs related to using the HP-UX bundled C compiler on HP-UX 11.11.

4.63 April 23, 2002

Added HPUX_BOOTFILE environment variable for use by the Configure script in determining HP-UX kernel configuration information -- e.g., the state of the ipis_s structure in the HP-UX 11 kernel. The change was suggested by Marc Bejarano <beej@alum.mit.edu>. Marc also suggested some changes to the HP-UX section in 00FAQ that discusses Configure's use of q4 for HP-UX 11.

Fixed a bug in the Solaris lsof file system matching code. It was not reporting that VCHR files in /devices were in / when /devices was in /, too.

Corrected bugs in device number, file size, file offset, and raw device number field output generation.

Added recognition of OpenBSD 3.1 to the Configure script with a suggestion from Peter Valchev <pvalchev@sightly.net>. Note that this change does not constitute a claim that lsof works on OpenBSD 3.1, because I haven't tested it there.

Built an automated test suite.
(See 00TEST and the tests/ sub-directory of the lsof main directory).
Bela Lubkin requested it. Dale Talcott, John Hughes, and Larry Rosenman helped me validate it on their systems.

During the development of the test suite I discovered the following lsof bugs or missing features, and corrected or supplied them.

- * Corrected the reporting of locks for:
 - o Digital UNIX 4.0d and Tru64 Unix 5.[01];
 - o HP-UX 10.30 and 11.00;
 - o OpenUNIX 8;
 - o UnixWare 7.1.1.

- * Enabled HP-UX 10.30 and 11.00 to report open NFS file link counts.

* Corrected the reporting of UNIX domain socket names for Apple Darwin, FreeBSD 4.5 and above, NetBSD 1.4.1 and above, and for OpenBSD 3.0 and above.

* Enabled HP-UX 11.11 to stat(2) large files.

* Fixed handling of combination 32 and 64 bit device numbers in AIX 64 bit architectures.

Updated the AIX 4.3.3 NFS rnode recognition code, first installed at revision 4.51. It looks like some IBM update has restored a single rnode structure independent of the machine bit width.

Updated the NetBSD and OpenBSD sources so NetBSD can process DTYPE_PIPE files, as OpenBSD was already able to do.

Updated Darwin get-xnu-headers.sh script to reflect information about a recent reorganization of the Darwin CVS hierarchy, supplied by Allan Nathanson <aj@apple.com>.

Added defense against the standard I/O descriptor attack.

4.64 June 26, 2002

Corrected some FreeBSD pre-processor directives. David O'Brien <obrien@NUXI.com> pointed them out.

Updated lsof's main() function to: 1) close all open file descriptors above 2 before starting; and 2) to set a non-interfering umask. Moved GET_MAX_FD test from misc.c to proto.h, so that main() could use it. Added multiple-include protection to proto.h.

Moved FAQ's test suite Q's & A's to a more appropriate section. Added a Q&A on HASSECURITY option and its affect on searching for open files. (That was already in the man page.)

Updated hpux/kmem/dnode.c for HP-UX < 11 compilation with information from John Dzuber <Zube@CS.ColoState.EDU>. While lsof doesn't support HP-UX < 11 any more, I

try to avoid disabling it there when possible, and a locking fix for HP-UX >= 11 in lsof 4.63 inadvertently disabled compilation of lsof for HP-UX < 11. Fixed long-standing bug in HP-UX 10.20 lock reporting.

Removed language from the test suite programs that requires an ANSI-C compiler. This allowed the test suite to be validated with cc and gcc on the unsupported HP-UX 10.20.

At the suggestion of Manuel Bouyer <bouyer@antioche.eu.org> switched NetBSD and OpenBSD lsof from using nlist() to using kvm_nlist(). Made the same change for BSDI, Darwin, and FreeBSD.

Validated test suite on OPENSTEP 4.2.

In response to a suggestion from Jeff Stoner <jstoner@blackboard.com> enhanced support for the FD list of the -d option to allow it to be either an exclusion or inclusion list, using the '^' prefix to denote exclusions.

Made adjustments for FreeBSD 4.6 and 5.0-CURRENT. Fixed a FreeBSD /etc/make.conf CFLAGS extraction bug, reported by Kris Kennaway <kris@obsec.org>, and new a bug in the fix, reported by Eric Cronin <ecronin@eecs.umich.edu>

Added nullfs support for FreeBSD, NetBSD, and OpenBSD at the request of Andrew Brown <atatat@atatdot.net>.

Modified all readmnt() functions to ignore mounted-on directory names that don't begin with '/'.

Tested on NetBSD 1.6A and OpenBSD 3.1.

Upgraded to Solaris 9 FCS with two changes to the BETA-Refresh support: 1) an adjustment to dnode.c for a change in the so_so (sonode) structure; and 2) addition of Solaris 9 FCS specific DNLC code. David Comay <David.Comay@Eng.Sun.COM> sent me the dnode.c change and Casper Dik <Casper.Dik@sun.com> helped with the new DNLC support code.

Applied OpenUNIX changes that permit lsof to compile

and run on the upcoming 8.0.1 release.

The changes

were supplied by Robert Lipe <robertl@caldera.com>.

Larry Rosenman <ler@lerctr.org> provided a test system.

Added Solaris fd file system support.

4.65 October 10, 2002

Adjusted for change in FreeBSD 5.0-CURRENT inode structure, reported by David O'Brien <obrien@NUXI.com>.

Adjusted for changes in FreeBSD 5.0-CURRENT <sys/vnode.h>.

One change was reported by Anders Nordby

<anders@FreeBSD.org>. Adjusted for FreeBSD 5.0-CURRENT on sparc64 architecture.

Enhanced the error reporting of Solaris lsof when it detects a kvm_open() failure, and added a FAQ entry on the cause, based on a report from Peter J. Bertoncini <pjb@anl.gov>.

Enabled compiling of lsof for NetBSD 1.5 with the NULL file system, using a patch from Andrew Brown <atatat@atatdot.net>.

Removed a hack in the LTbigf test program that was once needed when it was compiled on Solaris 9 BETA-Refresh with gcc. The hack isn't needed on Solaris 9 FCS. Janet Hempstead <jan@library.carleton.ca> brought the need for this change to my attention.

Applied a patch, supplied by Andrew Brown <atatat@atatdot.net>, that updates lsof for NetBSD version 1.6F. Corrected handling of the NetBSD nullfs.

Updated to BSDI BSD/OS 4.3 on a test system kindly provided by Terry Kennedy <terry@tmk.com>.

Updated to FreeBSD 4.7.

Updated to Apple Darwin 1.5, 5.x and 6.x with patches supplied by Allan Nathanson <ajn@apple.com>. The patches include IPv6 support.

Updated Configure to use the -bnolibpath loader option when building lsof on a PowerPC, running

AIX 5 or greater. Valdis Kletnieks <Valdis.Kletnieks@vt.edu> informed me this was needed. Lsof for AIX 5.x was initially developed on the IA64, where -bnolibpath can't be used and I didn't think to restore it to PowerPC loads when AIX 5.x became available for that architecture.

Updated to UnixWare 7.1.3 on a test system provided by Larry Rosenman <ler@lerctr.org>. Removed claims that lsof works on OpenUNIX 8.0.1, because UnixWare 7.1.3 is the release name of OpenUNIX 8.0.1.

Based on a comment that his e-mail address was wrong in the lsof distribution from Kenneth Stailey <kstailey@disclosure.com>, removed all e-mail addresses from lsof documentation files except this one, 00DIST. The addresses in 00DIST are used to send revision release notices to those who contributed to a revision, but the addresses in this file for previous revisions and in other documentation files sometimes grow stale and are never validated.

4.66 December 22, 2002

Acquired Solaris 7 and 8 test systems, courtesy of John Dzuberka <Zube@CS.ColoState.EDU>. Updated 00TEST and tests/TestDB accordingly.

Clarified FreeBSD 5.0 architecture claims at the suggestion of David O'Brien <obrien@NUXI.com>. Also implemented David's suggestion to change Intel to x86.

Installed changes to DNLC handling in OSR lsof in preparation for handling changes in the OSR 5.0.7 DNLC cache. Information about the changes and patches to handle them were supplied by Bela Lubkin <filbo@deepthought.armory.com>.

Upgraded True 64 UNIX support to the 5.1B release on a test system provided by Berkley Shands <berkley@cse.wustl.edu> Had to use relaxed ANSI compilation because of an error in a system header file and other lsof source usages.

Implemented the HASNOSOCKSECURITY compile-time option. When it and HASSECURITY are defined, lsof

will be built to list only the user's open files, but will also list anyone else's open socket files, provided the "-i" option selects their listing. Updated the Customize script to ask about setting HASNOSOCKSECURITY. Left it undefined in all dialect machine.h header files. This change was requested by Kenneth Stailey <kstailey@speakeasy.net> for use with ntop.

Added support for OpenBSD 3.2 and its kernel trace file.

Improved lsof help (-h) and version (-v) information reporting.

Fixed a FreeBSD 4.7 and above off-by-two UNIX domain socket path termination bug, reported by Ken Stailey <kstailey@speakeasy.net>

4.67 March 27, 2003

Began the transition of the lsof ftp server host name from vic.cc.purdue.edu to lsof.itap.purdue.edu. That reflects Purdue organizational changes. This first step makes the new name an alias to the old one. The old name, vic.cc.purdue.edu, will remain usable for an extended period.

Corrected a revision number reference in section 17.17 of 00FAQ on the appearance of Solaris negative DNLC caching handling.

Updated 00FAQ discussion of compilers for 64 bit Solaris.

Validated test suite for 64 bit Solaris 8 and gcc.

At the request of Alek O. Komarnitsky <alek@komar.org> added the "+c <width>" option to enable optional changing of the COMMAND column output maximum width from the default to <width>. The default maximum width remains CMDL, as defined in lsof.h.

Fixed three AIX kernel bit size detection bugs, one in the AIX Configure script stanza, the second and third in the AIX dproc.c get_kernel_access() function. The bugs were reported by Pierre-Yves

Fontaniere <pyf@cc.in2p3.fr>, who tested the fixes.

Added kernel event queue file support for FreeBSD, NetBSD and OpenBSD. Andrew Brown <atatat@atatdot.net> supplied the code.

Updated to AIX 5.2 on a test system provided by Dale Talcott <dtalcott@purdue.edu>. Had to build work-arounds for two missing AIX 5.2 header files, <j2/j2_snapshot> and <proc/proc_public.h>. Corrected an off-by-one UNIX socket addressing bug. Taught AIX lsof to handle both jfs and jfs2 files at the same time. Adjusted for an IBM mistake in the sizing of the fdsinfo structure in <procinfo.h> Toshiya Nakamura <TOSHIYAN@jp.ibm.com> helped test,

Updated to FreeBSD 4.8. Corrected another bug in FreeBSD UNIX domain socket name handling.

Corrected gcc build problems on HP-UX 11i, reported by Yuliy Minchev <yuliy@mobiltel.bg>.

Updated BSDI BSD/OS support to 4.3.1.

Augmented a lock ID test on NetBSD to check if the ID is an LWP pointer.

4.68 June 18, 2003

Enhanced Configure script's cleanup operations.

Added support for OpenBSD 3.3, based on a report from Peter Valchev <pvalchev@sightly.net>.

Improved the description of the detached PGP signature certificate file in the main lsof README file, based on a suggestion from Diana Stockdale <diana@mpl.ucsd.edu>.

Installed a work-around for FreeBSD 5.0-CURRENT on Alpha to avoid a compiler register use complaint.

Corrected a 'c' option error message. Gnele <blaadeleng@yahoo.com> reported the problem.

Upgraded EXT2FS and UFS support for NetBSD and OpenBSD to handle new inode information, and the fast UFS1 and UFS2 file systems.

With the help of Andrew Brown <atatat@atadot.net> determined the NetBSD snapshot (1.6F) at which <sys/mount.h> could be included under `_KERNEL`, thus eliminating the `lsof` `netexport.h` hack. The same change applies to OpenBSD versions 3.3 and above.

Applied a patch from Armin Gruner <ag@muc.de> that corrects the use of the `HASPROCFS` definition in the FreeBSD dialect sources.

Corrected spelling errors in `00FAQ` and in the generated `00.README.FIRST_<version>` file of the distribution archive. John Jackson <jrj@purdue.edu> and Ray Phillips <r.phillips@jkmrc.uq.edu.au> spotted and reported the errors.

Corrected a spelling error in a comment and incorrect use of an alarm function in the `LTsock` test program.

At the suggestion of Stuart Anderson <sba@srl.caltech.edu> added preliminary (and incomplete) SAM-FS file system support to Solaris `lsof`. Completion awaits availability of SAM-FS internals.

Fixed a Solaris device name printing bug, reported by Ric Anderson <ric@tick.Telcom.Arizona.EDU>, only visible when `HASDCACHE` is not defined. Ric helped test the fix.

Fixed an AIX kernel bit size handling bug related to the NFS node (`rnode`) structure.

Corrected a `print_kptr()` function call error in the AIX AFS code, reported by David Steiner <david.r.steiner@Dartmouth.EDU>. Upon further reflection and because I no longer have appropriate AIX AFS test systems, disabled AIX AFS support in the `Configure` script for AIX versions above 4.3.3.0 or AIX AFS versions above 3.5.

Added support for FreeBSD 5.1.

With advice from Allan Nathanson <ajn@apple.com> adjusted the Darwin `get-xnu-headers.sh` script to access the kernel header files needed by `lsof` from a new form of the Apple open source repository.

Installed Linux and lsof library bug fixes and improvements, supplied by Marian Jancar <mjancar@suse.cz>. One Linux improvement handles mount strings that have octal escapes in them, eg., \040 for embedded blanks. Marian tested the changes.

4.69 October 16, 2003

Received and applied an OpenBSD patch from Peter Valchev <pvalchev@sightly.net> that replaces a ctob() call with a sysconf() call. Peter claims sysconf() is needed for OpenBSD on SPARC. (It is not needed for NetBSD on SPARC.)

With the upgrade of my only Solaris 7 test system to Solaris 8, dropped the *claim* that lsof works on Solaris 7. That doesn't mean it won't work there, so those who want lsof for Solaris 7 probably should be able to build it there and it probably will work there.

Revised lsof's DNLC handling for BSD derivatives, including: BSDI; Darwin, DEC OSF/1, Digital UNIX and Tru64 UNIX; FreeBSD; NetBSD; and OpenBSD. The latest NetBSD distribution's dropping of the vnode capability ID (v_id) required the revision.

Adjusted to the latest FreeBSD 5.1-CURRENT.

Added NetBSD support for using kvm_getproc2().

Added a patch from Andrew Brown <atatat@atadot.net> to handle NetBSD enum conflicts and changes in the <miscfs/kernfs/kernfs.h> and <miscfs/procfs/procfs.h> header files.

Added a "#define _KERNEL" to the AIX dnode2.c source file for compatibility with a new <j2/j2_inode.h> AIX 5.2 header file version. The addition was supplied by Dick Dunbar <Dick.Dunbar@Siebel.com> and was offered as a patch to lsof 4.68/

Added support for a second type of Solaris SAMFS. Stuart Anderson <sba@srl.caltech.edu> provided the support. SAMFS support in lsof SOLARIS remains scanty, because Sun won't release any details on its kernel structures.

Dropped the *claim* that lsof works on AIX 4.3.3, because I was unable to test it there. That doesn't mean it won't work there, so those who want lsof for AIX 4.3.3 probably should be able to build it there and it probably will work there.

Updated for Solaris 10 on test systems provided by Mike Miscevic <miscevic@hotpop.com>. Casper Dik <casper@holland.sun.com> provided significant help. During the Solaris 10 port found and fixed an lsofs handling bug that prevented reporting of open lsofs file lock status.

Updated the DNLC test, LTdnlc, to provide a possible explanation about file systems on which the test might fail.

Modified the procedure for obtaining missing Darwin XNU kernel header files. The new one requires more manual intervention, but is the best that can be done with the way Apple open sources are now organized. 00FAQ explains the new procedures for those not used to downloading Apple open source files.

Added support for Apple Darwin 7.0 (Mac OS X 10.3) with patches supplied by Allan Nathanson <ajn@apple.com>. Dropped the *claim* that lsof builds and works on Apple Darwin below 6.0.

Validated lsof on FreeBSD 4.9, using a test system provided by Ben Lewis <bl@purdue.edu>.

Validated lsof on FreeBSD 5.1-CURRENT for Amd64. David O'Brien <obrien@FreeBSD.org> provided a test system.

Changed the NetBSD Configure stanza to do header file searches in /usr/include by default. The LSOFS_INCLUDE and NETBSD_SYS environment variables may still be used to specify other search paths.

Discussions with Andrew Brown and Wolfgang S. Rupprecht <wolfgang@wsrcc.com> led to the change.

4.70 January 16, 2004

Improved shell-portability of the linux stanza of the Configure script with a patch from Paul Jarc <ptj@po.cwru.edu>.

Added a "silent" rule to tests/Makefile for Paul. Updated, extended and clarified the test suite documentation in 00FAQ and 00TEST.

Fixed Solaris 10 dlsof.h typo, reported by Mike Miscevic <miscevic@hotmail.com>. The typo prevents lsof from loading cleanly in Solaris 10 builds past 40.

Fixed a Solaris HSFS node number reporting bug and added a structure definition work-around for Solaris 10.

Converted PGP signing to GPG. My previous PGP key can be used, but the gpg "--allow-non-selfsigned-uid" option may have to be used when it is imported into a GPG key ring.

Added bz2 compression.

Updated for OpenBSD 3.4.

Added a work-around for a missing header file in the s10_44 Solaris 10 build.

Added support for FreeBSD 5.2-BETA and 5.2-CURRENT.

Updated Linux AX25 support with modifications supplied by Lutz Poetschulat <dl9cu@db0zwi.de>.

Added raw IPv6 support to Linux lsof.

Improved handling of parameters after "-i@".

Improved file name test in LTdnlc.c.

Added loop count controls to the reading of Solaris lock chains. The change was implemented as a result of a report from Steve Gonczi <steve@relicore.com>.

Based on a report from John Jackson <jrj@purdue.edu>, enabled a Solaris 10 <sys/lgrp.h> work-around for Solaris 9, too. (Patch 112233 installs an lgrp.h on Solaris 9 that needs the work-around.)

With help from Andrew Brown <atatat@atadot.net> and John Heasley <heas@netbsd.org> added log-structured file system (LFS) support for NetBSD and OpenBSD.

Added AMD64 to the list of FreeBSD 5.x-CURRENT supported architectures. FreeBSD.org provides a test system, courtesy of (I believe) David O'Brien <obrien@FreeBSD.org>.

Added a cast to lseek() in the HP-UX /dev/kmem-based kread() function to make it work properly with the bundled HP C compiler.

4.71 March 11, 2004

Added text file support to Apple Darwin lsof and enabled the lsof executable portion of the LTbasic test. Added support for Darwin kernel queue, POSIX semaphore and POSIX shared memory files. Tested on Darwin 7.2 (aka Mac OS 10.3.2).

Added process_kqueue() function prototypes for FreeBSD, NetBSD and OpenBSD.

Picked some lint in AIX sources, lib/rnmh.c and tests/LTsock.c.

Added "-x [fl]" cross-over option, which enables +d and +D processing to cross over symbolic links and/or file system mount points. Discussion with Johan Lindquist <johan@smilfinken.net> and Eric Williams (aka The Ghost In The Machine) <ewill3@earthlink.net> on Linux news groups revealed the need for the option.

Updated support for UnixWare 7.1.4.

Added support for the optional reporting of socket options, socket states and TCP flags for most currently supported dialects. John Smith <lbalbalba@hotmail.com> and Tristan Nefzger <tn@bhtrader.com> requested the information. The dialects and their versions for which this feature has become available include:

AIX 4.3.2 and 5.[12]

Apple Darwin 7.2

BSDI BSD/OS 4.3.1

Digital UNIX and Tru64 UNIX 4.0
FreeBSD 4.9 and 5.2
HP-UX 11 and 11.11 (aka 11i)
NetBSD 1.6ZH
OpenBSD 3.4
OPENSTEP 4.2
OpenUNIX 8
SCO OpenServer Release 5.0.6
Solaris 2.6, 8, 9 and 10
UnixWare 7.1.[134]

Modified the Configure stanza for HP-UX 11 with better q4 detection. Steve Bonds <3vhmxxm02@sneakemail.com> supplied the modification.

Applied a patch from Mike Miscovic <miscovic@hotpop.com> to enable lsof to compile with the zone support in the Solaris 10 s10_b51 release. Added information on lsof zone behavior to 00FAQ.

Added a "-z [z]" option to Solaris 10 lsof. It enables the listing of zone name and can also be used to select the listing of processes and their files from specified zones.

4.72 July 13, 2004

Corrected Solaris 10 ZONE column title display bug with a patch from Joep Vesseur <Joep.Vesseur@Sun.COM>. Joep's fix was offered as a patch to 4.71.

Based on a report from Jean-Pierre Radley <jpr@jpr.com> about an unexpected GNU uname Configure interaction on OSR, and working from information received from Bela Lubkin, changed the OSR Configure stanza to use /bin/uname instead of uname. Added an FAQ entry about Configure version detection problems.

Added the +m and "+m m" options in response to a dialog with Robert T. Brown <rbrown@netmentor.com>. The options allow the creation of a mount table supplement file which can be used on selected dialects to get device numbers when stat(2) and lstat(2) can't deliver them. (That's generally the result of an inaccessible NFS server.) Currently the new options are supported only on Linux.

Made

cpumask_t typedef _KERNEL compensation for FreeBSD 5.2-CURRENT. Refined it for 5.2.1-RELEASE with testing help from Scott Ellentuch <tuc@tsg.com>.

Added support for FreeBSD 4.10. Larry Rosenman <ler@lerctr.org> kindly provided a test system.

Added support for NetBSD 2.0 with patches supplied by Andrew Brown <atatat@atadot.net>. Andrew also provided two test systems.

Made handling of Linux maps file more robust, based on a report from Jan Blunck <J.Blunck@tu-harburg.de>. As a side benefit, made handling of generated stat(2) information more flexible.

As a result of a discussion with Jason Fortezzo <fortezza@mechanicalism.net>, adjusted lsof for Solaris to obtain the maximum user name length from ut_name of the utmpx structure, if <utmpx.h> exists.

Tested under OpenBSD 3.5.

Updated 00README information about using gcc (via the Configure aixgcc abbreviation) to compile lsof on AIX. Ann Janssen <ajanssen@nebook.com> made me aware the information was out of date.

Added an AIX SIGDANGER handler and some 00FAQ sections on lsof memory usage after a discussion with Tom Qin <tom.qin@citigroup.com> about lsof memory usage.

Added scripts/sort_res.perl5, contributed by Fabian Frederick <fabian.frederick@gmx.fr>. The script displays lsof output sorted by size and path name.

Improved handling of files on Linux NFS mount points that use the root_squash option, based on discussions with Paul Szabo <psz@maths.usyd.edu.au>.

Updated FreeBSD 5.2-CURRENT support, based on a problem report from Filippo Natali <filippo@widestore.net>.

Corrected improper FreeBSD 5.x-CURRENT #if condition, reported by Kim Culhan <kimc@kim.net>.

Added a Configure script work-around for AIX 5.2 lsof

with JFS2, compiled by gcc >= 3.3. The work-around was supplied by Florian M. Weps <fmw@hactrn.ch>.

4.73 October 21, 2004

Added an `__XPG4_CHAR_CLASS__` #define before `#include'ing <ctype.h>` on Solaris to restore lsof's ability to display special characters such as acute-e.

Added wide-character (e.g., UTF-8) support where possible, prompted by a request from Kyungjoon Lee <kjoonlee@gmail.com>. Some older dialects -- e.g., NetBSD 1.4.1 -- don't support wide characters, so the wide character support is enabled by definitions in each dialect's machine.h. Dialects with wide-character support are listed in 00FAQ.

Make a FreeBSD 5.2-CURRENT adjustment for `<sys/pipe.h>`, supplied by Sergey A. Osokin <osa@FreeBSD.ORG>.

Implemented a Linux feature request made by Jakub Jelinek <jakub@redhat.com> that enhances lsof's ability to locate UNIX domain sockets whose paths are named as arguments. Jakub supplied suggested code.

Dropped *claims* that lsof works on AIX below 5.1, SCO
Dropped *claims* that lsof works on AIX below 5.1, SCO
Openserver 5.0.4, Tru64 UNIX 5.0, and UnixWare below 7.1.4. Lsof will probably build and work on those UNIX dialect versions, but I no longer have any way to test lsof on them.

Added support for FreeBSD 5.3 and 6.0. The FreeBSD 5.3 support hasn't been tested.

Added FD test code that will allow dialect versions to test FD option selections. Used the new code in the PSTAT-based HP-UX lsof to enable it to avoid scanning the mount table when its information is not needed. The addition was made in response to a query from Harvey Garner <Harvey.Garner@championusa.com> about lsof performance in a busy NFS environment.

Upgraded lsof's AIX support level to AIX 5.3, based on a report from Dick Dunbar <Dick.Dunbar@Siebel.com>. (I have not tested lsof under AIX 5.3.) Based on Dick's recommendation and local testing changed the C for AIX

version 6 and higher -qmaxmem option value to -1.

Made LSOB_AR environment variable more useful and documented it in 00XCONFIG.

Corrected the use of sum(1) to generate signatures for the lsof distribution and binaries to match the documentation

that claims it is sum -r output. Jin

Guojun <jin@george.lbl.gov> noticed and reported the problem.

Tested under OpenBSD 3.6.

Added checksum and GPG certificate files for the bz2, gz and Z lsof distribution archives. The new files reside with the distribution archives and supplement the signature information already inside the archives.

Validated on Solaris 10, i8xpc, build s10_63.

4.74 January 17, 2005

Fixed a Solaris segment fault bug on systems that lack a /dev/allkmem device. Offered the fix as a patch to lsof 4.73. The bug was reported by Donald Zoch <donald.zoch@amd.com>.

Updated lsof for FreeBSD 6.0 and higher for a change in <sys/vnode.h>, based on a report from Sergey A. Osokin <osa@FreeBSD.ORG>. Made the update available in a 4.74 'A' edition pre-release.

Filed an HP bug report about missing pstat(2) CWD info for LOFS on HP-UX 11.11 and higher. The missing CWD info was noticed by Ermin Borovac <e.borovac@bom.gov.au>.

Added info

to 00FAQ about the problem, which can cause the lsof test suite's LTbasic test to fail.

Updated the q4-generated tcp_s.h in the lsof distribution and added socket option support for HP-UX 11.00. Erwin Reyns <ereyns@europarl.eu.int> helped test.

Updated for Solaris 10, build s10_69, with a patch supplied by Mike Miscevic <miscevic@hotpop.com>.

Added v_path support to Solaris 10 lsof. That relieves

it of having to read and decode the kernel DNLC, and delivers full paths more reliably.

Added specialized NFS4 support to Solaris 10 Isof.

Applied Solaris 10 patches to Isof supplied by Casper Dik <casper@holland.sun.com>.

Updated Isof for NetBSD 2.99.10 and tested it on a system provided by Andrew Brown <atatat@atatdot.net>.

Added support for the FreeBSD 6.0-CURRENT f_vnode pointer in the file structure.

Added BSDI, FreeBSD, NetBSD and OpenBSD support for the *efflink member of the inode structure. This makes the Isof LTnlink test run faster on all modified dialects and correctly on OpenBSD.

Added ptys support for NetBSD, using modifications provided by Andrew Brown.

Changed the netbsd Configure stanza to look by default for system header files in both /usr/include and /usr/src. (The NETBSD_SYS environment variable can still be used to select an alternate for /usr/src.)

Corrects two FreeBSD 4.10 RPC/XDR type definitions.

Added an FAQ Q&A about setuid and setgid restrictions in HP-UX 11.11. The information in the answer was supplied by Frank Sanders <frank.sanders@siemens.com>.

Added abbreviations for AXI FCIO and FSNAPSHOT file flags. Holger VanKoll <Holger.VanKoll@swisscom.com> reported the missing FCIO.

Adjusted Isof's private AIX 64 bit rnode structure for 64 bit AIX 5.2 systems. (IBM doesn't distribute a correct <nfs/rnode.h> for it.)

Corrected a Linux socket inode printing bug reported by Igor Schein <igor@txc.com>.

Updated for FreeBSD 4.11. The support compiles but hasn't been tested.

Back-ported a FreeBSD 6.0-CURRENT fix to FreeBSD 5.3-RELEASE-p1. That was done to solve a compilation problem reported by Radko Keves <rado@daemon.sk>.

4.75 May 16, 2005

Dropped the **claim** that lsof works on DEC OSF/1 and Digital UNIX, since my last 4.0 test system has been removed. The last tested distribution of lsof on DEC OSF/1 and Digital UNIX was revision 4.74. It has been archived on lsof.itap.purdue.edu in pub/tools/unix/lsof/OLD/src.

Added negation forms to the values in the -g (PGID) and -p (PID) lists. Negated PGID and PID values, like negated UID or login name values, are applied without ORing or ANDing and take effect before any other selection criteria are applied.

At the request of Marcin Gozdalik <gozdal@gmail.com> added a -X option for Linux. The option inhibits the reading of the /proc/net/tcp* and /proc/net/udp* files.

Based on a report from David Gutierrez <davegu1@hotmail.com> changed DEC OSF/1 process table allocation to request memory in smaller increments.

Based on a report from jayjwa <jayjwa@atr2.ath.cx> updated the Customize script to use "tail -n 1" where possible.

Enabled support for FreeBSD 5.4.

Improved the BSDI, FreeBSD, NetBSD, OpenBSD and Solaris kvm_open() and kvm_openfiles() error messages.

Enabled support for NetBSD 2.99.12.

Improved HP-UX Configure stanza with help from Piet Starreveld <pstarrev@csc.com>. Picked some lint Piet found.

Enabled IPv6 support for HP-UX > 11. Piet Starreveld helped test it on 11.23, among others.

Updated for HP-UX 11.23 on the ia64 architecture.

Updated to latest FreeBSD 6.0-CURRENT, using a test system provided by Andrzej Tobola <ato@iem.pw.edu.pl>.

Added support for SCO OSR 6.0.0 and UnixWare 7.1.4 with help from Richard at SCO.

Corrected a Linux bug in NFS handling, reported by Karel Zak <kzak@redhat.com>. Karel supplied a patch.

Improved the code for accessing an AIX 3.2 and higher sockaddr_un structure, thus eliminating a segmentation fault possibility.

Updated for AIX 5.3.

Added preliminary (DEBUG) support for the AIX SANFS file system.

Fixed a bug in the Solaris 10 processing of the vnode's v_path pointer with code supplied by Edward Jajko <ejajko@portal.com>. The fix was offered as a patch to 4.74.

Dropped support for OpenUNIX 8, since a test system is no longer available. Archived an OpenUNIX-only distribution of the last revision (4.74) tested on OpenUNIX in pub/tools/unix/lsof/OLD/src.

Tested under Openbsd 3.7.

Tested under Darwin 7.7.0.

Enabled building on amd64 Solaris 10 with hints from Marc Aurele La France <tsi@ualberta.ca>. Marc provided a test system.

Supplied a missing quote in the FreeBSD Configure stanza. Carl Cook <Info@quantum-sci.com> reported the problem.

Removed "-O" option from tests/Makefile so that the HP-UX bundled compiler won't complain.

4.76 August 30, 2005

Corrected an example and spelling errors in man page.

Updated for Apple Darwin 8.x with changes supplied by Allan Nathanson <ajn@apple.com>. Allan also provided a test system.

Completed documentation of CLRLFILEADD in all machine.h files.

At the request of Chris Markle <cmarkle@sendmail.com> added partial listen queue length to socket options displayed when -Tf is specified. Partial queue length is not reported for all dialects. (00FAQ lists the ones where it is reported.)

Updated for FreeBSD 7.0 with information supplied by Andrzej Tobola <ato@iem.pw.edu.pl>.

Updated Solaris VxFS support for VxFS versions 4 and above with technical advice from Craig Harmer <craig_harmer@symantec.com>, Gary Millen <gary_millen@symantec.com> and Chuck Silvers <charles_silvers@symantec.com>. Testing help was provided by Michael Antlitz <mantlitz@prophasys.com>, Steve Ginsberg <steve@dhapdigital.com> and Kenneth Stailey <kstailey@yahoo.com>.

Fixed a Solaris address space map processing bug. Janardhan Molumuri <mjanardhan@gmail.com> reported the bug and help me identify it. Made the fix available as a patch to 4.75.

Added support for Solaris 10 port and CTFS files. The CTFS support is incomplete, because I don't know how to get inode number, size and link count. (There's a new 00FAQ entry about that.)

Investigated a report from Christopher J Warweg <warwegc@GAO.GOV> that the CHECKSUMS for the lsof 4.75 binary for 64 bit Solaris 8 was incorrect. It was my packaging error. I rebuilt and repackaged the binary.

Enabled support for Linux map file names with embedded spaces.

4.77 April 10, 2006

Added -X option support for Solaris 10 and above. When -X is specified lsof will report cached v_node path names for unlinked files, followed by "(deleted)".

Improved cached vnode path name handling by adding "(?)" to the end of path names of questionable accuracy.
Updated 00FAQ to reflect these changes.

Updated
for FreeBSD 7.0-CURRENT.

Fixed name addition spacing bug, reported by Stuart Anderson <anderson@ligo.caltech.edu>. Also updated Solaris 10 SAMFS support at Stuart's request.

Added missing "break;" and another HASSTATVFS test to the NetBSD and OpenBSD dnode.c. Bill Behr <bbeh@networkstoragecorp.com> reported those needs.

Fixed an HP-UX 11 file descriptor "chunk" size problem, reported by Per Allansson <per@appgate.com>. Per helped devise the fix and tested it. This fix was offered as a patch to lsof 4.76.

Updated for FreeBSD 6.0-STABLE and FreeBSD 6.1-PRERELEASE.

Updated scripts/sort_res.perl5 with changes supplied by Frederick Fabian <fabian.frederick@skynet.be>, the author of the script.

Corrected +|-M man page documentation error, reported by Roger Cornelius <rac@tenzing.org>.

Improved FreeBSD user device random seed generation in response to a problem report from Danny Braniss <danny@cs.huji.ac.il>.

Eliminated
three syntax error bugs and other compiler complaints from the PSTAT-based lsof. H. Merijn Brand <h.m.brand@xs4all.nl> reported the problems and tested the fixes.

Eliminated compiler complaints in the test suite.

Investigated problems with the building of lsof on PA-RISC HP-UX 11.23, based on a report from John Orndorff <John.Orndorff@sungard.com>. Found that neither the HP bundled C compiler nor gcc would build lsof, but the the HP unbundled ANSI C compiler would. Concluded that HP bundled C compiler can't handle

<gssapi/gssapi.h>. Devised a work-around to gcc's omission of the rpercent structure definition of <netdb.h> that allows it to compile lsof's print.c, but the resulting binary doesn't run reliably. Documented the situation in 00FAQ.

Changed reporting of unknown file types. The number of an unknown type is now reported as four octets. The change was made in response to a Linux lsof bug report from Karel Zak <kzak@redhat.com>.

Dropped

the *claim* that lsof works on BSDI BSD/OS since my last test system has been removed. The last tested distribution of lsof for BSDI BSD/OS was revision 4.76. It has been archived on lsof.itap.purdue.edu in pub/tools/unix/lsof/OLD/src.

As a result of discussing the lsof source tar's MD5 checksum with Andrew Bell <andrew.bell.ia@gmail.com>, changed the description of a suitable MD5 tool in the lsof distribution's documentation to name the openssl "dgst" command.

Enabled compilation on Solaris 10 1/06 with a fix sent by Jason Fortezzo <fortezza@mechanicalism.net>. Made the fix available as a patch to 4.76.

Adjusted to FreeBSD 5.5-PRERELEASE.

Corrected a bug in the lsof library's process_file() function to enable the locating of AIX XTI sockets by their TCP/IP address values. The bug was reported by Michel Dubois <Dubois@sears.ca>.

Based on a bug report from Karel Zak <kzak@redhat.com> added command name length checking to as many dialects as possible (Linux for Karel) for the "-c c" option.

Updated for OpenBSD 3.[89]. Tested the 3.9 update on a system provided by David Mazieres. I have not tested on OpenBSD 3.8, but David reports lsof 4.76 worked there.

Ended regression testing of lsof on 32 bit Solaris 8 with the ending of access to a test system. Lsof continues to be tested on 64 bit Solaris 8.

4.78 April 24, 2007

Added more information to the lsof FAQ about missing link counts and sizes on Linux files.

Simplified Linux stat() and lstat() usage.

Relocated #define's that prevent OpenBSD compilation on systems without a /proc file system. Pieter Bowman <bowman@math.utah.edu> reported the problem.

Added code to avoid processing Linux /proc/<PID>/maps file entries with zero device and node numbers. Some such entries now have names associated with them that are not path names -- e.g., "[heap]", "[stack]" or "[vdso]". Scott Worley <sworley@chkno.net> reported lsof's mishandling of such entries.

Added SELinux security context support, provided by James Antill <james.antill@redhat.com>. I have not tested this, but James and Karel Zak <kzak@redhat.com> have.

Added the #include of <sys/types.h> to Solaris lsof to enabled compilation on Solaris 10 6/06. Peter Harvey Peter.Harvey@Sun.COM diagnosed the problem and supplied a patch.

Added better support for JFS2 on AIX 5.2 and 5.3, based on bug reports and help from Thomas Braunbeck <BRAUNBEC@de.ibm.com> and Tom Whitty <TWHITTY@cerner.com>.

Documented that lsof supports AIX 5.3 only up through maintenance level 1 (ML1).

Enabled Solaris lsof to locate the AFS vnode operation address for OpenAFS 1.4.1. The fix was supplied by Robert Jelinek <Robert.Jelinek@MorganStanley.com>.

Enabled support for Solaris 10 ZFS. If the necessary ZFS header files aren't found, lsof offers the option to drop ZFS support, to use internal, possibly inaccurate structure definitions, or to supply a path to the missing header files. Horst Scheuermann <Horst.Scheuermann@uni-trier.de> provided a development system and helped test the support.

Corrected a typo in the man page, reported by Eric S.
Raymond <esr@thyrsus.com>.

Changed the spelling of macroes to macros in lsof
source and documentations files, based on a suggestion
from Josh Soref <timeless@gmail.com> and verification
with the OED.

The following dialects are no longer supported: 32 bit
AIX 5.2, HP-UX 11, OpenStep 4.2, Solaris 2.6, Solaris
8, True Unix 64 and UnixWare 7.1.4. Lsof may work on
them, but I no longer have test systems for them.
Support for OpenBSD ends at its version 3.9 for lack of
interest in the port.

4.79 April 15, 2008

```
***** IMPORTANT NOTE *****
*
* Lsof support has been reduced to the following *
* dialects: AIX, FreeBSD, Linux and Solaris, and *
* only in selected versions
of those dialects. *
* The selected versions are listed in this file *
* and in other lsof documentation. *
*
* I have made this move because of retirement *
* and because I no longer have many test systems *
* available to me. *
*
* Vic Abell *
*
*****
```

Fixed a Solaris VXFS permission problem when accessing
the VXFS inode offsets. The bug was reported by
Gregory A. Ivanov <ivga@mts.ru>. Gregory tested the
fix.

Moved an #include <string.h> later in FreeBSD dlsof.h
to enable compilation on recent FreeBSD releases. The
change was supplied by Roy Marples <uberlord@gentoo.org>.

Improved Linux /proc file stream reading speed by applying
an expanded version of a patch from
Eric Dumazet
<dada1@cosmosbay.com> that allocates a page size buffer

to each stream. Improved TCP, TCP6, UDP and UDP6 hashing by determining the hash bucket count from the /proc/net sockstat and sockstat6 files. The improvement was suggested by Eric and he provided sample code. Eric also tested both improvements.

Modified Configure script to build lsof on FreeBSD

6.2. Tested it on a system provided by Larry Rosenman <ler@lerctr.org>.

Fixed a Linux maps file processing bug that prevented path names from having an embedded colon. James Lingard <jchl@arastra.com> reported the bug and helped with its fix.

Based on reports from Eric Dumazet and Samuel Thibault <samuel.thibault@ens-lyon.org> added support for the Linux 2.6.22 kernel's /proc/<PID>/fdinfo files -- i.e., file offset and flags. Samuel Thibault provided a test system.

Fixed a Linux UNIX socket memory leak, reported by Philip Shin <pshin@xceedium.com>. Phillip supplied the fix.

With

generous assistance from HP added support for an HP-UX 11.23 patch that makes TLI/XTI socket address information available.

Fixed a header file problem for FreeBSD 6.2 on the Alpha architecture. The problem was reported by Pekka Honkanen <phonkane@cc.hut.fi>. Pekka tested the fix.

Based on a report and using suggested fixes from Karel Zak <kzak@redhat.com>, made these changes to Linux lsof: corrected a getpidcon() error message; insured that inode numbers are handled correctly for their unsigned long long type; and improved SELinux handling. At the request of Alon Bar-Lev <alonbl@gentoo.org> added the LINUX_HASSELINUX environment variable to enable or inhibit SELinux support unconditionally.

Updated Configure for FreeBSD 8.0-CURRENT and tested lsof on AMD64 there.

Added a patch provided by Oles Hnatkevych <don_oles@able.com.ua> for FreeBSD systems where the root file system is on a CD9660 device.

Added compensation for the disappearance of FMARK and FDEFER from the FreeBSD 8.0-CURRENT <sys/file.h>.

Updated FreeBSD lsof with ZFS support. Larry Rosenman <ler@lerctr.org>, Erwin Lansing <erwin@FreeBSD.org>, Wesley Shields <wxs@atarininja.org> and Dmitry Morozovsky <marck@rinet.ru> provided test systems.

Fixed a socket file identification problem reported by Pavol Rusnak <stick@gk2.sk>. Pavol also reported the cause of the problem.

Added the ability to format the repeat mode marker line with strftime(3), where the dialect supports the localtime(3) and strftime(3) C library functions. The addition was suggested by Mike Depot <mdepot@comcast.net>, who also tested it. The addition required creating a new main lsof source module, util.c, that contains functions whose compilation conflicts with the general header file tree defined by lsof.h and dlsof.h.

Based on reports from Andrei V. Lavreniyuk <andy.lavr@reactor-xg.kiev.ua> and Pav Lucistnik <pav@FreeBSD.org> updated the FreeBSD 7.0 and above file lock handling to use new locking structures. The update requires a terrible hack to get a definition for the lock owner structure from a kernel source module into a local lsof header file.

4.80 May 12, 2008

Updated for a FreeBSD 7.0 and above byte level locking change. The problem was reported by Conrad J. Sabatier <conrads@cox.net>, who helped test the update. Wesley Shields <wxs@FreeBSD.org> provided an 8.0-CURRENT test system.

Propagated the FreeBSD 7.0 and above locking changes to FreeBSD 6.x, based on a report from Edwin Groothuis <edwin@FreeBSD.org>.

Added warnings for unsupported dialects or versions.

Added Linux support for the UDPLITE protocol. Eric Dumazet <dada1@cosmosbay.com> supplied a patch.

Added a missing quote to the Configure script's FreeBSD stanza.

Added a usage.o rule to the HP-UX PSTAT-based Makefile. I mistakenly deleted the rule at revision 4.79. The missing rule was reported by Kawaljeet Kaur <kawaljeet.malviya@gmail.com> who tested the corrected Makefile.

4.81 October 21, 2008

Updated the Darwin libproc sources with changes from Allan Nathanson <ajn@apple.com>. Tested them on a iMac mini, provided by Apple Inc.

Changed dummy declarations in library source files to eliminate complaints about unused variables and empty object files. This change may not work on dialects I can no longer test; it has been tested on some versions of AIX, Darwin, FreeBSD, Linux and Solaris.

At the request of Hal Brooks <hal@uga.edu> added support for Linux /proc/net/packet files. Hal tested it.

Added socket file only performance enhancements to Linux and PSTAT-based HPUX lsof.

Added htonl call around improper usage of INADDR_LOOPBACK; report from an Apple engineer forwarded by Allan Nathanson <ajn@apple.com>.

Adjusted for FreeBSD-8.0 change in device number handling. The adjustment should work for FreeBSD 5 and above, should the 8.0 change be propagated downward. The problem was reported by Pav Lucistnik <pav@FreeBSD.org>. An updated test system was provided by Erwin Lansing <erwin@FreeBSD.org>.

Reduced AIX support to version 5.3, since test systems with older versions are no longer available to me.

At the request of Marjo F. Mercado <mmercado@xceedium.com> and Phil Shin <pshin@xceedium.com> applied some speed improvements to lsof, particularly when the files of interest are /Internet files -- i.e., selected with lsof's "-i" option. Added a two new options to assist the improvements: 1) "-c^<command>" to tell lsof to exclude the named command(s); and 2) "-stcp|ud>:[^]state'" to tell lsof

to include in its reporting or exclude (^) from its reporting Internet files in the named states (e.g., LISTEN, ^CLOSE_WAIT, IDLE, etc.) For the most part these changes apply only to AIX, Darwin, FreeBSD, PSTAT-based HP-UX, Linux and Solaris, since those are the only places I could test them. They are controlled by the HASTCPUDPSTATE definition in each dialect's machine.h header file. Marjo and Phil provided HP-UX 11.23 and 11.31 test systems.

Fixed a stat(2) problem on HP-UX 11.31 while testing the speed improvements.

Adjusted for kernel header file changes in FreeBSD 8.0-CURRENT. Larry Rosenman <ler@lerctr.org> provided a test system.

Added a warning for Solaris systems where VxFS node info can't be obtained from the VxFS utility library. The warning was requested by Tom Matthews <Tom.MATTHEWS@rbs.com>.

Corrected mishandling of file system path name arguments that have trailing slashes, except, of course, the root file system, "/". Allan Nathanson <ajn@apple.com> reported the bug.

4.82 March 25, 2009

Corrected an over-zealous exclusion test that caused Isot to report nothing when it was given no arguments and built with HASSECURITY and HASNOSOCKSECURITY enabled. Joshua Kinard <kumba@gentoo.org> reported the bug and supplied information for reproducing it.

Based on a report from Dan Trinkle <trinkle@cs.purdue.edu> corrected use of <sys/utsname.h> for 32 bit Solaris 10 and above compilations. Simultaneously eliminated a casting complaint in arg.c and updated Configure to use the appropriate 64 bit compilation option (-xarch=v9 or -m64) with the Solaris Sun C compiler.

Updated for FreeBSD 7.1-PRERELEASE with information supplied by Larry Rosenman <ler@lerctr.org>.

Updated the Darwin libproc sources with changes from Allan Nathanson <ajn@apple.com>. Tested them on a iMac mini, provided by Apple Inc. Allan also provided man page corrections.

Updated the FreeBSD Makefile to use the `{MAKE}` variable for ZFS `dnod2.c` module compilation, based on a suggestion from Alexis Ballier <aballier@gentoo.org>.

Improved the Solaris VxFS library location test, based on a suggestion from Jason Fortezzo <fortezza@mechanicalism.net>. Jason tested the change.

Updated Solaris 10 ZFS support for ZFS version 4 and ZFS pool version 10, using a test system kindly provided by Vladislav Nespor <vladislav.nespor@id.ethz.ch>. Renata Maria Dart <renata@slac.stanford.edu> tested on ZFS version 4, verifying that the update works there, too. (ZFS pool version 10 is apparently the ZFS version shipped with the 10/08 update to Solaris. The original ZFS support targeted ZFS version 3.)

I still consider ZFS support in Solaris `lsf` a hack, because it depends on a `znode` structure definition that I developed using `dbx`. Sun is remiss in not distributing the ZFS header files used to build the distributed kernel.

Because of the `znode` structure definition hack, I can't guarantee that `lsf` ZFS support will work for any other versions of ZFS.

Solaris 10: adjusted to a change in the way devices are stored in the kernel; fixed a problem in zone handling; and added rudimentary `sharedfs` support. Carson Gaspar <carson@taltos.org> reported the device number problem, provided a test system, and tested the changes. Peter Vines <psv2b@eservices.virginia.edu> reported the zone handling problem and tested the fix.

Adapted to FreeBSD 8.0-CURRENT changes in device number computation. Problem was reported by Erwin Lansing <erwin@FreeBSD.org>. Larry Rosenman <ler@lerctr.org> provided a test system.

Corrected Solaris `Configure` test for appropriate VxFS library when using `gcc` to compile `lsf`.

Updated for loss of KAME IPv6 FreeBSD accommodations.

Adapted to FreeBSD 7.2. Made `Configure` script recognized

FreeBSD 6.3.

4.83 January 18, 2010

Converted Solaris 10 and above ZFS support to use the CTF debugger library, libctf. Code was supplied by Robert Byrnes <Robert.Byrnes@deshaw.com>.

Corrected a typo in the testing of the LINUX_HASSELINUX environment variable in the Configure script. The error was reported by Mike Frysinger <vapier@gentoo.org>. At Mike's request made Configure script accept LSOF_RANLIB (ranlib command), LSOF_CFGF (additional configuration flags) and LSOF_CFGL (additional library specifications) from the environment.

Enabled compilation of Solaris 10 lsof after a recent Sun patch which changed the PC file system's structure. Peter Vernam <pvernam@draper.com> reported the problem and helped with the fix.

Made the sort of configuration CFLAGS in the CkTestDB script impervious to locale settings.

Ported to Solaris 11, using a test system kindly provided by David Day <dday76@gmail.com>.

Adjusted to the disappearance of <nfs/rpcv2.h> in FreeBSD 8.0-BETA1.

Changed Solaris node type lookup to a hashed method and added some ability for it to handle duplicate vnodeop names in /dev/ksyms.

Updated for FreeBSD 9.0-CURRENT. Andrzej Tobola <ato@iem.pw.edu.pl> provided a test system. Extends the fix to FreeBSD 6.0 and above via a Configure test and a compile-time definition. The need for the extension was reported by Erik Trulsson <ertr1013@student.uu.se>

Made corrections to FAQ typographical errors, suggested by Josh Soref <timeless@gmail.com>.

Added __UCLIBC__ test to Linux dlsof.h so lsof would compile on an Intel ARM XScale processor. The addition was provided by Doug Kehn <rdkehr@yahoo.com>.

Added test for <utmpx.h> to FreeBSD configuration. Improved its use in lsof.h. The changes were supplied by Martin Wilke <miwi@FreeBSD.org>.

4.84 July 29, 2010

Fixed a man page nroff command error with a correction supplied by Josh Soref <timeless@gmail.com>.

Made Configure script recognize FreeBSD 7.3. Larry Rosenman <ler@lerctr.org> provided a test system.

Improved task support, initially for Linux only, with help provided by Jerome Marchand <jmarchan@redhat.com> and Miklos Szeredi <mszeredi@suse.cz>. The support includes a new compile-time definition, HASTASKS, and a new run time option, "-K" to select task reporting.

While adding help output support for "-K", reorganized the printing of help columns to make it much easier to add a new option description.

Updated the Solaris PC file system structure patch in revision 4.83 so it will compile with gcc.

Disabled the Solaris lgrp_root work-around in the Solaris machine.h so it won't cause compilation problems on Solaris 11. It no longer causes compilation problems on my Solaris 9 and 10 test systems, but some older Solaris 9 and 10 versions may still need it, so the work-around was left in the Sun machine.h and a FAQ entry was created about it.

Updated for Solaris 11 b134, using a test system kindly provided by Carson Gaspar <carson@taltos.org>. Made provisions for the next ZFS version. Added info about the failure of the LTnlink test on ZFS file systems.

Corrected typo in Configure script, reported by Dmitry Berezin <dmitryb@oit.rutgers.edu>.

4.85 September 27, 2011

John Dzuberka <Zube@CS.ColoState.EDU> kindly provided a patched Solaris 9 test system with the lgrp_root conflict and I was able to devise an automatic work-around for the conflict. The special note in ../dialects/sun/machine.h was removed and the 17.28.1 FAQ entry was modified to reflect the update.

Added a Solaris 11 work-around for a typedef problem with <sys/mutex.h>. Carson Gaspar <carson@taltos.org> reported the problem and supplied the work-around.

Added support for FreeBSD 7.4 and 8.2; tested on systems provided by Larry Rosenman <ler@lerctr.org>.

Added support for 32 bit Solaris 11 lsof with mods supplied by Jan Wortelboer <J.H.P.Wortelboer@uva.nl>.

Added Solaris 11 support for using an alternate genunix location. Bill Goodridge <bill@its.brooklyn.cuny.edu> reported the alternate location.

Added further Linux cross configuration support to lsof's Configure script. The additional support was supplied by Grant Erickson <erick205@umn.edu>. See the descriptions of the LINUX_* environment variables in 00XCONFIG for more information.

Tested lsof on Linux kernel 2.6.32 and picked some lint that surfaced during the test.

Added fixes and changes for Apple Mac OS X 10.6, provided by Allan Nathanson <ajn@apple.com>. Allan also provided a test system.

Tested on FreeBSD 6.4 i386, using a test system provided by Terry Kennedy <TERRY@tmk.com>. Updated for recent FreeBSD ZFS changes on an 8.2 amd64 test system also provided by Terry.

Changed documentation to indicate FreeBSD 7.x is no longer supported, since I no longer have a test system.

Made some changes to the lsof man page, suggested by Navid <evi1m4chine@gmail.com>.

Added compensation for Solaris 10 systems that have patch 144488-10. The patch requires that the new header file <sys/socket_proto.h> be included while _KERNEL is defined. Brett Bartick <Brett.bartick@nomura.com> reported the problem first, followed by Stuart Anderson <anderson@ligo.caltech.edu>. Michael Hocke <michael.hocke@nyu.edu> suggested a work-around which

I refined to limit it to the specific Solaris 10 instance and then tested on a system provided by Charles Stephens <cfs@cowlabs.com>

Added the +|-e option for Linux. It exempts file systems

named by path from function calls that might block in the kernel -- i.e., stat(2) and lstat(2), and when the +e form is used, readlink (2). The new packager of lsof for the Linux Fedora and RHEL distributions, Peter Schiffer <pschiffe@redhat.com>, asked for the feature so it could be used with Clearcase file systems, whose implementation can block stat(2) calls. I consider this feature very risky and easy to misuse -- e.g., specifying the file system as '/' would exempt all file systems. I don't intend to propagate this option to any other UNIX dialect that lsof currently supports.

Made FreeBSD 9 adjustment.

Fixed a Linux bug that prevented the display of paths for abstract UNIX sockets. Masatake Yamato <yamato@redhat.com> reported the bug and supplied a patch.

Added compensation for the removal of RPC header files from Glibc 2.14 for Linux. Marek Behun <kabel@blackhole.sk> reported the problem and supplied a patch.

Added support for Linux Netlink protocol. Masatake Yamato requested the support and supplied a patch. Peter Schiffer <pschiffe@redhat.com> provided a test system.

Corrected Linux UDP6-lite path. The error was reported by Masatake Yamato and he also supplied a patch.

4.86 April 10, 2012

Lsof for AIX is no longer supported on any versions of that operating system.

Added information about the clang compiler for FreeBSD to the FAQ.

Corrected an arg.c bug in the accumulation of +|-e option values, reported by Peter Schiffer <pschiffe@redhat.com>. This correction was supplied as a patch to revision 4.85.

Enabled FreeBSD 10 support and tested it there on a system provided by Larry Rosenman <ler@lerctr.org>.

Updated for latest Solaris 11 with patches supplied by Carson Gaspar <carson@taltos.org>. Carson supplied a test system.

Adjusted Linux file system search method to compensate for NFS mounts that have duplicate device numbers. The problem was reported by Peter Schiffer <pschiffe@redhat.com>, who provided a test system.

At the request of Peter Schiffer <pschiffe@redhat.com>, added support for Linux SCTP socket files. Peter provided a test system. Applied a warning patch supplied by Peter.

Added support for Mac OS X 10.7 (Lion), provided by Allan Nathanson <ajn@apple.com>. Allan also supplied a test system.

Enabled FreeBSD 8.3 support and tested it there on a system provided by Larry Rosenman <ler@lerctr.org>.

Corrected the FAQ information on ZFS with Solaris 10 after Steven Blackmon <stblackm@cisco.com> and Prasad Jampala <jampalp@cisco.com> pointed out that it was incorrect -- i.e., outdated by the libctf changes at revision 4.83.

Added code to handle a Linux NFS-mounted root. Jia He <hejianet@linux.vnet.ibm.com> reported the need for this.

4.87 January 2, 2013

Added an entry to 00FAQ about lsof behavior when the HASSECURITY and HASNOSOCKSECURITY options are defined. Carson Gaspar <carson@taltos.org> pointed out the need for this clarification.

Added a work-around for a missing definition of mach_port_t in Darwin 9 (Mac OS/X 10.5.8). The work-around was supplied by Jim Reid <jim@rfc1035.com>.

Added support for Linux anon_inodefs, provided by Masatake YAMATO <yamato@redhat.com>.

Documented a Solaris 9 and 10 portmap reporting problem (+M) in 00FAQ. The problem was reported by Clint Roberts <Clint.Roberts@ttius.com>. I have no solution to the problem, but discuss a possible work-around in the answer to this 00FAQ question: "Why doesn't lsof report portmap registrations for some Solaris versions?"

Added FreeBSD support for the oldnfs and newnfs file system types. Daniel Braniss <danny@cs.huji.ac.il> reported the

need for the addition.

Added

ICMP socket support for Linux with code provided by Masatake YAMATO <yamato@redhat.com>.

Corrected the reporting of process group ID for libproc versions of Mac OS X with a patch from Jeff Trawick <trawick@gmail.com>. The patch has not been applied to Darwin kmem versions, because of little call for them and inadequate test system access. The patch has been tested on Mac OS X 10.8 (Mountain Lion), courtesy of a test system provided by Allan Nathanson <ajn@apple.com>.

Added thread support to those FreeBSD versions that have ki_numthreads in their kinfo_proc structure. This also activates the -K option for those FreeBSD versions. Jeff Trawick reported problems with FreeBSD lsof when threads are present and this addition solves those problems.

Made changes to 00FAQ and the distribution, suggested by Warren Young <warren@etr-usa.com>. The 00FAQ changes center on sections that discuss the -s option. The changes to the distribution include a ChangeLog file that is either a pointer to or a copy of 00DIST, the distribution notes.

Added support to FreeBSD for using the clang compiler.

Added Linux support for using the getxattr() call to obtain socket protocol identification when it can't be obtained from the /proc/net files that lsof examines. Masatake YAMATO <yamato@redhat.com> developed the kernel patch to getxattr() and supplied the lsof patch.

4.88 October 13, 2014

Reduced to 50 the number of open file descriptors lsof attempts to close while trying to protect itself from a file descriptor exec() attack. This limits the overhead lsof incurs on systems that have large file descriptor limits, yet provides sufficient open descriptors for the library functions lsof calls.

Updated for changes in FreeBSD 10 with advice from Eyegene Ryabinkin <rea@freebsd.org>. Taught Configure to recognize FreeBSD 8.4.

Herein am noting that lsof for Solaris 10 or 11 is no longer

supported. I

no longer have test systems. Some support is still available from Casper Dik <Casper.Dik@oracle.com> and a Solaris 11 patch he provided is included in this revision.

Initialized local variables in the Linux process_id() function.

Jia He <jiakernel@gmail.com> reported the problem.

Added support for FreeBSD 11.

Updated FreeBSD ZFS Configure stanza to supply a dummy opt_kdtrace.h when needed.

Added tmpfs file system support for FreeBSD.

Since a test system is no longer available, dropped the claim of FreeBSD 4.9 support.

Added the +|-E options for Linux. -E displays endpoint info; +E displays endpoint info and endpoint files. Masatake YAMATO <yamato@redhat.com> requested this support and suggested code to implement it.

Fixed a Linux bug handling processes whose command includes a non-printing character, particularly a NEWLINE character, and clarified printing of single '\\' characters in command and file names. Stephane Chazelas <stephane.chazelas@gmail.com> reported the problem.

Added support for Linux RDMA and CRYPTO protocol names and UNIX socket type with code from Masatake YAMATO <yamato@redhat.com>.

Fixed field output to insure that the field descriptor field is always selected, since it identifies the file set. The bug was reported by Gary Plewa <gary.m.plewa-1@lowes.com>.

4.89 July 7, 2015

Applied correction from Casper Dik <Casper.Dik@oracle.com> to his patch for Solaris 11 that I applied incorrectly in revision 4.88.

Updated for latest version of FreeBSD 11.0-CURRENT.

Compensated for a missing FreeBSD 10.0 typedef of bool on the i386 architecture. Allen Hewes <rallenh@hotmail.com> provided a test system. Andrey Chernov <ache@freebsd.org> provided useful advice.

Improved tests/Add2TestDB script with a patch from Peter Schiffer <pschiffe@redhat.com>. Added patches from Peter to eliminate Linux gcc warnings. Updated Lsof.8 with improvements supplied by Bjarni Ingi Gislason <bjarniig@rhi.hi.is>.

Changed FreeBSD global CFLAGS extraction per Terry Kennedy <TERRY@tmk.com>. Also made sure -DNEEDS_BOOL_TYPEDEF is #define'd when the resulting CFLAGS doesn't contain it. Terry reported that need.

Improved Linux test for tcp.h in response to a report from Cato Auestad <cato@cato.ninja>. Cato did the testing.

Fixed Linux UNIX socket search by name bug reported by Stephane Chazelas <stephane.chazelas@gmail.com>.

Added Linux display of UNIX socket endpoint information with code provided by Masatake YAMATO <yamato@redhat.com>. Peter Schiffer <pschiffe@redhat.com> provided a test system.

Insured that type definitions from <vm/vm.h> were again made visible to lsof on FreeBSD 11 after a system header file change hid them.

4.90 February 14, 2018

```
!!!NOTE!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!
! It is likely that this is the last lsof revision I
!
! will issue, unless serious bugs are detected, Stay
! tuned to lsof-l for information about future support
! of lsof.
!
! I thank all the many contributors to lsof over the
! many years (20+?) I have been distributing lsof
! versions 1, 2, 3 and 4.
!
! Vic Abell <abe@purdue.edu>
!
!!!NOTE!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
```

Taught the Configure script to create a dummy opt_random.h for FreeBSD systems whose <sys/random.h> includes it.

Added support for the FreeBSD ZFUSE file system.

Corrected the quoting in a Darwin putchar() statement in the dfile.c source file. Andrew Janke <floss@apjanke.net> reported my error.

Added support for the FreeBSD DTYPE_PTS file descriptor and for unknown descriptors that reference the kernel's badfileops operation switch. Enabled FreeBSD 12.0 support. Tested the changes on systems provided by Larry Rosenman <ler@lerctr.org>.

Enhanced -K option with the form "-K i" to direct lsof to (i)gnore tasks. A query from Rachel Kroll <rkroll@fb.com> suggested this option. Linux task reports now include both process and task command names, making lsof's "-c <name>" option work correctly.

Added a patch to prevent NFS blocking in Linux supplied by Kristyna Streitova <kstreitova@suse.com>.

Installed a FreeBSD patch that prevents examining a TCP state structure during a race condition. The patch was supplied by Bryan Drewery <bdrewery@FreeBSD.org>.

Updated FreeBSD for new UFS inode structure that lacks an i_dev member in the most recent 12.0-CURRENT. Larry Rosenman <ler@lerctr.org> reported the problem and provided a test system.

Added "#define KLD_MODULE" to dlsof.h and dnode2.c to prevent <machine/cpuconf.h> from generating an "ARM_NARCH is 0" error. This is needed so lsof can access kernel structures. Larry Rosenman supplied the addition.

Added recognition of the FreeBSD 11 file system name "nullfs". Jamie Landeg-Jones <jamie@catflap.org> supplied the fix.

Added a patch from Larry Rosenman <ler@lerctr.org> that is needed on FreeBSD 12 so the lsof compilation can obtain the inpcb and tcpcb structures from their respective header files.

Updated FreeBSD dmnt.c for the ino64 changes.

Inserted a patch for Solaris 12.x to avoid compilation errors from <sys/aio_req.h>, based on information provided by Jorn Clausen <joern.clausen@uni-bielefeld.de>. Jorn tested the patch.

Added performance enhancement that uses the FreeBSD `closefrom()` and `dup2()` C library functions when available. The enhancement was supplied by Conrad Meyer <cem@freebsd.org>.

Corrected FreeBSD `lsf`'s gathering of ZFS file device numbers.

Updated `lsf` test library for FreeBSD.

Updated socket options information collection from the socket structure per changes supplied by Gleb Smirnov <glebius@FreeBSD.org>.

Added patch to `dlsof.h` that avoids a `_KERNEL` conflict with `bzero`. Mateusz Guzik <mjguzik@gmail.com> supplied the patch.

Corrected test library to handle 64 bit FreeBSD device numbers.

Added `#defines` for FreeBSD 12, `src r324225`, from Gleb Smirnov <glebius@FreeBSD.org>.

Incorporated Linux pseudoterminal endpoint processing (+|-E) provided by Masatake YAMATO <yamato@redhat.com> with access to test systems provided by Peter Schiffer <pschiffe@redhat.com>.

Corrected Linux command extraction for commands that include parentheses -- e.g., `"(sd-pam)"`.

4.91 March 26, 2018

A bug has been reported in the PTY endpoint processing of Linux `lsf` 4.90 by Peter Wu <peter@lekensteyn.nl>, making it necessary for me to release another revision of `lsf`.

This revision applies two fixes that correct the Linux PTY endpoint processing bug. Masatake YAMATO <yamato@redhat.com> supplied the fixes.

4.92 July 14, 2018

THIS IS A FREEBSD-ONLY DISTRIBUTION!

Fixes `Configure` script section that creates the FreeBSD `lockf_owner.h` header file; fixes `<string.h>` conflicts with FreeBSD kernel header files. Mateusz Guzik supplied part of the fix.

Released lsof to GitHub with Purdue releases documented in support/GitHub-release.

Vic Abell <abe@purdue.edu>
July 14, 2018

4.92.1 May 6, 2019

```
!!!NOTE!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!
! The maintainership is switched from Vic to lsof-org !
! at GitHub team officially. !
! We thank Vic for working on lsof over the years. !
!
! lsof-org at GitHub team (https://github.com/lsof-org) !
!!!NOTE!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
```

This is just for testing "Release" feature of GitHub. Many documentations are not updated yet. URLs in -v output and -h output are updated.

4.93.0 May 7, 2019

[freebsd] Made FreeBSD 13 adjustment.
[darwin] Fix a typo causing a build error.
Fix a potential memory leak.
[linux] use tircp for rpc if libc doesn't provide rpc.h.
Fix a typo in man page.
[linux] fix memory leaks detected by valgrind about unix endpoint information.
Update the description about -fg and -fG options on linux.

4.93.1 May 7, 2019

Fix a broken symbolic link.

4.93.2 May 8, 2019

Update the version number embedded in lsof executable.

Masatake YAMATO <yamato@redhat.com>, a member of lsof-org
May 8, 2019

Found in path(s):
* /opt/cola/permits/1402400301_1661782874.918154/0/lsof-4-93-2-dfsg-orig-1-tar-xz/lsof-4.93.2/00DIST

No license file was found, but licenses were detected in source scan.

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* /opt/cola/permits/1402400301_1661782874.918154/0/lsof-4-93-2-dfsg-orig-1-tar-xz/lsof-
4.93.2/dialects/freebsd/dnode2.c

* /opt/cola/permits/1402400301_1661782874.918154/0/lsof-4-93-2-dfsg-orig-1-tar-xz/lsof-
4.93.2/dialects/freebsd/dzfs.h

* /opt/cola/permits/1402400301_1661782874.918154/0/lsof-4-93-2-dfsg-orig-1-tar-xz/lsof-4.93.2/util.c

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*/
/*
* If this is a regular file with a non-numeric FD, it may be the
* executable.
*/
```

Found in path(s):

```
* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/tests/LTbasic.c
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Found in path(s):

* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/darwin/kmem/dfile.c

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Found in path(s):

* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/print.c
*
/opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/OLD/print.c
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*
* @(#)cdefs.h 8.2 (Berkeley) 10/4/93
*/

Found in path(s):

* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/osr/include/sys/cdefs.h

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Frequently Asked Questions about lsof

| The latest release of lsof is always available via anonymous ftp |
| from lsof.itap.purdue.edu. Look in pub/lsof.README for its |
| location. |

This file contains frequently asked questions about lsof and answers to them.

Vic Abell <abe@purdue.edu>
October 13, 2014

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9.2.5 Why does Configure complain about q4 for /dev/kmem-based lsof for HP-UX 11?

9.2.6 When compiling /dev/kmem-based lsof for HP-UX 11 what do the "aCC runtime: ERROR..." messages mean?

9.2.7 Why doesn't /dev/kmem-based lsof for HP-UX 11 report VxFS file link counts, node numbers, and sizes correctly?

9.2.8 Why can't /dev/kmem-based lsof be built with gcc for 64 bit HP-UX 11?

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9.2.10 Why does the ANSI-C compiler complain about comments in HP-UX 11 header files?

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the bundled C compiler build PSTAT-based lsof for
PA-RISC HP-UX 11.23?

9.3.9 Why won't gcc build PSTAT-based lsof for PA-RISC HP-UX 11.23?

9.3.10 Why does PSTAT-based lsof complain, "FATAL: pst_stream_size should be: 672; is 72" on HP-UX 11.11 and above?

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Why can't lsof find files on an inaccessible NFS file system?

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 - 14.5.1 Why is space considered a non-printable character in command names?
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- 17.14 Why don't lsof and Solaris pfiles reports always match?
- 17.15 Why does lsof say, "kvm_open(namelist=default, core=default): Permission denied?"
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- 17.20 Why does lsof get a segmentation fault on 64 bit Solaris 8 using NIS+?
- 17.21 Will lsof crash the Solaris kernel?
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- 17.24 Lsof and Solaris 10 zones
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- 17.28 Problems with Solaris 9 and above
 - 17.28.1 Why does the compiler complain about lgrp_root on Solaris 9 and above?

18.0 Lsof Features

- 18.1 Why doesn't lsof report on /proc entries on my system?
- 18.2 How do I disable the device cache file feature or alter its behavior?
 - 18.2.1 What's the risk with a perverted device cache file?
 - 18.2.2 How do I put the full host name in a personal device cache file path?
 - 18.2.3 How do I put the personal device cache file in /tmp?
- 18.3 Why doesn't lsof know about AFS files on my favorite dialect?
 - 18.3.1 Why doesn't lsof report node numbers for all AFS volume files, or how do I reveal dynamic module addresses to lsof?

1.0 General Concepts

1.1 Lsof -- what is it?

Lsof is a UNIX-specific tool. Its name stands for LiSt Open Files, and it does just that. It lists information about files that are open by the processes running on a UNIX system.

See the lsof man page, the 00DIST file, the 00QUICKSTART file, and the 00README file of the lsof distribution for

more information.

1.2 Where do I get lsof?

lsof is available via anonymous ftp from [lsof.itap.purdue.edu](ftp://lsof.itap.purdue.edu). Look in the `pub/tools/unix/lsof` sub-directory.

`ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof`

Bzip2'd, compressed and gzip'd tar files with GPG certificates are available.

1.2.1 Are there mirror sites?

On March 21, 2013 these sites appeared to have the latest lsof revision:

`ftp://ftp.fu-berlin.de/pub/unix/tools/lsof`

`ftp://sunsite.ualberta.ca/pub/Mirror/lsof`

`http://www.mirrorservice.org/sites/lsof.itap.purdue.edu/pub/tools/unix/lsof/`

`ftp://ftp.mirrorservice.org/sites/lsof.itap.purdue.edu/pub/tools/unix/lsof/`

`rsync://rsync.mirrorservice.org/lsof.itap.purdue.edu/pub/tools/unix/lsof/`

1.2.2 Are lsof executables available?

Some lsof executables are available in the subdirectory `pub/tools/unix/lsof/binaries`. These are neither guaranteed to be current nor cover every dialect and machine architecture.

I don't recommend you use pre-compiled lsof binaries; I recommend you obtain the sources and build your own binary. Even if you're a Sun user without a Sun C compiler, you can use gcc to compile lsof.

If you must use a binary file, please be conscious of the security and configuration implications in using an executable of unknown or different origin. The lsof binaries are accompanied by GPG certificates. Please use them!

Three additional cautions apply to executables:

1. Don't try to use an lsof executable, compiled for one version of a UNIX dialect, on another. Patches can make the dialect version different.
2. If you want to use an lsof binary on multiple systems, they must be running the same dialect OS version and

have the same patches and feature support.

1.2.3 How do I check the validity of an lsof distribution?

There are two ways to check the validity of an lsof distribution:

1. Follow the instructions in the CHECKSUMS_<revision> file found with the lsof distribution.

Checking with GPG is the best method.

2. Follow the instructions in the "Security" section of the README.lsof_<revision> file found inside the lsof distribution.

Again, checking with GPG is the best method.

1.2.4 Why can't I get the sum(1) result reported in README.lsof_<revision>?

The "Security" section of the README.lsof_<revision> file found inside the lsof distribution gives md5, sum, and GPG certificate information.

The simplest, the sum(1) signature, seems to be the trickiest. That's because there are different sum(1) methods, BSD systems usually have cksum(1) instead of sum(1), and different systems compute the block size value differently.

First, the lsof sum results are computed with the old, "alternate" algorithm. On newer systems, you can use sum's "-r" option to get that computation result.

Second, on BSD systems you usually must use cksum(1) instead of sum(1), because they have no sum(1). To tell cksum(1) to use the old, "alternate" algorithm, use its "-o1" option.

Third, the second value that sum reports, the block count, may be computed differently on different systems -- usually block size is considered to be 512 or 1,024. The lsof block counts were computed on a system with a sum(1) option that considers block size to be 512. The BSD system cksum(1) -o1 option considers block size to be 1,024. If your sum(1) or cksum(1) doesn't report a block count that matches the sum(1) signature given in README.lsof_<revision>, check its man page to see what

block size it uses, then adjust its reported block count appropriately.

1.2.5 Why won't gpg accept the lsof-signing PGP public key?

An older PGP key that once signed lsof distributions is included in lsof revisions prior to 4.70. The PGP key is indeed my key, but is incompatible with GPG. It was created about ten years ago and is still acceptable to PGP versions 2.6.2 through 6.5.2.

Lsof revisions 4.70 and above are signed with a copy of my PGP key that has been made acceptable for use with GPG by importing it under GPG's "--allow-non-selfsigned-uid" option.

You can find my GPG compatible key in lsof revisions 4.70 and above and at:

```
ftp://lsof.itap.purdue.edu/pub/Victor_A_Abell.gpg
```

If you have an older lsof revision with my PGP key, there are two possible ways to use it:

- * Use it with a PGP version from 2.6.2 through 6.5.2.

- * Use GPG's "--allow-non-selfsigned-uid" option when you import my PGP key into your GPG key ring.

```
$ gpg --allow-non-selfsigned-uid --import Victor_A_Abell.gpg
```

1.3 Where can I get more lsof documentation?

A significant set of documentation may be found in the lsof distribution (See "Where can I get lsof?"). There is a manual page, copious documentation in files whose names begin with 00, and a copy of this FAQ in the file 00FAQ (perhaps slightly less recent than this file if you're reading it via a web browser.)

Two URLs provide some documentation that appears in the lsof distribution:

FAQ: <ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/FAQ>

man page: ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/lsof_man

1.4 How do I report an lsof bug?

If you believe you have discovered a bug in lsof, you can report it via e-mail to <abe@purdue.edu>. Do NOT report lsof bugs to the UNIX dialect vendor. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

Before you send me a bug report, please read the "Bug Reports" section of the 00README file of the lsof distribution. It lists the steps you should take before and when reporting a suspected bug.

1.5 Where can I get the lsof FAQ?

This lsof FAQ is available in the file 00FAQ in the lsof distribution and at the URL:

`ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/FAQ`

1.5.1 How timely is the on-line FAQ?

The on-line FAQ is sometimes too timely. :-)

I update it as soon as new information is available. That may include information about support that won't appear in the lsof source distribution until the next revision. If you encounter something like that, please send me e-mail at <abe@purdue.edu>. I may be able to point you at a pre-release distribution that contains the support of interest. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

1.6 Is there a test suite?

Yes, as of lsof revision 4.63 there's an automated lsof test suite in the tests/ sub-directory of the lsof top-level directory.

More information on using the test suite, what it does, how to use it and how to configure it may be found in the 00TEST file of the lsof distribution. That file also explains where the test suite has been tested.

Frequently asked questions about the test suite will be asked and answered here in the FAQ. (See "Test Suite Problems.")

After lsof has been configured
with the Configure script,
lsof can be made and tested with:

```
$ make  
$ cd tests  
$ make
```

Under normal conditions -- i.e., unless the lsof tree has
been cleaned or purged severely -- all tests or individual
tests may be run by:

```
$ cd test  
$ make  
or  
$ <run a single test> (See 00TEST.)
```

1.7 Is lsof vulnerable to the standard I/O descriptor attack?

Lsof revisions 4.63 and above are not vulnerable.

Lsof revisions 4.62 and below are vulnerable, but no damage
scenarios have so far been demonstrated.

The standard I/O descriptor attack is a local programmed
assault on setuid and setgid programs that tricks them into
opening a sensitive file with write access on a standard
descriptor, usually stderr (2), and writing error messages
to stderr. If the attacker can control the content of the
error message, the attacker may gain elevated privileges.

The attack was first described in Pine Internet Advisory
PINE-CERT-20020401, available at:

<http://www.pine.nl/advisories/pine-cert-20020401.txt>

If you are using an lsof revision below 4.63, you should
remove any setuid or setgid permissions you might have
given its executable. Then you should upgrade to lsof
revision 4.63.

1.8 Can I alter lsof's make(1) behavior?

Yes. There are at least two ways to do that.

You can put replacements for lsof Makefile strings in your
environment. If you specify the -e make option, make will

give environment variable values precedence over strings from the Makefile. For example, to change the compiler string CC from the environment, you might do this with the Bourne shell:

```
$ CC=foobar; export CC
$ make -e
```

You can also replace Isof Makefile strings in the make command invocation. Here's the previous example done that way:

```
$ make CC=foobar
```

Changing the CFGF, CFGL, and DEBUG strings used in Isof Makefiles, either from the environment or from the make invocation, can significantly alter Isof make(1) behavior.

I commonly use DEBUG to change the -O option to -g so I can build an Isof executable for debugging -- e.g.,

```
$ make DEBUG=-g
```

(Look for DEBUG in this FAQ for other examples of its use.)

Consult the Makefiles to see what CFGL, CFGF, and other Isof Makefile strings contain, and to see what influence their alteration might have on Isof make(1) behavior.

1.9 Is there an Isof license?

No.

The only restriction on the use or redistribution of Isof is contained in this copyright statement, found in every Isof source file. (The copyright year in or format of the notice may vary slightly.)

```
/*
 * Copyright 2002 Purdue Research Foundation, West Lafayette,
 * Indiana 47907. All rights reserved.
 *
 * Written by Victor A. Abell
 *
 * This software is not subject to any license of the American
 * Telephone and Telegraph Company or the Regents of the
 * University of California.
 *
```

* Permission is granted to anyone to use this software for
* any purpose on
any computer system, and to alter it and
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*
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* authors and Purdue University must appear in documentation
* and sources.
*
* 3. Altered versions must be plainly marked as such, and must
* not be misrepresented as being the original software.
*
* 4. This notice may not be removed or altered.
*/

1.10 Language locale support

1.10.1 Does lsof support language locales? How do I use the support?

Most UNIX dialect versions of lsof support 8 bit language locale characters -- e.g., the ability to print 8 bit characters that have accents and other marks over them.

See the answer to the "Does lsof support wide characters in language locales?" question for information on when lsof's language locale support covers characters wider than 8 bits.

To see if lsof supports language locales for your dialect, look in the dialect's machine.h header file for the HASSETLOCALE definition. If it is present and not disabled, then lsof has language locale support for the dialect.

To enable lsof's language locale support, you must specify in a locale environment variable (e.g., LANG) a language locale known to your system that supports the printing of marked characters -- e.g., en_US. (On some dialects locale(1) may be used to list the known language locales.)

Note that LANG=C and LANG=POSIX are NOT language locales that support the printing of marked characters.

If the language locale doesn't support the printing of marked

characters, lsof's OUTPUT of them follows the rules for non-printable characters described in the OUTPUT section of lsof(8).

Consult your dialect's setlocale(3) man page for the names of environment variables other than LANG -- e.g., LC_ALL, LC_TYPE, etc. -- which may be used to define language locales.

1.10.2 Does lsof support wide characters in language locales?

When lsof's language locale support is enabled with the HASSETLOCALE definition, for selected dialects lsof will also print wide characters (e.g., from UTF-8) when iswprint(3) reports them to be printable.

Wide character support is available when HASWIDECHAR is defined in a dialect's machine.h header file. As of this writing on July 22, 2004, the following dialect versions have wide character support:

- AIX >= 4.3.2
- Apple Darwin >= 7.3.0
- FreeBSD >= 5.2
- HP-UX >= 11.00
- /proc-based Linux
- NetBSD >= 1.6
- SCO OpenServer >= 5.0.6
- Solaris >= 2.6
- Tru64 UNIX 5.1

1.11 Are any files in the lsof distribution copyrighted?

Yes. Most files carry the copyright of the Purdue Research Foundation and may be redistributed under the terms that accompany the copyright notice. Those terms may also be found in the answer to the question, "Is there an lsof license?")

A few files carry other copyright notices. Some are BSD notices and they explain the terms under which they are included in the lsof distribution.

Those that carry vendor copyright notices have been reproduced in their original or modified forms with permission from the copyright owners. That permission is indicated in the README files that accompany the files.

1.12 Are there other lsof-related resources?

There are other resources available, connected to lsof. Among them are FreeBSD and Linux packages whose products use lsof and two particularly interesting resources.

The two interesting resources are a Gnome Tool Kit (GTK) GUI for lsof and a Perl wrapper module.

The GTK GUI is called Glsof and was developed by Gnele. It can be found at:

<http://www.sourceforge.net>

The Perl wrapper module by Marc Beyer can be found at:

<http://search.cpan.org/dist/Unix-Lsof/>

1.13 What

does the "WARNING: unsupported dialect or version" mean?

The lsof configure script issues that message for UNIX dialects or their versions where I have been unable to test the current revision of lsof. The message doesn't mean that lsof won't work, just that I have no direct evidence that it will.

If the COnfigure script succeeds, except for the warning, try compiling lsof. If that succeeds, try the lsof test suite.

2.0 Lsof Ports

2.1 What ports exist?

The pub/lsof.README file carries the latest port information:

AIX 5.[23] and 5.3

FreeBSD 4.9 and 6.4 for x86-based systems

FreeBSD 8.[234], 9.0, 10.0 and 11.0 for AMD64-based systems

Linux 2.1.72 and above for x86-based systems

Solaris 9, 10 and 11

In the above list the only UNIX dialects present are ones for which I test the current lsof revision. Lsof may still support unlisted dialect versions -- e.g., HP-UX 10.20, Solaris 7, etc. -- but I don't have access to systems where I could test lsof

on them, so I can't claim lsof works on them. If your dialect isn't in the list, you should try building lsof on it anyway.

Lsof version 4 predecessors, versions 2 and 3, may support older version of some dialects. Contact me via e-mail at <abe@purdue.edu> if you're interested in their distributions. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

2.2 What about a new port?

The 00PORTING file in the distribution gives hints on doing a port. I will consider doing a port in exchange for permanent access to a test host. I require permanent access so I can test new lsof revisions, because I will not offer distributions of dialect ports I cannot upgrade and test.

2.2.1 User-contributed Ports

Sometimes I receive contributions of ports of lsof to systems where I can't test future revisions of lsof. Hence, I don't incorporate these contributions into my lsof distribution.

However, I do make descriptions of these contributions available. You can find them in the 00INDEX and README files at:

`ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/contrib`

Consult the 00INDEX file in the contrib/ directory for a list of the available contributions and consult README there for information on how to obtain them.

2.3 Why isn't there an AT&T SVR4 port?

I haven't produced an AT&T SVR4 port because I haven't seen a UNIX dialect that is strictly limited to the AT&T System V, Release 4 source code. Every one I have seen is a derivative with vendor additions.

The vendor additions are significant to lsof because they affect the internal kernel structures with which lsof does business. While some vendor derivatives of SVR4 are similar, each one I have encountered so far has been different enough from its siblings to require special source code.

If you're interested in an SVR4 version of lsof, here are some existing ports you might consider:

DC/OSx (This obsolete port is only available upon special request.)
Reliant UNIX (This obsolete port is only available upon special request.)
SCO|Caldera UnixWare (This is the most likely choice.)
Solaris

2.4 Why isn't there an SGI IRIX port?

Lsof support for IRIX was terminated at lsof revision 4.36, because it had become increasingly difficult for me to obtain information on the IRIX kernel structures lsof needs to access.

At IRIX 6.5 I decided the obstacles were too large for me to overcome, and I stopped supporting lsof on IRIX. I have sources to the last revision of lsof (4.36) for IRIX, but that version of lsof does not work on IRIX 6.5 and is vulnerable to the standard I/O descriptor attack. (See the "Is lsof vulnerable to the standard I/O descriptor attack?" Q&A for more information.) Contact me to discuss obtaining those sources.

If you wish to pursue the issue, don't contact me, contact SGI. This case was opened with SGI on the subject:

Case ID: 0982584

Category: Unix

Priority: 30-Moderate Impact

Problem Summary:

kernel structure header files needed for continued lsof support

Problem Description:

Email In 07/17/98 19:09:23

2.5 Why does lsof's Configure script report "WARNING: unsupported dialect or version"?

Lsof's Configure script issues this message when it encounters a dialect or its version that lsof once supported, but no longer does. Usually I drop support for a dialect or version when I can no longer test lsof on it.

However, it's worth trying to compile and use lsof. Be sure to run the test suite. (See the answer to the "Is there a test suite?" question for information on the test suite.)

If you have problems with an unsupported dialect or version, contact me via e-mail at <abe@purdue.edu> and I may be able to help. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

3.0 Lsof Problems

3.1 Configuration Problems

3.1.1 Why

can't Configure determine the UNIX dialect version?

The lsof Configure script uses UNIX shell commands, often in a command pipeline, to determine the UNIX dialect version. (Consult the dialect stanza in Configure to determine which commands are used.) If Configure can't determine the dialect version, probably one of the commands is not behaving as Configure expects.

Symptoms of the failure include Configure warning messages and incorrect version definitions in the Makefile CFLAGS.

If you suspect that the lsof Configure script is failing to determine the dialect version correctly, try running the commands from Configure stanza one at a time. That will usually reveal the source of the problem. Be particularly mindful that the PATH environment variable can cause commands to be executed from non-standard directories.

If you can't determine the source of the problem, there is a work-around. You can supply the UNIX dialect version in the LSOF_VSTR environment variable. Use Configure as a guide to forming what it expects in LSOF_VSTR. There is also some information on LSOF_VSTR in the 00XCONFIG documentation file of the lsof distribution.

3.2 Compilation Problems

3.2.1 Why does the compiler complain about missing header files?

When you use make to build lsof, the compiler may complain that it can't find header files -- e.g.,

```
$ make
(cd lib; make DEBUG="-O" CFGF="-DAIXA=0 -DAIXV=4330 \
-DLSOF_VSTR=\"4.3.3.0\"")
gcc -DAIXA=0 -DAIXV=4330 -DLSOF_VSTR="4.3.3.0" -O \
-c ckkv.c
In file included from ckkv.c:33: ../machine.h:70: \
sys/types.h: A file or directory in the path name \
does not exist. \
```

That type of complaint doesn't represent an lsof problem. It represents a problem with a missing system header file that probably should be found in /usr/include or in the system source tree.

As a first step try using find(1) to locate the problem header file.

If it's a system header file and can't be found, here are some possible causes:

1. The file set, RPM or package containing the header files has not been installed. Instructions for doing that are specific to the UNIX dialect and beyond the scope of this document.

2. If the compiler is gcc, the private gcc header files:

- * May not have been installed;
- * May have been installed incorrectly;
- * May not have been updated properly after the last compiler or system update;
- * Ones from a previous installation may not have been removed.

A path leading to the gcc private header files can be found with `gcc -v`. Consult the gcc documentation for instructions on proper installation of the private gcc header files.

3. On some dialects -- e.g., FreeBSD, NetBSD, OpenBSD -- lsof may need to use header files that are located in the system source tree -- /sys or /usr/src/sys, for example. Make sure the system source tree has been installed.

3.2.2 Why does gcc complain about the contents of header files distributed by the system's vendor?

When you use make to build lsof and gcc to compile it, gcc may complain that it finds errors in system header files

-- e.g.,

```
$ make
(cd lib; make DEBUG="-O" CFGF="-Dsolaris=80000 \
-DHASPR_GWINDOWS -m64 -DHASIPv6 -DHAS_VSOCK \
-DLSOF_VSTR=\"5.8\"")
gcc -Dsolaris=80000 -DHASPR_GWINDOWS -m64 -DHASIPv6 \
-DHAS_VSOCK -DLSOF_VSTR="5.8" -O -c dvch.c
In file included from /usr/include/sys/proc.h:31, \
    from /homes/abe/gnu/gcc-3.2.1/lib/gcc-lib/sparcv9-sun-solaris2/\
3.2.1/include/sys/user.h:267, from /usr/include/kvm.h:13, \
from ../dlsf.h:53, from ../lsof.h:172, from dvch.c:43: \
/homes/abe/gnu/gcc-3.2.1/lib/gcc-lib/sparcv9-sun-solaris2/\
3.2.1/include/sys/task.h:59: parse error before "uint_t"
```

Errors like the above are most likely not problems in the system's header files, but in the private copies of them that were created when gcc was made or installed. Note the presence of `"../gcc-3.2.1/lib/gcc-lib/sparcv9-sun-solaris2/3.2.1/include/..."` in the paths for `user.h` and `task.h`. It indicates both header files are gcc-specific.

To solve errors like this requires comparing the header files in the vendor's `/usr/include` tree to the gcc-specific ones in gcc's private `gcc-lib/.../include` tree. It may be necessary to regenerate gcc-specific header files, correct them or remove them. See the gcc distribution for the appropriate tools.

A possible temporary work-around is to direct gcc to use the vendor's header files instead of its temporary ones by declaring `-I/usr/include` in the compilation flags.

3.2.3 Other header file problems

Don't overlook any vendor tools that might validate the vendor header files installed on the system -- e.g., the Solaris `pkgchk` tool can be used to check the header files that were installed

from the SUNWhea package.

For other header file problems contact me at <abe@purdue.edu>. Please follow the reporting guidelines in the "How do I report an lsof bug?" section of this FAQ.

3.3 Why doesn't lsof report full path names?

lsof reports the full path name when it is specified as a search argument for open files that match the argument. However, if the argument is a file system mounted-on directory, and lsof finds additional path name components from the kernel name cache, it will report them.

lsof reports path name for file system types that have path name lookup features -- e.g., some versions of AdvFS for Digital and Tru64 UNIX. The Linux /proc-based lsof reports full path names, because the Linux /proc file system provides them. lsof on recent builds of Solaris 10 also report full path names, because those Solaris kernels record the full path name in the vnode structure.

Otherwise, lsof uses the kernel name cache, where it exists and can be accessed, and reports some or all path name components (e.g., the sys and proc.h components of /usr/include/sys/proc.h) for these dialects:

- Apple Darwin
- DC/OSx
- FreeBSD
- HP-UX, /dev/kmem and PSTAT based
- Linux, /dev/kmem-based
- NetBSD
- NEXTSTEP
- OpenBSD
- OPENSTEP
- Reliant UNIX
- SCO OpenServer
- SCO|Caldera UnixWare
- Solaris 2.x, 7, 8 and 9 (except for some VxFS versions; see the "Why doesn't Solaris lsof report VxFS path name components?" section for more information)
- Solaris 10 (early builds) Tru64 UNIX

As far as I can determine, AFS path lookups don't share in

kernel name cache operations, so lsof can't identify open AFS path name components. Apparently Solaris VxFS versions 4 and above don't share in kernel name cache operations, either, so lsof can't display path name components for those open files.

Since the size of the kernel name cache is limited and the cache is in constant flux, it does not always contain the names of all components in an open file's path; sometimes it contains none of them.

Lsof reports the file system directory name and whatever components of the file's path it finds in the cache, starting with the last component and working backwards through the directories that contain it. If lsof finds no path components, lsof reports the file system device name instead.

When lsof does report some path components in the NAME column, it prefixes them with the file system directory name, followed by " -- ", followed by the components -- e.g., /usr -- sys/path.h for /usr/include/sys/path.h. The " -- " is omitted when lsof finds all the path name components of a file's name.

The PSTAT-based HP-UX lsof relies on kernel name cache contents, too, even though its information comes to lsof via pstat() function calls. Consequently, PSTAT-based HP-UX lsof won't always report full paths, but may use the " -- " partial path name notation, or may occasionally report no path name at all but just the file system mounted-on directory and device names.

Lsof can't obtain path name components from the kernel name caches of the following dialects:

AIX

Only the Linux kernel records full path names in the structures it maintains about open files; instead, most kernels convert path names to device and node number doublets and use them for subsequent file references once files have been opened.

To convert the device and node number doublet into a complete path name, lsof would have to start at the root node (root directory) of the file system on which the node resides, and search every branch for the node, building

possible path names along the way. That would be a time consuming operation and require access to the raw disk device (usually implying setuid-root permission).

If the prospect of all that local disk activity doesn't concern you, think about the cost when the device is NFS-mounted.

Try using the file system mount point and node number lsof reports as parameters to find -- e.g.,

```
$ find <mount_point> -inum <node_number> -print
```

and you may get an appreciation of what a file system directory tree search would cost.

3.3.1 Why do lsof -r reports show different path names?

When you run lsof with its repeat (`-r") option, you may notice that the extent to which it reports path names for the same files may vary from cycle to cycle. That happens because other processes are making kernel calls affecting the cache and causing entries to be removed from and added to it.

3.3.2 Why does lsof report the wrong path names?

Under some circumstances lsof may report an incorrect path name component, especially for files in a rapidly changing directory like /tmp.

In a rapidly changing directory, like /tmp, if the kernel doesn't clear the cache entry when it removes a file, a new file may be given the same keys and lead lsof to believe that the old cache entry with the same keys belongs to the new file.

Lsof tries to avoid this error by purging duplicate entries from its copy of the kernel name cache when they have the same device and inode number, but different names.

This error is less likely to occur in UNIX dialects where the keys to the name cache are node address and possibly a capability ID. The Apple Darwin, Digital UNIX, FreeBSD, HP-UX, NEXTSTEP, OPENSTEP, Solaris, Tru64 UNIX, and UnixWare dialects use node address. Apple Darwin, FreeBSD, NetBSD, OpenBSD,

Tru64 UNIX, and also use a capability ID to further identify name cache entries.

3.3.3 Why doesn't lsof report path names for unlinked (rm'd) files?

When lsof gets path name components from the kernel's name cache, it does not report the path names of a file that has been unlinked from its parent directory -- e.g., deleted via rm, or the unlink() system call -- even when some process may still hold the file open; lsof reports only the file system's mounted-on directory and device. That's because path name components are removed from the kernel name cache when the file is unlinked.

Unlinked open files are sometimes used by applications for temporary, but invisible storage (i.e., ls won't show them, and no other process can open them.) However, they may occasionally consume disk space to excess and cause concern for a system administrator, who will be unable to locate them with find, ls, du, or other tools that rely on finding files by examining the directory tree.

By using lsof's +L option you can see the link count of open files -- in the NLINK column. An unlinked file will have an NLINK value of zero. By using the option +L1 you can tell lsof to display only files whose link count is less than one (i.e., zero).

There are some UNIX dialect-specific exceptions to lsof's inability to report unlinked path names. They are described in the answer to the "When will lsof report path names for deleted files?" question.

3.3.4 Why doesn't lsof report the "correct" hard linked file path name?

When lsof reports a rightmost path name component for a file with hard links, the component may come from the kernel's name cache. Since the key which connects an open file to the kernel name cache may be the same for each differently named hard link, lsof may report only one name for all open hard-linked files. Sometimes that will be "correct" in the eye of the beholder; sometimes it will not. Remember, the file identification keys significant to the kernel are the device and node numbers, and they're the same for all the hard linked names.

3.3.5 When will lsof report path names for deleted files?

Lsof will report path names for deleted files for two dialects: Linux and later builds of Solaris 10.

Deleted Linux path names are reported by default and have "(deleted)" at their ends.

The display of Solaris 10 deleted path names may be selected with the `-X` option. When selected they are also reported with "(deleted)" at their ends.

3.4 Why is lsof so slow?

Lsof may appear to be slow if network address to host name resolution is slow. This can happen, for example, when the name server is unreachable, or when a Solaris PPP cache daemon is malfunctioning.

To see if name lookup is causing lsof to be slow, turn it off with the `--n` option.

Port service name lookup or portmap registration lookup may also be causes of slow-down. To suppress port service name lookup, specify the `--P` option.

Lsof doesn't usually make direct portmap calls -- only when `+M` is specified, or when `HASPMAPENABLED` is defined during lsof construction. (The lsof help panel, produced with `lsof -h`` will display the default portmap registration reporting state.) The quickest first step in checking if lsof is slow because of the portmapper is to use lsof's `--M` option.

Lsof may be slow if UID to login name lookups are slow. Suppress them with `--l`.

On dialects where lsof uses the kernel name cache, try disabling its use with `--C`.

(You can tell if lsof uses the kernel name cache by looking for `--C` in lsof's `lsof -h`` output.) Of course, disabling kernel name cache use will mean that lsof won't report full or partial path names, just file system and character device names.

If you're just interested in the open files of one process, try using the `--p <Process-ID>` option to limit lsof to that

process. (The ``-p" option may also be followed with a list of Process-IDs.)

If you're interested in including or excluding certain commands, try lsof's "-c[^]cmd" option.

If you're interested in certain Internet TCP and UDP states (e.g., ESTABLISHED) or in excluding some (e.g., CLOSE_WAIT), try lsof's "-s p:s" option, available where shown on the lsof help output, obtained with -h or -?. More information on it may be found in the answer to the "How are protocol state name exclusion and inclusion used?" question.

Your UNIX dialect may not support "-s p:s" and its associated performance improvements to Internet-only file processing. You can find more information on those topics in the answer to the "Why doesn't my dialect support state name exclusion and inclusion?" question.

Older AIX lsof may be slow to start because of its oslevel identity comparison. (Newer AIX lsof uses uname(2).) See the "Why does AIX lsof start so slowly?" and "Why does lsof warn "compiled for x ... y; this is z.?" sections for more information.

3.5 Why doesn't lsof's setgid or setuid permission work?

If you install lsof on an NFS file system that has been mounted with the nosuid option, lsof may not be able to use the setgid or setuid permission you give it, complaining it can't open the kernel memory device -- e.g., /dev/kmem.

The only solution is to install lsof on a file system that doesn't inhibit setgid or setuid permission.

3.6 Does lsof have security problems?

I don't think so. However, lsof does usually start with setgid permission, and sometimes with setuid-root permission.

Any program that has setgid or setuid-root permission, should always be regarded with suspicion.

Lsof drops setgid power, holding it only while it opens access to kernel memory devices (e.g., /dev/kmem, /dev/mem, /dev/swap). That allows lsof to bypass the weaker security of access(2) in favor of the stronger checks the kernel

makes when it examines the right of the lsof process to open files declared with -k and -m. Lsof also restricts some device cache file naming options when it senses the process has setuid-root power.

On a few dialects lsof requires setuid-root permission during its full execution in order to access files in the /proc file system. These dialects include:

- DC/OSx 1.1 for Pyramid systems
- Reliant UNIX 5.4[34] for Pyramid systems

When lsof runs with setuid-root permission it severely restricts all file accesses it might be asked to make with its options.

The device cache file (typically .lsof_hostname in the home directory of the real user ID that executes lsof) has 0600 modes. (The suffix, hostname, is the first component of the host's name returned by gethostname(2).) However, even when lsof runs setuid-root, it makes sure the file's ownerships are changed to that of the real user and group. In addition, lsof checks the file carefully before using it (See the question "How do I disable the device cache file feature or alter it's behavior?" for a description of the checks.); discards the file if it fails the scrutiny; complains about the condition of the file; then rebuilds the file.

See the 00DCACHE file of the lsof distribution for more information about device cache file handling and the risks associated with the file.

3.7 Will lsof show remote hosts using files via NFS?

No. Remember, lsof displays open files for the processes of the host on which it runs. If the host on which lsof is running is an NFS server, the remote NFS client processes that are accessing files on the server leave no process records on the server for lsof to examine.

3.8 Why doesn't lsof report locks held on NFS files?

Generally lock information held by local processes on remote NFS files is not recorded by the UNIX dialect kernel. Hence, lsof can't report it.

One exception is some patch levels of Solaris 2.3, and all versions of Solaris 2.4 and above. Lsof for those dialects does report on locks held by local processes on remotely mounted NFS files.

3.8.1 Why does lsof report a one byte lock on byte zero as a full file lock?

When a process has a lock of length one, starting at byte zero, lsof can't distinguish it from a full file lock. That's because most UNIX dialects represent both locks the same way in their file lock (flock or eflock) structures.

3.9 Why does lsof report different values for open files on the same file system (the automounter phenomenon)?

On UNIX dialects where file systems may be mounted by an automounter with the ``direct" type, lsof may sometimes report difference DEVICE, SIZE/OFF, INODE and NAME values when asked to report files open on the file system.

This happens because some files open on the file system -- e.g., the current directory of a shell that changed its directory to the file system as the file system's first reference -- may be characterized in the kernel with temporary automounter node information. The cd doesn't cause the file system to be mounted.

A subsequent reference to the file system -- e.g., an ls of any place in it -- will cause the file system to be mounted. Processes with files open to the mounted file system are characterized in the kernel with data that reflects the mounted file system's parameters.

Unfortunately some kernels (e.g., some versions of Solaris 2.x) don't revisit the process that did only a change-directory for the purpose of updating the data associated with the open directory file. The file continues to be characterized with temporary automounter information until it does another directory change, even a trivial ``cd .".

Lsof will report on both reference types, when supplied the file system name as an argument, but the data lsof reports will reflect what it finds in the kernel. For the different types lsof will display different data, including

different major and minor device numbers in the DEVICE column, different lengths in the SIZE/OFF column, different node numbers in the INODE column, and slightly different file system names in the NAME column.

In contrast, fuser, where available, can only report on one reference type when supplied the file system name as an argument. Usually it will report on the one that is associated with the mounted file system information. If the only reference type is the temporary automounter one, fuser will often be silent about it.

3.10 Why don't lsof and netstat output match?

Lsof and netstat output don't match because lsof reports the network information it finds in open file system objects -- e.g., socket files -- while netstat often gets its information from separate kernel tables.

The information available to netstat may describe network activities never or no longer associated with open files, but necessary for proper network state machine operation.

For example, a TCP connection in the FIN_WAIT_[12] state may no longer have an associated open file, because the connection has been closed at the application layer and is now being closed at the TCP/IP protocol layer.

3.10.1 Why can't lsof find accesses to some TCP and UDP ports?

Lsof stands for LiSt Open Files. If there is no open file connected to a TCP or UDP port, lsof won't find it. That's the most common reason why lsof doesn't find a port netstat might report open.

One reason I've found on some UNIX dialects is that their kernels set aside TCP and UDP ports for communicating with support activities, running in application layer servers -- the automounter daemons, and the NFS biod and nfsd daemons are examples. Netstat may report the ports are in use, but lsof doesn't.

Another reason is that netstat may also be able to report a port is open on a particular dialect, because it uses a source of data different from what lsof uses -- e.g., netstat might examine kernel tables or use streams messages

to MIB2, while lsof relies on the information it finds in open file structures and their descendants.

Sometimes it's possible to search the data netstat and lsof use. For example, on Linux /proc/tcp and /proc/udp can be examined. There might an entry there for a particular protocol and port, but if the line on which the port appears doesn't have an inode number that matches an inode number of an open file, lsof won't be able to identify the process using the port.

This is a tough question to which there is no easy answer.

3.11 Why does lsof update the device cache file?

At the end of the lsof output you may see the message:

```
lsof:
WARNING: /Homes/abe/.lsof_vic was updated.
```

In this message /Homes/abe/.lsof_vic is the path to the private device cache file for login abe. (See 00DCACHE.)

Lsof issues this message when it finds it necessary to recheck the system device directory (e.g., /dev or /devices) and rebuild the device cache file during the open file scan. Lsof may need to do these things it finds that a device directory node has changed, or if it cannot find a device in the cache.

3.12 Why doesn't lsof report state for UDP socket files?

Lsof reports UDP TPI connection state -- TS_IDLE (Idle), TS_BOUND (Bound), etc. -- for some, but not all dialects. TPI state is stream-based TCP/IP information that isn't available in many dialects.

A fairly weak general rule is if netstat(1) reports UDP TPI state, lsof may be able to report it, too. But don't be surprised if lsof fails to report UDP TPI state for your dialect. Other factors influence lsof's ability to report UDP TPI state, including the availability of state number data in kernel structures, and state number to state name conversion data.

3.13 I am editing a file with vi; why doesn't lsof find the file?

Classic implementations of vi usually don't keep open the file being edited. (Newer ones may do so in order to maintain an advisory lock.) Instead classic vi opens the file, makes a temporary copy (usually in /tmp or /usr/tmp), and does its work in that file. When you save the file being edited from a classic vi implementation, it reopens and rewrites the file.

During a classic vi session, except for the brief periods when vi is reading or rewriting the file, lsof won't find an open reference to the file from the vi process, because there is none.

3.14 Why doesn't lsof report TCP/TPI window and queue sizes for my dialect?

lsof only reports TCP/TPI window sizes for Solaris, because only its netstat reports them. The intent of providing TCP/TPI information in lsof NAME column output is to make it easier to match netstat output to lsof output.

In general lsof only reports queue sizes for both TCP and UDP (TPI) connections on BSD-derived UNIX dialects, where both sets of values appear in kernel socket queue structures. SYSV-derived UNIX dialects whose TCP/IP implementations are based on streams generally provide only TCP queue sizes, not UDP (TPI) ones.

While you may find that netstat on some SYSV-derived UNIX dialects with streams TCP/IP may report UDP (TPI) queue sizes, you will probably also find that the sizes are always zero -- netstat supplies a constant zero for UDP (TPI) queue sizes to make its headers align the same for TCP and UDP (TPI) connections. Solaris seems to get it right -- i.e., its netstat does not report UDP (TPI) queue sizes.

When in doubt, I chose to avoid reporting UDP (TPI) queue sizes for UNIX dialects whose netstat-reported values I knew to be a constant zero or whose origin I couldn't determine. OSR is a dialect in this category.

3.14.1 Why doesn't lsof report socket options, socket states, and TCP flags and values for my dialect?

The lsof -T argument, 'f', that selects the reporting of socket options, socket states and TCP flags was implemented at lsof revision 4.71 for the following UNIX dialects, providing the

indicated information:

AIX 4.3.2 and 5.1 and above

All socket options and values, socket states, and TCP flags and values described in `lsof(8)` are reported.

Apple Darwin 7.2 and above

All socket options and values, socket states, and TCP flags and values described in `lsof(8)` are reported.

Digital UNIX and Tru64 UNIX 4.0

All socket options and values, socket states, and TCP flags and values described in `lsof(8)` are reported.

FreeBSD 4.9 and above

All socket options and values, socket states, and TCP flags and values described in `lsof(8)` are reported.

HP-UX 11.00 (/dev/kmem-based `lsof`)

All socket options and values are reported. No socket states are reported. Only the `TF_NODELAY` TCP flag and the `TF_MSS` value are reported.

HP-UX 11.11 and `iiiv2` (PSTAT-based `lsof`)

All socket options and values, and socket states are reported. No TCP flags or values are reported.

Linux

No socket options and values, socket states, or TCP flags and values are reported. The support for "-Tf" could not be added to Linux, because socket options, socket states, and TCP flags and values are not available via the `/proc` file system.

NetBSD 1.6G and above

All socket options and values, socket states, and TCP flags and values described in `lsof(8)` are reported.

OpenBSD 3.4 and above

All socket options and values, socket states, and TCP flags and values described in `lsof(8)` are reported.

OPENSTEP 4.2

All socket options and values, socket states, and TCP flags and values described in `lsof(8)` are reported.

OpenUNIX 8

All socket options and values, socket states, and TCP flags and values described in `lsof(8)` are reported.

SCO OpenServer Release 5.0.6

All socket options and values, socket states, and TCP flags and values described in `lsof(8)` are reported.

Solaris 2.6, 8 and above

The socket option display is limited to `BROADCAST`, `DEBUG`, `DGRAM_ERRIND`, `DONTROUTE` and `OOBINLINE`. Socket values are limited to `KEEPALIVE` and `LINGER`. No socket

states are reported. The TCP DELACK, NODELAY and SENTFIN flags are reported. The TCP MSS value is reported.

UnixWare 7.1.[134]

All socket options and values, socket states, and TCP flags and values described in lsof(8) are reported.

3.14.2 Why doesn't lsof report the partial listen queue connection count for my dialect?

The reporting of partial listen queue connections was added to -Tf processing at lsof revision 4.76. Currently it is reported for these dialects:

AIX 4.3.2

This dialect is no longer supported, so no attempt was made to add partial listen queue length support for it.

AIX 5.1

and above

Partial listen queue information is available.

Apple Darwin 7.2 and above

Partial listen queue information is available.

Digital UNIX 4.0

This dialect is no longer supported, so no attempt was made to add partial listen queue length support for it.

FreeBSD 4.9 and above

Partial listen queue information is available.

HP-UX 11.00 (/dev/kmem-based lsof)

No partial listen queue information is available.

HP-UX 11.11 and iiiV2 (PSTAT-based lsof)

No partial listen queue information is available.

Linux

No partial listen queue information is available.

NetBSD 1.6G and above

Partial listen queue information is available.

OpenBSD 3.4 and above

Partial listen queue information is available.

OPENSTEP 4.2

Partial listen queue information is available.

OpenUNIX 8

This dialect is no longer supported, so no attempt was made to add partial listen queue length support for it.

SCO OpenServer Release 5.0.6

No

partial listen queue information is available.

Solaris 2.6, 8 and above

Partial listen queue information is available.

Tru64 UNIX 5.0

This dialect is no longer supported, so no attempt was made to add partial listen queue length support for it.

Tru64 UNIX 5.1

Partial listen queue information is available.

UnixWare 7.1.[134]

Partial listen queue information is available.

3.15 What does "no more information" in the NAME column mean?

When lsof can find no successor structures -- a gnode, inode, socket, or vnode -- connected to the file structure of an open descriptor of a process, it reports "no more information" in the NAME column. The TYPE, DEVICE, SIZE/OFF, and INODE columns will be blank.

Because the file structure is supposed to contain a pointer to the next structure of a file's processing support, if the pointer is NUL, lsof can go no further.

Some UNIX dialects have file structures for system processes -- e.g., the sched process -- that have no successor structure pointers. The "no more information" NAME will commonly appear for these processes in lsof output.

It may also be the case that lsof has read the file structure while it is being assembled and before a successor structure pointer value has been set. The "no more information" NAME will again result.

Unless lsof output is filled with "no more information" NAME column messages, the appearance of a few should be no cause for alarm.

3.16 Why doesn't lsof find a process that ps finds?

If lsof fails to display open files for a process that ps indicates exists, there may be several reasons for the difference.

The process may be a "zombie" for which ps displays the "(defunct)" state. In that case, the process has exited

and has no open file information lsof can display. It does still have a process structure, sufficient for the needs of ps.

Another possible explanation is that kernel tables and structures may have been changing when lsof looked for the process, making lsof unable to find all relevant process structures. Try repeating the lsof request.

3.17 Why doesn't -V report a search failure?

The usual reason that -V won't report a search failure is that lsof located the search item, but was prevented from listing it by an option that doesn't participate in search failure reporting.

For example, this lsof invocation:

```
$ lsof -V -i TCP@foobar -a -d 999
```

won't report it can't find the Internet address TCP@foobar, even if there is an open file connected to that address, unless the open file also has a file descriptor number of 999 (the ``-a -d 999" options).

Compile-time options can also affect -V results in much the same way. For example, if HASSECURITY and HASNOSOCKSECURITY are defined at compile time, this lsof invocation, run by a non-root user:

```
$ lsof -V -c inetd
```

won't report that it can't find the inetd command, even if there is a process running the inetd command, because the HASSECURITY and HASNOSOCKSECURITY options prevent the listing of all but the socket files of another user, and no socket file selector (e.g., "-i") was specified.

3.18 Portmap problems

3.18.1 Why isn't a name displayed for the portmap registration?

When portmap registration reporting is enabled, any time there is a registration for a local TCP or UDP port, lsof displays it in square brackets, following the port number

or service name -- e.g., ``:1234[name]" or ``:name[100083]"

The TCP or UDP port number or service number (what follows the `:') is displayed under the control of the `lsof -P` option. The registration identity is held by the portmapper and may be a name or a number, depending on how the registration's owner declared it. `lsof` reports what the port map holds and cannot derive a registration name from a registration number.

`lsof` can be compiled with registration reporting enabled or disabled by default, under the control of the `HASPMAPENABLED` #define (usually in `machine.h`). The `lsof` help panel (`lsof -h`) will show the default. `lsof` is distributed with reporting disabled by default.

3.18.2 How can I display only portmap registrations?

`lsof` doesn't have an option that will display only TCP or UDP ports with portmap registrations. The `+M` option only enables the reporting of registration information when Internet socket files are displayed; `+M` doesn't select the displaying of Internet socket files -- the `-i` option does that.

This simple `lsof` pipe to `grep` will do the job:

```
$ lsof -i +M | grep "\["
```

This works because `-i` selects Internet socket files, `+M` enables portmap registration reporting, and only output lines with opening square brackets will have registrations.

When portmap registration reporting is enabled by default, because the `lsof` builder constructed it that way, `+M` is not necessary. (The `lsof` help panel, produced with `lsof -h` will display the default portmapper registration reporting state.)

However, specifying `+M` when reporting is already enabled is acceptable, as is specifying `-M` when reporting is already disabled.

Digression: `lsof` will accept ``+'` or ``-'` as a prefix to most options. (That isn't documented in the man page or help panel to reduce confusion and complexity.) The `-i` option is as acceptable as `+i`, so the above example could be written a little more tersely as:

```
$ lsof +Mi | grep "[
```

But be careful to use the ``Mi" ordering, since ``iM" implies M is an address argument to `i'.

3.18.3 Why doesn't lsof report portmap registrations for some ports?

lsof reports portmap registrations for local TCP and UDP ports only. It identifies local ports this way:

- * The port appears in the local address section of the kernel structure that contains it.
- * The port appears in the foreign address section of a kernel structure whose local and foreign Internet addresses are the same.
- * The port appears in the foreign address section of a kernel address structure whose Internet address is INADDR_LOOPBACK (127.0.0.1).

Following these rules, lsof ignores foreign portmapped ports. That's done for reasons of efficiency and possible security prohibitions. Contacting all remote portmappers could take a long time and be blocked by network difficulties (i.e., be inefficient). Many firewalls block portmapper access for security reasons.

lsof may occasionally ignore portmap registration information for a legitimate local port by virtue of its local port rules. This can happen when a port appears in the foreign part of its kernel structure and the local and foreign Internet addresses don't match (perhaps because they're on different interfaces), and the foreign Internet address isn't INADDR_LOOPBACK (127.0.0.1).

3.18.4 Why doesn't lsof report portmap registrations for some Solaris versions?

In some versions of Solaris -- 9 and 10 are known to exhibit this problem -- lsof is unable to display portmap registrations.

This portmap registration reporting failure occurs when the Solaris netconfig field (in /etc or etc/inet) has its first two non-comment lines enabling tcp6 and udp6. When netconfig is

configured in that fashion, lsof's attempt to read the portmap via an RPC function fails.

I don't have an explanation for the failure, but this comment in the netconfig(4) man page appears to have some bearing on the problem:

```
# The following two entries starting with udp6 and tcp6 are
# meant to be used for IPv6. If you have Ipv6 enabled on your
# machine then you can uncomment these two lines to enable
# RPC and NFS to use the Ipv6 stack.
...
#udp6 tpi_clts    v inet6 udp /dev/udp6 -
#tcp6 tpi_cots_ord v inet6 tcp /dev/tcp6 - "
```

My interpretation of that comment is that there is a different RPC interface to the portmap when IPv6 is enabled. However, I can't find any documentation on it in the RPC man pages. If anyone has information on it, please send it to me at <abe@purdue> and put "lsof Solaris portmap" in the subject line.

A work-around may be to move the ucp6 and tcp6 lines after the udp and tcxp lines in netconfig. I don't know if that change has any unacceptable consequences, but it works for me on my Solaris 9 test system, and I have a report that it also works on Solaris 10.

3.19 Why is `lsof | wc` bigger than my system's open file limit?

There is a strong temptation to count open files by piping lsof output to wc. If your purpose is to compare the number you get to some Unix system parameter that defines the number of open files your system can have, resist the temptation.

One reason is that lsof reports a number of "files" that don't occupy Unix file table space -- current working directories, root directories, jail directories, text files, library files, memory mapped files are some. Another reason is that lsof can report a file shared by more than one process that itself occupies only one file table slot.

If you want to know the number of open files that occupy file table slots, use the +ff option and process the lsof

output's FILE_ADDR column information with standard Unix tools like cut, grep, sed, and sort.

You might also consider using use lsof's field output with +ff, selecting the file struct address with -FF, and processing the output with an AWK or Perl script. See the list_fields.awk, list_fields.perl, and shared.perl5 scripts in the scripts/ subdirectory of the lsof distribution for hints on file struct post-processing filters.

3.20 Why doesn't lsof report file offset (position)?

Lsof won't report a file offset (position) value if the -s option (without parameters) has been specified, or if the dialect doesn't support the displaying of file offset (position). (Note that on selected dialects the help output, obtained with -h or -?, may show that the -s option can also be supplied the "p:s" parameters; for more information on that addition, see the answer to the "How are protocol state name exclusion and inclusion used?" question.)

That lsof is reporting only file size is indicated by the fact that the appropriate column header says SIZE instead of SIZE/OFF.

If lsof doesn't support the displaying of file offset (position) -- e.g., for Linux /proc-based lsof -- the -h or -? output panel won't list the -o option.

Sometimes the availability of file offset information depends on the dialect's kernel. This is particularly true for socket file offsets.

Maintenance of offsets for pseudo-terminal devices varies by UNIX dialect and is related to how the dialect kernel implements pseudo-terminal support. Kernels like AIX, for example, that short-circuit the transfer of data between socket and pseudo devices to reduce TCP/IP daemon interrupt rates won't advance offsets in the TCP/IP daemon socket files. Instead they will advance offsets in the open standard I/O files of the shell child process where the pseudo-terminal devices are used.

When in doubt about the behavior of lsof in reporting file offset information, do some carefully measured experiments, consult the lsof sources, or contact me at <abe@purdue.edu>

to discuss the matter. Please follow the reporting guidelines in the "How do I report an lsof bug?" section of this FAQ.

3.20.1 What does lsof report for size when the file doesn't really have one?

When a file has no true size -- e.g., it's a socket, a FIFO, or a pipe -- lsof tries to report the information it finds in the kernel that describes the contents of associated kernel buffers.

Thus, for example, size for most TCP/IP files is socket buffer size. The size of the socket read buffer is reported for read-only files; the size of the write buffer for write-only files; and the sum of the buffers sizes for read-write files.

3.21 Problems with path name arguments

3.21.1 How do I ask lsof to search a file system?

You can ask lsof to search for all open files on a file system by specifying its mounted path name as an lsof argument -- e.g.,

```
$ lsof /
```

Output of the mount command will show file system mounted path names. It will also show the mounted-on device path for the file system.

If the mounted-on device is a block device (the permission field in output of `ls -l <device>` starts with a `b/`), you can specify it's name, too -- e.g.,

```
$ lsof /dev/sd0a
```

If the mounted-on device isn't a block device -- for example, some UNIX dialects call a CD-ROM device a character device (ls output starts with a `c'`) -- you can force lsof to assume that the specified device names a file system with the `+f` option -- e.g.,

```
$ lsof +f -- /dev/sd0a
```

(Note: you must use ```--`" after `+f` or `-f` if a file name follows immediately, because `+f` and `-f` can be followed by

characters that specify flag output selections.)

When you use `+f` and `lsof` can't match the device to a file system, `lsof` will issue a complaint.

The `+f` option may be used in some dialects to ask `lsof` to search for an NFS file system by its server name and server mount point. If the mount application reports an NFS file system mounted-on value that way, then this sample `lsof` request should work.

```
$ lsof +f -- fleet:/home/fleet/u5
```

Finally, you can use `-f` if you don't want a mounted file system path name to be considered a request to report all open files on the file system. This is useful when you want to know if anyone is using the file system's mounted path name. This example directs `lsof` to report on open access to the `/` directory, including when it's being used as a current working or root directory.

```
$ lsof -f -- /
```

The `lsof -f` option performs the same function as `-f` does in some fuser implementations. However, since the `lsof -c` option was chosen for another purpose before the `-f` option was added to `lsof`, `+f` was selected as the analogue to the fuser `-c` option. (Sorry for the potential confusion.)

3.21.2 Why doesn't `lsof` find all the open files in a file system?

`lsof` may not find all the open files in a file system for several reasons.

First, some processes with files open on the file system may have been changing status when `lsof` examined the process table, and `lsof` "missed" them. Remember, the kernel changes much faster than `lsof` can respond to the changes.

Second, be sure you have specified the file system correctly. Perhaps you specified a file instead. You can use `lsof's` `-V` option to have `lsof` report in detail on what it couldn't find. Make sure the report for the file system you specified says "file system." Here's some `-V` output:

```
$ /lsof -V /tmp ./lsof.h ./lsof
```

```

COMMAND PID USER  FD  TYPE DEVICE SIZE/OFF INODE NAME
lsf  2688  abe  txt  VREG 18,1,7 1428583 226641 ./lsf
lsf  2689  abe  txt  VREG 18,1,7 1428583 226641 ./lsf
lsf: no file use located: ./lsf.h

```

You can also use lsf's +f option to force it to consider a path name as a file system. If lsf can't find a file system by the specified name, it will issue a complaint -- e.g.,

```

$ lsf +f -- /usr
lsf: not a file system: /usr

```

(/usr is a directory in the / file system.)

3.21.3 Why does the lsf exit code report it didn't find open files when some files were listed?

Sometimes lsf will list some open files, yet return a non-zero exit code, suggesting it hasn't found all the specified files.

The first thing you should when you suspect lsf is incorrect is to repeat the request, adding the -V option. In the resulting report you may find that your file system specification really wasn't a file system specification, just a file specification.

Finally, if you specify two files or two file systems twice, lsf will credit all matches to the first of the two and believe that there were no matches for the second. It's possible to specify a single file system twice with different path names by using both its mounted directory path name and mounted-one device name.

```

$ lsf +f -V spcuna:/sysprog /sysprog
COMMAND PID USER  FD  TYPE DEVICE SIZE/OFF INODE NAME
ksh  11092  abe  cwd  VDIR 39,0,1  1536 226562 /sysprog
(spcuna:/sysprog)
...
lsf: no file system use located: spcuna:/sysprog

```

All matches were credited to /sysprog; none to spcuna:/sysprog.

3.21.4 Why won't lsf find all the open files in a directory?

When you give lsof a simple directory path name argument (not a file system mounted-on name), you are asking it to search for processes that have the directory open as a file, or as a process-specific directory -- e.g., root or current working directory.

If you want to list instances of open files inside the directory, you need to specify the individual path names of those files, or use the lsof +D and +d options.

See the answer to the question "Why are the +D and +d options so slow?" before you use +D or +d casually.

See the answer to the question "Why do the +D and +d options produce warning messages?" for an explanation of some process authority limitations of +D and +d.

3.21.5 Why are the +D and +d options so slow?

The +D and +d options cause lsof to build a path name search list for a specified directory. +D causes lsof to descend the directory to its furthest subdirectory, while +d restricts it to the top level. In both cases, the specified directory itself is included in the search list. In both symbolic links are ignored.

Building such a search list can take considerable time, especially when the specified directory contains many files and subdirectories -- lsof must call the system readlink() and stat() functions for each file and directory. Storing the search list can cause lsof to use more than its normal amount of dynamic memory -- each file recorded in the search list consumes dynamic memory for its path name, characteristics, and search linkages. Using the list means lsof must search it for every open file in the system.

Building the search list for a directory specified on some file systems can be slow -- e.g., for an NFS directory with many files. Some file systems have special logging features that can introduce additional delays to the building of the search list -- e.g., NFS logging, or logging on a Solaris UFS file system. The bottom line is that slow search list construction may not be so much an lsof problem as a file system problem. (Hint: if you're using Solaris UFS logging, consider specifying the "logging,noatime" option pair to reduce the number of atime writes to the

UFS logging queue and disk.)

A somewhat risky way to speed up lsof's building of the search list is to use lsof's `--O` option. It forces lsof to do all system calls needed to build the search list directly, rather than in a child process. While direct system calls are much faster, they can block in the kernel -- e.g., when an NFS server stops responding -- stopping lsof until the kernel operation unblocks.

As an example of the load +D can impose, consider that an `lsof +D /` on a lightly loaded NeXT '040 cube with a 1GB root file system disk took 4+ minutes of real time. It also generated several hundred error messages about files and directories the lsof process didn't have permission to access with `stat(2)`.

The bottom line is that +D and +d should be used cautiously. +D is more costly than +d for deeply nested directory trees, because of the full directory descent it causes. So use +d where possible. And you might need to consider the performance of the file system that holds the directory you name with +d or +D.

In view of these warnings, when is it appropriate to use +D or +d? Probably the most appropriate time is when you would specify the directory's contents to lsof with a shell globbing construct -- e.g., `lsof *`. If that's what you need to do, `lsof +d .` is probably more efficient than having the shell produce a directory list, form it into an argument vector, and pass the vector to lsof for it to unravel.

See the answer to the question "Why do the +D and +d options produce warning messages?" for an explanation of some process authority limitations of +D and +d.

3.21.6 Why do the +D and +d options produce warning messages?

+D and +d option processing is limited by the authority of the lsof process -- i.e., lsof can only examine (with `lstat(2)` and `stat(2)`) files the owner of the process can access.

If the ownership, group membership, or permissions of the specified directory, file within it, or directory within

it prevents the owner of the lsof process from using lstat(2) or stat(2) on it, lsof will issue a warning message, naming the path and giving the system's (lstat(2)'s or stat(2)'s) reason (errno explanation text) for refusing access.

As an example, assume user abc has a subdirectory in /tmp, owned by abc and readable, writable and searchable by only its owner. If user def asks lsof to search for all /tmp references with +D or +d, lsof will be unable to lstat(2) or stat(2) anything in abc's private subdirectory, and will issue an appropriate warning.

Lsof warnings can usually be suppressed with the -w option. However, using -w with +D or +d means that there will be no indication why lsof couldn't find an open reference to a restricted directory or something contained in it.

Hint: if you need to use +D or +d and avoid authority warnings, and if you have super-user power, su and use lsof with +D or +d as root.

3.22 Why can't my C compiler find the rpcent structure definition?

When you try to compile lsof your compiler may complain that the rpcent structure is undefined. The complaints may look like this:

```
>print.c: In function `fill_portmap':  
>print.c:213: dereferencing pointer to incomplete type  
>...
```

The most likely cause is that someone has allowed a BIND installation to update /usr/include/netdb.h (or perhaps /usr/include/rpc/netdb.h), removing the rpcent structure definition that lsof expects to find there.

Only Solaris has an automatic work-around. (See dlsof.h in dialects/sun.). The Solaris work-around succeeds because there is another header file, <rpc/rpcent.h>, with the rpcent structure definition, and there is a Solaris C pre-processor test that can tell when the BIND <netdb.h> is in place and hence <rpc/rpcent.h> must be included.

Doubtlessly there are similar work-arounds possible in other UNIX dialects whose header files have been "touched" by BIND, but in general I recommend restoration of the

vendor's <netdb.h> and any other header files BIND might have replaced. (I think BIND replaces <resolv.h>, <sys/bitypes.h>, <sys/cdefs.h> -- and maybe others.)

3.23 Why doesn't lsof report fully on file "foo" on UNIX dialect "bar?"

lsof sometimes won't report much information on a given file, or may even report an error message in its NAME column. That's usually because the file is of a special type -- e.g., in a file system specific to the UNIX dialect -- and I haven't used a system where the file appeared during my testing.

If you encounter such a situation, send me e-mail at <abe@purdue.edu> and we may be able to devise an addition to lsof that will report on the file in question. Please follow the reporting guidelines in the "How do I report an lsof bug?" section of this FAQ. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

3.24 Why do I get a complaint when I execute lsof that some library file can't be found?

On systems where the LIBPATH (or the equivalent) environment variable is used to record the library search path in executable files when they are built, an incorrect value may make it impossible for the system to find the shared libraries needed to load lsof for execution.

This may be particularly true on systems like AIX >= 4.1.4, where the lsof Makefile takes the precautionary step of using the -bnolibpath loader flag to insure that the path to the private static lsof library is not recorded in the lsof binary. Should LIBPATH be invalid when lsof is built, it will be recorded in the lsof binary as the default library path search order and lead to an inability to find libraries when lsof is executed.

So, if you get missing library complaints when you try to execute lsof, check LIBPATH, or whatever environment variable is used on your system to define library search order in executable files. Use the tools at your disposal to look at the library paths recorded in the lsof binary -- e.g., chatr on HP-UX, dump on AIX, ldd on Solaris.

Make sure, too, that when the correct library search path has been recorded in the executable file, the required library files exist at one or more of the search paths.

3.25 Why does lsof complain it can't open files?

When lsof begins execution, unless it has been asked to report only help or version information, typically it will attempt to access kernel memory and symbol files -- e.g., /unix, /dev/kmem. Even though lsof needs only permission to open these files for reading, read access to them might be restricted by ownerships and permission modes.

So the first step to diagnosing lsof problems with opening files is to use ls(1) to examine the ownerships and permission modes of the files that lsof wants to open. You may find that lsof needs to be installed with some type of special ownership or permission modes to enable it to open the necessary files for reading. See the "Installing Lsof" section of OOREADME for more information.

3.26 Why does lsof warn "compiled for x ... y; this is z."?

Unless warnings are suppressed (with -w) or the kernel identity check symbol (HASKERNIDCK) definition has been deleted, all but one lsof dialect version (exception: /proc-based Linux lsof) compare the identity of the running kernel to that of the one for which lsof was constructed. If the identities don't match, lsof issues a warning like this:

```
lsof: WARNING: compiled for Solaris release 5.7; this is 5.6.
```

Two kernel identity differences can generate this warning -- the version number and the release number.

Build and running identity differences are usually significant, because they usually indicate kernels whose structures are different -- kernel structures commonly change at dialect version releases. Since lsof reads data from the kernel in the form of structures, it is sensitive to changes in them. The general rule is that an lsof compiled for one UNIX dialect version will not work correctly when run on a different version.

There are three work-arounds: 1) use `-w` to suppress the warning -- and risk missing other warnings; 2) permanently disable the identity check by deleting the definition of `HASKERNIDCK` in the dialect's `machine.h` header file -- with the same risk; or 3) rebuild `lsof` on the system where it is to be run. (Deleting `HASKERNIDCK` can be done with the `Customize` script or by editing `machine.h`.)

Generally checking kernel identity is a quick operation for `lsof`. However, it is potentially slow under AIX, where `lsof` must run `/usr/bin/oslevel`. To speed up `lsof`, use `-w` to suppress the `/usr/bin/oslevel` test. See "Why does AIX `lsof` start so slowly?" for more information.

3.27 How can I disable the kernel identity check?

The kernel identity check is controlled by the `HASKERNIDCK` definition. When it is defined, most dialects (exclusion: `/proc`-based Linux `lsof`) will compare the build-time kernel identity with the run-time one.

To disable the kernel identity check, disable the `HASKERNIDCK` definition in the dialect's `machine.h` header file. The `Customize` script can be used to do that in its section about the kernel identity check.

Caution: while disabling the kernel identity check may result in smaller `lsof` startup overhead, it comes with the risk of executing an `lsof` that may produce warning messages, error messages, incorrect output, or no output at all.

3.28 Why don't `ps(1)` and `lsof` agree on the owner of a process?

Generally the user ID `lsof` reports in its `USER` column is the process effective user ID, as found in the process structure. Sometimes that may not agree with what `ps(1)` reports for the same process.

There are sundry reasons for the difference. Sometimes `ps(1)` uses a different source for process information, e.g., the `/proc` file system or the `psinfo` structure. Sometimes the kernel is lax or confused (e.g., Solaris 2.5.1) about what ID to report as the effective user ID. Sometimes the system carries only one user ID in its process structure (some BSD derivatives), leaving `lsof` no choice.

The differences between lsof and ps(1) user identifications should be small and normally it will be apparent that the confusion is over a process whose application has changed to an effective user ID different from the real one.

3.29 Why doesn't lsof find an open socket file whose connection state is past CLOSE_WAIT?

TCP/IP connections in states past CLOSE_WAIT -- e.g., FIN_WAIT_1, CLOSING, LAST_ACK, FIN_WAIT_2, and TIME_WAIT -- don't always have open files associated with them. When they don't, lsof can't identify them. When the connection state advances from CLOSE_WAIT, sometimes the open file associated with the connection is deleted.

3.30 Why don't machine.h definitions work when the surrounding comments are removed?

The machine.h header files in dialect subdirectories have some commented-out definitions like:

```
/* #define HASSYSDC "/your/choice/of/path */
```

You can't simply remove the comments and expect the definition to work. That's intended to make you think about what value you are assigning to the symbol. The assigned value might have a system-specific convention. HASSYSDC, for example, might be /var/db/lsof.dc for FreeBSD, but it might be /var/adm/lsof.dc for Solaris.

Symbols defined in the lsof documentation are described in 00PORTING, other machine.h comments, and other lsof documentation files. HASSYSDC, for example, is discussed in 00DCACHE. When comments and documentation don't suffice, consult the source code for hints on how the symbol is used.

3.31 What do "can't read inpcb at 0x...", "no protocol control block", "no PCB, CANTSENDMORE, CANTRCVMORE", etc. mean?

Sometimes lsof will report "can't read inpcb at 0x00000000", "no protocol control block", "no PCB, CANTSENDMORE, CANTRCVMORE" or a similar message in the NAME column for open TCP socket files. These messages mean the file's socket structure lacks a pointer to the INternet Protocol Control

Block (inpcb) where lsof expects to find connection addresses
-- local and foreign ports, local and foreign IP addresses.
The socket file has probably been submitted to the shutdown(2)
function for processing.

In some implementations lsof
issues the "no PCB, CANTSENDMORE,
CANTRCVMORE" message, which tries to explain the absence
of a protocol control block by showing the socket state
settings that have been made by the shutdown(2) function.

If a non-zero address follows the "0x" in the "can't read
inpcb" message, it means lsof couldn't read inpcb contents
from the indicated address in kernel memory.

3.32 What do the "unknown file system type" warnings mean?

Lsof may report a message similar to"

```
unknown file system type, v_op: 0x10472f10
```

in the NAME column for some files.

This means that lsof has encountered a vnode for the file
whose operation switch address (from v_op) references a
file system type for which there is no support in lsof.

After lsof identifies the file system type, it uses
pre-compiled code to locate the file system specific node
for the file where lsof finds information like file size,
device number, node number, etc.

To get some idea of what the file system type might be,
use
nm on your kernel symbol file to locate the symbol name
that corresponds to the v_op address -- e.g., on Solaris
do:

```
$ nm -x /dev/ksyms | grep 0x10472f10  
0x10472f10 ... |file_system_name_vnodeops
```

Where "file_system_name" is the clue to the unsupported
file system.

Lsof doesn't use the v_op address to identify file system
types on all dialects. Sometimes it uses an index number
it finds in the vnode. It will translate that symbol to
a short name in the warning message -- e.g., "nfs3" -- if
possible.

3.33 Installation

3.33.1 How do I install lsof?

There is no "standard" way to install lsof. Too much depends on local conditions for me to be able to provide working install rules in the lsof make files. (The skeleton install rules you will find just give "hints.") See the "Installing Lsof" section of 00README for a fuller explanation.

To install lsof you will need to consider these questions:

- * Who should be able to use lsof? (See HASSECURITY and HASNOSOCKSECURITY in the "Security" section of 00README.)
- * Where should lsof be installed? This is a decision mostly dictated by local conditions. Somewhere in /usr/local -- etc/ or sbin/ -- is a common choice.
- * What permissions should I give the lsof executable? The answer to this varies by dialect. The make files have install rules that give hints. The "Installing Lsof" section of 00README gives information, too.
- * What if I want to install lsof in a shared file system for machines that require different lsof configurations? See the next question and answer, "How do I install a common lsof when I have machines that need differently constructed lsof binaries?"

3.33.2 How do I install a common lsof when I have machines that need differently constructed lsof binaries?

A dilemma that faces some system administrators when they install lsof in a shared file system -- e.g., NFS -- is that they must have different lsof executables for different systems.

The answer is to build an lsof wrapper script that is executed in place of lsof. The script can use system commands to determine which lsof binary should be executed.

Consider this example. You have HP-UX machines with 32 and 64 bit kernels that share the /usr/local/sbin directory where you want to install lsof. Consequently, on each

system you must use a different lsof executable, built for the system's bit size. (That's because lsof reads kernel structures, sized by the kernel's bit size.)

One answer is to install three things in /usr/local/sbin:

1) a 32 bit lsof as lsof32; 2) a 64 bit lsof as lsof64; and 3) an lsof script. The script might look like this one, based on work by Amir J. Katz:

```
#!/bin/sh
x=`/usr/bin/getconf KERNEL_BITS` # returns 32 or 64
if /usr/bin/test "X$x" = "X32"
then
  lsof32 $*
else
  if /usr/bin/test "X$x" = "X64"
  then
    lsof64 $*
  else
    echo "Can't determine which
lsof executable to use;"
    echo "getconf KERNEL_BITS says: $x"
    exit 1
  fi
fi
```

Solaris users should consult "How do I install lsof for Solaris 7, 8 or 9?" for information on a similar trick using the Solaris isaexec command.

Users of other dialects might be able to use a command like uname(1) that can identify a distinguishing feature of the system to be incorporated in pre-installed lsof executable names. For example, use `uname -r` and install binaries with suffixes that match `uname -r` output.

3.34 Why do lsof 4.53 and above reject device cache files built by earlier lsof revisions?

When lsof revisions 4.53 run and encounter a device cache file built by an earlier revision, it will reject the file and build a new one. The rejection will be advertised with these messages:

```
lsof: WARNING: no /dev device in <name>: 2 sections
...
lsof: WARNING: created device cache file: <name>
```

This happens because the header line of the device cache file was changed at revision 4.53 to contain the number of the device on which the device directory resides. The old device cache file header line -- the "2 sections" line in the above warning message, now reads "2 sections, dev=600".

This is not a serious problem, since lsof automatically rebuilds the device cache file with the correct header line.

3.35 What do "like block special" and "like character special" mean in the NAME column?

When lsof comes across an open block or character file whose device, raw device and inode place it somewhere other than /dev (or /devices), lsof doesn't report the /dev (or /devices) name in the NAME column. Instead lsof reports the file system name and device or path name in the NAME column and parenthetically adds "like block special <path>" or "like character special <path>".

The value for <path> will point to a block or character device in /dev (or /devices) whose raw device number matches that of the open file being reported, but whose device number or node number (or both) don't match.

Such an open file is connected to a device node that has been created in a directory other than /dev (or /devices.) See `mknode(8)` for information on how such nodes are created. (Generally one needs root power to create device nodes with `mknode`.)

3.36 Why does an lsof make fail because of undefined symbols?

When lsof is compiled via the `make` step and the final load step fails because of missing symbols, the problem may not be lsof. The problem may be that ld, called by the compiler as part of the `make` step, can't find some library that lsof needs.

First check the last compiler line of the make operation -- e.g., the last line with `cc` or `gcc` in it before the undefined symbol report -- for loader arguments, i.e., ones beginning with `-l`. Except for `-llsof` the rest name system libraries. (`-L./lib` precedes `-llsof` to tell the loader its location.)

Check that all the named system libraries exist. Look in `/lib` and `/usr/lib` as a start, but that may not be the only place system libraries live. Consult your dialect's documentation, e.g., the compiler and loader man pages, for other possible locations.

If some system library doesn't exist, that may mean it was never installed or was removed. You'll have to re-install the missing library.

You may find that all the system libraries `ldsof` uses exist. Your next step might be to use `nm` and `grep` to see if any of them contain the undefined symbols.

```
$ nm library | grep symbol
```

If the undefined symbol exists in some library named by the `ldsof` make step, then you might have a problem with some environment variable that controls the load step. The most common is `LD_LIBRARY_PATH`. It may have a setting that causes `ld` to ignore a directory containing a library `ldsof` names. If this is the case, try unsetting `LD_LIBRARY_PATH` in the environment of the `ld` process -- e.g., do:

```
$ unset LD_LIBRARY_PATH
or
% unsetenv
LD_LIBRARY_PATH
```

Consult your `ld` man page for other environment variables that might affect library searching -- e.g., `LIBPATH`, `LPATH`, `SHLIB_PATH`, etc.

If the undefined function doesn't exist in any libraries `ldsof` names, check other libraries. See if the function has a man page that names its library. If the latter is true, please let me know, because that is an `ldsof` problem I need to fix.

If none of these solutions work for you, send me some documentation via e-mail at abe@purdue.edu. Include ``uname -a`` output, the output of the `ldsof `Configure ...`` and ``make`` steps, and the contents of the environment in force when the ``make`` step was executed -- e.g., ``env`` or ``printenv`` output. If you've located the libraries `ldsof` names, send me that information, too. Make sure "ldsof" appears in the "Subject:"

line so my e-mail filter won't classify your letter as Spam.

3.37 Command Regular Expressions (REs)

3.37.1 What are basic and extended regular expressions?

Lsof's

`--c` option allows the specification of regular expressions (REs), enclosed in two slash (/) characters and followed by these modifiers:

- `b` the RE is a basic RE.
- `i` ignore case.
- `x` the RE is an extended RE (the default).

Note: the characters of the regular expression may need to be quoted to prevent their expansion by the shell.

Example: this RE is an extended RE that matches exactly four characters, whose third may be an upper ('O') or lower case ('o') oh:

```
-c /^..o.$/i
```

For simplicity's sake, an RE that is acceptable to `egrep(1)` is usually called an extended RE.

REs suitable for the old line editor, `ed(1)`, are often called basic REs (and sometimes also called obsolete).

These are some ways basic REs usually differ from extended REs. (There are other differences.)

* `]`, `+`, `?`, `{`, and `}` are ordinary characters.

* `^` is an ordinary character except at the beginning of the RE.

* `$` is an ordinary character except at the end of the RE.

* `*` is an ordinary character if it appears at the beginning of the RE.

For more information on REs and the distinction between basic and extended REs, consult your dialect's man pages for `ed(1)`, `egrep(1)`, `sed(1)`, and possibly `regex(5)` or

regex(7).

3.37.2 Why can't I put a slash in a command regular expression?

Since a UNIX command name is the last part of a path to the command's executable, the `ls` command regular expression (RE) syntax uses slash (/) to mark the beginning and end of an RE. Slash may not appear in the RE and the backslash escape is ineffective for "hiding" it.

More likely than not, if you try to put a slash in an `ls` command RE, you'll get this response:

```
$ ls -s/.\./ ...
ls: invalid regexp modifier: /
```

`ls` is complaining the the first character it found after the second slash isn't an `ls` command RE modifier -- 'b', 'i', or 'x'.

3.37.3 Why does `ls` say my command regular expression wasn't found?

When you use both forms of `ls`'s `-c` option -- `ls -c <command>` and `ls -c /RE/[m]` -- and ask that `ls` do a verbose search (`ls -V`), you may be surprised that `ls` will say that the regular expression wasn't found.

This can happen if the `ls -c <command>` form matches first, because then the `ls -c /RE/[m]` test will never have been applied. For example:

```
$ ./ls -clsf -c/^..o.$/ -V -adcwd
COMMAND PID USER  FD  TYPE DEVICE SIZE/OFF  NODE NAME
ls      7850  abe  cwd  VDIR  6,0  2048 96442 / (/dev/sd0a)
ls: no command found for regex: ^..o.$
```

The `ls -clsf` option matched first, so the `ls -c/^..o.$/` option wasn't tested.

3.38 Why doesn't `ls` report on shared memory segments?

`ls` reports on shared memory segments only if they're associated with an open file. That's consistent with `ls`'s mission -- to List Open Files. Shared memory segments with no file associations aren't open files.

That's not to say that a report on shared memory segments

and
their associated processes wouldn't be useful. But it
calls for a new tool, not more baggage for lsof.

3.39 Why does lsof report two instances of itself?

When you ask lsof to report all open files and it has
permission to do so, you may see two lsof processes in the
output. The processes are connected via pipes -- e.g.,
here's an HP-UX 11 example.

```
COMMAND  PID USER  FD  TYPE  DEVICE ...  
...  
lsof    29450  abe   7w  PIPE 0x48732408 ...  
lsof    29450  abe   8r  PIPE 0x48970808 ...  
...  
lsof    29451  abe   6r  PIPE 0x48732408 ...  
lsof    29451  abe   9w  PIPE 0x48970808 ...
```

The first process will usually be the lsof you initiated;
the second, an lsof child process that is used to isolate
its parent process from kernel functions that can block --
e.g., readlink() or stat().

Information to and from the kernel functions is exchanged
via the two pipes. When the parent process detects that
the child process has
become blocked, it attempts to kill
the child. Depending on the UNIX dialect that may succeed
or fail, but the parent won't be blocked in any event.

See the "BLOCKS AND TIMEOUTS" and "AVOIDING KERNEL BLOCKS"
sections of the lsof man page for more information on why
the child process is used and how you can specify lsof
options to avoid it. (Caution: that may be risky.)

3.40 Why does lsof report '\n' in device cache file error messages?

Lsof revisions prior to 4.58 may report '\n' in error
messages it delivers about problems in the device cache
file -- e.g.,

```
lsof: WARNING: no ...: 4 sections\n
```

That's deliberately done to show the exact contents of the
device cache file line about which lsof is complaining,
including its terminating NL (New Line) '\n' character.
In the above example the line in the device cache file

causing the lsof complaint contains "4 sections" and ends with a '\n'.

At revision 4.58 and above, device cache error messages like the one in the above example have been changed to read:

```
lsof: WARNING: no ...: line "4 sections"
```

The terminal '\n' is no longer reported, the line contents are enclosed in double quote marks (""), and the word "line" has been added as a prefix to denote that what follows is a line from the device cache file.

3.41 Kernel Symbol and Address Problems

3.41.1 What does "lsof: WARNING: name cache hash size length error: 0" mean?

When run on some systems, lsof may issue this warning:

```
lsof: WARNING: name cache hash size length error: 0
```

That is an example from a FreeBSD system where lsof reads the kernel's `_nchash` variable and finds its value is zero.

Similar warnings include:

```
WARNING: kernel name cache size:
WARNING: can't read kernel's name cache:
WARNING: no name cache address
WARNING: name cache hash size length error:
WARNING: unusable name cache size:
```

These warnings are issued when lsof is attempting to read the kernel's name cache information.

They are usually the result of a mis-match between the addresses for kernel symbols lsof gets via `nlist(2)` and the addresses in use by the kernel.

lsof usually gets kernel symbol addresses from what it believes to be the kernel boot file. In FreeBSD, for example, that's the path returned by `getbootfile(3)`, usually `/kernel`. The boot file can have other names in other UNIX dialects -- `/unix`, `/vmunix`, `/bsd`, `/netbsd`, `/mach`, `/stand/vmunix`, etc.

Lsof will get incorrect (mismatched) addresses from the boot file if it has been replaced by a newer one which hasn't yet been booted -- e.g., if this is done in FreeBSD:

```
# mv /kernel /kernel.OLD
# mv /kernel.NEW /kernel
```

Until the FreeBSD system is rebooted, the booted kernel is /kernel.OLD, but getbootfile() says it is /kernel. If symbol addresses important to lsof in /kernel.OLD and /kernel don't match, the lsof WARNING messages result.

3.41.2 Why does lsof produce "garbage" output?

Kernel name cache warnings may not be the only sign that lsof is using incorrect symbol addresses to read kernel values. If there's no reasonable test lsof can make on what it reads from the kernel, it may issue other warnings or even report nonsensical results.

The warnings may appear on STDERR, such as:

```
lsof: can't read proc table info
```

Or the warnings may appear in the NAME column as messages saying lsof can't read or interpret some kernel structure -- e.g.,

```
... NAME
... can't read file struct from 0x12345
```

One possible work-around is to point lsof's kernel symbol address gathering at the proper boot file. That can be done with lsof's -k option -- e.g.,

```
$ lsof -k /kernel.OLD
```

The best work-around is to make sure the standard boot file is properly sited -- e.g., if you've moved a new /kernel in place, boot it.

3.42 Why does lsof report open files when run as super user that it doesn't report when run with lesser privileges?

The most likely cause is that the HASSECURITY

option was selected when the lsof executable was built.

If HASSECURITY is defined when lsof is built, and lsof is run with the privileges of a non-ROOT user, it will only list open files belonging to the user. The same lsof executable, when run with root user privileges, will list all open files.

However, if HASSECURITY and HASNOSOCKSECURITY are both defined when lsof is built, lsof will list open files belonging to the user and will also list anyone else's open socket files, provided their listing is selected with the "-i" option.

So first ask yourself if the process whose open files lsof won't list belong to a user other than the one under which you're running lsof, and are not open socket files. If either is true, use lsof's help (-h or -?) option and look for a line near the bottom of the help panel that says:

```
"... can list all files..."
```

If the leading "..." says "Only root" then HASSECURITY was defined when lsof was built. If the trailing "..." says
", but anyone can list socket files" then HASNOSOCKSECURITY was also defined.

Should you want an lsof not built with HASSECURITY defined, rerun the lsof Configure script. If you let Configure do customization, make sure you answer 'n' when it asks if you want to enable HASSECURITY and HASNOSOCKSECURITY. If you don't need to do customization, you can rebuild lsof with the "-n" option to Configure. Here's an example of such a rebuild sequence:

```
$ Configure -clean  
$ Configure -n <dialect-abbreviation>  
$ make
```

More information on the HASSECURITY and HASNOSOCKSECURITY options may be found in the "Security" section of the 00README file of the lsof distribution.

3.43 Test Suite Problems

3.43.1 Errors all tests can report:

3.43.1.1 Why do tests complain "ERROR!!! can't execute ../lsof"?

All tests in the test suite expect an executable lsof file to exist in the tests parent directory, ../lsof.

If there's none there, the tests/Makefile has a rule to make it, but there are probably circumstances where that rule may fail.

The work-around is to re-Configure and re-make lsof, then run the test suite.

3.43.1.2 Why do tests complain "ERROR!!! can't find ..." a file?

Many tests create (or use from a supplied environment variable path) a test file and use lsof to find it. When lsof can't find the file, the tests report the error with messages of the form:

```
ERROR!!! can't find ... : <some file path>
```

or

```
ERROR!!! lsof couldn't find ...
```

These type of error messages mean that the lsof field output delivered to the test didn't contain a file that the test could identify as the one it intended lsof to find. It might also mean that the process information -- command name, PID or parent PID -- didn't match what the test expected.

This could imply a bug in the test or a bug in lsof. Try using lsof to find a known file that is open. For example, while in the tests sub-directory, do this:

```
$ sleep 30 <
Makefile
$ ../lsof Makefile
```

If lsof doesn't report that Makefile is open, then the fault may be with lsof. If lsof reports the file is open, search further in the test code for the failure cause.

3.43.1.3 Why do some tests fail to compile?

If a test suite program fails to compile, it may be because I've never had an opportunity to compile the test on the

particular UNIX version you are using.

See Appendix B in 00TEST for a list of the UNIX dialects where the test suite has been validate.

3.43.1.4 Why do some tests always fail?

There are several tests in the optional group that have conflicting or special requirements:

LTbigf needs a dialect and file system that support large files.

LTlock won't work if the tests/ sub-directory is on an NFS file system.

LTnfs won't work if the tests/ sub-directory is not on an NFS file system.

So for two tests in particular, LTlock and LTnfs, one will generally fail.

Some failing tests can be run successfully by supplying to them a path to the appropriate type of file system with the -p option.

3.43.1.5 Why does the test suite say it hasn't been validated on my dialect?

When you use the default rule of the test suite's Makefile, it may issue this complaint:

```
$ cd tests
$ make
!!!WARNING!!!
```

This dialect or its particular version may not have been validated with the lsof test suite. Consequently some tests may fail or may not even compile.

```
!!!WARNING!!!
```

You are then given the opportunity to answer 'y' to have the test suite operation continue.

This message means that the tests/TestDB file in the tests sub-directory doesn't show that the test suite has been

run with the combination of compiler flags found in tests/config.cflags. The tests might not run; they may encounter compiler failures.

See 00TEST for more information on the UNIX dialects where the test suite has been validated and on the workings of TestDB and its supporting scripts.

When the tests/Makefile "auto" rule is used, the message is more terse and the condition is fatal.

This suite has not been validated on:

<dialect_description>

No opportunity to continue is offered.

The tests/Makefile "silent" rule will skip checking for the validation footprint.

3.43.1.6 Why do the tests complain they can't stat() or open() /dev/mem or /dev/kmem?

When the tests detect that lsof for the dialect reads its information from kernel memory (i.e., the LT_KMEM definition is present in tests/config.cflags), and when the lsof executable path is ../lsof, the tests make sure they can stat() and open() for read access the relevant kernel memory devices, /dev/kmem and possibly /dev/mem.

If those stat() or open() operations fail, the tests issue an error message and quit. The message explains why the system rejected the operation in terms of system "errno" symbols and messages. More often than not the explanation will be that the process lacks permission to access the indicated device node.

One work-around is to give the lsof executable being tested the necessary permission -- e.g., via chgrp, chmod, etc. -- and set its path in the LT_LSOF_PATH environment variable. (See 00TEST.)

Another work-around is to make sure the process that runs the tests has the necessary permissions -- e.g., run it as root, or enable the process login to access the resources. For example, I can run the tests on my personal work-station

because /dev/kmem and /dev/mem are readable by the "kmem" group and my login is in that group.

3.43.2 LTbigf test issues

3.43.2.1 Why does the LTbigf test say that the dialect doesn't support large files?

Large file support is defined dialect by dialect in the lsof source files and Configure script. If large file support isn't defined there, it isn't defined in the LTbigf test.

If you think that's wrong for a particular dialect, contact me via e-mail at <abe@purdue.edu>.

Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

3.43.2.2 Why does LTbigf complain about operations on its config.LTbigf* file?

The LTbigf must be able to write a large file test (size > 32 bits) and seek within it and the process file ulimit size must permit the operation. If the default location for the test file, tests/, isn't on a file system enabled for large file operations or if the process ulimit file block size is too small, lsof will get file operation errors, particularly when seeking

There may be a work-around. Specify the path to a file LTbigf can write in a file system enabled for large file operations a the -poption. Make sure that the ulimit file block size permits writing a large file. For example, presuming /scratch23 is large-file-enabled, and presuming you have permission to raise the ulimit file block size, this shell commands will allow the LTbigf test to run on AIX:

```
$  
./LTbigf -p /scratch23/abe/bigfile
```

(Note: syntax for the ulimit command varies by dialect and by shell. Discovering the proper variant is left to the reader.)

More information on this subject can be found in the LTbigf

description in the 00TEST file. Of course, the LTbigf.c source file in tests/ is the ultimate source of information,

3.43.2.3 Why does LTbigf warn that lsof doesn't return file offsets?

On some dialects (e.g., Linux) lsof can't report file offsets, because the data access method underlying lsof doesn't provide them. If LTbigf knows that lsof can't report file offsets for the dialect, it issues this warning:

```
LTbigf ... WARNING!!! lsof can't return file offsets
for this dialect, so offset tests have
been disabled.
```

LTbigf then performs the size test and skips the offset tests.

For more information see 00TEST and the "Why doesn't /proc-based lsof report file offsets (positions)?" Q&A of this file.

3.43.3 Why does the LTbasic test complain

"ERROR!!! lsof this ..."
and "ERROR!!! lsof that ..."?

The LTbasic test program uses lsof to examine a running lsof process. It looks for the lsof current working directory, executable (if possible), and kernel memory file (if applicable).

Failures to find those things result in the LTbasic error messages. More information on how LTbasic produces the error messages may be found in the LTbasic.c source file.

On HP-UX 11.11 and higher, for example, if the test's current working directory is on a loopback (LOFS) file system, LTbasic won't be able to find the current working directory of the lsof process because of a bug in the HP-UX kernel.

The solution for that HP-UX problem is to install an HP-UX patch. See the answer to the "Why doesn't PSTAT-based lsof report a CWD that is on a loopback (LOFS) file system?" question for more information on the patch.

3.43.4 NFS test issues

3.43.4.1 Why does the LTnfs test complain "couldn't find NFS file ..."?

The LTnfs

test must work with an NFS test file. After it opens the file it asks lsof to find it on an NFS file system. If the file isn't on an NFS file system, lsof won't find it, and the NFS test script complains and fails.

The work-around is to use -p option to supply a path to a regular NFS file (not a directory) that is on an NFS file system that LTnfs can read. Presuming /share/bin/file is such a file and can be opened for reading by the LTnfs test, this sample shell command could be used to run the LTnfs test successfully:

```
$ ./LTnfs -p /share/bin/file
```

(If the NFS file system is enabled for large files, the NFS test will produce the error message described in the following Q&A.)

3.43.5 LTnlink test issues

3.43.5.1 Why does the LTnlink test complain that its test file is on an NFS file system?

The LTnlink test may complain:

```
LTnlink ... WARNING!!! test file <path> is NFS mounted.
```

and then issue an explanation and a hint about using the -p option.

The LTnlist

test does this because of the way NFS file links are managed when an NFS file is unlinked and the unlinking process still has the file open. Unlike with files on a local file system, when an NFS file that is still open is unlinked, its link count is not reduced.

The file name is changed to a name of the form .nfsxxxx and the link count is left unchanged until the process holding the file open closes it. That's done by NFS so it can keep proper track of the file on NFS clients and servers.

Since the link count isn't reduced when the LTnlink test program closes the NFS test file it still has open, lsof won't find it for LTnlink with a link count of zero. Consequently, LTnlink disables that test section and issues its warning.

The warning suggests that the unlink test section can be run by giving LTnlink a path to a test file with the -p option. That path must name a file LTnlink can write and unlink. Presuming /scratch23/abe/nlinkfile is on a local file system and the LTnlink test can write to it and unlink it, this sample shell command can be used to run the complete LTnlink test successfully:

```
$ LTnlink -p /scratch23/abe/nlinkfile
```

3.43.5.2 Why does LTnlink delay and report "waiting for link count update: ..."?

On some UNIX dialects and file system combinations the updating of link count after a file has been unlinked can be delayed. Consequently, lsof won't be able to report the updated link count to LTnlink for a while.

When lsof doesn't report the proper link count to LTnlink, it sleeps and repeats the lsof call, using the "waiting for link count update: ..." message as a signal that it is waiting for the expected lsof response. The wait cycle duration is limited to approximately one minute.

3.43.5.3 Why does LTnlink fail because of an unlink error?

LTnlink may fail with an error similar to:

```
LTnlink ... ERROR!! unlink(<name>) failed: (Permission denied).
```

That message will be followed by a short explanation.

The error means that the kernel support for the file system on which the file <name> resides does not allow a process to unlink a file while it has the file open. (When LTnlink is run without the "-p path" option, it creates a <name> that begins with "./config.LTnlink" and ends with the LTnlink process ID number.)

An unlink failure of this type runs counter to original UNIX file system behavior, but it has been observed on some file system types, especially on the ZFS file system.

The work-around is to run LTnlink on a file system that allows a process to unlink a file it has open. Usually /tmp has that

support. So, try running LTnlink this way:

```
$ ./LTnlink -p /tmp/<name>
```

where <name> is a unique name in /tmp of your choosing. To be safe, create a subdirectory in /tmp, named by your login:

```
$ rm -f /tmp/<login>
$ mkdir /tmp/<login>
$ ./LTnlink -p /tmp/<login>/<name>
```

3.43.6 LTdnlc test issues

3.43.6.1 Why won't the LTdnlc test run?

Lsof

is unable to access the DNLC cache on AIX, because the kernel symbols for the DNLC aren't exported. Contact IBM to learn why that decision was made.

The LTdnlc test won't work on Apple Darwin because lsof can't obtain reliable DNLC information.

The LTdnlc test may fail on other dialects. Failure causes include: a busy system with a DNLC that is changing rapidly; path name components too large for the DNLC; a file system -- e.g., NFS, /tmp, loopback -- which doesn't fully participate in the DNLC; or DNLC limitations (Many DNLC implementations will only store path name components if they are 31 characters or less.)

If you suspect the file system doesn't fully participate in kernel DNLC processing, as a work-around rebuild and test lsof on one that does.

3.43.6.2 What does the LTdnlc test mean by "... <path> found: 100.00%"?

Even when it succeeds the LTdnlc test will report:

```
LTdnlc ... /export/home/abe/src/lsof4/tests found: 100.00%
```

This message means that the LTdnlc test asked lsof to find the file at the indicated path five times and lsof found the full path name in the indicated percentage of calls. The LTdnlc test considers it a failure if the percentage falls below 50.0%

3.43.6.3 Why does the DNLC test fail?

The DNLC test may fail when some component of the lsof tests/ sub-directory can't be cached by the kernel DNLC. Some kernels have a limit on the length of individual components (typically) 32.

3.43.7 Why hasn't the test suite been qualified for 64 bit HP-UX 11 when lsof is compiled with gcc?

When I attempted to qualify lsof for HP-UX 11, compiled with gcc 3.0, the LTsock test failed. I traced the failure to a gcc compilation error. Because LTsock is an important test, I didn't feel that the test suite was qualified if it failed.

LTsock compiles and runs correctly on 64 bit HP-UX 11 when compiled with HP's ANSI-C.

3.43.8 LTzoff test issues

3.43.8.1 Why does LTzoff warn that lsof doesn't return file offsets?

On some dialects (e.g., Linux) lsof can't report file offsets, because the data access method underlying lsof doesn't provide them. If LTzoff knows that lsof can't report file offsets for the dialect, it issues this warning:

```
LTzoff ... WARNING!!! lsof can't return file offsets
for this dialect, so offset tests have
been disabled.
```

LTzoff then performs the size test and skips the offset tests.

For more information see 00TEST and the "Why doesn't /proc-based lsof report file offsets (positions)?" Q&A of this file.

3.43.9 LTlock test issues

3.44 File descriptor list (the ``-d" option) problems

3.44.1 Why does lsof reject a ``-d" FD list?

lsof rejects ``-d" FD lists that contain both exclusions and inclusions with messages like:

lsof: exclude in an include list: ^1

lsof: include in an exclude list: 2

That's because ``-d" FD lists are processed as ORed lists, so it makes no sense for them to contain both exclusions and inclusions.

I.e.,

if a ``-d" FD list were to contain ``^cwd,1", the ``^cwd" member is useless, because the ``1" member dominates by saying "include only FD 1". That effectively excludes ``cwd" FD.

Note that lists may have multiple members of the same type, exclude or include. They are processed as an ORed set. If an FD isn't excluded by any member of an exclude list, it is selected. If an FD is included by any member of an include list, it is selected.

3.44.2 Why are file descriptors other than those in my FD list reported?

The FD list that follows ``-d" excludes or includes file descriptors, but unless the ``-a" (AND) option is specified, the FD list selections are ORed to the other selections.

For example, the following lsof command will cause all file descriptors to be listed for the lsof command, and all but the cwd descriptor for all other commands, probably not what was intended.

```
$ lsof -clsof -d^cwd
```

Hint: use ``-a" -- e.g.,

```
$ lsof -clsof  
-a -d^cwd
```

3.45 How can I supply device numbers for inaccessible NFS file systems?

When lsof can't get device numbers for inaccessible NFS file systems via stat(2) or lstat(2), it attempts to get them from the mount table's dev=xxx options. Successes are reported with a warning message that indicates the source of the device number and that output might be incomplete as a consequence of the warnings.

Some system mount tables -- e.g., Linux /proc/mounts -- don't have a dev=xxx option. In that case, and provided lsof for the dialect supports them, you can use the +m option to create a mount table supplement file and the "+m m" option to use it.

First check the lsof -h (help) output to see if the +m and "+m m" options are supported. If they are, use +m to create a mount table supplement file when all mounted file systems are accessible. Use "+m m" later to make the supplement available when some mounted file systems might not be available.

Here's an example that creates a mount supplement file in \$HOME/mnt-sup and later makes it available to lsof.

```
$ rm -f $HOME/mnt-sup
$ lsof +m > $HOME/mnt-sup
...
$ lsof +m $HOME/mnt-sup <other lsof options>
```

If lsof has to get the device number from the supplement, it will issue an informative warning message. The warning can be suppressed with lsof's -w option.

Caution! Since the mount table supplement file is static, it is its supplier's responsibility to update it as file system mounts change.

For more information, consult the lsof man page. The "ALTERNATE DEVICE NUMBERS" section has useful information on how lsof acquires device numbers when stat(2) or lstat(2) fail.

3.46 Why won't lsof find open files on over-mounted file systems?

When a file system, /xyz for example, is mounted on the same mount point as another file system, /abc for example, running lsof with an argument of the path of the first file system's mount point -- the over-mounted one, /abc -- probably will not reveal any files open on /abc.

That's because lsof looks for open files on a file system by looking for files with the file system's device number. The two file systems usually have different device numbers and lsof determines the device number search key from the supplied name of the second file system.

A general work-around exists only for Linux. On that UNIX dialect, when you know the over-mounted file system's mount point path, you can ask lsof to report on all open files and grep that output for the path of the over-mounted file system mount point.

3.47 What can be done when lsof reports no more space?

Many lsof methods cache information in memory, using the dialects malloc() library function. When malloc() can't allocate the requested amount of memory, lsof exits with warning messages similar to this AIX message:

```
lsof: no more dev-ch space at pid 2257750: 0x82a8e600
```

Lsof then exits immediately and produces no more output.

A possible work-around is to increase the memory foot print of the shell that runs lsof. That is often done with the ulimit(1) shell command.

3.48 What if the lsof build encounters ar and ld problems?

The lsof main and library Makefiles use the library archiver, ar, and the system loader, ld, applications. Improperly located, installed or configured versions of them may cause the lsof build to encounter errors with them.

The application producing the error should identify itself in its error messages.

The first thing to check the path of the application that is being used. Try `which ar` or `which ld` to see if perhaps the PATH used during the build might be causing the wrong archiver or loader to be used.

If the problem is with the use of the wrong archiver, and it's not possible to correct the PATH to it, try using the LSOF_AR environment variable to specify the path to and arguments for the correct archiver. See 00XCONFIG for more information and note that LSOF_AR must specify the path to the archive application and the arguments for it, less the terminating library and module name arguments.

If the problem is with the loader, there is no lsof work-

around. That's because lsof calls the loader via the C compiler, so the problem must be fixed at the compiler (system) level.

3.49 Why does lsof -i report an open socket file for a process, but lsof -p on that process' ID report nothing?

The lsof in use was probably built with the HASSECURITY and HASNOSOCKSECURITY options and the process in question does not belong to the user of lsof.

The HASSECURITY option limits lsof output to processes owned by the user invoking lsof and the HASNOSOCKSECURITY option weakens that slightly to allow output of open socket file information for all processes.

For example, if process PID 12345 is owned by some user other than the one invoking lsof, and lsof has been compiled with the HASSECURITY and HASNOSOCKSECURITY options, the following lsof command will display the open socket files of process 12345:

```
$ lsof -p 12345 -a -i
```

This security restriction is described in the lsof(8) manual page.

4.0 AIX Problems

4.1 What is the Stale Segment ID bug and why is -X needed?

Kevin Ruderman reports that he has been informed by IBM that processes using the AIX 3.2.x, 4.1[.12345]], 4.2[.1], and 4.3.x kernel's readx() function can cause other AIX processes to hang because of what appears to be file system corruption.

This failure, known as the Stale Segment ID bug, is caused by an error in the AIX kernel's journaled segment memory handler that causes the kernel's dir_search() function erroneously to believe directory entries contain zeroes. The process using the readx() call need not be doing anything wrong. Usually the system must be under such heavy load that the segment ID being used in the readx() call has been freed and then reallocated to another process since it was obtained from kernel memory.

Lsof uses the readx() function to access library entry structures, based on the segment ID it finds in the proc structure of a process. Since IBM probably will never fix the kernel bug, I've added an AIX-specific option to lsof that controls its use of the readx() function.

By default lsof readx() use is disabled; specifying the ``-X" option enables readx() use.

If you want to change the default readx() behavior of AIX lsof, change the HASXOPT, HASXOPT_ROOT, and HASXOPT_VALUE definitions in dialects/aix/machine.h. You can also use these definitions to enable or disable readx() -- consult the comments in machine.h. You may want to disable readx() use permanently if you plan to make lsof publicly executable.

When HASXOPT_ROOT is defined, lsof will restrict use of the -X option to processes whose real UID is root; if HASXOPT_ROOT isn't defined, any user may specify the -X option. The Customize script offers the option to change HASXOPT_ROOT when HASXOPT is defined and HASXOPT_ROOT is named in any dialect's machine.h header file.

I have never seen lsof cause a problem with its use of readx(), but I believe there is some chance it could, given the right circumstances.

4.1.1 Stale Segment ID APAR

Here are the details of the Stale Segment ID bug and IBM's response, provided by Kevin Ruderman.

AIX V3

APAR=ix49183

user process hangs forever in kernel due to file system corruption

STAT=closed prs TID=tx2527 ISEV=2 SEV=2

(A "closed prs" is one closed with a Permanent Restriction.)

RCOMP=575603001 aix v3 for rs/6 RREL=r320

AIX V4 (internal defect, no apar #)

prefix p

name 175671

abstract KERMP: loop for ever in dir_search()

Problem description:

1. Some user application -- e.g., lsof -- gets the segment ID (SID) for the process private segment of a target process from the process table.
2. The target process exits, deleting the process private segment.
3. The SID is reallocated for use as a persistent segment.
4. The user application runs again and tries to read the user area structure from /dev/mem, using the SID it read from the process table.
5. The loads done by the driver for /dev/mem cause faults in the directory; new blocks are allocated; the size changed; and zero pages created.
6. The next application that looks for a file in the affected directory hangs in the kernel's dir_search() function because of the zero pages. This occurs because the kernel's dir_search() function loops through the variable length entries one at a time, moving from one to the next by adding the length of the current entry to its address to get the address of the next entry. This process should end when the current pointer passes the end of the known directory length.

However, while the directory length has increased, the entry length data has not, so when dir_search() reaches the zero pages, it loops forever, adding a length of zero to the current pointer, never passing the end of the directory length. The application process is hung; it can't be killed or stopped.

IBM closed the problem with a PRS code (Permanent Restriction) under AIX Version 3 and had targeted a fix for AIX 4.2. They have recently (I became aware of it September 10, 1996) cancelled the defect report altogether and have indicated they are not going to fix the defect.

4.2 Gcc Work-around for AIX 4.1x

When gcc is used to compile lsof for AIX 4.1x, it doesn't align one element of the user structure correctly. Xlc

sees the U_irss element as a type "long long" and aligns it on an 8 byte boundary. That's because the default mode of xlc is -qlonglong; when -qlonglong is enabled, the _LONG_LONG symbol is also defined.

Gcc sees U_irss as a two element array of type long, because _LONG_LONG isn't defined. Hence gcc aligns the U_irss element array on a 4 byte boundary, rather than an 8 byte one, making the gcc incantation of the user structure 4 bytes shorter than xlc's.

When the length of gcc's user structure is supplied as argument 4 to the undocumented getuser() function of the AIX kernel, getuser() rejects it as an incorrect size and returns EINVAL.

Lsof has a work-around for this problem. It involves a special test in the Configure script when the "aixgcc" Configure abbreviation is used -- e.g.,

```
$ Configure -n aixgcc
```

The test is to compile a small program with gcc and check the alignment of U_irss. If it's not aligned on an 8 byte boundary, the Configure script makes a special copy of <sys/user.h> in ./dialects/aix/aix<AIX_version> whose U_irss will align properly, and generates compile time options to use it.

While I have tested this work-around only with 4.1.4, it should work with earlier versions of AIX 4.1. It does not work for AIX 4.2; a different work-around is employed there. (See the next section.)

If you want to use this technique to compile other AIX 4.1x programs with gcc for using getuser(), check the Configure script.

Stuart D. Gathman identified this gcc AIX alignment problem.

4.3 Gcc and AIX 4.2[.1]

Alignment problems with gcc and AIX 4.2[.1] inside the user structure are more severe, because there are some new 64 bit types in AIX that gcc doesn't yet (as of 2.7.x) support. The <sys/user.h> U_irss element problem, discussed in 4.3

above, doesn't exist in 4.2[.1].

The AIX lsof machine.h header file has a work-around, provided by Henry Grebler, that bypasses gcc alignment problems. Later versions of gcc (e.g., 2.8.x) will probably bypass the problems as well.

4.4 Why won't lsof's Configure allow the use of gcc for AIX below 4.1?

Gcc can't reliably be used to compile lsof for AIX versions below AIX 4.1 because of possible kernel structure element alignment differences between it and xlc.

4.5 What is an AIX SMT file type?

When you run AIX X clients with the DISPLAY environment variable set to ``:0.0" they communicate with the AIX X server via files whose kernel file structure has an undefined type (`f_type == 0xf`) -- at least there's no definition for it in `<sys/file.h>`.

These are Shared Memory Transport (SMT) sockets, an artifact of AIXWindows, designed for more efficient data transfers between the X server and its clients.

Henry Grebler and David J. Wilson alerted me to the existence of these files. Mike Feldman and others helped me identify them as SMT sockets.

The curious reader can find more about SMT sockets in `/usr/lpp/X11/README.SMT`.

4.6 Why does AIX lsof start so slowly?

When AIX lsof starts it compares the running kernel's identity to the one for which it was built, using `/usr/bin/oslevel`. That comparison can sometimes take a long time to complete, depending on the system's maintenance level and how recently it was examined with `oslevel`.

AIX revisions 4.67 and above for AIX 5 and above don't use `oslevel` to determine the kernel identity. They use `uname(2)` instead, and it is much faster.

You can skip the `oslevel` test by suppressing warning messages

with lsof's -w option. Doing that carries with it the risk of missing other warning messages, however.

You can also disable the kernel identity check by disabling the definition of the HASKERNIDCK symbol by editing AIX machine.h header file or by using the Customize script to disable it.

See the "Why does lsof warn "compiled for x ... y; this is z.?" section for more information.

4.7 Why does exec complain it can't find libc.a[shr.o]?

When you try to execute lsof you may get this complaint:

```
exec(): 0509-036 Cannot load program ./lsof because of
the following errors:
0509-022 Cannot load library libc.a[shr.o].
0509-026 System error: A file or directory in
the path name does not exist.
```

This is probably the result of making lsof when the LIBPATH environment variable contained a directory path that doesn't contain

libc.a. You can see what LIBPATH contained when lsof was made by using the dump application on lsof. For example, if LIBPATH contained /foo/bar when lsof was made, you will see this (partial) dump output:

```
$ dump -H lsof
...
***Import File Strings***
INDEX PATH          BASE      ...
0    /foo/bar
```

To correct the problem, revisit the lsof source directory and remake lsof this way:

```
$ unset LIBPATH; make (sh or ksh)
or
% unsetenv LIBPATH; make (csh or tcsh)
```

4.8 What does lsof mean when it says, "no PCB, CANTSENDMORE, CANTRCVMORE" in a socket file's NAME column?

When an AIX application calls shutdown(2) on an open socket file, but hasn't called close(2) on the file, the file will remain visible to lsof as an open socket file without any

extended protocol information.

Lsof reports that state in the NAME column by saying that there is "no PCB" (Protocol Control Block) for the protocol (e.g., TCP in the NODE column). If the open socket file has the state variables SO_CANTSENDMORE and SO_CANTRCVMORE set -- i.e., from the shutdown(2) call -- lsof reports them with the CANTSENDMORE and CANTRCVMORE notes in the NAME column.

4.9 When the -X option is used on AIX 4.3.3, why does lsof disable it, saying "WARNING: user struct mismatch; -X option disabled?"

The -X option causes lsof to read the loader information of the user structure from virtual memory via the readx() system call. It does that with the user structure definition from <sys/user.h> that was compiled into the lsof executable.

On AIX 4.3.3 there are two different user structure definitions in two separate <sys/user.h> header files, distributed at different times by IBM. If lsof was compiled with one and the kernel on which lsof is being run was compiled with the other, lsof normally won't get correct loader information when it calls readx().

In an attempt to compensate for that difference, lsof makes an independent check of the loader information by getting the user structure's open file count via readx() and comparing it to the open file count obtained independently via getprocs(). When the two counts don't match, lsof tries to read the count (and re-read the loader information) with two offsets, based on observed differences between the two user structures.

When one of the three attempts produces a correct open file count, lsof uses its corresponding offset on subsequent readings of the loader information.

When none of the three attempts produces a correct open file count, lsof issues the WARNING message and disables -X processing.

To eliminate this problem, obtain an lsof binary that matches the kernel of the AIX 4.3.3 system where you want to run lsof. Compiling lsof on the target system is the preferred way to get a matching binary.

4.10 Why doesn't the -X option work on my AIX 5L or 5.[123] system?

If your AIX 5L or 5.[123] system uses the ia64 architecture, lsof needs setuid-root permission to be able to do the processing that -X requires.

Check the output of ``uname -a`` to determine the architecture type.

The work-around is to give lsof setuid-root permission.

4.11 Why doesn't /usr/bin/oslevel report the correct AIX version?

The oslevel man page says, "The oslevel command reports the level of the operating system using a subset of all filesets installed on your system."

You can see which fileset is below the expected level with oslevel's -l option. For example, if you believe your system is at AIX level 4.3.3, but oslevel reports 4.3.2, use this oslevel command to find the filesets below 4.3.3:

```
$ /usr/bin/oslevel -l 4.3.3.0
```

If you don't know what level argument to supply to oslevel's -l option, use oslevel's -q option first.

4.11.1 Why doesn't /usr/bin/oslevel report the correct AIX version on AIX 5.1?

The subset list for oslevel on AIX 5.1 seems to include at least two filesets, xlsmp.msg.en_US.rte and xlsmp.rte, that do not install from AIX 5.1 media with a 5.1.0.0 level. Hence, oslevel reports 5.0.0.0 instead of the expected 5.1.0.0.

If either xlsmp.msg.en_US.rte or xlsmp.rte is installed, lsof's Configure script and run-time tests will identify the AIX version incorrectly. The run-time test will issue a complaint message of this form:

```
lsof: WARNING: compiled for AIX version xxx; this is yyy.
```

You can correct the Configure test by pre-defining the oslevel value, setting the correct value in the LSOF_VSTR

environment variable before running the Configure script
-- e.g., to pre-define AIX 5.1 when using ksh, do this:

```
$ LSOF_VSTR=5.1.0.0 Configure -n aix
```

You can't affect oslevel output without uninstalling
xlsmp.msg.en_US.rte and xlsmp.rte. If you can't do that,
you'll have to put up with the run-time complaint.

4.12 Why does lsof for AIX 5.1 or above Power architecture complain about kernel bit size?

When you run an lsof binary on an AIX 5.1 or above Power
system,
it might complain:

```
lsof: FATAL: compiled for a 32 bit kernel.
```

```
The bit size of this kernel is 64.
```

or

```
exec: 0509-036 Cannot load program ./lsof because of  
the following errors:
```

```
0509-032 Cannot run a 64-bit program on a 32-bit  
machine.
```

Starting at lsof revision 4.61, lsof binaries for Power
architecture systems running AIX 5.1 or above are closely
tied to the kernel bit size. Lsof must do that so it can
read and understand kernel structures.

Lsof's Configure script tunes the lsof configuration so
that the binary built in the make(1) step is adjusted to
the kernel bit size.

An lsof binary knows the bit size for which it was constructed,
tests the bit size of the kernel under which it is running,
and objects if the two sizes don't match. To see the bit
size for which lsof was constructed, run it with its -v
option and look for these lines in the output:

```
configuration info: 32 bit kernel
```

or

```
configuration info:
```

```
64 bit kernel
```

(Note: these lines will appear only in -v output for AIX
5.1 and above lsof binaries, built for Power architecture.)

You can see the kernel bit size test method in the aix

stanza of the lsof Configure script and in the `get_kernel_access()` function of the lsof `.../dialects/aix/dproc.c` source file.

There is more information on pre-defining the kernel bit size when building lsof in `Configure`, `OOPORTING`, and `OOXCONFIG`.

The only work-around is to use an lsof binary built to match the running kernel bit size.

4.13 What can't gcc be used to compile lsof on the ia64 architecture for AIX 5 and above?

Gcc can't be used to compile lsof on the ia64 architecture for AIX 5 and above because I haven't had access to a system that has a working gcc compiler. The gcc compiler on my one and only ia64 AIX 5.1 test system, provided by IBM, didn't work at all.

4.14 Why does lsof get a segmentation fault when compiled with gcc for a 64 bit Power architecture AIX 5.1 kernel?

When lsof is configured with the lsof "aixgcc" `Configure` abbreviation, the resulting lsof executable may cause a segmentation violation when it is run. I've observed this with gcc version 2.9-aix43-010414-7.

As far as I have been able to tell, the segmentation fault is the result of a gcc compilation, loading, or library error. Watching lsof run with gcc's companion debugger, `gdb`, shows no error in the lsof source code that might explain the fault.

The only work-around I know is to use the IBM C compiler in place of gcc -- i.e., use the "aix" lsof `Configure` abbreviation.

4.15 Why does lsof ignore AFS on my AIX system?

The lsof `Configure` script quits on AIX when AFS is present, the AIX version is greater than 4.3.3.0 or the AFS version is greater than 3.5. That's because I have no test systems available for those AIX and AFS version combinations.

When the lsof `Configure` script detects an AIX and AFS version combination that is unsupported, it will report:

!!!FATAL: Lsof does not support AFS on this combination of AIX and AFS versions. To disable AFS, set the value of the AIX_HAS_AFS environment variable to "no".

The only work-around is to set the AIX_HAS_AFS environment variable as explained in the error message:

```
$ AIX_HAS_NSF=no; export AIX_HAS_NSF
$ ./Configure -n aix
```

4.16 Why does lsof report "system paging space is low" and exit?

When AIX paging space runs low, the AIX kernel sends a SIGDANGER signal to processes, warning them that they should reduce their memory usage.

When lsof receives that signal, it issues the following fatal error message and exits:

```
lsof: FATAL: system paging space is low.
```

A possible work-around is to limit the amount of information lsof must cache in its process memory with the "-c", "-g", "-l" and "-p" options.

Also see the answer to the "What can be done when lsof reports no more space?" question.

4.17 Why does lsof have a compilation problem on AIX 5.3 above maintenance level 1?

On some AIX 5.3 systems with maintenance levels 2 and higher installed, lsof 4.77 and below may not compile properly. The compiler complains the snapshotObject structure definition, needed by <j2/j2_inode.h>, is missing.

That problem is fixed in the 4.78 revision.

5.0 Apple Darwin Problems

5.1 What do /dev/kmem-based and libproc-based mean?

Lsof for Apple Darwin currently uses /dev/kmem to read kernel data structures from which it gathers and reports open file

information. That version of lsof is called /dev/kmem-based lsof.

At an upcoming release lsof will use a library called libproc to obtain information about open files. That version of lsof will be called libproc-based lsof.

The /dev/kmem-based lsof sources may be found in the kmem subdirectory of the dialects/darwin branch of the lsof source tree. When the supporting version of Apple Darwin is released, the libproc-based lsof sources will be found in .../dialects/darwin/libproc.

5.2 /dev/kmem-based Apple Darwin Questions

5.2.1 Why does Configure ask for a path to the Darwin XNU kernel header files?

When lsof was ported to Apple Darwin by Allan Nathanson at revision 4.53, some kernel header files needed by lsof weren't being exported by the developers. (That's still true at lsof revision 4.76.)

At first a shell script that Allan provided would get the missing header files by checking them out from the CVS root. Although the script was updated from time to time, eventually the re-organization of Darwin sources has made it impossible to update the script to do an automatic download of the missing header files.

At lsof revision 4.69 and above it is necessary for the Darwin lsof builder to download the Darwin XNU kernel headers before attempting to build lsof. The download may be done via a web browser, starting at this URL:

<http://www.opensource.apple.com/darwinsource/index.html>

Once there, select the link to the Mac OS X version that matches the one on the system where lsof is to be built.

Follow that link's "[Source]" link. Once there, select the tar.gz link of the xnu* entry near the bottom of the page. That entry should have a name that matches the xnu* name shown by `uname -a` -- e.g., if `uname` reports:

```
$ uname -a
```

... root:xnu/xnu-517.7.21 ...

Then the appropriate xnu* entry is xnu-517.7.21. Clicking its link should lead to an "Apple Open Source" page requesting an Apple ID and password.

Enter them if they're available. If an Apple ID and password are not available, get them by following the instructions on the page -- i.e., follow the signin.apple.com link.

Once a valid Apple ID and its password have been entered, the download will begin. Select the saving of the downloaded xnu*.tar.gz file in an appropriate place on the Mac OS X system.

Once the download completes, install it. Use `gunzip` to decompress the download and `tar` to extract the archive -- e.g.,

```
$ gunzip -c xnu-517.7.21.tar.gz | tar xf -
```

Remember the absolute path to the extracted archive. That is its installed place. E.g., if the xnu-517.7.21.tar archive was extracted to the lsof builder's home directory, its full installation path will be something like:

```
~/xnu-517.7.21
```

Now run the lsof Configure script. When it asks for the path to the installed Darwin XNU kernel header files, supply the path to the gunzip'd and extracted xnu* archive -- e.g.,
~/xnu-517.7.21.

The path to the Darwin XNU kernel headers may also be supplied to the Configure script in the `DARWIN_XNUDIR` environment variable, eliminating the need to enter it interactively -- e.g.,

```
$ DARWIN_XNUDIR=~/xnu-344.49 ./Configure -n darwin
```

5.2.1.1 Why does Configure complain that Darwin XNU kernel header files are missing?

These are some reasons why the lsof Configure script might claim that Darwin XNU header files are missing:

* The wrong path to them was specified.

*

The files and directories in the path are not readable and searchable -- i.e., check the modes and ownerships.

* The downloaded archive doesn't match the Mac OS X version of the system.

If in doubt, revisit the Darwin XNU kernel header file download instructions in the answer to the question "Why does Configure ask for a path to the Darwin XNU kernel header files?"

If Configure still can't find Darwin XNU kernel header files, contact me via e-mail at <abe@purdue.edu> for help. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

5.2.2 Why doesn't Apple Darwin lsof report text file information?

At the first port of lsof to Apple Darwin, revision 4.53, insufficient information was available -- logic and header files -- to permit the installation of VM space scanning for text files. As of lsof 4.70 it is still not available.

Text file support will be added to Apple Darwin lsof after the necessary information becomes available.

5.2.3 Why doesn't Apple Darwin lsof support IPv6?

At the first port of lsof to Apple Darwin, revision 4.53, Apple Darwin lacked IPv6 support. IPv6 became available in Apple Darwin version 1.5 and support for it was added to lsof then.

5.2.4 Why does lsof complain about a mismatch between the release for which lsof was compiled and the booted Mac OS X release?

When lsof is started on the "Gold Master" Darwin release (aka Mac OS X), it complains:

lsof: compiled for 1.0 release; this is 1.3.2.

This happens because the lsof binary released with Mac OS X was built on a system whose release number (1.0) doesn't match that of the released system -- usually 1.3.x. Lsof makes this check because UNIX dialect OS changes are often accompanied by header file changes that affect lsof.

In this specific case, this error can be ignored. If you don't want to do that, get the lsof distribution and build lsof so its built-on and running-on Mac OS X release numbers match.

5.2.5 Why does lsof for Apple Darwin 8 and higher report "stat(...): ..." in the NAME column?

Lsof for Apple Darwin 8 may report messages like these in the NAME column:

```
stat(/private/var/run/asl_prune): No such file or directory
or
stat(/private/var/db/netinfo/local.nidb/Config): Permission denied
```

Those messages indicate that lsof was unable to collect open file information for the paths enclosed in "stat(...)" with the stat(2) function, because the function encountered the reported error.

A work-around for the "Permission denied" error is to run lsof with elevated privileges -- e.g., when logged on as the super user.

If the stat(2) error message is "No such file or directory", the file probably has been unlinked (removed) and there is no lsof work-around.

5.2.6 What are the limitations of Apple Darwin lsof link count reporting?

Lsof for Apple Darwin cannot report link count information reliably.

For Apple Darwin below 8 link count information is not always available in the kernel node structures available to lsof. When link count information is available, however, it includes link counts of zero. Thus, using lsof's +L1 option may result in the finding of some files whose link counts are zero.

Lsof can report only some link count information for Apple Darwin 8 and above. Link count information is only available for files where lsof can assemble the full file path and has permission to apply stat(2) to it. (See the answer to the "Why does lsof for Apple Darwin 8 and higher report "stat(...): ..."

in the NAME column?" question for more information on stat(2) failures.)

Apple Darwin 8 and above files that have been unlinked and thus have a link count of zero cannot be found by stat(2) -- i.e., stat(2) returns a "No such file or directory" error. As a result lsof never displays link counts of zero and the use of lsof's +L1 option to find them always fails.

5.2.7 Why does Apple Darwin report process group IDs incorrectly?"

The kmem version of lsof for Apple Darwin does not report process group IDs correctly when requested to do so with its ``-g" option. This is a bug that surfaced after the libproc version was released and access to kmem test systems has prevented patching the bug.

If you are using the kmem version and would like a fix for this problem, please send e-mail to me <abe@purdue.edu>. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

5.3 Libproc-based Apple Darwin Questions

6.0 BSD/OS BSDI Problems

6.0.5 Statement of deprecation

As of lsof revision 4.76 support for BSDI BSD/OS has been dropped. The 4.76 distribution of lsof for BSDI BSD/OS may be found on lsof.itap.purdue.edu in pub/tools/unix/lsof/OLD/src.

7.0 DEC OSF/1, Digital UNIX, and Tru64 UNIX Problems

7.1 Why does lsof complain about non-existent /dev/fd entries?

When you run lsof for Digital UNIX 3.2, lsof may complain:

```
lsof: can't lstat /dev/fd/xxx: No such file or directory
lsof: can't lstat /dev/fd/yyy: No such file or directory
```

(Or it may warn about other missing /dev/fd paths.) When you do an ``ls /dev/fd" none of the missing paths are listed.

This is caused by a bug in the DEC library function `getdirentries()`. For some reason, when `/dev/fd` is a file system mount point, `getdirentries()` returns an incorrect size for it to `readdir()`. (Lsof calls `readdir()` in its `ddev.c readdev()` function.) Because of the incorrect size, `readdir()` goes past the end of the `/dev/fd` directory buffer, encounters random paths and returns them to lsof. Lsof then attempts to `lstat(2)` the random paths, gets error replies from `lstat(2)`, and complains about the paths.

Duncan McEwan discovered this error and has reported it to DEC. Duncan also supplied an alternate `readdir()` function as a work-around. I've incorporated his `readdir()` in `dialects/osf/ddev.c` (as the static `ReadDir()` function) with some slight modifications, and enabled its use when the `USELOCALREADDIR` symbol is defined.

The Configure script defines `USELOCALREADDIR` for Digital UNIX version and 3.2. If you don't want to use Duncan's local `readdir()` function, edit the Makefile and remove `-DUSELOCALREADDIR` from the CFGF string. When DEC releases a corrected `getdirentries()` function, I'll modify the Configure script to stop defining `USELOCALREADDIR`.

7.2 Why does the Digital UNIX V3.2 ld complain about Ots* symbols?

When you compile lsof on your Digital UNIX V3.2 system, ld may complain:

```
ld:
Unresolved:
knlist
_OtsRemainder32Unsigned
_OtsDivide64Unsigned
_OtsRemainder64Unsigned
_OtsDivide32Unsigned
_OtsMove
_OtsDivide32
_OtsRemainder32
*** Exit 1
```

Chris Eleveld reports this happens on Digital UNIX V3.2 systems after the Fortran compiler has been installed.

The best work-around seems to be to remove `-lmdl` from the CFGF string in the Makefile

produced by Configure -- i.e.,
change:

```
CFGL= -lml  
to  
CFGL=
```

According to the V3.2 man page for nlist(3), this shouldn't work, but my testing shows that it does. Although I haven't been able to test this second work-around, you might try adding -lots to CFGL, rather than removing -lml -- i.e., change:

```
CFGL= -lml  
to  
CFGL= -lml -lots
```

WARNING: my testing also shows that the V2.0 nlist(3) man page means what it says when it calls for -lml -- lsof loaded without -lml under V2.0 can't locate the proc (process) table address.

DON'T REMOVE -lml FROM THE DIGITAL UNIX V2.0 MAKEFILE.

If you run into this problem, please let me know what problem you encountered and how you solved it.

7.3 Why can't lsof locate named pipes (FIFOs) under V3.2?

While lsof for V3.2 can report on named pipes (FIFOs), it can't find them by name. That appears to happen because of the way the V3.2 kernel lstat(2) function reports named pipe device numbers.

The V3.2 kernel reports the device number as 0xffffffff, while the kernel structures for named pipes that lsof examines contain the device number of the file system on which the named pipe resides.

Consequently, lsof can't match the device and inode number pair it receives from applying lstat(2) to the named pipe with any device and inode number pair it finds when scanning kernel structures.

I don't have a work-around. You can, of course, ask for full lsof output and use a post-processing filter (e.g., grep) to locate the named pipe of interest.

This problem doesn't exist under V2.0.

7.4 Why does lsof use the wrong configuration header files?

For example, why can't the lsof compilation find cpus.h?

DEC OSF/1, Digital UNIX, and Tru64 UNIX configuration header files describe the hardware and software environment for which your kernel boot file was constructed. For example, /sys/<name>/cpus.h defines the number of CPUs in its NCPUS #define.

Lsof searches for the configuration header file subdirectory in /sys (/usr/sys for Digital UNIX version 4.0 and Tru64 UNIX) by converting the first host name component to capital letters -- e.g., TOMIS is derived from tomis.bio.purdue.edu. If that subdirectory exists, lsof uses header files from it. (Configure reports what subdirectory is being used.)

If Configure doesn't find a host-name derived subdirectory, it prompts you for the entry of a subdirectory name. If you can't find one, quit Configure and run the kernel generation process to create a proper configuration subdirectory. If you don't identify a proper configuration subdirectory and you try to compile lsof, the compiler will complain about missing header files -- e.g., a missing cpus.h.

Once you have located or generated a proper configuration subdirectory, rerun Configure. If you have generated a configuration subdirectory whose name is derived from the host name, Configure will find and use it. If not, you will have to specify its name to Configure.

7.5 Why does lsof indicate incomplete paths with "--" for Tru64 UNIX 5.1 files?

When lsof can't find a component of a path in the kernel's name cache (aka DNLC), or can't determine that the left-most component has as its parent the file system root, it uses an "incomplete path" notation. That notation begins with the file system root name, followed by "--", followed by the consecutive path name components lsof was able to find in the DNLC -- e.g., "/--init".

Because the DNLC was significantly redesigned in Tru64 UNIX

5.1, lsof's handling of the cache had to be completely redone. As part of the DNLC redesign a name cache entry parameter lsof formerly used to locate the file system root of a path was removed. With help from Chang Song I've been able to implement an alternate method for detecting the root of these file system types: AdvFS (MSFS), CDFS, DVDFS, FDFS, NFS, NFS3, and UFS.

When lsof doesn't know how to identify the root for a file system type, it will resort to the "--" incomplete path notation.

7.6 Why doesn't lsof report link count, node number, and size for some Tru64 5.x CFS files?

lsof reports link count, node number, and size for open CFS files as recorded in their kernel node structure's cached attributes. Sometimes not all attributes are cached on the system where lsof runs, so lsof cannot report them.

7.7 Why does lsof say it can't read the kernel name list or proc table on Digital UNIX 4.x or Tru64 UNIX?

By default on Digital UNIX 4 and Tru64 UNIX lsof reads the addresses for kernel symbols with the knlist(3) function. That function can fail, for example, when the kloadsvr daemon isn't running or is malfunctioning. When that happens, lsof may abort with one of these error messages:

```
lsof: can't read kernel name list from knlist(3): ...
```

or

```
lsof: can't read proc table info
```

The first message suggests a complete knlist(3) or kloadsvr failure; the second, a partial one.

If you know the name of the file from which the running system was booted, e.g., /vmunix, you can use lsof's -k option to direct it to read kernel symbol addresses from the name list of that file --

```
$ lsof -k /vmunix ...
```

If that works, then knlist(3) is malfunctioning and you need to fix it.

8.0 FreeBSD Problems

8.1 Why doesn't lsof report on open kernfs files?

lsof doesn't report on open FreeBSD kernfs files because the structures lsof needs aren't defined in the kernfs.h header file in /sys/misc/kernfs.

8.2 Why doesn't lsof work on my FreeBSD system?

If lsof doesn't work on your FreeBSD system, first make sure you have the latest lsof revision. See the answer to the "Where do I get lsof?" question for information on how to get the latest lsof revision.

Once you have gotten the latest lsof revision, Configure and make it. If Configure fails -- e.g., it complains about an unknown FreeBSD version -- then lsof probably hasn't been ported to your FreeBSD version yet, and there's no need to go any further. Follow the answer to the "How do I report an lsof bug" to report the Configure complaint to me.

If you are able to Configure and make lsof, run its test suite. (See the answer to the "Is there a test suite?" question for more information on how to use lsof's test suite.)

If lsof still fails, make sure your kernel sources, kernel header files, kernel boot file, standard header files and libraries are synchronized. They should all be built from the same CVS refresh. (Don't forget to do a "make buildworld" followed by a "make installworld".) If they aren't, then the KVM library or lsof may be using kernel structure definitions that don't match the booted kernel; or lsof may fail to compile properly because of header files in /usr/src/sys/sys and /usr/include/sys that don't match.

If you have synchronized your kernel, header files and libraries, and still can't get lsof to work, follow the steps in the answer to the "How do I report an lsof bug" question to report the problem to me.

8.3 Why doesn't lsof work on the RELEASE version of CURRENT?

Lsof tracks the CURRENT release of the current leading edge FreeBSD version, because my access to leading edge FreeBSD is limited to FreeBDSD.org reference systems, all running the CURRENT release.

Sometimes that tracking leads to changes in lsof that won't work on an earlier RELEASE version of the current leading edge version.

When that happens, please send e-mail to me <abe@purdue.edu>. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

8.4 Why does kvm_open() complain it can't find some file?

If lsof issues this complaint:

```
lsof: kvm_open(execfile=/boot/kernel/kernel,
corefile=/dev/mem: No such file or directory
```

Your FreeBSD system might not have a /dev/mem device. If not, create one -- e.g., as root do:

```
# mknod /dev/mem c <major> 0

# chmod 440 /dev/mem
# chgrp kmem /dev/mem
```

For <major> use /dev/kmem's major device number.

You may have to run kldload, too -- again as root do:

```
# kldload mem
```

8.5 FreeBSD ZFS Problems

8.5.1 Why does FreeBSD lsof report "WARNING: no ZFS support has been defined."?

Lsof issues that message when it detects a file on a ZFS file system, but has not been built with support for ZFS. Lsof's Configure script detects support can be added for ZFS when it finds this file:

```
/usr/src/sys/contrib/opensolaris/uts/common/fs/zfs/sys/zfs_znode.h
```

That header file and others in the OpenSolaris files in /usr/src enable lsof to extract information about ZFS files

from the kernel structures associated with them.

8.6 Why can't Configure create lsof_owner.h for FreeBSD 6 and above?

Lsof may report:

```
Creating ./lockf_owner.h from /usr/src/sys/kern/kern_lockf.c
FATAL ERROR: can't read /usr/src/sys/kern/kern_lockf.c
FATAL ERROR: ./lockf_owner.h creation failed (see
00FAQ)
```

or

```
Creating ./lockf_owner.h from /usr/src/sys/kern/kern_lockf.c
FATAL ERROR: ./lockf_owner.h creation failed (see 00FAQ)
```

Those messages mean that lsof's Configure script failed to create a local header file, `./lockf_owner.h`, needed to use the new kernel file locking code of some versions of FreeBSD 6 and above.

The changes that implement that new locking code alter the lockf structure in `<sys/lockf.h>` and introduce a new structure, `lockf_entry`, to that header file. When Configure detects the presence of the `lockf_entry` definition in `<sys/lockf.h>`, it tries to construct the local header file, `./lockf_owner.h`.

Configure has to do that because an unfortunate side effect of the new kernel file locking code is that `<sys/lockf.h>` doesn't contain the `lockf_owner` structure definition referenced in its own lockf structure. Lsof needs to access elements of that `lockf_owner` structure to determine if a lock belongs to the process that has a file open.

The missing `lockf_owner` structure definition is in the kernel source file, typically `/usr/src/sys/kern/kern_lockf.c`. Configure tries to extract the `lockf_owner` structure definition from `kern_lockf.c` into lsof's local header file, `./lockf_owner.h`. If Configure can't do that, it reports:

```
FATAL ERROR: ./lockf_owner.h creation failed
```

If Configure can't even read `kern_lockf.c`, it first reports:

```
FATAL ERROR: can't read /usr/src/sys/kern/kern_lockf.c
```

The work-around for this problem is to update the FreeBSD kernel `/usr/src` tree (e.g., do a CVSup or csup) on the system where lsof is to be built and then do a "make buildworld"

followed by a "make installworld".

8.6.1 Why are there lockf structure compiler errors for FreeBSD 6.0 and higher lsof?

If, when compiling lsof, the compiler complains with error messages like:

```
dnode.c: In function 'get_lock_state':
dnode.c:113: error: 'struct lockf' has no member named 'lf_flags'
dnode.c:115: error: 'struct lockf'
has no member named 'lf_id'
...
```

Then lsof is being built on a system that has new kernel file locking code and lsof's Configure script failed to build a local lockf_owner.h header file with a structure definition lsof needs.

See the "Why can't Configure create lsof_owner.h for FreeBSD 6 and above?" section for more information and a work-around.

8.6.2 Why don't /usr/src/sys/sys/lockf.h and /usr/include/sys/lockf.h match?

This mismatch can cause the errors explained in the answer to the "Why are there lockf structure compiler errors for FreeBSD 6.0 and higher lsof?" question.

If /usr/src/sys/sys/lockf.h has been updated with a CVSup or csup, the new lockf.h won't be propagated to /usr/include/sys until the "make buildworld" and "make installworld" steps have been completed.

8.7 FreeBSD and clang

As of lsof revision 4.87, lsof may be compiled with clang.

8.7.1 Why does clang complain about VOP_FSYNC?

There is an error in the Solaris ZFS compatibility vnode.h header file with use of VOP_FSYNC before it is defined. No work-around is possible that will eliminate the clang compile-time warning message about the invalid declaration of the VOP_FSYNC function.

9.0 HP-UX Problems

9.1 What do /dev/kmem-based and PSTAT-based mean?

Lsof for HP-UX 11.0 and below uses /dev/kmem to read kernel data structures from which it gathers and reports open file information. That version of lsof is called /dev/kmem-based lsof.

Starting with HP-UX 10.10, finding definitions for the necessary kernel structures became more difficult as HP no longer distributed header files in /usr/include that defined all kernel structures. So I started "inventing" structure definitions by using Q4 to display them.

By HP-UX 11, the process of invention became extremely intensive to support. Following a patch to the ipc_s structure in early 1999, my invented definition of that structure became incorrect. Although I was able to devise a work-around test for the patch with Q4, it was clear that my inventions were bound to cause more problems.

Discussion with HP about the patch led to my proposing that an lsof API in the HP-UX kernel was the proper solution. Much to my surprise, HP agreed. I believe Carl Davidson was the prime mover behind that decision, but I know others participated, among them Louis Huemiller, Rich Rauenzahn, and Sailu Yallapragada. I am indebted to these folks and HP for their willingness to do this work.

The API was added to the PSTAT interface in a project named PEGLE, Pstat Enhancements for Glance and Lsof. Louis and Sailu did the bulk of the design and implementation work and testing began in March, 2000

HP-UX 11.11 is the first version that provides PSTAT support for lsof. HP-UX versions in between 11.0 and 11.11 -- all Beta versions as far as I can determine -- have no lsof support.

See the "PSTAT-based HP-UX lsof Questions" section for questions and answers specific to PSTAT-based HP-UX lsof.

The next section, "Why doesn't a /dev/kmem-based HP-UX lsof compilation use -O?" covers /dev/kmem-based HP-UX lsof.

The /dev/kmem-based lsof sources may be found in the kmem

subdirectory of the dialects/hpux branch of the lsof source tree. The PSTAT-based lsof sources may be found in .../dialects/hpux/pstat.

9.2 /dev/kmem-based HP-UX lsof Questions

The sources for /dev/kmem-based lsof for HP-UX may be found in lsof_<revision>/dialects/hpux/kmem.

lsof's Configure shell script decides to use these sources when it finds that the /usr/include/sys/pstat subdirectory doesn't exist.

lsof can be forced to use the /dev/kmem sources by setting "/dev/kmem" in the HPUX_BASE environment variable. Consult the Configure shell script and 00XPORTING for more information.

9.2.1 Why doesn't a /dev/kmem-based HP-UX lsof compilation use -O?

If you only have the standard (bundled) HP-UX C compiler and haven't purchased and installed the optional one, then you can't use cc's -O option. The HP-UX cc(1) man page says this:

"Options

Note that in the following list, the cc and c89 options -A , -G , -g , -O , -p , -v , -y , +z , and +Z are not supported by the C compiler provided as part of the standard HP-UX operating system. They are supported by the C compiler sold as an optional separate product."

lsof's Configure script tries to detect what C compiler product you have installed by examining your compiler. If that examination reveals a standard (bundled) compiler, lsof avoids using -O.

If the Configure compiler test fails, the C compiler will complain that it doesn't support -O. You can suppress that complaint with this make invocation:

```
$ make DEBUG=""
```

9.2.2 Why doesn't the /dev/kmem-based CCITT support work under 10.x?

Pasi Kaara, who originally provided the HP-UX CCITT support, reports that it no longer works under HP-UX 10.x. Consequently, at lsof revision 4.02 it has been disabled.

9.2.3 Why

can't /dev/kmem-based lsof be compiled with ``cc -Aa`` or ``gcc -ansi`` under HP-UX 10.x?

Some HP-UX 10.x header files, needed by lsof, can't be compiled properly in ANSI_C mode; structure element definition and alignment problems result. The `f_offset` member of the file structure, for example, is incorrect.

This ANSI-C obstacle extends to using the `-Aa` option of the HP C compiler and the `-ansi` option of `gcc`.

9.2.4 Why does /dev/kmem-based lsof complain about no C compiler?

Lsof's Configure script looks in `/bin` and `/usr/ccs/bin` for an HP C compiler, because it needs to know if the compiler is the standard (bundled) one or the optional separate product. If it finds no compiler in either place, Configure quits after complaining:

```
No executable cc in /bin or /usr/ccs/bin
```

If you don't have a C compiler in either of these standard places, you should consider installing it. If you have `gcc` installed, you can use it by declaring the ```hpuxgcc``` abbreviation to lsof's Configure script.

If you have a C compiler in a non-standard location, you can use the `HPUX_CCDIR[12]` environment variables to name the path to it. Consult the `00XCONFIG` file of the lsof distribution for more information.

9.2.5 Why does Configure complain about q4 for /dev/kmem-based lsof for HP-UX 11?

When you run Configure on an HP-UX 11 system, it may complain:

```
!!!ERROR!!!  !!!ERROR!!!  !!!ERROR!!!  !!!ERROR!!!  
Configure can't use /usr/contrib/bin/q4 to examine the ipis_s  
structure. You must do that yourself, report the result in  
the HPUX_IPC_S_PATCH environment variable, then repeat the  
Configure step. Consult the Configure script's use of  
/usr/contrib/bin/q4 and the 00XCONFIG file for information  
on ipis_s testing and the setting of HPUX_IPC_S_PATCH.  
!!!ERROR!!!  !!!ERROR!!!  !!!ERROR!!!  !!!ERROR!!!
```

This message states that Configure cannot use q4 from /usr/contrib/bin to examine the kernel's boot image for the ipis_s structure. Maybe q4 hasn't been installed, or perhaps Configure can't execute it.

Lsof needs to gather information about ipis_s to determine if the ipis_s structure is defined in the kernel boot image, if the ipis_s structure of the kernel boot image has an ipis_msgsqueued member, and if the ipc_s structure of the kernel boot image uses has an ipc_ipis member.

The ipis_s structure isn't described in any header file HP-UX releases with HP-UX 11. It appears in the private Lsof header file ../dialects/hpux/kmem/hpux11/ipc_s.h. Lsof gets local and remote connection addresses (IP and port numbers) from ipc_s, so an incorrect ipc_s definition may cause incorrect reporting of TCP/IP connection addresses. It definitely will cause incorrect reporting on 32 bit kernels. In any case Lsof should be compiled with a correct ipc_s definition no matter the kernel bit size, so the Configure script always tests for it when the HP-UX version is 11.

For Lsof's Configure script to gather the necessary ipis_s information q4 needs to be installed in /usr/contrib/bin and the kernel boot image, /stand/vmunix, needs to have been processed with pxdB. If either is untrue, Lsof issues the above error message, perhaps preceded by q4 messages. (Note: Lsof's use of q4 may also fail if q4 can't execute nm -- e.g., it can't find /usr/bin/nm, or there is a conflicting, private version of nm earlier in the path.)

If /stand/vmunix hasn't been processed by pxdB, the q4 messages will include:

q4: (error) vmunix not pxdB'd
or
q4: (warning) /stand/vmunix has not been processed by pxdB.

It's possible to make a suitable private copy of /stand/vmunix for configuring Lsof. That requires /opt/langtools/bin/pxdB or the q4 version of pxdB from /usr/contrib/bin/q4pxdB. The path to the result is supplied to the Lsof Configure script in the HPUX_BOOTFILE environment variable. Configure still requires /usr/contrib/bin/q4.

The following sample Bourne shell commands make a private copy of /stand/vmunix in /tmp, process it with pxdB or q4pxdB, and supply its path to lsof's Configure script in HPUX_BOOTFILE.

```
$ cp /stand/vmunix /tmp/vmunix.lsof

$ /opt/langtools/bin/pxdB /tmp/vmunix.lsof
or
$ /usr/contrib/bin/q4pxdB /tmp/vmunix.lsof

... pxdB messages ...
$ HPUX_BOOTFILE=/tmp/vmunix.lsof Configure -n hpux
```

It may also be necessary to use q4 outside the lsof Configure script. In that case q4 can be used to determine the state of ipis_s and ipc_s with these q4 commands:

```
$ /usr/contrib/bin/q4 /stand/vmunix
...
q4> fields -c struct ipc_s
...
q4> fields -c struct ipis_s
```

Look in the q4 output for the ipc_ipis member of the ipc_s structure, and look in the q4 output for the ipis_s structure for the ipis_msgsqueued member. If ipc_s has ipc_ipis but ipis_s lacks ipis_msgsqueued, set HPUX_IPC_S_PATCH environment variable to "1". If ipc_s has ipc_ipis and ipis_s has ipis_msgsqueued, set HPUX_IPC_S_PATCH to "2" -- e.g.,

```
$ HPUX_IPC_S_PATCH=1 Configure -n hpux
or
$ HPUX_IPC_S_PATCH=2 Configure -n hpux
```

If ipis_s has no ipc_ipis member, set HPUX_IPC_S_PATCH to "N" -- e.g., use this Configure step:

```
$ HPUX_IPC_S_PATCH=N Configure -n hpux
```

9.2.6 When compiling /dev/kmem-based lsof for HP-UX 11 what do the "aCC runtime: ERROR..." messages mean?

When the lsof Makefile asks the HP-UX unbundled compiler to load lsof, it may complain:

```

/bin/cc -o lsof -DHPUXV=1100 -DHASVXFS -DHPUXKERNBITS=64 \
-I/home/abe/src/lsof4/dialects/hpux/kmem/hpux11 +DD64 \
-DHAS_IPC_S_PATCH=2 -I/home/abe/src/lsof4/dialects/hpux/kmem \
-DLSOF_VSTR="B.11.00" -g dfile.o dmnt.o dnode.o dnode1.o \
dnode2.o dproc.o dsock.o dstore.o arg.o main.o misc.o \
node.o print.o proc.o store.o usage.o -L./lib -llsof -lelf \
-lnsl
aCC runtime: ERROR: Unexpected use of shared libraries
aCC runtime: ERROR: Read aCC manpage, +A option
/usr/lib/nls/loc/locales.1//is_IS.iso88591

```

This is a bug in the HP-UX national language support. (Notice the last message with "locales" in it?) Complain to HP -- then use this work-around before executing make:

```

$ unset LANG
$ make

```

9.2.7 Why doesn't /dev/kmem-based lsof for HP-UX 11 report VxFS file link counts, node numbers, and sizes correctly?

This is usually the result of running an lsof binary whose revision number is less than 4.57 on a system that has OnlineJFS support installed. It can also happen with lsof 4.57 binaries when the OnlineJFS support with which they were built doesn't match the OnlineJFS status of the system on which they are run.

The OnlineJFS status of lsof 4.57 and higher binaries can be determined by running:

```

$ lsof -v 2>&1 | grep HASONLINEJFS

```

If that shell pipe produces output, lsof was compiled with OnlineJFS support enabled; no output, disabled.

If OnlineJFS is installed on an HP-UX 11 system the /sbin/fs/vxfs/subtype executable exists and outputs "vxfs3.3" when run.

The problem occurs because the optional OnlineJFS support installation doesn't update <sys/fs/vx_inode.h>. Consequently lsof can be compiled with an incorrect definition of the vx_inode structure and look for link counts, node numbers, and sizes in the wrong places in the structure.

The current response I have gotten from HP is that no
<sys/fs/vx_inode.h> update will be provided for OnlineJFS.

I've addressed this problem temporarily with a work-around
(hack) in lsof revision 4.57.

9.2.8 Why can't /dev/kmem-based lsof be built with gcc for 64 bit HP-UX 11?

When Configure is given the "hpuxgcc" abbreviation, the
HP-UX version is 11, and the kernel bit size is 64, the
lsof Configure script may abort with the messages:

```
!!!!!!!!!!!!!!!! FATAL ERROR !!!!!!!!!!!!!!!
```

```
APPARENTLY GCC CANNOT BUILD 64 BIT EXECUTABLES.  
A COMPILER MUST BE USED THAT CAN. SEE 00FAQ  
FOR MORE INFORMATION.
```

(This is the "more information" in 00FAQ.)

This
means the Configure script compiled a test program
with gcc the result wasn't an ELF-64 binary. lsof tries
two gcc modes, one with no options and another with the
-mlp64 option, before it concludes gcc can't be used.

See the "How can I acquire a gcc for building lsof for 64
bit HP-UX 11?" answer for information on where you might
be able to get a gcc for HP-UX 11 that can produce ELF-64
executables.

9.2.8.1 How can I acquire a gcc for building lsof for 64 bit HP-UX 11?

Check this HP URL:

http://h21007.www2.hp.com/dspp/tech/tech_TechSoftwareDetailPage_IDX/1,1703,547,00.html

(That's one very long link; be careful you cut 'n paste it
all.)

In November 2001 that URL led to a web page whose title
was "gcc for hp-ux 11." The page offered a link for
downloading a 64 bit gcc 3.0 compiler for HP-UX 11.0 and
11i. Rich Rauenzahn of HP installed that compiler on an
HP test system he allows me to use and I successfully built
a 64 bit lsof with it.

The HP package may install the 64 bit capable gcc in /usr/local/pa20_64/bin/gcc, so you may have to adjust your path or set the LSOF_CC environment variable to compensate.

9.2.9 Why does /dev/kmem-based lsof for HP-UX 11 report "unknown file system type" for some open files?

The lsof binary being used probably doesn't have support for the VxFS file system.

To confirm that, check `lsof -v` output for "-DHASVXFS". If it's not present, lsof doesn't have VxFS support.

You also need to establish that lsof really is complaining about VxFS files by checking the kernel boot file for the symbol associated with the hexadecimal address reported in the "unknown file system type" message -- e.g., "v_op: 0x8711c8." Use nm(1) to do that:

```
$ nm -x /stand/vmunix | grep 8711c8
```

If nm reports the symbol associated with the address is vx_vnodeops, then lsof is complaining about an open VxFS file.

The solution in that case is to build lsof yourself (The bundled C compiler will do it.), making sure that lsof's Configure script detects the presence of VxFS. Configure does that by finding these two header files:

```
/usr/include/sys/fs/vx_hpux.h  
/usr/include/sys/fs/vx_inode.h
```

If the system where you are building lsof doesn't have those header files, but does have VxFS, you might be able to install the header files by installing the HP JournalFS package from the CoreOS CD -- in particular the file set JournalFS.VXFS-PRG and its associated patch, PHKL_18543. (My thanks to Steve Bonds for that information.)

Finally, if you find that lsof isn't complaining about VxFS when it complains about an unknown file system type, send e-mail to me <abe@purdue.edu> for further assistance. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

9.2.10 Why does the ANSI-C compiler complain about comments in HP-UX

11 header files?

When compiling lsof on HP-UX 11, the HP ANSI-C compiler's pre-processor, cpp, may complain about comments in HP-UX header files -- e.g.,

```
cpp: "/usr/include/sys/cdfs.h", line 232: warning 2028:
Found comment inside comment started on line 232.
cpp: "/usr/include/sys/cdnode.h", line 196: warning 2028:
Found comment inside comment started on line 196.
cpp: "/usr/include/nfs/snnode.h", line 30: warning 2028:
Found comment inside comment started on line 30
```

This is not a problem with lsof. It is a problem with the HP-UX header files; they have non-compliant ANSI-C comment sequences in them -- e.g.,

```
<sys/cdfs.h>: 232
/* struct cdfs *cdfs_link; /* linked list of file systems */
```

The initial "/*" is not terminated by an ending "*/" before the appearance of a second "/*".

9.2.11 Why does dnode1.c cause the HP-UX 11 compiler to complain that <sys/fs/vx_inode.h> is missing or incorrect?

If CFLAGS in the lsof Makefile for an HP-UX 11 compilation includes HASONLINEJFS, indicating the system has OnlineJFS support, lsof needs the <sys/fs/vx_inode.h> header file.

Sometimes it is missing from /usr/include/sys/fs.

<sys/fs/vx_inode.h> is a header file that must be obtained from Veritas. If that proves impossible, please contact me via e-mail at <abe@purdue.edu>. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

9.3 PSTAT-based HP-UX lsof Questions

The sources for PSTAT-based lsof for HP-UX may be found in lsof_<revision>/dialects/hpux/pstat.

lsof's Configure shell script decides to use these sources when it finds that the /usr/include/sys/pstat subdirectory exists.

Lsof can be forced to use the PSTAT-based sources by setting "pstat" in the HPUX_BASE environment variable. Consult the Configure shell script and 00XPORTING for more information.

9.3.1 Why does PSTAT-based lsof complain about pst_static and other PSTAT structures?

When lsof starts it may issue one of these fatal error messages:

```
lsof: FATAL: can't determine PSTAT static size
```

```
lsof: FATAL: can't read <n> bytes of pst_static
```

```
lsof: FATAL: pst_static doesn't contain <name>_size
```

```
lsof: FATAL: <name>_size should be <n>
```

These messages indicate that lsof's tests for the proper level of PSTAT support have failed. The structure names, given in <name>, and sizes, given in <n>, identify the support deficiency more precisely.

You may need to upgrade the PSTAT support in your kernel to be able to use PSTAT-based lsof.

9.3.2 Why does PSTAT-based lsof complain it can't read pst_* structures?

Lsof may put messages like the following in the NAME column of its output.

```
can't read cwd pst_filedetails: Permission denied
```

```
can't read mem pst_filedetails: Permission denied
```

```
can't read rtd pst_filedetails: Permission denied
```

```
can't read txt pst_filedetails: Permission denied
```

```
can't read pst_filedetails: Permission denied
```

```
can't read 3 stream structures: Permission denied
```

```
can't read pst_socket: Permission denied
```

These messages indicate that the lsof binary lacks the authority to read the name structures for processes other than ones belonging to the UID under which lsof is running. Authority to read the structures of other processes is limited to root processes -- i.e., lsof must have setuid-root permission if it is to list open files for arbitrary processes.

If you want to eliminate these errors, you must run lsof as root or install it with setuid-root permission.

9.3.3 Why does PSTAT-based lsof rebuild the device cache file after each reboot?

After each HP-UX rebuild, the first time a user runs lsof it will report:

```
lsof: WARNING: device cache mismatch: /dev/tun...  
lsof: WARNING: created device cache file: /<user_path>
```

This happens because the device numbers on /dev/tun* device nodes are recalculated at each reboot. When lsof detects a change in the device number of a /dev/tun* file, it rebuilds its local device cache file.

9.3.4 Why doesn't PSTAT-based lsof report TCP addresses for telnetd's open socket files?

When lsof can't report TCP addresses for telnetd's open socket files it is because an unpatched PSTAT kernel interface doesn't report the addresses to lsof.

This has been addressed in PSTAT kernel patch PHKL_24047. It is available from the HP IT Resource Center at:

<http://itrc.hp.com>

In the page's "maintenance / support" box select the "individual patches" link. Once at its page, select the "hp-ux" link. On that page select the "Series 800" or "Series 700" radio button and select "11.11" from the pull-down list to the right of the button. Under "search or browse the path list" select "Search by Patch IDs" from the pull down list, enter PHKL_24047 in the following text box, and select search. That should lead to information about PHKL_24047 and a link for downloading it. (You may have to log in first and you may have to create a login identity by registering before you can log in.)

Some time in March 2006 the PHKL_24047 patch was "lost" by the HP-UX networking lab. It has been "found" again in August 2006 and will be re-released as a GRO patch "some time." I don't yet know when that will be. You must contact HP to learn about the availability of the

GRO patch.

9.3.5 Why does PSTAT-based lsof cause an HP-UX 11.11 kernel panic?

When PSTAT-based lsof runs on some HP-UX 11.11 kernels, the kernel may panic. Symptoms include:

Console message:

```
0xFBE000301100EF00 00000000 0000EF00 -  
type 31 = legacy PA HEX chassis-code
```

/var/adm/syslog:

```
... vmunix: Trap Type 15 (Data page fault)  
... vmunix: Instruction Address (pcsq.pcoq) = 0x...
```

The panic is caused by a bug in the way PSTAT's `pstat_getstream()` function obtains module names from streams managed by the `otsam` stream driver (part of OSI Transport Services). `lsof` calls `pstat_getstream()` when it encounters an open `otsam` stream file. An HP-UX 11.11 system uses `otsam` if `otsam` appears in `/stand/system`.

HP-UX

11.11 patch `PHKL_24507` (available some time after July 15, 2001) fixes the `pstat_getstream()` bug. See the information in the answer to the "Why doesn't PSTAT-based lsof report TCP addresses for telnetd's open socket files?" question for information on how to obtain the patch.

9.3.6 Why doesn't PSTAT-based lsof report a CWD that is on a loopback (LOFS) file system?

When PSTAT-based lsof reports on processes whose current working directory (CWD) is on a loopback file system, lsof can't report the open CWD file. The reason is that the HP-UX 11.11 and above kernel's loopback file system code is not passing the CWD file ID to the kernel's `pstat(2)` code. Hence lsof is given no information on the `lofs` CWD.

The problem was first reported to me by Ermin Borovac and an internal bug report was filed with the HP-UX file system group on October 26, 2004. That report has now been answered by the patch `PHKL_33200 -- s700_800 11.11 lofs cumulative patch`. The HP IT Resource Center (<http://itrc.hp.com>) is a source for the patch.

9.3.7 Why do some swinstall packages for PSTAT-based HP-UX 11.11

packages complain about setgid and setuid bits?

First, let me explain that I do not provide lsof swinstall packages for lsof. Others provide them and they should be contacted about problems with their packages.

However, I have become aware of a problem with one package about which I have some information I can share. The problem shows up in these swinstall messages:

```
ERROR: Unknown owner and/or group for file
"/usr/local/bin/lsof". SUID and/or SGID bit was
not set.
ERROR: Failed installing fileset "lsof.lsof-RUN,r=4.73".
Check the above output for details.
```

The swpackage SUID/SGID functionality was restricted by changes for POSIX compliance, breaking backward compatibility. The patch PHCO_27671 allows SUID/SGID for uid/gid of 0 only, as a compromise between backward compatibility and POSIX conformance.

If the setuid bit is to be set on the executable, the UID and GID of the executable must be 0 (zero).

9.3.8 Why won't the bundled C compiler build PSTAT-based lsof for PA-RISC HP-UX 11.23?

A PA-RISC HP-UX 11.23 bundled C compiler dated May 2005 or later will not build PSTAT-based lsof. It will deliver error messages related to the system's <gssapi/gssapi.h> header file.

There is nothing wrong with that header file or lsof. The problem is that the bundled C compiler can't cope with the gssapi.h header file.

The work-around is to use the HP ANSI C compiler. Using gcc is not a satisfactory work-around. See the answer to the "Why won't gcc build PSTAT-based lsof for PA-RISC HP-UX 11.23?" question for more information.

9.3.9 Why won't gcc build PSTAT-based lsof for PA-RISC HP-UX 11.23?

Gcc will not even compile PSTAT-based lsof revisions below 4.77 for PA-RISC HP-UX 11.23 dated May 2005 or later. It reports errors in lsof's print.c fill_portmap() function about missing members

of the rpercent structure. That happens because gcc defines `_XOPEN_SOURCE_EXTENDED` which disables the definition of the rpercent structure in `<netdb.h>`.

Using the HP bundled C compiler is not a viable work-around. That is explained in the answer to the "Why won't the bundled C compiler build PSTAT-based lsof for PA-RISC HP-UX 11.23?"

While an lsof revision 4.77 or higher can be compiled with gcc, the results are unreliable. lsof will compile, but it occasionally produces segment faults when it runs. I have not been able to reproduce the failure reliably or locate a debugger that will work with the gcc-compiled lsof.

The only reliable work-around is to use the HP ANSI C compiler.

9.3.10 Why does PSTAT-based lsof complain, "FATAL: pst_stream_size should be: 672; is 72" on HP-UX 11.11 and above?

This message indicates a mismatch between the PSTAT header files used to build lsof (`<sys/pstat.h>` and those in the `/usr/include/sys/pstat` subdirectory), and those that built the running kernel.

Unfortunately the June 2008 patch set for HP-UX 11.23 creates this inconsistency, because it does not contain all the patches needed to match the kernel with the PSTAT header files. Even more serious is that the missing patches update the kernel's PSTAT support to provide TCP/UDP endpoint information to lsof from TCP/TLI streams.

The patch inconsistency comes about because, while the following patch is installed,

PHKL_36577 1.0 PM-PSTAT section 2 manpage changes

other kernel patches are not.

The PHKL_36577 patch updates the PSTAT header files and manual pages to match kernel changes that other patches with the following numbers (or patches that contain or supersede them) contain:

PHNE_36575 1.0 Cumulative STREAMS Patch
PHNE_37670 1.0 cumulative ARPA Transport patch
PHNE_37851 1.0 NFS cumulative patch

Those patches implement the kernel changes that support the delivery of information promised in patch PHKL_36577.

The work-around is to install the missing patches.

9.4 Why won't the HP-UX depot install?

I don't distribute lsof depots, so I can't support them.

From time to time depots prepared by various sites -- e.g., usually HP-UX software collection sites -- will contain errors that cause installation of the depot to fail.

Do not contact me when this happens. Instead, contact the administrator of the site that prepared the depot.

As should be clear from the bulk of the lsof documentation, I do not recommend you use pre-built lsof binaries in any form. Instead, I recommend you obtain the lsof source distribution and build lsof yourself.

10.0 Linux

10.1 What do /dev/kmem-based and /proc-based lsof mean?

At approximately Linux 2.1.72 and exactly at lsof revision 4.23 support for Linux forks. The first fork, containing the oldest lsof form is based on access to kernel memory structures, and is called /dev/kmem-based lsof. A /dev/kmem-based lsof is heavily intertwined with the Linux kernel version, its header files, and its system map file. Typically a /dev/kmem-based lsof needs only setgid permission to local all open file information.

After approximately Linux 2.1.72 and at revision 4.23 lsof obtains all its information from the /proc file system. That lsof is called the /proc-based lsof. A /proc-based lsof does not read kernel memory, needs neither kernel header files nor the system map file, and is less likely to be affected by Linux kernel changes. However, it does require setuid-root permission to list all open files, and it can't report file offsets (positions).

After revision 4.52 the /dev/kmem-based Linux sources for

lsof are no longer distributed. Information about them may be found in the 00INDEX and README files at:

`ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/OLD/src`

10.2 /proc-based Linux lsof Questions

10.2.1 Why doesn't /proc-based lsof report file offsets (positions)?

/proc-based lsof revisions 4.79 and above can only report file offsets (positions) for the files of Linux kernels 2.6.22 and above.

During its initialization /proc-based lsof tests to see if offset information can be obtained. If it cannot, lsof disables offset reporting. If the -o option was selected, lsof also issues this warning:

```
lsof: WARNING: can't report offset; disregarding -o.
```

10.2.2 Why does /proc-based lsof report "can't identify protocol" for some socket files?

/proc-based lsof may report:

```
COMMAND PID ... TYPE ... NODE NAME
pump 226 ... sock ... 309 can't identify protocol
```

This means that it can't identify the protocol (i.e., the AF_* designation) being used by the open socket file. lsof identifies protocols by matching the node number associated with the /proc/<PID>/fd entry to the node numbers found in selected files of the /proc/net sub-directory. Currently /proc-based lsof examines these protocol files:

```
/proc/net/ax25 (untested)
/proc/net/icmp
```

```
/proc/net/ipx (needs kernel patch)
/proc/net/netlink
/proc/net/packet
/proc/net/raw
/proc/net/raw6
/proc/net/sctp/assocs
/proc/net/sctp/eps
/proc/net/sockstat
```



```
/proc/net/sockstat6  
/proc/net/tcp  
/proc/net/tcp6  
/proc/net/udp  
/proc/net/udp6  
/proc/net/udplite  
/proc/net/udplite6  
/proc/net/unix
```

If /proc-based lsof says it can't identify the protocol for an open socket file, you may be able to identify the protocol yourself by using `grep` to look for the specific node number in the files of /proc/net -- e.g.,

```
$ grep <node_number> /proc/net/*
```

You may not be able to find the desired node number, because not all kernel protocol modules fully support /proc/net information.

If you find a matching node number in a /proc/net file that is not currently being processed by lsof, contact me via e-mail at <abe@purdue.edu>. I'll discuss adding support to /proc-based lsof for the protocol of the /proc/net file with you. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

The code that matches node numbers of open IPX protocol socket files to those in /proc/net/ipx requires Jonathan Sergent's Linux 2.1.79 patch to /usr/src/linux/net/ipx/af_ipx.c. The patch, suitable for input to Larry Wall's patch program, may be found in the lsof distribution file:

```
.../dialects/linux/proc/patches/net_ipx_af_ipx.c.patch
```

10.2.3 Why does /proc-based lsof warn about unsupported formats?

Lsof may issue the following warning:

```
lsof: WARNING: unsupported format: /proc/net/<file>
```

if the header line of the indicated <file> in /proc/net -- ax25, ipx, raw, tcp, udp, or unix -- doesn't match what lsof expects to find.

When the header line of a /proc/net file isn't what lsof expects, lsof probably can't parse the rest of the file

correctly and doesn't try. As a result, lsof can't report any NAME column information (e.g., local and remote addresses) for socket files bound to the indicated network protocol.

If you get this warning, please send me e-mail at <abe@purdue.edu>. Include the contents of the file lsof claims has an unsupported format. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

10.2.4 Why does /proc-based lsof report "(deleted)" after a path name?

The "(deleted)" notation following a path name in /proc-based lsof's NAME column comes from the /proc/<PID>/fd/<FD> entry for the open file. It's the Linux kernel's way of indicating the file is open but has been unlinked (rm'd).

10.2.5 Why doesn't /proc-based lsof report full open file information for all processes?

/proc-based lsof can only report on processes whose /proc files it has permission to read. /proc normally grants permission to read all its files only to root or to the owning user ID.

Without permission to read most /proc files, lsof can only report full information for processes belonging to the user who is running lsof. /proc-based lsof may be able to report some information for all processes, depending on the permissions of their associated /proc files, but usually /proc-based lsof won't be able to access the files in /proc/<PID>/fd/ that describe regular open files.

If you want /proc-based lsof to report on all processes, you must install it with setuid-root permission.

10.2.6 Why won't Customize offer to change HASDCACHE or WARNDEVACCESS for /proc-based lsof?

/proc-based lsof doesn't read device information from /dev or the device cache file, so it makes no sense to change the state of device cache processing or /dev node accessibility warnings.

10.2.7 /proc-based lsof Linux NFS questions

10.2.7.1 Why can't lsof find files on an accessible NFS file system?

On occasion lsof may be unable to identify that an open file is on an NFS file system. This is most likely the result of a bug in the way the Linux kernel supplies information

to the reader of /proc/mounts (lsof) -- sometimes that pseudo-file is truncated by the kernel.

One way to see if this is the case is to search for the NFS file system in /proc/mounts -- e.g.,

```
$ grep <NFS_file_system_mount_point> /proc/mounts
```

If you get no output or the third word of the output isn't "nfs", then lsof won't consider the file system an NFS file system.

A second test is to look at the end of /proc/mounts -- e.g.,

```
$ tail /proc/mounts
```

If tail reports "# truncated" then /proc/mounts is incomplete because of a Linux kernel bug. The bug is documented at:

<http://www.xss.co.at/sysinfo/mounts.html>

The bug is fixed in Linux kernel 2.4.18, and possibly in some earlier Linux kernel versions.

10.2.7.2 Why can't lsof find files on an inaccessible NFS file system?

If lsof issues this message about a Linux file system, mounted from an NFS server:

```
lsof: WARNING: can't stat() nfs file system /xxx/yyy
```

Then lsof won't be able to find any open files on the file system.

That's because of an inadequacy in the Linux /proc file system. Its /proc/mounts file doesn't give the device doublet (major and minor numbers) of the file system as do many UNIX systems (e.g., Solaris). The only way lsof can get the device doublet for a Linux file system is to call stat(2) on the file system path, which fails if the NFS server isn't accessible.

When lsof doesn't know the device doublet of a file system, it can't find open files on the inaccessible file system, because it can't match the doublets of open files to the doublet of the inaccessible file system.

This topic is covered extensively in lsof(8) in its ALTERNATE DEVICE NUMBERS and BLOCKS AND TIMEOUTS sections.

10.2.8 Why doesn't /proc-based Linux lsof report socket options and values, socket state flags, and TCP options and values?

The Linux /proc file system doesn't report socket options and values, socket states, and TCP options and values to lsof.

10.2.9 Does /proc-based Linux lsof use a device cache?

No. The Linux /proc/<PID>/fd/* entries provide device names to lsof via readlink(2). It is not necessary to enable device cache processing for /proc-based Linux lsof via the Customize script or modifications to the Linux machine.h header file.

10.2.10 Why doesn't /proc-based Linux lsof report any or all file structure values for its +fcfgn option?

/proc-based lsof revisions 4.79 and above can only report some file structure values for Linux kernels below 2.6.22.

When running on Linux kernels at 2.6.22 and above lsof 4.79 can report some file flag values -- i.e., in response to the +fg or +fG options. The flag values are obtained from the /proc/<PID>/fdinfo/ files introduced at Linux kernel 2.6.22.

/proc-based Linux lsof tests its availability to obtain file flag values at initialization. If values are not available, lsof disables file flag reporting. If the flags were requested with +fg or +fG, lsof displays this warning:

lsof: WARNING: can't report file flags; disregarding +f.

As a special note, when Linux lsof can report flag bits, it will not report 'R' for a read-only file. There is no read-only flag bit O_* symbol in <fcntl.h> (or <bits/fcntl.h>) and lsof reports only bits that are set. The absence of O_RDWR and O_WRONLY flag bits implies the file is read-only.

10.3 Special Linux file types

10.3.1 Why is ``DEL" reported as a Linux file type?

Lsof usually reports entries from the Linux /proc/<PID>/maps file with ``mem" in the TYPE column. However, when lsof can't stat(2) a path in the process' ``maps" file and the ``maps" file entry contains ``(deleted)", indicating the file was deleted after it had been opened, lsof reports the file type as ``DEL".

10.3.2 Why is ``unknown" reported as a Linux file type?

Lsof may report a Linux file's type as ``unknown" in the TYPE column when lsof can't obtain complete stat(2) results for the file.

Usually the NAME column will contain a ``(stat: xxx)" error message, but that could have been suppressed with the lsof ``-w" option.

10.4 Linux ``mem" Entry Problems

10.4.1 What do ``path dev=xxx" and ``path inode=yyy" mean in the NAME column of Linux ``mem" file types?

When the device or inode number in the process' ``maps" file entry doesn't match the stat(2) results from the file path, lsof reports the inconsistent information from the stat(2) of the path parenthetically after the path in the NAME column in one of these forms:

(path dev=xxx) only the device number,
``xxx", from a stat(2) of the
``maps" file entry path
differs from the ``maps" file
entry value reported in the
DEVICE column.

(path inode=yyy) only the inode number,
``yyy", from a stat(2) of the
``maps" file entry path
differs from the ``maps" file
entry value reported in the
NODE column.

(path dev=xxx inode=yyy) Both device and inode numbers differ.

Lsof reports the ``maps" file device number in the DEVICE column and the inode number in the NODE column.

When device and inode mismatches occur, lsof suppresses the reporting of link count and size. See the answer to the "Why is neither link count nor size reported for some Linux ``DEL" and ``mem" file types?" question for more information.

Device and inode inconsistencies can occur when a file at a ``maps" path is replaced after the process has started, or when a different file system with similar path names is mounted on top of the original file system.

The device inconsistency parenthetical messages can be suppressed with lsof's ``-w" option.

10.4.2 Why is neither link count nor size reported for some Linux ``DEL" and ``mem" file types?

Link count and size are not reported for some entries from the process' ``maps" file because a stat(2) of the entry file path failed or stat(2) delivered device or inode numbers that don't match the ones in the ``maps" entry.

When the stat(2) device or inode numbers don't match those in the ``maps" file entry, it is likely that the stat(2) results don't apply to the file that was originally mapped by the process and whose path appears in the ``maps" file entry, so lsof tries to avoid reporting possibly incorrect information.

See the answer to the "What do ``path dev=xxx" and ``path inode=yyy" mean in the NAME column of Linux ``mem" file types?" for more information on how mismatched stat(2) device and inode numbers are reported.

10.5 Special Linux NAME column messages

10.5.1 What does ``(stat: xxx)" mean in the NAME column of Linux files?

When lsof tried to stat(2) the path in the NAME column, the stat(2) system call failed and produced an error message of ``xxx".

This situation usually occurs if the lsof process lacks permission to stat(2) the path -- e.g., the lsof executable lacks root permission, or lsof is attempting to stat(2) a path on an NFS device mounted with the root_squash option.

The message can be suppressed with lsof's `--w` option.

10.5.2 What does `readlink: xxx` mean in the NAME column of Linux files?

When lsof tried to convert the `/proc/<PID>/fd` path, reported in the NAME column, to its full and more meaningful path, the `readlink(2)` system call used to do the conversion failed. The `readlink(2)` failure message is `xxx`.

This situation usually occurs if the lsof process lacks permission to `readlink(2)` some part of the path -- e.g., the lsof executable lacks root permission, or lsof is attempting to `stat(2)` a path on an NFS device mounted with the `root_squash` option.

The message can be suppressed with lsof's `--w` option.

10.6 Why is `NOFD` reported as a Linux file type?

When lsof lacks permission to use `opendir()` on the `fd/` subdirectory of a process' `/proc/<PID>` directory, it reports a single file of the type `NOFD` (for no file descriptors).

Lsof reports the the `/proc/<PID>/path` in the NAME column, followed by `(opendir: xxx)`, where `xxx` is the error message returned by `opendir()`.

The `NOFD` entry can be suppressed with lsof's `--w` option.

10.7 Why does Linux lsof report a NAME column value that begins with `/proc`?

When lsof has problems processing a `/proc/<PID>` entry -- e.g., it can't convert the entry to a full and more meaningful path name, or it can't access the `/proc/<PID>/fd` subdirectory with `opendir()` -- it will report the `/proc/<PID>` path in the NAME column.

10.8 Linux `/proc/net/tcp*` and `/proc/net/udp*` issues

10.8.1 Why use the Linux -X option?

If you're not interested in TCP/IP socket information for a particular use of lsof, adding the -X option will make lsof run more quickly, because -X inhibits the reading of the /proc/net/tcp* and /proc/net/udp* files. For example, you may only be interested in knowing what process has a particular file open.

When the Linux system has a large number of open TCP/IP socket files, the time savings provided by -X can be significant.

10.8.2 Why does lsof say "-i is useless when -X is specified"?

If -X is specified, lsof can't report much information on open TCP/IP socket files. However, lsof's -i option requests that information. Hence, the two options conflict and can't be used together.

10.8.3 Why does lsof say "can't identify protocol (-X specified)"?

If the Linux lsof -X option is specified and an open socket file can't be identified without accessing the /proc/net/tcp* and /proc/net/udp* files, lsof will report that it can't identify the socket's protocol and that the failure may be caused by the -X specification

11.0 NetBSD Problems

11.1 Why doesn't lsof report on open kernfs files?

Lsof doesn't report on open NetBSD kernfs files because the structures lsof needs aren't defined in the kernfs.h header file in /sys/misc/kernfs.

11.2 Why doesn't lsof report on open files on: file descriptor file systems; /proc file systems; 9660 (CD-ROM) file systems; MS-DOS (floppy disk) file systems; or kernel file systems?

Lsof is not able to report on open files on certain file system if /usr/src/sys/msdosfs didn't exist when the lsof Configure script ran and lsof was made. /usr/src/sys/msdosfs contains header files lsof needs for collecting data on certain file system files.

You can tell if an lsof executable above) lacks support for a file system if the following test of `lsof -v` produces nothing:

```
$ lsof -v 2>&1 | grep <support_enabled_definition>
```

The <support-enabled_definition> will be:

```
File System Type Definition Note
-----
File descriptor HASFDESCFS
/proc HASPROCFS
9660 HAS9660FS
MS-DOS HASMSDOSFS (lsof 4.61 and above)
Kernel HASKERNFS
```

The work-around is to install /usr/src/sys, rerun the lsof Configure script, and remake lsof.

11.3 Why does lsof produce confusing results for nullfs file systems?

Consider this report from /sbin/mount:

```
/usr/home on /home type null (local)
```

(According to /sbin/mount /usr/home is the mounted-on device and /home is the mounted-on directory.)

When lsof is asked to report on open files on /home, it will report them as files on /usr/home instead. That's an artifact of the NetBSD kernel's dynamic name lookup cache (DNLC) and the way the kernel handles nullfs mounted-on directories.

While lsof will report all open files on /home when given /home as a file system directory argument, even though reporting them as located on /usr/home, lsof will not find the same files when asked to report on all open files on /usr/home when given /usr/home as a file system device argument. That's because from the mount perspective /usr/home is equivalent to a device, but from the device perspective it is still a directory.

So, what this lsof command reports:

```
$ lsof /home
... NAME
... /usr/home/...
```

Won't be duplicated by this lsof command:

```
$ lsof /usr/home
```

Another way to look at this confusing /home and /usr/home example is to consider what stat(2) reports. For /home stat(2) reports a device doublet that matches what lsof finds in open file node structures, while the device doublet stat(2) reports for /usr/home won't match what lsof finds. Nor does the mode reported by stat(2) indicate a block devices, as is the expected case.

There is no simple answer to this confusion, nor is there even a simple explanation. Simply be aware that when supplying file system arguments to lsof on NetBSD, use the mounted-on directory name for a nullfs as the lsof argument, and don't be surprised when the NAME column reports the mounted-on device name.

11.4 NetBSD header file problems

11.4.1 Why can't the compiler find some NetBSD header files?

If the compiler's pre-processor complains it can't find some header files when it compiles lsof source files, /usr/include and /usr/src may not have all the header files lsof needs.

As a work-around use the NETBSD_SYS environment variable to specify to lsof the location of the additional header files -- e.g.,

```
% setenv NETBSD_SYS /my_source
% ./Configure -n netbsd
```

or

```
$ NETBSD_SYS=/mys_source ./Configure -n netbsd
```

Caution: using this work-around may cause the lsof Configure script to activate or omit different features, depending on where it finds the header files that determine the state of the features.

11.4.2 Why does NetBSD lsof produce incorrect output?

If the NetBSD system's kernel was built from header files that don't match those in /usr/include -- e.g., //usr/src has the ones from which the kernel was built -- lsof may build, but won't produce correct output.

As a possible work-around, try directing the C compiler to select header files from /usr/src before it selects them from /usr/include. That can be done with the DEBUG make string -- e.g.,

```
$ make DEBUG="-I/usr/src -I/usr/include"
```

If that work-around fails, try using the LSOF_INCLUDE and NETBSD_SYS environment variables to swap /usr/include and /usr/src when running the Configure script, then use the make DEBUG string when running make -- e.g.,

```
$ LSOF_INCLUDE=/usr/src; export LSOF_INCLUDE
$ NETBSD_SYS=/usr/include; export NETBSD_SYS
$ ./Configure -n netbsd
$ make DEBUG="-I/usr/src -I/usr/include"
```

11.5 Why isn't lsof feature xxx enabled for NetBSD?

Lsof's Configure script enables NetBSD features by locating and examining header files associated with the features, and based on what it finds, setting compile-time definitions in Makefiles. (See 00PORTING for a list of the definitions.)

When Configure doesn't find header files or doesn't find appropriate values in header files, that may mean the header file tree lsof is searching is incomplete or out of date.

Lsof normally looks for NetBSD header files in /usr/include. It can also be directed to look in other directories -- e.g., /sys -- if told to do so with the contents of the LSOF_INCLUDE and NETBSD_SYS environment variables.

To determine what header file enables a missing feature, check the NetBSD stanza in the Configure script. Then check the locations it checks for the indicated header files and contents.

See 00XCONFIG for more information on LSOF_INCLUDE and

and NETBSD_SYS.

12.0 NEXTSTEP and OPENSTEP Problems

12.1 Why can't lsof report on 3.1 lockf() or fcntl(F_SETLK) locks?

Lsof has code to test for locks defined with lockf() or fcntl(F_SETLK) under NEXTSTEP 3.1, but that code has never been tested. I couldn't test it, because my NEXTSTEP 3.1 lockf() and fcntl(F_SETLK) functions return "Invalid argument" every way I have tried to invoke them.

If your NEXTSTEP 3.1 system does allow you to use lockf() and fcntl(F_SETLK) and lsof doesn't report locks set with them, then the code in ../dialects/next/dnode.c probably isn't correct. Please contact me via e-mail at <abe@purdue.edu> and tell me how you got your lockf() and fcntl(F_SETLK) system calls to work. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

12.2 Why doesn't lsof compile for NEXTSTEP with AFS?

I no longer have a NEXTSTEP test system that has AFS. Changes to lsof since I once had a test system have caused me to change the AFS code in NEXTSTEP without being able to test the changes.

If you need AFS support for NEXTSTEP and can't get it to compile, please contact me. Perhaps we can jointly fix the problems.

13.0 OpenBSD Problems

13.1 Why doesn't lsof support kernfs on my OpenBSD system?

Lsof supports the kernel file system on OpenBSD versions whose /sys/miscfs/kernfs/kernfs.h (or <miscfs/kernfs/kernfs.h> header file correctly defines the kern_target structure. The lsof Configure script's openbsd stanza checks for the presence of the structure's kt_name element and activates kernfs support for the CFLAGS -DHASKERNFS definition only when it finds kt_name.

The kernfs.h header file is scheduled to be updated in the OpenBSD 2.1 release, according to Kenneth Stailey, who authored its changes.

13.2 Will lsof work on OpenBSD on non-x86-based architectures?

I've not tested lsof on an OpenBSD system that uses a non-x86-based architecture, but I've had one report that lsof 4.33 compiles and works on OpenBSD for the pmax architecture (decstation 3100).

13.3 <sys/pipe.h> problems

13.3.1 Why does the compiler claim nbpg isn't defined?

When compiling lsof on some (older) OpenBSD SPARC versions, the compiler may complain:

```
In file included from ../dlsof.h:191,
  from ../lsof.h:166,
  from fino.c:52:
/usr/include/sys/pipe.h:83: `nbpg' undeclared here
(not in a function)
/usr/include/sys/pipe.h:83: size of array `ms' has
non-integer type
```

This happens because <sys/pipe.h> uses NBPG from <machine/param.h> to size the `ms' array, and some OpenBSD systems define NBPG in terms of a kernel integer variable, nbpg.

Lsof revisions 4.46 and above have a hack to dlsof.h, developed by Volker Borchert that avoids the compiler problem for SPARC OpenBSD 2.3. The hack might work for other OpenBSD SPARC versions, but hasn't been tested there.

If you want to enable the hack for your OpenBSD SPARC version, modify this code in ../dialects/n+obsd/dlsof.h:

```
# if defined(OPENBSDV)
# if OPENBSDV==2030 && defined(__sparc__)
# if defined(nbpg)
#undef nbpg
# endif /* defined(nbpg) */
#define nbpg 4096 /* WARNING!!! ... */
# endif /* OPENBSDV==2030 && defined(__sparc__) */
#include <sys/pipe.h>
```

```
#endif /* defined(OPENBSDV) */
```

You will probably want to change the second `#if` test to match your OpenBSD version. You may also want to change what value is assigned to `nbpg`. See the next section, "What value should I assign to `nbpg`?"

13.3.2 What value should I assign to `nbpg`?

If you need to enable the `nbpg` hack, described in "Why does the compiler claim `nbpg` isn't defined?", you may also need to assign a value other than 4096 to `nbpg`. 4096 works for the sun4c processor and should work for sun4m, but 8192 may be needed for sun4.

Check `<machine/param.h>` and other OpenBSD documentation to determine the correct `nbpg` assignment.

13.4 Why doesn't `lsof` report on open MS-DOS file system (floppy disk) files?

`lsof` is not able to report on open MS-DOS file system files if `/usr/src/sys/msdosfs` didn't exist when the `lsof` Configure script ran and `lsof` was made. `/usr/src/sys/msdosfs` contains header files `lsof` needs for collecting data on MS-DOS file system files.

You can tell if an `lsof` executable (revisions 4.61 and above) lacks MS-DOS file system support if the following command reports nothing:

```
$ lsof -v 2>&1 | grep HASMSDOSFS
```

The work-around is to install `/usr/src/sys`, rerun the `lsof` Configure script, and remake `lsof`.

13.5 Why isn't `lsof` feature xxx enabled for OpenBSD?

`lsof`'s Configure script enables OpenBSD features by locating and examining header files associated with the features, and based on what it finds, setting compile-time definitions in Makefiles. (See `00PORTING` for a list of the definitions.)

When Configure doesn't find header files or doesn't find appropriate values in header files, that may mean the header file tree `lsof` is searching is incomplete or out of date.

Lsof normally looks for OpenBSD header files in /usr/include and /sys. It can also be directed to look in other directories if told to do so with the contents of the LSOF_INCLUDE and NETBSD_SYS environment variables.

To determine what header file enables a missing feature, check the OpenBSD stanza in the Configure script. Then check the locations it checks for the indicated header files and contents.

See 00XCONFIG for more information on LSOF_INCLUDE and NETBSD_SYS.

14.0 Output Problems

14.1 Why do the lsof column sizes change?

Lsof dynamically sizes its output columns each time it runs to make sure that each column takes the minimum space. Column parsing -- e.g., with awk -- is possible, because each column is guaranteed to be separated from the preceding one by at least one space, and no column except the last (NAME) contains embedded spaces.

14.2 Why does the offset have ``0t' and ``0x" prefixes?

The offset value that appears in the SIZE/OFF column has ``0t' and ``0x" prefixes to distinguish it from size values that may appear in the same column.

Normally if the offset value is less than 100,000,000 (8 digits), it appears in decimal with a ``0t' prefix; over 99,999,999, in hexadecimal with a ``0x" prefix.

A decimal offset is handy, for example, when tracking the progress of an outbound ftp transfer. When lsof reports on the ftp process, it will report the size of the file being sent with its open descriptor; it will report the progress of the transfer via the offset of the outbound open ftp data socket descriptor.

The ``-o [n]" option may be used to specify the maximum number of decimal digits to be printed after ``0t" before lsof switches to the hexadecimal digits after ``0x". As

already noted, the default decimal digit count is 8.

14.3 What are the values printed in the FILE_FLAG column and why is 0x<value> sometimes included?

The two comma separated lists, separated by a semicolon, printed in the FILE-FLAG column (when the "+fg" option is specified), are short-hand names or hexadecimal values for the bits lsof finds in the f_flag or f_flags member of file structures for files (the first list, the one before the semicolon), and process open files flags found in various kernel structures, often named "pofile" (the second list, the one after the semicolon).

Lsof determines the short-hand names from symbols in the <fcntl.h>, <linux/fs.h>, <sys/fcntl.h>, <sys/fcntlcom.h>, <sys/file.h>, and <sys/user.h> header files.

See

the discussion of FILE-FLAG in the OUTPUT section of the lsof man page, and the FF_* and POF_* symbols in lsof.h for a list of the names.

Bits with no names defined for them are represented by an 0x<value> member of the comma-separated list -- a hexadecimal integer. When "+fG" is specified (instead of "+fg"), lsof will list all flag values as two hexadecimal integers, separated by a semicolon.

When "-FG" is specified to get the flags in an output field, the format defaults to hexadecimal. You can get names instead by following "-FG" with "+fg" -- e.g.,

```
$ lsof -FG +fg ...
```

However, when you precede "-FG" with "+fg" -- e.g.,

```
$ lsof +fg -FG
```

the format will be hexadecimal; order is important.

14.3.1 Why doesn't lsof display FILE_FLAG values for my dialect?

All versions of lsof except the /proc-based Linux lsof report FILE-FLAG values. Lsof can't obtain FILE-FLAG information from the Linux /proc interface.

14.4 Network Addresses

14.4.1 Why

does lsof's -n option cause IPv4 addresses, mapped to IPv6, to be displayed in IPv6 notation?

When you use the -n option to tell lsof to display numeric network addresses, and an IPv4 address has been mapped to IPv6, lsof displays the address in IPv6 format and puts "ipv4" in the TYPE column. That combination indicates the IPv4 address has been mapped to IPv6.

For example, the IPv4 address 1.2.3.4, when mapped to an IPv6 address, will be displayed by lsof as:

```
[::ffff:1.2.3.4]
```

The enclosing brackets are lsof's signal that this is an IPv6 address. Inside the brackets is a standard IPv6 address, reported by inet_ntop(). The first two colons, signifying zeroes in the first 64 bits of the IPv6 address, and the hexadecimal ffff in the next 32 bits, indicate that the last 32 bits contains a mapped IPv4 address, which is then displayed in IPv4 dot notation.

14.5 Why does lsof output \x, ^x, or \xnn for characters sometimes?

lsof displays only printable ASCII characters.

lsof

considers a character printable if isprint(3) says it is. If isprint(3) says a character isn't printable, the lsof man page explains:

```
"... Non-printable characters are printed in one of three forms: the C ``\[bfrnt]" form; the control character `^' form (e.g., ``^@"); or hexadecimal leading ``\x" form (e.g., ``\xab"). Space is non-printable in the COMMAND column (``\x20") and printable elsewhere."
```

14.5.1 Why is space considered a non-printable character in command names?

Space is considered an unprintable character in command names because it is sometimes possible to hide the full command name from scripts that parse ps(1) output by embedding a space in the name.

14.6 Why doesn't lsof print all the characters of a command name?

By default lsof prints the first nine characters of the names of commands associated with processes. If more characters are required, the "w" value of the "+c w" option may be used to specify a larger width.

If "w" is zero (0) lsof will print all characters of all command names up to the limit of the number of characters supplied by the particular UNIX dialect. When reporting command names, lsof replaces non-printable characters as discussed in the answer to " Why does lsof output \x, ^x, or \xnn for characters sometimes?"

See the answer to the "Why is space considered a non-printable character in command names?" question for an explanation of why spaces are replaced by the "\x20" representation in command names.

The number of command name characters supplied to lsof by UNIX dialects in files and structures varies by dialect. For example, Linux 2.4.27 supplies lsof the first 15 characters of command names and Solaris 9 supplies 16. Thus, even if "w" is zero (0), lsof can't report more characters for command names on those two UNIX dialects than they provide lsof.

14.7 Why does lsof reject some -c command names, saying their lengths are "> what system provides (nn)"?

The command name length that a specific system provides varies from dialect to dialect. As noted in the answer to the "Why doesn't lsof print all the characters of a command name?" question, Linux and Solaris provide a limited number of command name characters.

When more characters are specified in the parameter to the -c option, lsof considers it an error and issues a fatal error message -- e.g.,

lsof: "-c xxxxyyyy" length (8) > what system provides (7)

The only work-around is to specify no more characters to -c than the system provides to lsof.

14.8 Why does lsof sometimes print TYPE numbers instead of names?

When lsof can't convert a type number to a name for printing in the TYPE column, it will report the number as four octets.

14.9 Marker line format problems

14.9.1 Why won't lsof accept a marker line format?

Lsof's Configure script must find the localtime(3) and strftime(3) functions in the dialect's C library in order to enable support for marker line formats.

Check the output of lsof's -v option for the presence of -DHAS_STRFTIME in the compiler flags. If it isn't there, Configure didn't find the necessary two C library functions.

If you think lsof should have found the functions, make a copy of the C test program in the Configure script that it uses to find the functions. Then use the copy, or a more informative modification of it, to learn why Configure can't find the functions. You can find that program by searching for strftime.

14.9.2 Why does lsof reject the NL (%n) marker line format?

When repeat mode and field output (with -F) have both been specified, lsof won't allow new line (NL) formats to be specified with ``%n". That's because the marker line is always guaranteed to be a single line.

There is no work-around to this restriction.

14.10 How are protocol state name exclusion and inclusion used?

Protocol state name inclusion and exclusion with the ``-s p:s" option and its arguments have some issues to consider. Note: the ``-s p:s" option is only available when the help output, obtained with -h or -?, shows it; it was a recent addition to lsof and is supported only on dialects where it could be tested.

First, there is the problem of determining what state names, if any, the dialect produces. Try running this lsof command to find them:

```
$ lsof -i
```

Knowing the state names of interest, the next problem is to decide on the lsof options and their parameters that will produce the desired output. Here some examples are probably the most useful.

To list only TCP socket files in LISTEN and CLOSE_WAIT states, use:

```
$ lsof -itcp -stcp:listen,close_wait  
or  
$ lsof -iTCP -sTCP:LISTEN,CLOSE_WAIT
```

Case isn't important to lsof in protocol and state names.

To exclude TCP socket files in CLOSE_WAIT state, use:

```
$ lsof -itcp -stcp:^close_wait
```

Note the `^` preceding `close_wait`; it selects exclusion. You can mix included and excluded names in a comma separated list, but you may not include and exclude the same name for the same protocol.

To list TCP files in LISTEN state and UDP files in Idle state, use:

```
$ lsof -i -stcp:listen -sudp:idle
```

Note: if you don't accompany the ```-s p:s"` list option and arguments with the `-i` option, lsof will list all other regular files, while applying the specified inclusion and exclusion specifications to network files. Generally, then, you want to use `-i` with `-s`.

14.10.1 Why doesn't my dialect support state name exclusion and inclusion?

When state name inclusion and exclusion was added, I had access to test systems for AIX, Darwin, FreeBSD, Linux, PSTAT-based HP-UX and Solaris.

Therefore, I was unable to add and test the support to any other UNIX dialects.

If a dialect has the support, then the `HASTCPUDPSTATE` definition in its `machine.h` header file will be active; if not, it will be absent or commented out.

If your dialect doesn't have the support and you want it added, you will have to provide me Internet access to a test host, where I can compile lsof and have the credentials to test the changes the support requires. If that's possible for you, please contact me via e-mail at <abe@purdue.edu>. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

15.0 Pyramid Version Problems

15.0.5 Statement of deprecation

As of lsof revision 4.52 support for all Pyramid versions has been dropped. Contact me via e-mail at <abe@purdue.edu> if you are interested in obtaining the last lsof Pyramid distribution. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

16.0 SCO Problems

16.1 SCO OpenServer Problems

16.1.1 How can I avoid segmentation faults when compiling lsof?

If you have an older SCO OpenServer compiler, it may get a segmentation fault when compiling some lsof modules. That appears to happen because of the -Ox optimization action requested in the lsof Makefile.

Try changing -Ox to -O with this make invocation:

```
$ make DEBUG=-O
```

Bela Lubkin supplied this tip and Steve Williams verified it.

16.1.2 Where is libsocket.a?

If you compile lsof and the loader says it can't find the socket library, libsocket.a, called by the -lsocket option in the lsof compile flags, you probably are running an SCO OpenServer release earlier than 5.0 and don't have the TCP/IP Development System package installed.

You may have the necessary header files, because you have the TCP/IP run-time package installed, but if you don't have the TCP/IP Development System package installed, you won't have libsocket.a.

Your choices are to install the TCP/IP Development System package or upgrade to OpenServer Release 5.0. You will find libsocket.a in 5.0 -- you'll find all the libraries and header files there, in fact -- and you can use gcc to compile lsof if you don't want to install the 5.0 Development System package.

16.1.3 Why do I get "warning C4200" messages when I compile lsof?

When you compile lsof under OSR 3.2v4.2 (and perhaps under earlier versions as well), you may get many compiler warning messages of the form:

```
node.c(183) : warning C4200: previous declarator is not
compatible with default argument promotion
```

In my opinion this is a bug in the OSR compiler. Because the compiler cannot handle full ANSI-C prototypes, it assumes default types for function parameters as it encounters untyped in a function prototype -- e.g., in this function declaration from node.c,

```
readrnode(ra, r)
KA_T ra;
struct rnode *r;
{
...

```

the compiler assigns default int types to the ra and r arguments.

Then, when the compiler encounters the fully typed parameters after the function skeleton and sees parameters with types that don't match the assumptions it previously made, it whines about its own assumptions.

You can ignore these messages.

16.2 SCO|Caldera UnixWare Problems

16.2.1 Why doesn't lsof compile on my UnixWare 7.1.1 or above

system?

When you Configure lsof with the "uw" abbreviation and try to compile it for UnixWare 7.1.1, you may get compiler error messages like this:

```
UX:acomp: ERROR: "dproc.c", line 98:  
undefined struct/union member: p_pgidp
```

This suggests that you probably have a non-stop cluster UnixWare 7.1.1 system. Its <sys/proc.h> header file differs from the one on the system where I did the lsof port to UnixWare 7.1.1. I currently don't have access to a non-stop cluster system to be able to develop changes to lsof that would make it compile and work there.

If you have a non-stop cluster UnixWare 7.1.1 system, want lsof for it, and can offer me a test account on the system, please contact me via e-mail at <abe@purdue.edu>. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

If you have a system with nsc_cfs and can offer me a test account on it, please contact me via e-mail at <abe@purdue.edu>. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

16.2.2 Why does lsof complain about node_self() on my UnixWare 7.1.1 or above system?

If lsof exits immediately after issuing this message:

```
can't identify process NSC node; node_self(): <message>
```

It means that lsof has been built to run on a NonStop Cluster (NSC) UnixWare 7.1.1 or higher system and can't get the number of the node on which it is running. Lsof uses the node number to determine the path to the kernel boot file.

You can tell if lsof has been built for NSC by looking for "-DHAS_UW_NSC" in lsof's "-v" option output.

If the system on which you're trying to run lsof isn't running an NSC kernel, you will need to build a non-NSC lsof.

16.2.3 Why does UnixWare 7.1.1 or above complain about -lcluster, node_self(), or libcluster.so?

When you build, compile, and load lsof for UnixWare 7.1.1 and above, ld may complain that it can't find the -lcluster library or that the node_self symbol is undefined. When you try to run an existing lsof binary it may complain that libcluster.so can't be found.

These messages mean the tests made by Configure on your system led it to believe your system is running a NonStop Cluster (NSC) kernel, or the lsof binary you're trying to use was built on a NonStop Cluster system. If an lsof binary was built for NSC, this shell command produces output:

```
$ strings <lsof_binary> | grep HAS_UW_NSC
```

If that's not the case, and you can rebuild lsof, set the UW_HAS_NSC environment variable to "N" and do this:

```
$ Configure -n clean
$ UW_HAS_NSC=N
$ export UW_HAS_NSC
$ Configure -n uw
$ make
```

You can also edit Makefile and lib/Makefile. Remove -DHAS_UW_NSC from the CFGF strings. Remove -lcluster from the CFGL strings. Then run make again.

If you have an existing NSC lsof binary and you want one for a non-NSC system, you will have to build lsof yourself on the system where you want to use it. (That's always a good idea anyway.)

16.2.4 Why does UnixWare 7.1.1 or above lsof complain it can't read the kernel name list?

If lsof complains:

```
can't read kernel name list from <path>
```

It means that lsof can't find the booted kernel image file at <path>. On NonStop Cluster (NSC) UnixWare 7.1.1 or

higher systems lsof determines the booted file path by examining this file:

```
/stand/node_self/boot
```

If examining that file doesn't lead to an NSC path, lsof uses:

```
/stand/1/unix
```

On non-NSC systems lsof expects the booted kernel image to be in /stand/unix.

If your booted kernel image is in a different place, use lsof's "-k <path>" option to specify its path.

16.2.5 Why doesn't lsof report link count, node number, and size for some UnixWare 7.1.1 or above CFS files?

Lsof reports link count, node number, and size for open CFS files as recorded in their kernel node structure's cached attributes. Sometimes not all attributes are cached on the node where lsof runs, so lsof cannot report them.

16.2.6 Why doesn't lsof report open files on all UnixWare 7.1.1 NonStop Cluster (NSC) nodes?

Lsof can only report on files open on the node on which it runs, because the information lsof reports comes from the private kernel memory of the node. This may mean that asking lsof to find a specific open file, or use of a specific Internet address or port, may not report all open instances on nodes other than the one used to run lsof.

You can use the NSC onnode(1) command to run lsof on specific nodes, or the onall(1) command to run lsof on all nodes -- e.g.,

```
$ onall lsof [options] 2>&1 | less
```

or

```
$ onnode node-number lsof [options] 2>&1 | less
```

Note that, when lsof is run all nodes, the path name component assembly results it reports in its NAME column may vary, because the dynamic name cache from which lsof gets

the components is private to the kernel of each node.

Also note the use of shell redirection in the examples to merge the standard error file information from onnode and onall with lsof's standard output file output. That will put the onnode and onall node announcements in proper sequence with lsof's output.

16.2.7 Why doesn't lsof report the UnixWare 7.1.1 NonStop Cluster (NSC) node a process is using?

To induce lsof to report the node on which a process runs would be a significant, non-standard modification to lsof. It has much wider implications than merely the printing of a number in an output column. I'm not currently (April 2001) prepared to undertake such a modification.

If you want node-specific NSC information about open files, run lsof under the control of onall(1) or onnode(1).

```
$ onall lsof [options] 2>&1 | less
```

or

```
$ onnode node-number lsof [options] 2>&1 | less
```

16.2.8 Why does the compiler complain about missing UnixWare 2.1[.x] header files?

SCO|Caldera didn't ship the following header files with UnixWare 2.1 through 2.1.3:

```
<fs/proc/prdata.h>  
<fs/procfs/prdata.h>  
<sys/fs/fifonode.h>  
<sys/fs/namenode.h>
```

Lsof needs those header files for its compilation. Contact SCO|Caldera to get copies of those header files.

If you can't get the header files from SCO|Caldera, please contact me via e-mail at <abe@purdue.edu>. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

17.0 Sun Problems

17.0.5 Statement of deprecation

Lsof support for SunOS 4.1.x was last tested at revision 4.51.
Contact me via e-mail at <abe@purdue.edu> if you're interested in
obtaining it. Make sure "lsof" appears in the "Subject:" line so
my e-mail filter won't classify your letter as Spam.

17.1 My Sun gcc-compiled lsof doesn't work -- why?

Gcc can be used to build lsof successfully. However, an
improperly installed Sun gcc compiler will usually not
produce
a working lsof.

If your Sun gcc-compiled lsof doesn't report anything, or
reports ``can't read proc table," or gcc refuses to compile
lsof without error, check that the gcc step that "fixes"
Sun header files was run on the system where you're using
gcc to compile lsof. As an alternative, if you have the
SunPro C 5.0 compiler or later available, use it to compile
lsof -- e.g., use the solariscc Configure abbreviations.

17.2 How can I make lsof compile with gcc under Solaris 2.[456], 2.5.1, 7, 8 or 9?

Presuming your gcc-specific header files are wrong for
Solaris, edit the lsof Configure-generated Makefile and
lib/Makefile and make this change:

```
CFGF= -Dsolaris=20400 ...  
to  
CFGF= -Dsolaris=20400 -D__STDC__=0 -I/usr/include ...
```

or change:

```
CFGF= -Dsolaris=20500 ...  
to  
CFGF= -Dsolaris=20500 -D__STDC__=0 -I/usr/include ...
```

or change:

```
CFGF= -Dsolaris=20501 ...  
to  
CFGF= -Dsolaris=20501 -D__STDC__=0 -I/usr/include ...
```

This is only a temporary
work-around. You really should
instruct gcc to to update your gcc-specific header files
or install a recent gcc (e.g., 3.2), which has no need for

private copies of Solaris include files.

17.3 Why does Solaris Sun C complain about system header files?

You're probably trying to use `/usr/ucb/cc` if you get compiler complaints like:

```
cc -O -Dsun -Dsolaris=20300 ...
"/usr/include/sys/machsig.h", line 81: macro BUS_OBJERR
redefines previous macro at "/usr/ucbinclude/sys/signal.h",
line 444
```

Note the reference to `"/usr/ucbinclude/sys/signal.h"`. It reveals that the BSD Compatibility Package C compiler is in use. `lsf` requires the ANSI C version of the Solaris C compiler, usually found in `/usr/opt/bin/cc` or `/opt/SUNWspro/bin/cc`.

Try adding a `CC` string to the `lsf` Makefile that points to the Sun ANSI C version of the Sun C compiler -- e.g.,

```
CC= /usr/opt/bin/cc
or
CC= /opt/SUNWspro/bin/cc.
```

17.4 Why doesn't `lsf` work under my Solaris 2.4 system?

If `lsf` doesn't work under your Solaris 2.4 system -- e.g., it produces no output, little output, or the output is missing command names or file descriptors -- you may have a pair of conflicting Sun patches installed.

Solaris patch 101945-32 installs a kernel that was built with a `<sys/auxv.h>` header file whose `NUM_*_VECTORS` definitions don't match the ones in the `<sys/auxv.h>` updated by Solaris patch 102303-02.

`NUM_*_VECTORS` in the kernel of patch 101945-32 are smaller than the ones in the `<sys/auxv.h>` of patch 102303-02. The consequence is that when `lsf` is compiled with the `<sys/auxv.h>` whose `NUM_*_VECTORS` definitions are larger than the ones used to compile the patched kernel, `lsf`'s user structure does not align with the one that the kernel employs.

If you have these two patches installed, contact Sun and complain about the mis-match.

You may be able to work around the problem by editing
/usr/include/sys/auxv.h to have the following NUM_*_VECTORS
definitions:

```
#define NUM_GEN_VECTORS 4
#define NUM_SUN_VECTORS 8
```

The Configure script issues a prominent WARNING that you should
try the work-around.

I thank Leif Hedstrom for identifying the offending patches.

17.5 Where are the Solaris header files?

If you try to compile lsof under Solaris and get a compiler
complaint that it can't find system header files, perhaps
you forgot to add the header file package, SUNWhea.

17.6 Where is the Solaris /usr/src/uts/<architecture>/sys/machparam.h?

When you try to Configure lsof for Solaris 2.[23456], 2.5.1,
and 7 -- e.g., on a `uname -m` == sun4m system -- Configure
complains:

```
grep: /usr/src/uts/sun4m/sys/machparam.h:
No such file or directory
grep: /usr/src/uts/sun4m/sys/machparam.h:
No such file or directory
```

And when you try to compile the configured lsof, cc or gcc
complains:

```
dproc.c:530: `KERNELBASE' undeclared (first use this function)
```

The explanation is that somehow your Solaris system doesn't
have
the header files in /usr/src/uts it should have. Perhaps
someone removed the directory to save space. Perhaps you're
using a gcc installation, copied from another system. In any
event, you will have to load the header files from the SUNWhea
package of your Solaris distribution.

KERNELBASE is an important symbol to lsof -- it keeps lsof
from sending an illegal kernel value to kvm_read() where
a segmentation violation might result (a bug in the kvm
library). Lsof can get illegal kernel values because it
reads kernel values slowly with kvm_read() calls that the

kernel is changing rapidly.

Lsof doesn't need KERNELBASE at Solaris 2.5 and above, because it has a KERNELBASE value whose address lsof can find with /dev/ksyms and whose value it can read with kvm_read(). Under Solaris 2.5 /usr/src/uts has moved to /usr/platform.

17.7 Why does Solaris lsof say "can't read proc table"?

When lsof collects data on processes, using the kvm_*() functions to scan the kernel's proc structure table, it checks to make sure it has identified a reasonable number of them -- a minimum of three. When lsof can't identify three processes during a scan, it repeats the scan.

When five scans fail to yield three processes, lsof issues the fatal message:

```
lsof: can't read proc table
```

and exits.

Usually lsof fails to identify three processes during a scan because its idea of the form of the proc structure differs from that being used by the kernel. Since the proc structure is defined in <sys/proc.h> and other /usr/include header files, the root cause of a proc structure discrepancy usually can be found in the composition of /usr/include.

One common way that /usr/include header files can be incorrect is that gcc was used to compile lsof, gcc used its special (i.e., "fixed") header files instead of the ones in /usr/include, and the special gcc header files weren't updated when Solaris was. Answers to these questions:

My Sun gcc-compiled
lsof doesn't work -- why?

How can I make lsof compile with gcc under Solaris 2.[456],
2.5.1, 7, 8 or 9?

Why does Solaris Sun C complain about system header files?

discuss the gcc header file problem and offer suggestions
on how to fix it or work around it.

It may also be that you are trying to run a version of lsof that was compiled on an older version of Solaris. For example, an lsof executable, compiled for Solaris 2.4, will produce the "can't read proc table" message if you try to run it under Solaris 2.5. If you have compiled lsof under Solaris 2.5 and it still won't work, see if the header files in /usr/include have been updated to 2.5, or still represent a previous version of Solaris.

Another source of header file discrepancies to consider is the Solaris patch level and whether a binary kernel patch was not matched with a corresponding header file update. See the "Why doesn't lsof work under my Solaris 2.4 system?" question for an example of one in Solaris 2.4 -- there may be other such patch conflicts I don't know about.

17.8 Why does Solaris lsof complain about a bad cached clone device?

When lsof revisions below 4.04 have been run on a Solaris system and have been allowed to create a device cache file, the running of revisions 4.04 and above on the same systems may produce this complaint:

```
lsof: bad cached clone device: ...  
lsof: WARNING: created device cache file: ...
```

This is the result of a change in the device cache file that took place at lsof revision 4.04. The change introduced a node number into the clone device lines of the device cache file and was done in such a way that lsof could detect device cache files whose clone lines don't have node numbers (lines created by previous lsof revisions) and recognize the need to regenerate the device cache file.

17.9 Why doesn't Solaris make generate .o files?

Solaris /usr/ccs/bin/make won't generate .o files from .c files if /usr/share/lib/make/make.rules is missing. It may be found in and installed from the SUNWsport package.

17.10 Why does lsof report some Solaris 2.3 and 2.4 lock types as 'N'?

For Solaris 2.3 with patch P101318 installed at level 45 or above, and for all versions of Solaris 2.4, NFS locks are represented by a NFS-specific kernel lock structure that sometimes lacks a read or write lock type indicator.

When lsof encounters such a lock structure, it reports the lock type as `N`.

17.11 Why does lsof Configure say "WARNING: no cc in ..."?

When lsof's Configure script is executed with the solariscc abbreviation it tries to make sure it's using the Sun C compiler and not the UCB substitute from /usr/ucb/cc. Thus, it looks for cc in the "standard" Sun compiler location, /opt/SUNWspro/bin.

If Configure can't find cc there, it issues the warning:

```
lsof: WARNING: no cc in /opt/SUNWspro/bin;
using cc without path.
```

and uses cc for the compiler name, letting the shell find cc with its PATH environment variable.

You can tell Configure where to find your cc with the SOLARIS_CC_DIR cross-configuration environment variable. (See 00XCONFIG for more information on SOLARIS_CC_DIR). For example, use this Configure shell command:

```
SOLARIS_CC_DIR=/usr/special/bin Configure -n solariscc
```

(SOLARIS_CC_DIR should be the full path to the directory containing your cc.)

17.12 Solaris 7, 8 and 9 Problems

17.12.1 Why does lsof say the compiler isn't adequate for Solaris 7, 8 or 9?

Solaris 7, 8 and 9 kernels come in two flavors, 32 and 64 bit. 64 bit kernels run on machines that support the SPARC v9 instruction set architecture. Separate executables for some programs, -- e.g., ones using libkvm like lsof -- must be built for 32 and 64 bit kernels.

Previous Sun (e.g., SC4.0) and earlier gcc compilers will build lsof for 32 bit kernels, but they won't build it for 64 bit kernels. Compilers that will build lsof for 64 bit Solaris 7, 8 and 9 kernels are the Sun WorkShop Compilers C 5.0 and above, and recent gcc versions, e.g., 3.2.

When given the ``-xarch=v9" flag, the C 5.0 compiler and above, and associated loader and 64 bit libraries will build a 64 bit lsof executable; when given the "-m64" or "-mcpu=v9" (deprecated) flags, an appropriate gcc compiler will build a 64 bit lsof executable.

When the lsof Configure script detects a 64 bit kernel is in use (e.g., by executing `/bin/isainfo -kv`), and when it finds that the specified compiler is inappropriate, it complains with these messages:

For gcc:

```
!!!WARNING!!!=====!!!WARNING!!!=====!!!WARNING!!!  
!                               !  
! LSOF NEEDS TO BE CONFIGURED FOR A 64 BIT KERNEL, BUT !  
! THIS GCC DOESN'T SUPPORT THE BUILDING OF 64 BIT    !  
! SOLARIS EXECUTABLES. LSOF WILL BE CONFIGURED FOR A !  
! 32 BIT echo KERNEL.                               !  
!  
!                               !  
!!!WARNING!!!=====!!!WARNING!!!=====!!!WARNING!!!
```

For Sun C:

```
!!!WARNING!!!=====!!!WARNING!!!=====!!!WARNING!!!  
!                               !  
! LSOF NEEDS TO BE CONFIGURED FOR A 64 BIT KERNEL, BUT |  
! THE VERSION OF SUN C AVAILABLE DOESN'T SUPPORT THE  !  
! -xarch=v9 FLAG. LSOF WILL BE CONFIGURED FOR A 32 BIT !  
! KERNEL.                               !  
!                               !  
!!!WARNING!!!=====!!!WARNING!!!=====!!!WARNING!!!
```

17.12.2 Why does Solaris 7, 8 or 9 lsof say "FATAL: lsof was compiled for..."?

Solaris 7, 8 or 9 lsof may say:

lsof: FATAL: lsof was compiled for a xx bit kernel,
but this machine has booted a yy bit kernel.

Where: xx = 32 or 64
yy = 64 or 32

(xx and yy won't match.)

This message indicates that lsof was compiled for one size

kernel and is being asked to execute on a different size one. That's not possible for programs like lsof that use libkvm.

Depending on the instruction sets for which you need Solaris 7, 8 or 9 lsof, you may need two or more versions of lsof, compiled for each kernel size, installed for use with `/usr/lib/isaexec`. See the "How do I install lsof for Solaris 7, 8 or 9?" section of this document for more information on that.

17.12.3 How do I build lsof for a 64 bit Solaris kernel under a 32 bit Solaris kernel?

If your Solaris system has an appropriate compiler (e.g., WorkShop Compilers C 5.0 and above, or a recent gcc like 3.2) and the 64 bit libraries have been installed, you can force lsof's Configure script to build a 64 bit version of lsof with:

```
$ SOLARIS_KERNBITS=64 Configure -n solariscc
```

The `SOLARIS_KERNBITS` environment variable is part of the lsof cross-configuration support, described in the `00XCONFIG` file of the lsof distribution.

17.12.4 How do I install lsof for Solaris 7, 8 or 9?

If you are installing lsof where it will be used only under the bit size kernel for which it was built, no special installation is required.

If, however, you are installing different versions of lsof for different bit sizes -- e.g., for use on a 64 bit NFS server and from its 32 bit clients -- you should read the man page for `isaexec(3C)` and install lsof according to its instructions.

The executable at the directory where lsof is to be found should be a hard link to `/usr/lib/isaexec` or a copy of it. In the directory there must be instruction architecture subdirectories -- e.g., `.../sparc/` and `.../sparcv9/`. The lsof for 64 bit size kernels is installed in the `.../sparcv9/` subdirectory; the one for 32 bit size kernels, in `.../sparc/`.

For example, if you're installing 32 and 64 bit lsof

executables in /usr/local/etc, you would:

```
# cd /usr/local/etc
# ln /usr/lib/isaexec lsof
# mkdir sparc sparcv9
# install the 32 bit lsof as sparc/lsof
# install the 64
bit lsof as sparcv9/lsof
# chmod, chown, and chgrp sparc/lsof and
  sparcv9/lsof appropriately
```

Lsof permissions and ownerships are the same whether one or more lsof executables are being installed, with or without the /usr/lib/isaexec hard link.

17.12.5 Why does my Solaris 7, 8 or 9 system say it cannot execute lsof?

When you attempt to execute lsof, your Solaris 7, 8 or 9 shell may complain:

```
ksh: ./lsof: cannot execute
```

If the lsof executable exists and has the proper execution permissions, this error may be the result of trying to execute an lsof, built for a 64 bit kernel, on a 32 bit kernel.

This will tell you about the lsof executable:

```
$ file lsof
lsof: ELF 64-bit MSB executable SPARCV9 Version 1,
dynamically linked, not stripped
```

The "64-bit" notation indicates the binary was built for a 64 bit kernel. To see the running kernel bit size, use this command:

```
$ isainfo -kv
32-bit sparc kernel modules
```

The "32-bit" notation indicates a 32 bit kernel has been booted.

The only work-around is to obtain, or Configure and make, an lsof for the appropriate kernel bit size. If you Configure and make lsof on the kernel where you wish to

run it the proper compiler, the lsof Configure step will generate Makefiles that can be used with make to build an appropriate lsof executable.

To compile a 64 bit lsof, you must have an appropriate compiler -- i.e., Sun WorkShop Compilers C 5.0 or higher or a recent gcc like 3.2.

17.12.6 What gcc will produce 64 bit Solaris 7, 8 and 9 executables?
8 and 9 executables?

Properly built and installed recent gcc versions -- e.g., 3.2 -- will build lsof for 64 bit Solaris kernels.

If you update your gcc version to 3.2 or later, make sure the private gcc header files become current -- i.e., clear out any private header files from a previous gcc or Solaris installation before installing the new ones, or build to a new --prefix root and replace the old root with it after the build and installation are complete.

17.12.7 Why does lsof on my Solaris 7, 8 or 9 system say, "can't read namelist from /dev/ksyms?"

You're probably trying to use an lsof executable built for an earlier Solaris release on a 64 bit Solaris 7, 8 or 9 kernel. The output from `lsof -v` will tell you the build environment of your lsof executable. You should also have gotten a warning message that lsof is compiled for a different Solaris version than the one under which it is running -- something like this:

```
lsof: WARNING: compiled for Solaris release X; this is Y
```

You need to build lsof on the system where you want to use it. For 64 bit Solaris 7, 8 and 9 you need a compiler that can generate 64 bit Solaris executables -- e.g., the Sun Workshop 5 C compiler or later, or a recent gcc version like 3.2. See the "Why does lsof say the compiler isn't adequate for Solaris 7, 8 or 9?" section and the ones following it for a discussion of building lsof for 64 bit Solaris 7, 8 or 9.

17.13 Solaris and COMMON

17.13.1 What does COMMON mean in the NAME column for a Solaris VCHR

file?

When lsof puts COMMON or (COMMON) in the NAME column of a Solaris VCHR file, it means that the file is handled by the special file system functions of the kernel through a common vnode.

17.13.2 Why does a COMMON Solaris VCHR file sometimes seem to have an incorrect minor device number?

When lsof reports on an open file in a Solaris special file system that uses a COMMON vnode, and the file is a VCHR file, lsof tries to locate the associated device node by looking for matches on the major and minor device numbers first.

If no major and minor match results, lsof then looks for a match on pseudo and clone device files. (See /devices/pseudo.) Those device nodes are matched specially by either their major or minor device numbers, but not both. Hence, when lsof finds a match under those special conditions, it may report a value in its output DEVICE column that differs from one of the major and minor numbers of the device node.

Here's an example from a sun4m Solaris 7 system:

```
$ ls -li /devices/pseudo/pm@0:pm
151261 crw-rw-rw- 1 root  sys  117, 0 ...
$ lsof /devices/pseudo/pm@0:pm
COMMAND ... DEVICE ...  NODE NAME
powerd    117,1 ... 151261 /devices/pseudo/pm@0:pm (COMMON)
Xsun     ... 117,0 ... 151261 /devices/pseudo/pm@0:pm
```

Note that the DEVICE value for the file with (COMMON) in its name field has a different minor device number (1) from what ls reports (0), while the DEVICE value for the file without (COMMON) matches the ls output exactly. Both match on the major device number, 117. The minor device number mis-match is a result of the way the Solaris kernel handles special file system common vnodes, and it's the reason lsof puts (COMMON) after the name to signal that a mis-match is possible.

17.14 Why don't lsof and Solaris pfiles reports always match?

/usr/proc/bin/pfiles

for Solaris 2.6, 7, 8, and 9 also reports information on open files for processes. Sometimes the information it reports differs from what lsof reports.

There are several reasons why this might be true. First, because pfiles is a Sun product, based on Sun kernel features, its developers have a better chance of knowing exactly how open file information is organized. I sometimes have to guess at how kernel file structure linkages are constructed by gleaning hints from header files.

Second, lsof is aimed at providing information, specifically device and node numbers, that can be used to identify named file system objects -- i.e., path names. Thus, lsof tries to make sure its device and node numbers match those reported by stat(2). Pfiles doesn't always report numbers that match stat(2) -- e.g., for files using clone and pseudo devices via common vnodes like the nlist() /dev/ksyms usage.

Here's the Solaris 7 COMMON VCHR example again with additional pfiles output:

```
$ ls -li /devices/pseudo/pm@0:pm
151261 crw-rw-rw- 1 root  sys  117, 0 ...
$ lsof /devices/pseudo/pm@0:pm
vic1: 10 = lsof /dev/pm
COMMAND ... DEVICE ...  NODE NAME
powerd ... 117,1 ... 151261 /devices/pseudo/pm@0:pm (COMMON)
Xsun ... 117,0 ... 151261 /devices/pseudo/pm@0:pm
$ pfiles ...
0: S_IFCHR ... dev:32,24 ino:61945 ... rdev:117,1
...
14: S_IFCHR ... dev:32,24 ino:151261 ... rdev:117,0
```

Note that the NODE number, reported by lsof, matches what ls(1) and stat(2) report, while the ino value pfiles reports doesn't. Lsof also indicates with the (COMMON) notation that the DEVICE number is a pseudo one, derived from the character device's value. The lsof DEVICE value matches the pfiles rdev value, correct behavior for a character device, but pfiles gives no sign that it's not possible to find that character device number in /devices with ls(1) or stat(2).

17.15 Why does lsof say, "kvm_open(namelist=default, core=default): Permission denied?"

Lsof needs permission to read from the /dev/kmem and /dev/mem memory devices. Access to them is opened via a call to the kvm_open() library function and it reports the indicated message.

You must give lsof permission to read the memory devices. The super user can almost always do that, but other lsof users can do it if some group -- e.g., sys -- has permission to read the memory devices, and the lsof binary is installed with the group's ownership and with the setgid permission bit enabled.

17.16 Why is lsof slow on my busy Solaris UFS file system?

Lsof may be slow on a busy Solaris UFS file system when UFS logging has been enabled with the "logging" mount option. That option can significantly increase disk operations under certain conditions -- e.g., when a lot of files are accessed quickly.

When only the "logging" option is specified to mount, all file accesses (atime updates) are logged to the UFS logging queue.

Each atime update requires two writes to the disk to complete it.

If you want to do UFS logging -- and there are reliability advantages to it -- consider using the "logging,noatime" mount options instead. That will shift atime updates from the logging queue to fewer and independent asynchronous operations, consequently making the UFS logging queue a smaller bottleneck.

Consult mount_ufs(1M) for more information on the logging and noatime options.

(My thanks to Casper Dik for this tip on improving the performance of UFS logging.)

17.17 Why is lsof so slow on my Solaris 8 or 9 system?

Solaris 8 has a post-release feature upgrade modifying kernel name cache (DNLC) handling that can slow lsof throughput dramatically. The feature, sometimes called negative DNLC caching, is standard in Solaris 9.

As best I can tell, when you install the Solaris 8 MU1

package, you get negative DNLC caching. If this pipe produces any output, your system has negative DNLC caching.

```
$ nm /dev/ksyms | grep negative_cache_vnode
```

The reason negative DNLC caching perturbs lsof is that a single vnode address (found in the `negative_cache_vnode` kernel variable) is used to mark entries in the DNLC that are not (the negative part) found on disk.

Since a single vnode address (the DNLC key lsof uses) can represent many (I've seen upwards of 30,000.) DNLC entries, their presence overloads lsof's internal DNLC hashing function. An overloaded hash function is a slow hash function, and lsof's slows to a crawl when it encounters thousands of keys that produce the same value when the lsof DNLC hash function is applied to them.

The solution is simple -- ignore negative DNLC cache keys. They don't represent path name components lsof can use. Lsof revisions 4.50 and above have an addition that ignores them and the performance of those lsof revisions improves significantly when presented with negative DNLC cache keys.

If you don't have an lsof revision at 4.51 or later, there's a work-around. Use lsof's `--C` option. It disables lsof's DNLC caching. Of course, that also inhibits the reporting of any path name components from the kernel DNLC. When `--c` is used, lsof will continue to report file system and character device paths.

17.18 Solaris and VxFS

17.18.1 Why doesn't lsof support VxFS 3.4 on Solaris 2.6, and above?

Lsof will not support VxFS version 3.4 on Solaris 2.6 and above unless some files from VxFS Update 2 have been installed. VxFS 3.4 FCS and VxFS 3.4 update 1 lack the header files lsof normally uses to obtain information from the VxFS 3.4 kernel node structure, `vx_inode`. VxFS 3.4 Update 2 provides a method whereby lsof can obtain the necessary `vx_inode` information from the `vxfsu_get_iooffsets()` function in Veritas utility libraries.

The utility libraries (32 bit and 64 bit versions) may be found in `/opt/VRTSvxfs/lib`. An ancillary header file may

be found in /opt/VRTSvxfs/include/sys/fs/vx_libutil.h.

Documentation

of the vxfsu_get_ioffsets(3) function may be found in /opt/VRTS/man/man3/vxfsu_get_ioffsets.3.

Those files of VxFS 3.4 Update 2 may be downloaded from:

```
ftp://ftp.veritas.com/pub/support/vxfs_34.i64243.tar
```

The vxfs_34.i64243.tar archive will unpack into an i64243 directory containing these files:

```
$ ls i64243
README
libvxfsutil.sol26.sums
libvxfsutil.sol26.tar.Z
libvxfsutil.sol27.sums
libvxfsutil.sol27.tar.Z
libvxfsutil.sol28.sums
libvxfsutil.sol28.tar.Z
```

Read README. Select the *.tar.Z file appropriate for your Solaris version. Its contents will unpack into /opt/VRTS and /opt/VRTSvxfs, so you will need sufficient permission -- e.g., do it as root -- to unpack the uncompressed archive. Once you've done that, it's a good idea to compare the checksums of the archive you unpacked with the ones recorded in the appropriate *.sums file. Use `sum -r` to verify the checksums.

For example, if you want the Solaris 8 version, uncompress and unpack libvxfsutil.sol28.tar.Z -- e.g.,

```
$ su
...
# cd i6423
# zcat libvxfsutil.sol28.tar.Z | tar xf -
```

That should create these new files and subdirectories with the indicated checksums:

```
File or subdirectory  sum -r
/opt/VRTSvxfs/include/vxfsutil.h 03938
/opt/VRTSvxfs/lib/libvxfsutil.a 51794
/opt/VRTSvxfs/lib/sparcv9/
/opt/VRTSvxfs/lib/sparcv9/libvxfsutil.a 07420
```

```
/opt/VRTS/man/man3/  
/opt/VRTS/man/man3/vxfsu_get_ioffsets.3 62480
```

Once these files are in place, run lsof's Configure script for the solaris or solariscc abbreviation. Configure will locate the appropriate VxFS 3.4 Update 2 files and set up for the making of an lsof that will properly display open VxFS 3.4 file information.

17.18.2 Why does lsof report "vx_inode: vxfsu_get_ioffsets error" for open Solaris 2.6 and above VxFS 3.4 and above files?

Even when lsof supports VxFS 3.4 and above on Solaris 2.6 and above, it may report "vx_inode: vxfsu_get_ioffsets error" in the NAME column for all VxFS files.

The usual cause is that lsof doesn't have permission to read the file at the end of the /dev/vxportal symbolic link. If, for example, lsof has been installed setgid(sys), then the /dev/vxportal symbolic link destination should be owned by the sys group and readable by it.

Update 2 for VxFS 3.4 sets the modes of the /dev/vxportal symbolic link destination to 0640 and the group ownership to sys. But I have had a report that the modes are wrong in a VxFS 4.0 installation.

Another cause may be that the system has more than one version of VxFS installed (Only one can be active.), and lsof's Configure script did not choose the header files and libraries for the active VxFS version. Configure opts for VxFS 4.0 and above header files and libraries (in /opt/VRTS) in preference to those for VxFS below 4.0 (in /opt/VRTSvxfs).

Look for the directories /opt/VRTS and /opt/VRTSvxfs. If you have /opt/VRTS, make sure its header and library symbolic links point to those of the active VxFS version.

If you have both directories, look at the CFLAGS that Configure constructed for making lsof and see which directory path follows a -I option. If that doesn't match the directory path of the active VxFS version, try pointing Configure at the correct directory with the SOLARIS_VXFSINCL environment variable -- e.g.,

```
$ SOLARIS_VXFSINCL=/opt/.../include ./Configure -n solaris
```

17.18.3 Why does Solaris Configure claim there is no VxFS library?

The Isof Configure script, when configuring for Solaris, may report:

```
FATAL: no VxFS ../libvxfsutil.a
```

That fatal error message indicates Isof has found the VxFS utility library's header files, but can't find the library itself in the expected location adjacent to the header files.

One possible cause is an incorrect symbolic link from /opt/VRTS/lib/sparcv9/libvxfsutil.a to the library's real location. (Some VxFS distributions declared the link incorrectly.) Use `ls -lL`` on that path to see if it exists. If it doesn't exist, the link may be missing an additional leading `../` component.

If the problem is a missing `../` from the library's link, you can correct the link or check with Veritas/Symantec for the patch that corrects it.

If the problem is not a missing `../`, and you know the libvxfsutil.a location, you can define its path in the SOLARIS_VXFSLIB environment variable before running the Isof Configure script. (See 00XCONFIG for information about using the SOLARIS_VXFSLIB environment variable.)

If you have no libvxfsutil.a, you must obtain it from Veritas/Symantec or find it in your VxFS installation package.

17.18.4 Why doesn't Solaris Isof report VxFS path name components?

Solaris Isof will report path name components for VxFS versions that use the common Solaris Dynamic Name Lookup Cache (DNLC) or on some file systems of VxFS versions that support the VxFS Reverse Name Lookup (RNL) facility.

VxFS versions 3.3 (approximately) and below use the common Solaris DNLC. (I haven't been able to determine exactly when VxFS stopped using the DNLC.) For versions above that boundary, but below 4.0, Isof can't report path name components.

At VxFS 4.0 and above, Isof can be compiled to use the VxFS RNL facility for reporting path names. If `"-DHASVXFSRNL"` appears

in the compiler flags section of lsof "-v" option output, then the lsof Configure script detected the VxFS RNL facility and lsof has been compiled to use it.

Lsof's use of the RNL facility can fail when the VxFS file system disk layout version is below 6. In that case, lsof can report no path name components. For more information, see the vxfs_inotopath(3) manual page. any of the following commands will show the disk layout version for a VxFS file system, when supplied the block device or mount point on which the file system is mounted.

```
fstyp -v <block_device>  
or  
mkfs -m  
<block_device>  
or  
vxupgrade <mount_point>
```

You must have permission to read the block device -- e.g., be the root user.

You may also be able to upgrade an older disk layout to one that will work with the RNL. See the vxupgrade(1M) man page for more information on that.

When lsof can't report VxFS path name components, it reports the file system mount point and the path name of device on which it is mounted. The device path name is enclosed in parentheses.

17.18.5 Why does Solaris 10 lsof report scrambled VxFS paths?

Solaris 10 lsof may report a bogus, scrambled path for an open VxFS file, when lsof obtains the path from a vnode's cached path. Veritas/Symantec reports that their Solaris 10 implementation has bugs in the way it handles the Solaris 10 vnode cached path and those bugs will be fixed in an upcoming patch some time after August 15, 2005.

When Solaris 10 lsof reports a path for an open Vxfs file obtained via the VxFS Reverse Name Lookup facility, the path will be correct.

Also see the answers to the questions "Why does Solaris 10 lsof sometimes report the wrong path name?" and "Why doesn't Solaris lsof report VxFS path name components?"

17.19 Large file problems

17.19.1 Why does lsof complain it can't stat(2) a Solaris 2.5.1 large file?

When given an argument that is the path to a Solaris 2.5.1 file, enable for large file operations with the `O_LARGEFILE` `open(2)` option, lsof complains that it can't stat(2) the file. That's because lsof isn't using a `stat(2)` call and associated structure enabled for large files.

This error has been fixed, starting at lsof revision 4.58 for Solaris 2.6 and above. That fix won't work on Solaris 2.5.1 and I no longer have access to a Solaris 2.5.1 test system to develop a separate fix.

The work-around is to avoid specifying a `O_LARGEFILE` path as an argument to lsof on Solaris 2.5.1. Instead use a combination of lsof and `grep` to achieve the same results, albeit more clumsily.

17.20

Why does lsof get a segmentation fault on 64 bit Solaris 8 using NIS+?

I have received a report from Gary Craig that lsof produces a segmentation fault on his 64 bit Solaris 8 system using NIS+. Via an independent test program we have exonerated lsof and tracked the fault to the NIS+ `__nis_server_name()` function in the C name server library, `-lnsl`.

Lsof causes the `__nis_server_name()` NIS+ function to be called by calling `getservent()` to read entries of the port number to service name map.

The only Sun bug ID that appears to describe the problem is 4304244, although its text is unclear enough to leave room for doubt.

Until Sun eliminates the `__nis_server_name()` segmentation fault cause, a work-around for lsof is to use its `"-P"` option, causing lsof to avoid port to service name lookups.

17.21 Will lsof crash the Solaris kernel?

I've received and investigated one report that it has when the Sun hardware (a QME interface) was faulty. Today (May

23,

2002) I've learned that Sun has reports of kernel crashes caused by adb, lsof, and mdb.

The Sun investigation pinpointed a problem in the /dev/kmem kernel driver and there is a Sun bug report, 4344513, about the problem. There is a fix in Solaris 9, and patches for Solaris 7 and 8 (SPARC and x86).

To see if your Solaris system is fixed, look for a /devices/pseudo/*allkmem node.

Extensive address filtering was added to lsof revision 4.50 to forestall what I then (July 2001) believed to be only the possibility that lsof might crash Solaris. However, the filtering isn't perfect, since a filtered address might become invalid after lsof has filtered it but before lsof has delivered it to /dev/kmem. That filtering work is described in ../dialects/sun/solaris_kaddr_filters, also available at:

ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/solaris_kaddr_filters

The best and safest work-around is to upgrade to Solaris 9 or install an appropriate patch or its equivalent from this list:

Solaris	SPARC	x86
Version	Patch	Patch
===== 7	106541-20	106542-20
8	108528-14	108529-14

17.22 Why does lsof on Solaris 7, 8, or 9 report a kvm_open() failure?

When lsof is started on some Solaris 7, 8, and 9 systems it may report:

```
lsof: kvm_open(namelist=default, corefile=default): \
No such file or directory
```

Lsof revisions 4.65 and later will first report:

```
lsof: cannot stat /dev/allkmem
```

The second message, not delivered in lsof revisions below

4.65, explains the cause of the `kvm_open()` failure; it can't find `/dev/allkmem`.

`/dev/allkmem` is a device added to Solaris 7 and 8 in patches and in the Solaris 9 FCS. See the preceding "Will `lsdf` crash the Solaris kernel?" section for more information on `/dev/allkmem` and the patches.

The `kvm_open(3KVM)` function in the KVM library of patched Solaris 7 and 8 systems and in Solaris 9 expects to find `/dev/allkmem` and exits on error when it does not.

If you have installed the patch that updated your KVM library to a version that expects `/dev/allkmem` to be present and it is not, you may need to reconfigure your system's devices with `devfsadm(1M)` or enter "boot -r" to the OpenBoot monitor's prompt (usually "ok").

17.23 Solaris and SAM-FS

17.23.1 Why does Solaris `lsdf` report "(limited SAM-FS info)"?

`lsdf` 4.68 and above report "(limited SAM-FS info)" on Solaris in the NAME column after the path or file system name for all files it finds on SAM-FS file systems.

That's because no more information is known about the composition of the nodes that follow SAM-FS vnodes. If you can provide that information, please contact me via e-mail at <abe@purdue.edu>. Make sure "lsdf" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

17.23.2 Why can't `lsdf` locate named SAM-GS files?

Solaris `lsdf` 4.68 and above can't locate files on SAM-FS file systems when the files are named as `lsdf` arguments because

`lsdf` doesn't know how to locate open SAM-FS file device and node number information. (See also "Why does Solaris `lsdf` report "(limited SAM-FS info)?"

17.24 `lsdf` and Solaris 10 zones

17.24.1 How can I make `lsdf` list the Solaris zone?

Use the `lsdf` "-z [z]" option.

17.24.2 Why doesn't lsof work in a Solaris 10 zone?

When run from within a Solaris 10 zone, lsof will usually report:

```
lsof: can't stat(/devices): No such file or directory
```

That's because a Solaris zone usually has no /devices subdirectory, a restriction of the zone implementation intended to limit the ability of zone processes to control global system resources, including physical devices.

While a zone may have a /dev subdirectory, that subdirectory usually lacks the /dev/allkmem, /dev/mem and /dev/kmem devices lsof and the KVM library it uses require.

The work-around is to run lsof in the global zone. When it is run in a global zone lsof will be able to report on processes running in any zone, including the global zone.

17.24.3 Why does lsof complain it can't stat() Solaris 10 zone file systems?

When run from the global zone on Solaris 10 lsof may complain:

```
lsof: WARNING: can't stat() 15 zone file systems;  
using dev= options
```

The warning message means lsof found the reported number of file system entries in the mount table for which it didn't have permission to get stat(2) results, but which had "zone=" and "dev=" mount table options.

That is a normal restriction of Solaris 10 zones. Since the lsof warning message indicates it was able to find "dev=" options for the file systems, lsof will probably work correctly.

One work-around is to relax the restrictions on zone mount points, so that lsof can stat() them. While that may be possible by changing directory modes or group ownerships, it is probably not a good idea, because it weakens the restrictions zones are intended to provide.

Another work-around is to suppress the warning

message with
lsof's "-w" option. The down side of that is that it causes
the suppression of all warning messages, leading to the
possibility that some non-stat() warning messages will be
suppressed.

17.25 Solaris 10 problems

17.25.1 Why does Solaris 10 lsof sometimes report the wrong path name?

When a path name component is renamed -- e.g., with mv(1) --
Solaris 10 lsof may report the old component for an open file
that used the component in its path before the rename. That's
because Solaris 10 lsof reports the path name cached in the
open file's vnode and the Solaris 10 kernel doesn't update the
open vnode's cached path name when a component of it is changed.

When an open file is deleted -- e.g., with rm(1) -- the path
name by which it was opened remains cached in the vnode. Lsof
can be instructed to display that path name with the -X option.
The path name might be incorrect because of the rename problem
described above. See the answer to the 'What does "(deleted)"
mean
in the NAME column of a Solaris 10 open file?' question
for more information.

Lsof is sometimes able to detect that cached path name is
incorrect. In that case lsof may report only the mounted-on
directory and device of the file system or it may report that
the path name is of questionable accuracy by appending a
trailing "(?)" to it in the NAME column.

See the answer to the "Why does Solaris 10 lsof sometimes
report only the mounted-on directory and device?" and 'What
does "(?)" mean in the NAME column of a Solaris 10 open file?'
questions for more information.

17.25.2 Why does Solaris 10 lsof sometimes report only the mounted-on directory and device?

For some regular open files lsof may report only the mounted-on
directory and device of the file system on which the file
resides. That's because lsof was able to determine that the
path name cached in the open file's vnode is incorrect.

Lsof detects the cached path name is incorrect by applying
stat(2)

to it, provided that no error was detected when stat(2) was applied to the file system mounted-on directory during lsof setup. If a mounted-on directory stat(2) error was detected during setup, lsof does no cached path name analysis and simply reports it.

When the application of stat(2) to the cached path name returns a no-entry reply (the ENOENT error number), lsof concludes the path no longer exists (i.e., has been unlinked) and reports the mounted-on directory and device of the file system. That behavior can be modified with the -X option in lsof revisions 4.77 and above. See the answer to the 'What does "(deleted)" mean in the NAME column of a Solaris 10 open file?' for more information.

When the application of stat(2) to the cached path name returns a permission error reply (the EACCES or EPERM error numbers), lsof reports the cached path name and adds a trailing "(?)" to indicate the reported path name is of questionable accuracy. See the answer to the question 'What does "(?)" mean in the NAME column of a Solaris 10 open file?' for more information.

If the application of stat(2) to the cached path name yields any other error reply, lsof reports the mounted-on directory and device of the file system.

When the application of stat(2) to the cached path name succeeds, lsof compares the reported device and node numbers to what it has obtained for the open file from kernel structures. If they match, lsof reports the cached path name. If they don't match, lsof instead reports the mounted-on directory and device of the file system.

A work-around that allows lsof to apply stat(2) successfully to cached path names is to give lsof sufficient permission to do it -- i.e., run lsof as the root user.

17.25.3 What does "(deleted)" mean in the NAME column of a Solaris 10 open file?

When the -X option is specified to Solaris 10 lsof, it will report in its NAME column the path name cached for a deleted file in its vnode. The path name will be followed by "(deleted)".

Note that the path name cached in a file's vnode is the path

name by which the file was opened. It is not updated by the Solaris kernel when any path name component is changed. Hence, it may not represent the final path name the open file had.

See the answer to the "Why does Solaris 10 lsof sometimes report the wrong path name?" question for more information on how changing a path name component affects the correctness of a what lsof reports.

17.25.4 What does "(?)" mean in the NAME column of a Solaris 10 open file?

When lsof encounters a path name cached in the open file's vnode that stat(2) reports lsof lacks permission to access, lsof adds "(?)" to the path name reported in the NAME column to indicate the path name is of questionable accuracy.

See the answers to the "Why does Solaris 10 lsof sometimes report the wrong path name?" and "Why does Solaris 10 lsof sometimes report only the mounted-on directory and device?" questions for more information on why lsof may report a path name of questionable accuracy.

A work-around that allows lsof to apply stat(2) successfully to cached path names is to give lsof sufficient permission to do it -- i.e., run lsof as the root user.

17.26 Solaris contract file problems

17.26.1 Why doesn't lsof report size, link count and node number for Solaris 10 contract files?

Lsof doesn't report size, link count or node number for Solaris 10 contract files because I don't know how to obtain them from contract file kernel structures.

17.26.2 Why can't lsof locate a Solaris 10 contract file by path name?

Because lsof can't find the node number of Solaris contract files, it can't match the device and node numbers it gets from applying stat(2) to the contract file path name with what it finds in kernel data.

17.27 Solaris 10 and above ZFS problems

17.27.1 Why does Configure warn that ZFS support is not enabled?

To provide ZFS support it is necessary that lsof have access to the definitions of ZFS structures used by the kernel. Those definitions are made available to lsof when it runs by the libctf library.

If lsof's Configure script finds that ZFS is indicated by the presence of the <sys/fs/zfs.h> header file, but the libctf library is not indicated via the <libctf.h> header file, the script concludes that ZFS support is not possible and issues the following warning:

```
WARNING: ZFS support not enabled; libctf.h missing.
```

Install libctf support to remedy this problem.

17.28 Problems with Solaris 9 and above

17.28.1 Why does the compiler complain about lgrp_root on Solaris 9 and above?

When compiling lsof 4.84 on later Solaris 9 and 10 systems, the compiler may report the following error:

```
"/usr/include/sys/lgrp.h", line ...: identifier redeclared: lgrp_root
```

This error results from a conflict between usage of lgrp_root in both <sys/lgrp.h> and <sys/lgrp_user.h> when _KMEMUSER or _KERNEL is #define'd before <sys/lgrp.h> is #include'd. This problem is noted in SunSolve bug ID 5064229.

The work-around is to use lsof revision 4.85 sources.

18.0 Lsof Features

18.1 Why doesn't lsof report on /proc entries on my system?

/proc file system support is generally available only for BSD, SYSV R4 dialects, and Tru64 UNIX (Digital UNIX, DEC OSF/1). It's also available for Linux, and Pyramid DC/OSx and Reliant UNIX.

Even on some SYSV R4 dialects I encountered many problems while trying to incorporate /proc file system support.

The chief problem is that some vendors don't distribute the header file that describes the /proc file system node -- usually called prdata.h.

18.2 How do I disable the device cache file feature or alter its behavior?

To disable the device cache file feature for a dialect, remove the HASDCACHE definition from the machine.h file of the dialect's machine.h header file. You can also use HASDCACHE to change the default prefix (`.lsof`) of the device cache file.

Be sure you consider disabling the device cache file feature carefully. Having a device cache file significantly reduces lsof startup overhead by eliminating a full scan of /dev (or /devices) once the device cache file has been created. That full scan also overloads the kernel's name cache with the names of the /dev (or /devices) nodes, reducing the opportunity for lsof to find path name components of open files.

If you're worried about the presence of mode 0600 device cache files in the home directories of the real user IDs that execute lsof, consider these checks that lsof makes on the file before using it:

1. To read the device cache file, lsof must gain permission from access(2).
2. The device cache file's modes must be 0600 (0644 if lsof is reading a system-wide device cache file) and its size non-zero.
3. There must be a correctly formatted section count line at the beginning of the file.
4. Each section must have a header line with a count that properly numbers the lines in the section. Legal sections are device, clone, pseudo-device, and CRC.
5. The lines of a section must have the proper format.
6. All lines are included in a 16 bit CRC, and it is recorded in a non-checksummed section line at the

end of the file.

7. The checksum computed when the file is read must match the checksum recorded when the file was written.

8. The checksum section line must be followed by end-of-information.

9. Lsof must be able to get matching results from stat(2) on a randomly chosen entry of the device section.

For more information on the device cache file, read the 00DCACHE file of the lsof distribution.

18.2.1 What's the risk with a perverted device cache file?

Even with the checks that lsof makes on the device cache file, it's conceivable that an intruder could modify it so it would pass lsof's tests.

The only serious consequence I know of this change is the removal of a file whose major device number identifies a socket from some user ID's device cache file. When such a device has been removed from the device cache file, and when lsof doesn't detect the removal, lsof may not be able to identify socket files when executed by the affected user ID. Only certain dialects are at risk to this attack -- e.g., SCO OpenServer and Solaris 2.x, 7, 8, and 9.

If you're tracking a network intruder with lsof, that could be important to you. If you suspect that someone has corrupted the device cache file you're using, I recommend you use lsof's -Di option to tell it to ignore it and use the contents of /dev (or /devices) instead; or remove the device cache file (usually .lsof_hostname, where hostname is the first component of the host's name returned by gethostname(2)) from the user ID's home directory and let lsof create a new one for you.

18.2.2 How do I put the full host name in a personal device cache file path?

Lsof constructs the personal device cache file path name from a format specified in the HASPERSDC #define in the

dialect's machine.h header file. As distributed HASPERSDC declares the path to be ``.lsof_'' plus the first component of the host name with the format ``.lsof_%L''.

If you want to change the way lsof constructs the personal device cache file path name, you can change the HASPERSDC #define and recompile lsof. If, for example, you #define HASPERSDC to be ``.lsof_%l'' (note the lower case `l'), Configure and remake lsof, then the personal device cache file path will be ``.lsof_'' plus the host name returned by gethostname(2).

See the 00DCACHE file of the lsof distribution for more information on the formation of the personal device cache file path and the use of the HASPERSDC #define.

18.2.3 How do I put the personal device cache file in /tmp?

Change the HASPERSDC definition in your dialect's machine.h header file.

When you redefine HASPERSDC, make sure you put at least one user identification conversion in it to keep separate the device cache files for each user of lsof. Also give some thought to including the ``%0'' conversion to define an alternate path for setuid-root and root processes.

Here's a definition that puts a personal device cache file in /tmp with the name ``.lsof_login_hostname_pers''.

```
#define HASPERSDC "/tmp/.lsof_%u_%l_pers"
```

Thus the /tmp personal device cache file path for login "abe" on host "lsof.itap.purdue.edu" would be:

```
/tmp/.lsof_abe_lsof.itap.purdue.edu_pers
```

You can add the User ID (UID) with the "%U" conversion and the first host name component with the ``%L" conversion.

CAUTION: be careful using absolute paths like /tmp lest lsof processes that are setuid-root or whose real UID is root be used to exploit some security weakness via /tmp. Elect instead to add an alternate path for those processes with the ``%0" conversion. Here's an extension of the previous HASPERSDC format

for /tmp that declares an alternate path:

```
#define HASPERSDC "/tmp/.lsof_%u_%l_pers%0%h/.lsof_%L"
```

When the lsof process is setuid-root or its real UID is root, presuming root's home directory is '/' and the host's name is ``lsof.itap.purdue.edu'', the extended format yields:

```
/.lsof_vic
```

18.3 Why doesn't lsof know about AFS files on my favorite dialect?

Lsof currently supports AFS for these dialects:

- AIX 4.1.4 (AFS 3.4a)
- Linux 1.2.13 (AFS 3.3)
- NEXTSTEP 3.2 (AFS 3.3)
- Solaris 2.[56] (AFS 3.4a)

It may recognize AFS files on other versions of these dialects, but I have no way to test that. Lsof may report correct information for AFS files on other dialects, but I can't test that either.

AFS support must be custom crafted for each UNIX dialect and then tested. If lsof supports your favorite dialect, but doesn't recognize its AFS files, probably I don't have access to a test system. If you want AFS support badly for your dialect, consider helping me do the development and testing.

18.3.1 Why doesn't lsof report node numbers for all AFS volume files, or how do I reveal dynamic module addresses to lsof?

When AFS is implemented via dynamic kernel modules -- e.g., in NEXTSTEP -- lsof can't obtain the addresses of AFS variables in the kernel that it uses to identify AFS vnodes. It can guess that a vnode is assigned to an AFS file and it can obtain other information about AFS files, but it has trouble computing AFS volume node numbers.

To determine node numbers for AFS volumes other than the root volume, /afs, lsof needs access to a hashed volume structure pointer table. When it can't find the address of that table, because AFS support is implemented via dynamic kernel modules, lsof will return blanks in the

INODE column for AFS volume files. Lsof can identify the root volume's node number (0), and can compute the node numbers for all other AFS files.

If you have a name list file that contains the addresses of the AFS dynamic modules -- e.g., you saved module symbols when you created a loadable module kernel with modload(8) by specifying -sym -- lsof may be able to find the kernel addresses it needs in that file.

Lsof looks up AFS dynamic kernel addresses for these dialects at these default paths:

NEXTSTEP 3.2 /usr/vice/etc/afs_loadable

A different path to a name list file with AFS dynamic kernel addresses may be specified with the -A option, when the -A option description appears in lsof's -h or -? (help) output.

If any addresses appear in the -A name list file that also appear in the regular kernel name list file -- e.g., /vmunix -- they must match, or lsof will silently ignore the -A addresses on the presumption that they are out of date.

Found in path(s):

* /opt/cola/permits/1402400301_1661782874.918154/0/lsof-4-93-2-dfsg-orig-1-tar-xz/lsof-4.93.2/00FAQ
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- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/tests/LTnlink.c
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/tests/LTszoff.c
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/tests/LTunix.c
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/tests/LTdnlc.c
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/tests/LTnfs.c
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/tests/LTlock.c
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/tests/LTsock.c
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/tests/LTbigf.c

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- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/NEW/usage.c
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/usage.c

* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/lib/ckkv.c

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* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/osr/dproc.c

* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/darwin/kmem/dnode1.c

* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/osr/dmnt.c

* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/osr/dlsof.h

* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/osr/dfile.c

* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/osr/dnode.c

* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/osr/dsock.c

*

/opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/osr/machine.h
* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/osr/dproto.h
* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/n+obsd/dnode1.c
* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/hpux/kmem/dnode1.c
* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/freebsd/dnode1.c

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* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/scripts/list_fields.perl
* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/scripts/list_NULf.perl5
* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/scripts/shared.perl5
* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/scripts/idrlogin.perl5
*
/opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/scripts/list_fields.awk

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- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/lib/rnch.c
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/lib/lkud.c
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/lib/rdev.c
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/lib/isfn.c
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/lib/dvch.c
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/lib/finoc
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/linux/dproto.h
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/linux/dproc.c
- *
- /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/linux/dnode.c
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/lib/pdvn.c
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/lib/prfp.c
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/lib/rnam.c
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/linux/dfile.c
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/sun/dnode2.c
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/linux/dmnt.c
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/linux/dlsof.h
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/linux/dstore.c
- *
- /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/linux/machine.h
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/lib/cvfs.c
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/lib/rmmt.c
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/linux/dsock.c
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/lib/ptti.c

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* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-
4.93.2/dialects/hpux/pstat/dstore.c
* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-
4.93.2/dialects/hpux/pstat/dproc.c
* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-
4.93.2/dialects/hpux/pstat/dproto.h
* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-
4.93.2/dialects/hpux/pstat/dlsof.h
* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-
4.93.2/dialects/hpux/pstat/machine.h
* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-
4.93.2/dialects/hpux/pstat/dsock.c

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* /opt/cola/permits/1402400301_1661782874.918154/0/lsof-4-93-2-dfsg-orig-1-tar-xz/lsof-4.93.2/dialects/aix/dnode2.c

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* /opt/cola/permits/1402400301_1661782874.918154/0/lsof-4-93-2-dfsg-orig-1-tar-xz/lsof-4.93.2/dialects/hpux/kmem/dnode2.c

* /opt/cola/permits/1402400301_1661782874.918154/0/lsof-4-93-2-dfsg-orig-1-tar-xz/lsof-4.93.2/dialects/sun/dnode1.c


```
* /opt/cola/permits/1402400301_1661782874.918154/0/lsof-4-93-2-dfsg-orig-1-tar-xz/lsof-4.93.2/dialects/aix/dnode1.c
* /opt/cola/permits/1402400301_1661782874.918154/0/lsof-4-93-2-dfsg-orig-1-tar-xz/lsof-4.93.2/dialects/n+os/dnode1.c
```

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```
* /opt/cola/permits/1402400301_1661782874.918154/0/lsof-4-93-2-dfsg-orig-1-tar-xz/lsof-4.93.2/tests/LsofTest.h
```

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From: Sandel, Ken L. <sandel@purdue.edu>

Sent: Tuesday, July 10, 2018 14:28

To: Victor Abell

Subject: RE: One more question regarding GitHub release

Vic,

For clarity I approved the release.

Ken

Ken L. Sandel

Senior Director, Sponsored Program Services
Senior Intellectual Property Officer
Purdue University
610 Purdue Mall
Hovde Hall Room 328
West Lafayette, IN 47907
sandel@purdue.edu
(765) 494-1063 (office)
(765) 426-2530 (cell)

From: Kasper, Joseph R. <JRKasper@prf.org>
Sent: Tuesday, July 10, 2018 11:23 AM
To: Victor Abell <vabell@lsof.comcastbiz.net>
Cc: Sandel, Ken L. <sandel@purdue.edu>
Subject: RE: One more question regarding GitHub release

Hi Vic,

My apologies for not following up. Mr. Sandel approves the release on GitHub under the copyright notice text currently in use.

Best,
Joe

Joseph R. Kasper, Ph.D.
Senior Business Development Manager & Director of Marketing
Office of Technology Commercialization

765-588-3486
jrkasper@prf.org
Purdue Technology Center Aerospace
1801 Newman Road
West Lafayette, IN 47906
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From: Victor Abell <vabell@lsof.comcastbiz.net>

Sent: Monday, July 9, 2018 8:26 PM
To: Kasper, Joseph R. <JRKasper@prf.org>
Subject: RE: One more question regarding GitHub release

Joe,

Has there been any word from Ken about the release of lsof to GitHub?

Vic

From: Kasper, Joseph R. [mailto:JRKasper@prf.org]
Sent: Thursday, June 28, 2018 1:15 PM
To: Victor Abell
Subject: RE: One more question regarding GitHub release

Hi Vic,

One more request. Ken would like a copy of the email from Gerry. If for any reason you are not comfortable sending it to me, please contact Ken directly (765-494-1063, sandel@purdue.edu).

If this last piece of information is satisfactory to Ken, I expect to get his approval.

Thanks for your cooperation throughout this process.

Best,
Joe

From: Victor Abell <vabell@lsof.comcastbiz.net>
Sent: Thursday, June 28, 2018 7:43 AM
To: Kasper, Joseph R. <JRKasper@prf.org>
Subject: RE: One more question regarding GitHub release

Joe,

I sent e-mail to Gerry McCartney and in his answer he says he has no objection.

Vic

From: Kasper, Joseph R. [mailto:JRKasper@prf.org]
Sent: Tuesday, June 26, 2018 4:03 PM
To: Victor Abell
Subject: RE: One more question regarding GitHub release

Hi Vic,

Thanks for the extra detail. I think it would put Kens mind at ease if you have Gerrys blessing. Let me know if youll reach out to him.

Best,
Joe

From: Victor Abell
<vabell@lsof.comcastbiz.net>
Sent: Tuesday, June 26, 2018 3:57 PM
To: Kasper, Joseph R. <JRKasper@prf.org>
Subject: RE: One more question regarding GitHub release

Joe,

I have had no communication with ITaP about the move to GitHub. The extent of their involvement with lsof has been minimal the Visiting Scholar appointment and the maintenance of a distribution system.

I know Gerry McCartney well. Would it be helpful if I contacted him about the GitHub move?

Vic

From: Kasper, Joseph R. [<mailto:JRKasper@prf.org>]
Sent: Tuesday, June 26, 2018 3:44 PM
To: Vic Abell; Victor Abell
Subject: One more question regarding GitHub release

Hi Vic,

Ken Sandel, Senior IP Officer, just got back to me. He wants to know if the leadership of ITaP supports the contribution to Github. Please let me know. If you have any communication to this effect that you can forward to me, it would be helpful.

Best,
Joe

Joseph R. Kasper, Ph.D.
Business Development Manager
Purdue Research Foundation
Office
of Technology Commercialization
765-588-3486
jrkasper@prf.org
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* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/regex.h

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* @(#)netdb.h 5.15 (Berkeley) 4/3/91

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/*

* GetOpt() -- Local get option

*

* Borrowed from lsof's main.c source file.

*

* Liberally adapted from the public domain AT&T getopt() source,

* distributed at the 1985 UNIFORM conference in Dallas

*

* The modifications allow '?' to be an option character and allow

* the caller to decide that an option that may be followed by a

* value doesn't have one -- e.g., has a default instead.

*/

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* /opt/cola/permits/1402400301_1661782874.918154/0/lsof-4-93-2-dfsg-orig-1-tar-xz/lsof-4.93.2/tests/LTlib.c

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/* Extended regular expression matching and search library,
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(Implements POSIX draft P1003.2/D11.2, except for some of the
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- * /opt/cola/permits/1402400301_1661782874.918154/0/lsof-4-93-2-dfsg-orig-1-tar-xz/lsof-4.93.2/dialects/darwin/libproc/machine.h
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsof-4-93-2-dfsg-orig-1-tar-xz/lsof-4.93.2/dialects/darwin/libproc/dsock.c
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsof-4-93-2-dfsg-orig-1-tar-xz/lsof-4.93.2/dialects/darwin/libproc/dstore.c
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsof-4-93-2-dfsg-orig-1-tar-xz/lsof-4.93.2/dialects/darwin/libproc/dproto.h
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* GetOpt() -- Local get option
*
* Liberally adapted from the public domain AT&T getopt() source,
* distributed at the 1985 UNIFORM conference in Dallas
*
* The modifications allow '?' to be an option character and allow
* the caller to decide that an option that may be followed by a
* value doesn't have one -- e.g., has a default instead.
*/

Found in path(s):

* /opt/cola/permits/1402400301_1661782874.918154/0/lsof-4-93-2-dfsg-orig-1-tar-xz/lsof-4.93.2/OLD/main.c.old
* /opt/cola/permits/1402400301_1661782874.918154/0/lsof-4-93-2-dfsg-orig-1-tar-xz/lsof-4.93.2/main.c
* /opt/cola/permits/1402400301_1661782874.918154/0/lsof-4-93-2-dfsg-orig-1-tar-xz/lsof-4.93.2/OLD/main.c

No license file was found, but licenses were detected in source scan.

Notes for the distribution of lsof version 3

| The latest release of lsof is always available via anonymous ftp |
| from vic.cc.purdue.edu. Look in pub/tools/unix/lsof. |

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Dialects Supported

=====

Lsof (for LiSt Open Files) lists files opened
by processes on
selected Unix systems. It's a major revision of lsof version 2,
and has been tested on:

AIX 3.2.5, 4.1.[1234], the IBM RISC/System 6000
and 4.2
BSDI BSD/OS 2.0, 2.0.1, Intel-based systems
and 2.1
DC/OSx 1.1 Pyramid systems
EP/IX 2.1.1 the CDC 4680
FreeBSD 1.1.5.1, 2.0, Intel-based systems
2.0.5, 2.1, 2.1.5,
2.2, and 3.0
HP-UX 8.x, 9.x, 10.01, HP systems (some combinations)
10.10, and 10.20
IRIX 5.2, 5.3, 6.0, 6.0.1, SGI systems
and 6.[1234]
Linux through 2.0 Intel-based systems
NetBSD 1.0, 1.1, and 1.2 Intel and SPARC-based systems
NEXTSTEP 2.1 and 3.[0123] all NEXTSTEP architectures
OpenBSD 1.2 and 2.0 Intel-based systems
OSF/1 2.0, 3.0, 3.2, and the DEC Alpha
4.0-BETA
Reliant UNIX 5.43 Pyramid systems
RISC/os 4.52 MIPS R2000-based systems
SCO OpenServer 1.1, 3.0, Intel-based systems
and 5.[024]
SCO UnixWare 2.1 and 2.1.1 Intel-based systems
Sequent PTX 2.1.[1569], Sequent systems
4.0.[23],
4.1.[024],
4.2[.1], and 4.3
Solaris 2.[123456], 2.5.1, Sun 4 and i86pc systems
and 2.6-Beta
SunOS 4.1.[1234] Sun 3 and 4
Ultrix 4.2, 4.3, 4.4, DEC RISC and VAX
and 4.5

(The pub/tools/unix/lsof/contrib directory on vic.cc.purdue.edu
contains information on other ports.)

If your favorite Unix dialect is not in the list, or if your version
of it is more recent than the ones listed, please contact me at
<abe@vic.cc.purdue.edu>.

How Lsof Works

=====

Using available kernel data access methods -- getproc(), getuser(),
kvm_*(), nlist(), pstat(), read(), readx(), /proc -- lsof reads

process table entries, user areas and file pointers to reach the underlying structures that describe files opened by processes.

Lsof interprets most file node structures -- advfsnodes, autonodes, cnodes, cdrnodes, devnodes, fifonodes, gnodes, hsnodes, inodes, mfsnodes, pcnodes, procnodes, rnodes, snodes, specnodes, s5inodes, tmpnodes. It understands NFS connections. It recognizes FIFOs, multiplexed files, Unix and Internet sockets. It knows about streams. It understands /proc file systems for some dialects. On many dialects it recognizes execution text and library references. It knows about AFS on some Unix dialects.

Lsof Output

=====

The lsof output describes:

- * the identification number of the process (PID) that has opened the file;
- * the process group identification number (PGRP) of the process (optional);
- * the process identification number of the parent process (PPID) (optional);
- * the command the process is executing;
- * the owner of the process;
- * for all files in use by the process, including the executing text file and the shared libraries it is using:
 - * the file descriptor number of the file, if applicable;
 - * the file's access mode;
 - * the file's lock status;
 - * the file's device numbers;
 - * the file's inode number;
 - * the file's size or offset;

- * the name of the file system containing the file;
- * any available components of the file's path name;
- * the names of the file's stream components;
- * the file's local and remote network addresses;
- * other file or dialect-specific values.

Getting Started Quickly

=====

If you want to get started using `lsnf` quickly, or see some examples of how `lsnf` can be used, consult the `00QUICKSTART` file of the `lsnf` distribution.

The `00QUICKSTART` file won't help you build or install `lsnf`, but it will cut through the density of the `lsnf` man page, giving you more readily an idea of what you can do with `lsnf`.

For information on building and installing `lsnf`, consult the `00README` file of the `lsnf` distribution.

Limiting, Filtering, and Selecting `lsnf` Output

=====

`lsnf` accepts options to limit, filter, and select its output.

These are the possible criteria:

- * Process ID (PID) number -- to list the open files for a given process;
- * Process Group ID (PGRP) -- to list the open files for all the processes of a given process group;
- * User ID number or login name -- to list the open files for all the processes of a given user;
- * Internet address -- to list the open files using a given Internet address (host name), protocol, or port (number or name); or to list all open Internet files;
- * command name;

- * file descriptor name or number;
- * list all open NFS files;
- * list all open Unix domain socket files;
- * list all uses of a specific file;
- * list all open files on a file system.

Selection options are normally ORed -- i.e., an open file meeting any of the criteria is listed. The selection options may be ANDed so that an open file will be listed only if it meets all the criteria.

In the absence of any selection criteria, lsof lists files open to all processes.

Parsing Lsof Output with Another Program

=====

The

lsof -F option directs it to produce "field" output that can easily be parsed by another program. The lsof distribution contains sample awk, perl 4, and perl 5 scripts in its scripts subdirectory that show how to post-process field output.

Repeat Mode

=====

Lsof can be directed to produce output, delay for a specified time, then repeat the output, cycling until stopped by an interrupt or quit signal. This mode is useful for monitoring the status of some file operation -- e.g., an ftp transfer or a tape backup operation.

Repeat mode is more efficient when combined with lsof's selection options, since they limit lsof overhead.

It's possible to use lsof's field output options to supply repeat mode output to another process for its manipulation. The scripts subdirectory of the lsof distribution has sample Perl scripts showing how to consume lsof repeat mode output from a pipe.

Distribution Restrictions

=====

Lsof may

be used and distributed freely, subject to these limitations:

1. Neither the author nor Purdue University is responsible for any consequences of the use of this software.
2. The origin of this software must not be misrepresented, either by explicit claim or by omission. Credit to the author and Purdue University must appear in documentation and sources.
3. Altered versions must be plainly marked as such, and must not be misrepresented as being the original software.
4. This notice may not be removed from or altered in the lsof source files.

Cautions

=====

Lsof is a tool that is closely tied to the Unix operating system version. It uses header files that describe kernel structures and reads kernel structures that typically change from OS version to OS version.

DON'T TRY TO USE AN LSOF BINARY, COMPILED FOR ONE UNIX OS VERSION, ON ANOTHER.

On some Unix dialects, notably SunOS and Solaris, lsof versions may be even more restricted by architecture type. An lsof binary, compiled for SunOS 4.1.3 on a sun4c machine, for example, won't work on a sun4m machine. Although I have no evidence that they exist, the potential for similar restrictions exists in Solaris versions of lsof.

AN LSOF BINARY, COMPILED FOR ONE SOLARIS ARCHITECTURE, ISN'T GUARANTEED TO WORK ON A DIFFERENT SOLARIS ARCHITECTURE.

Distribution Contents

=====

The lsof distribution is checked for completeness when it is constructed and by the Inventory script when you run the Configure script. (See The Inventory Script section of the 00README file of this distribution.)

If you're worried you don't have everything, run the Inventory script. Here's an approximate picture of what you should have:

lsof_<version>:

```
00CREDITS  00PORTING  Customize lsof_fields.h  proc.c
00DCACHE  00QUICKSTART  Inventory main.c      proto.h
00DIST    00README    arg.c  misc.c  scripts/
00FAQ    AFSConfig  dialects/ node.c  store.c
00MANIFEST  Configure  lsof.h  print.c  version
```

lsof_<version>/dialects:

```
aix/  epix/  linux/  osf/  riscos/  sun/
bsd/  freebsd/  netbsd/  ptx/  sco/  ultrix/
common/  hpux/  next/  pyramid/  sgi/  unixware/
```

lsof_<version>/dialects/common:

```
00Manifest  dvch.frag  lkud.frag  prt.frag  rnam.frag
ckfa.frag  fchi.frag  pcdn.frag  rdev.frag  rnch.frag
cvfs.frag  isfn.frag  prfp.frag  rmnt.frag  rvfs.frag
```

Specific dialects sub-directories may differ slightly, depending on the needs of the dialect, but they should all contain:

lsof_<version>/dialects/next:

```
Makefile  ddev.c  dlsof.h  dnode.c  dproto.h  dstore.c
Mksrc*  dfile.c  dmnt.c  dproc.c  dsock.c  machine.h
```

lsof_<version>/scripts:

```
00MANIFEST  count_pf.perl*  list_fields.awk
00README    count_pf.perl5*  list_fields.perl*
big_brother.perl5  list_NULLf.perl5*  watch_a_file.perl*
```

Warranty

=====

Lsof

is provided as-is without any warranty of any kind, either expressed or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose.

The entire risk as to the quality and performance of Lsof is with you. Should Lsof prove defective, you assume the cost of all

necessary servicing, repair, or correction.

Bug Reports

=====

Now that the obligatory disclaimer is out of the way, let me hasten to add that I accept lsof bug reports and try hard to respond to them. I will also consider and discuss requests for new features, ports to new dialects, or ports to new OS versions.

PLEASE DON'T SEND A BUG REPORT ABOUT LSOF TO THE UNIX DIALECT VENDOR.

At worst such a bug report will confuse the vendor; at best, the vendor will forward the bug report to me.

Please send all bug reports, requests, etc. to me via email at <abe@purdue.edu>.

What's new in Version 3

=====

I had three goals in mind for version 3:

1. Make it faster.

Lsof 3 defers as many lookup operations -- /dev scan, mount table scan, /etc/services scan -- until they're needed.

I used prof on lsof and used its information to reduce lsof's overhead.

2. Make it easier to maintain and port to other systems, and eliminate complicated nestings of #if/#else/#endif pre-processor statements.

3. Add a few features:

- o ANDing of options;
- o Sorting of output by Process ID;
- o Searching for Unix domain sockets by name -- to a limited extent.

- o Process group ID support. (This was a late addition.)

As a result of goal 2, the organization of lsof version 3 differs greatly from version 2. The main directory contains totally common functions, a dialect subdirectory contains subdirectories of code specific to each Unix dialect that is supported. There is also a dialects/common subdirectory that contains code fragments that are used by more than one, but not all dialects.

A top-level Configure script constructs the complete set of sources for a given dialect and the Makefile at the top-level. Configure is self-documenting. When it is finished, Configure calls a second script, Customize, that assists with the modification of a few important compile-time options.

Version 3 Release Notes

=====

3.0 May 24, 1994

This is the first official release of lsof 3.

3.01 May 27, 1994

Corrected the #ifdef condition for HASPWSTAYOPEN under Sequent Dynix 3.0.12.

Fixed bug that prevented the display of current working and root directory path names under SunOS 4.1.x, even when the user area contained pointers to them.

Changed the strategy for allocating space to the local proc table in EP/IX, NEXTSTEP, Solaris, and SunOS.

Closed the distance between reading the Solaris proc structure and its companion pid structure in an effort to avoid using a stale pid structure pointer. A stale pid structure pointer sometimes causes a segmentation violation in `kvm_read()`.

Added code to the SunOS `kread()` function to filter out non-kernel addresses that might lead `kvm_read()` to a segmentation violation. The Configure script was updated to create a header file, `kernelbase.h`, with the necessary kernel memory boundary value;

and to remove the header file when the -clean option is specified. The Configure script now passes the target name to the Mksrc shell script. It's used by sun/Mksrc to determine the source for kernelbase.h.

3.02 June 2, 1994

Added #if's to of kernelbase.h for Solaris and SunOS. This eliminates a redeclaration complaint from old versions of SunOS.

Added code to process_file() in all dialects to display "no more information" when f_count in the file structure is zero.

3.03 July 8, 1994

Added support for displaying process group IDs. This includes two new options: -j to select PGRP display; and -g<list> to specify a list of PGRPs whose files are to be displayed. (-j was chosen to match a similar option in some ps(1)'s.)

Philippe-Andre Prindeville <philipp@res.enst.fr> suggested this addition.

3.04 July 15, 1994

Corrected handling of port name component of -i option on systems where htons() is required.

Corrected casting of UID arguments -- needed when UID is a short and the compiler wants the minimum argument size to be larger.

3.05 July 26, 1994

Added printing of DECnet socket information for the Ultrix 4.2 and 4.3 dialects. John Beacom <beacom@wisnud.physics.wisc.edu> kindly provided the test system. A new Configure abbreviation, ultrix42dn, must be used to activate the DECnet support.

3.06 September 2, 1994

The major news in this revision are the V/88 R32V3 and R40V4.2 ports for Motorola M88K systems. Chance Neale <cneale@panix.com> kindly provided test systems and Mike Feldman <feldman@charm.urbana.mcd.mot.com> provided technical assistance.

Version 3.06 contains other, minor modifications:

* The Configure

script has been isolated from the

environment, thanks to a report of a CC=xlc problem from Johnny Tolliver <jxt@ca04.cad.ornl.gov>. Johnny also suggested a better form for the install commands in the Makefile's install rule. This change affected all the dialect Mksrc scripts.

A new HP-UX abbreviation (hpuxx25) was added for systems that have the /etc/conf/x25 include files. The old HP-UX abbreviation (hpux) no longer references /etc/conf or defines HPUX_CCITT.

* The command "lsf `tty`" now works most places (maybe not always for SGI IRIX, but I tried) thanks to a bug report from Casper Dik <casper@fwi.uva.nl>.

* A mode has been added to disable forking when debugging. The V/88 R40V4.2 debugger needed that.

* Printing of stream NAMEs was standardized (IRIX was different) and an attempt was made to avoid stream NAMEs like /dev/ttyx4->/dev/ttyx4.

* A new documentation file, 00FAQ, accompanies the distribution. It contains frequently asked questions about lsf, and the best answers I can manage to give.

* I have a new HP-UX test system, courtesy of Dave Curry <davy@ecn.purdue.edu> and George Goble <ghg@ecn.purdue.edu> of Purdue's Engineering Computer Network. I want to thank J. Nelson Howell <nelson@zeus.mgmt.purdue.edu> of Purdue's School of Management for his prior support of lsf development under HP-UX.

3.07 September 8, 1994

This revision contains a small security enhancement. Tim Ramsey <tar@ksu.ksu.edu> pointed out that lsf's setgid or setuid power might allow its user to read an alternate kernel name list or memory file via the -c and -k options that the real UID might not have authority to read. In revision 3.07 lsf uses access(2) to check the real UID's authority

to read files named with -c and -k.

3.08 September 23, 1994

This revision contains support for Novell's UnixWare, versions 1.1,

1.1.1, and 1.1.2. Peter Lord

<plord@novell.co.uk> made this possible by providing a copy of UnixWare and supplying technical advice.

Binaries and sources for this version will be available from Novell sources. See the Novell UnixWare section of the distribution's 00README file for details.

This version adds /proc file system support to the dialects derived from SYSV R4 (except EP/IX 2.1.1): FreeBSD, IRIX 5.2, Solaris, UnixWare, and V/88 R40V4.2.

This version compiles under IRIX 4.0.5 again, correcting a problem introduced at version 3.06 in the "lsof `tty`" fix.

HP-UX now skips file systems whose mount type is "ignore". The presence of the -c option is now controlled by the HASCOPT definition in machine.h. The HASSWAPPOR option is now documented and implemented correctly. Hans Petter Christiansen <hpchr@dxcern.cern.ch> suggested these changes.

3.09 October 18, 1994

This revision recognizes the DEC Alpha OSF/1 V3.0, IBM AIX 4.1, and Solaris 2.4 dialects. It has support for the SunOS 4.1.3 PC file system and two bug fixes: an IRIX, V/88, and Solaris file argument processing bug; and a V/88 include error.

Alex Kreis <akreis@us.oracle.com> made the initial request for DEC OSF/1 V3.0 support and provided help with testing. Ron Young <ron@screamer.nevada.edu> graciously provided a test host. James Woodward <woodward@zk3.dec.com> provided invaluable clues to V3.0 kernel organization. Others who read the alpha-osf-managers mailing list made generous offers of test facilities, and I thank them, too. The decosf3 abbreviation was added to the Configure script, and the script was modified to request the name of the system configuration subdirectory of

/sys where the configuration-specific header files reside for the decosf1, decosf2, and decosf3 configuration abbreviations.

Mark Peek <mark_peek@taligent.com> provided and tested the AIX 4.1 changes.

Casper Dik <casper@fwi.uva.nl> provided and tested the Solaris 2.4 changes.

Friedel Loinger <friedel@wise.tau.ac.il> suggested the addition of support for the SunOS 4.1.3 PC file system ("pcfs").

Andreas Stolcke <stolcke@ICSI.Berkeley.EDU> supplied a fix to a file argument processing bug that causes lsof to crash when supplied the path of an NFS mounted file. The bug affects lsof versions for Motorola V/88 R40V4.2, SGI IRIX 5.2, and Solaris 2.[123].

Corrected an error in the path to include prdata.h in dlsof.h for Motorola V/88 R40V4.2.

3.10 October 21, 1994

This revision adds support for the cache and PC file systems to Solaris. It fixes these bugs: a problem with the display of Motorola V/88 R40V4.2 device numbers; and a failure of Readlink() to resolve symbolic links completely in all cases.

Some major internal restructuring was necessary to be able to display negative inode numbers for SunOS PC file system nodes, while displaying them as unsigned numbers for Solaris, hence all dialect versions were affected.

3.11 October 28, 1994

This revision adds support for Linux version 1.0.9. Tim Korb <jtk@arthur.cs.purdue.edu> kindly provided a development system in the Computer Science Department at Purdue. It is likely that the Linux revision will have to be adjusted for each installation, and it is probable that this revision will not run under later versions of Linux. See the 00FAQ and 00README files for more information on Linux tuning.

3.12 October 29, 1994

This revision supports Linux version 1.1.47 -- the Yggdrasil Plug-and-Play Linux Fall '94 release. Both Linux versions now obtain kernel symbol addresses from the /zSystem.map file.

November 4, 1994

Hendrik G. Seliger <hank@Blimp.automat.uni-essen.de> reports that lsof compiles and seems to work under Linux 1.1.61. He used the linux1147 Configure abbreviation. Marty Leisner <leisner@sdsp.mc.xerox.com> reports that the linux1147 Configure abbreviation produces a working lsof for Linux 1.1.64, too.

3.13 November 11, 1994

This revision contains Pyramid DC/OSx support, provided by Anthony Shortland <Anthony.Shortland@FMR.com>.

Marty Leisner <leisner@sdsp.mc.xerox.com> reported a segmentation violation failure in Linux lsof. In response I changed its task structure access to use /dev/kmem instead of mmap'ing kernel memory. This avoids a possible segmentation violation when bad pointers are obtained from kernel memory. I also enabled the setting of Linux INET and Unix select flags so that the -n and -U options work -- I forgot to do that when I did the Linux port.

Marty Leisner reports that the linux1147 Configure abbreviation produces a working lsof for Linux 1.1.64, too.

Francois Pindard <pinard@iro.umontreal.ca> provided a correction to the Linux install rule.

3.14 November 16, 1994

This revision adjusts the Configure script stanzas for DEC OSF/1, Motorola V/88, Pyramid DC/OSx, and Ultrix.

It also contains additional support for DC/OSx and Ultrix.

Bruce Beare <bjb@pyramid.com> and Robert Vernon <bob@pyramid.com.au> helped me understand Pyramid nomenclature. Robert Vernon provided DC/OSx support for the RxFs file system and added machine series

auto-detection to the Configure script. Alex Podlecki <a.podlecki@att.com> helped test the updated DC/OSx distribution.

Chris Timmons <skynyrd@tahoma.cwu.edu> provided information on RISC and VAX Ultrix 4.4 that led to correct prefixing of nlist() names. I updated the Configure script to detect Ultrix version, machine hardware type, and the presence of DECnet support.

I also updated the OSF/1 and V/88 Configure scripts to determine configuration parameters automatically.

3.15 November 25, 1994

Corrected DEC OSF/1 V2.0 support of the ADVFS file system.

Bernt Christandl <beb@mpe-garching.mpg.de> and Alex Kreis <akreis@us.oracle.com> helped test. No OSF/1 V1.x system with ADVFS was available for testing.

3.16 December 2, 1994

Fixed some device number handling bugs in DEC OSF/1 V2.0 and V3.0 support.

3.17 January 25, 1994

Isof now supports SGI IRIX 5.3, thanks to changes supplied by Dave Olson <olson@anchor.engr.sgi.com>; and SCO OpenDesktop or OpenServer releases 1.1 and 3.0, thanks to support from Dion Johnson <dionj@sco.com>, Bela Lubkin <belal@sco.com>, and Nathan Peterson <nathanp@sco.com>.

Dave Olson pointed out an IRIX stream handling bug in `sgi/dnode.c`. When I investigated it, I found that it had implications wider than SGI IRIX. The eventual fix provided the display of inode numbers for character devices when the inode number must be obtained from `/dev`. IRIX, Solaris, and SunOS benefit from the fix.

I added version detection to the Configure script, so there is now just one Configure abbreviation for IRIX versions 4.05, 5.2, and 5.3 -- ``irix". (The Configure abbreviation for the SCO dialect ``sco".)

Ian

Darrow <ian@sq.com> pointed out that lsof wouldn't Configure or work properly under Solaris on an i86pc. Sorting out the difficulties made clear that the HASSWAPPOR definition should be removed from every machine.h file and that ntohs() should be used in every dsock.c on every port supplied to printinaddr().

Andreas Stolcke <stolcke@ICSI.Berkeley.EDU> pointed out a method that sometimes allows lsof to report on files open to a crashed or unavailable remote NFS server. This led to the addition of code, where possible, to estimate the device number of mount points that cannot be stat()'d. The alternate device number can come from /etc/mstab or /etc/mnttab, or from the dialect's version of them. On systems that use /etc/mstab or /etc/mnttab, it is sometimes possible to add the device number manually to the mount options field in the form ``dev=xxxx''. Some internal changes in the way lsof handles device numbers were necessary to prevent ones whose dev_t typedef is a signed short from causing sign extension when promoted to integers as function arguments.

David Addison <addy@meiko.co.uk> and Robert Ehrlich <Robert.Ehrlich@inria.fr> pointed out that lsof errs when reporting device numbers and other node information for some special Sun files. I rewrote most of sun/dnode.c to correct the problem; Robert rewrote it again; and I rewrote it once more. David and Robert helped me test it under Solaris 2.[34] and SunOs 4.1.[23].

While using code from the Motorola V/88 port for the SCO port, I found and fixed some NFS bugs in the V/88 port.

3.18 January 31, 1995

I added the -b and -w options. The -b option causes lsof to avoid the functions lstat(2), readlink(2), and stat(2) that might block in the kernel -- e.g., when they reference an inaccessible NFS file system. Instead it uses alternate device numbers obtained from the mount table, where possible.

The -w option causes lsof to suppress

warning

messages -- e.g., when the -b option has been specified. The suppression of warning messages was formerly bundled into the -t option. The -t option now selects -w.

I figured out how to make alternate AIX 3.2.5 device numbers from the kernel mount structure. The new -b option therefore works under AIX 3.2.5.

With the help of Chance Neale <cneale@panix.com> I fixed bugs in the Motorola V/88 R32V3 NFS support.

I added a solariscc Configure abbreviation for those who want to use Sun's C compiler.

3.19 February 10, 1995

Robert Ehrlich <Robert.Ehrlich@inria.fr> pointed out that Isolf might be able to gather more complete path name information from the kernel's name cache. Name cache access may be inhibited with the new -C option. Revision 3.19 implements name cache access for:

DEC OSF/1 [23].0
Dynix (Purdue 3.0.12)
EP/IX 2.1.1
FreeBSD 1.1.5.1
HP-UX 9.01
Motorola V/88 R40V4.2
NEXTSTEP 3.1

SGI IRIX 5.3

Solaris 2.[34]
SunOS 4.1.x
Ultrix 2.2 and 4.2

Revision 3.19 does NOT implement name cache access for:

===

AIX The knlist() function won't
return cache addresses --
some IBM wisdom to "protect"
their customers.

Linux My only access is to 1.0.9,
and it doesn't seem to have
a kernel name cache.

Motorola V/88 It doesn't have a unified
R32V3 name cache.

Novell UnixWare I don't have a test system.

Pyramid DC/OSx I don't have a test system.

SCO OpenDesktop It doesn't have a unified
OpenServer name cache.

SGI IRIX 4.0.5H I saw no unified name cache
in the header files before
my 4.05H system was converted
to 5.2.

SGI IRIX 5.2 I don't have a test system.

Another Robert Ehrlich suggestion led to the
establishment of a device cache file feature. The
new -D option gives control of it. This feature
speeds lsof dramatically
on some dialects after
lsof has been called once and the cache has been
built. (Calling stat(2) on several hundred or
thousand /dev nodes can take a long time.) The
feature can be disabled or modified in the machine.h
header file and the dialects/*/ddev.c source file
when lsof is built.

3.20 February 23, 1995

Upgraded Linux socket handling for versions 1.1.75
or greater with help from Marty Leisner
<leisner@sdsp.mc.xerox.com> and Linus Torvalds
<Linus.Torvalds@cs.Helsinki.FI>. There is now a
single Configure script abbreviation for linux.

Updated for Motorola V/88 R40V4.3 with help from
Mike Feldman feldman@charm.urbana.mcd.mot.com>
and Chance Neale <cneale@panix.com>.

Updated for SGI IRIX 6.0 with help from Przemek
Klosowski <przemek@rrdjazz.nist.gov> and Dave Olson
<olson@anchor.engr.sgi.com>.

Corrected access of device cache file that needs
to be updated so that someone other than the file
owner can rewrite it. Deleted the chmod() failure
warning.

Updated
Configure and the Sun Makefile to specify
absolute paths to the Sun install program.

3.21 March 3, 1995

Removed BSDI BSD/386 support, because I no longer
have a test system, and I needed to have separate
sources for two of the three dialects (FreeBSD,
and NetBSD) once served by the BSDI BSD/386 sources.
FreeBSD sources are now in the freebsd subdirectory;
NetBSD, in netbsd.

With the help of Greg Earle <earle@isolar.Tujunga.CA.US>
and Paul Kranenburg <pk@cs.few.eur.nl> installed
new NetBSD support for versions 1.0 and 1.0A. The
NetBSD 0.9 support was removed. The 1.0A support has
been tested on Intel and SPARC-based systems.

3.22 March 9, 1995

Fixed a bug in name cache handling that occasionally
caused lsof to cause a segmentation violation on
FreeBSD. Although the bug didn't do that anywhere
else, recreated the binaries of all dialect versions
that use the affected code from rnam.frag and rnc.frag.

3.23 March 24, 1995

Removed forgotten HASSWAPPORTR reference from HP-UX
machine.h and inserted ntohs() calls in the printinaddr()
calls of dsock.c for HP-UX and NEXTSTEP.

Added support for NEXTSTEP 3.3, courtesy of Allan
Nathanson <ajn@NeXT.com>

3.24 March 31, 1995

Changed Configure script to handle DEC OSF/1 V3.2.
Removed leading zero from DEC OSF/1 and ADVFS
version values. Added dialects/osf/dec_a/3.2 header
file directory, courtesy of Dave Morrison
<dmorriso@us.oracle.com>, who also tested the 3.24
DEC/OSF1 V3.2 lsof.

3.25 April 5, 1995

Ported to RISC/os on a R2030 (R2000-based) system,
provided by Zdenko Tomasic <zdenko@harvey.cam.rice.edu>.

Tightened security on the device cache file; lsof

always tries to change its ownerships to the effective IDs after creating it. This was suggested by Stefan Kelm <kelm@cert.dfn.de>.

Ported to FreeBSD 2.0, starting with work done by Kurt Jaeger <pi@complx.stgt.sub.org> on lsof revision 3.16. Ade Barkah <mbarkah@hemi.com> and William McVey <wam@cs.purdue.edu> provided test systems.

3.26 April 20, 1995

Ported to SCO OpenDesktop or OpenServer 5.0 (aka Everest and 3.2v5.0.0). Hugh Dickins <hughd@sco.COM>, Bela Lubkin <belal@sco.COM>, Craig B. Olofson <craig@sco.COM>, and Nathan Peterson <nathan@sco.com>, provided me an early-release version of 3.2v5.0.0 and gave technical advice.

Added length checking of the Namech buffer to the printinaddr() function.

3.27 May 2, 1995

Corrected typo in AIX install rule, courtesy of a report from John Colgrave <colgrave@hursley.ibm.com>.

At the suggestion of Greg Earle <earle@isolar.Tujunga.CA.US> added a function to print the name of the unknown protocol (the AF_* symbol), when there is no specific processing for it in dsock.c. This change affected most dialects: exceptions are DC/OSx, Linux, Motorola V/88, and UnixWare.

3.28 May 26, 1995

Added support for Sequent PTX 2 and PTX 4. The PTX 2.1.6 and PTX 4.0.2 test systems and technical advice were provided by Gerrit Huizenga <gerrit@sequent.com>, Peter Jordan <petej@sequent.com>, Kevin Smallwood <kcs@sequent.com>, and Mike Spitzer <mks@sequent.com>. (Thomas A. Endo) <tendo@netcom.com> and (David Putz). <PutzDW@PO1.LMB.unisys.com> tested under PTX 2.1.5. Bob Foertsch <foertsch@uiuc.edu> tested under PTX 4. Kevin Smallwood tested under 2.1.1. Others who helped include Shane Kenney <shane@sequent.com>, Stephan Rossi <rossi@mtu.edu>, Douglas R. Smith <drsmith@us.oracle.com>, and Joel White <jdwhite@netcom.com>.

Changed the local dev structure's name to l_dev to avoid conflicts with the PTX dev structure. Added a common/rdev1.frag -- a variant of rdev.frag. It's used by EP/IX, PTX, RISC/os, and V/88.

Changed printname() to check Namech first and print it if it contains something. This eliminates some hacks in the handling of names for streams, but generates some duplicate device name look-up code in the dnode.c files of some dialects.

3.29 June 2, 1995

Added clone device support to Motorola V/88 R40V4.3.

Added a generic ``-X" option for dialect-specific use. Used it in AIX to allow use of readx(). Lsof no longer uses readx() by default, because its use can cause an AIX 3.2.x and 4.1.x kernel error to appear. Kevin Ruderman <rudi@acs.bu.edu> reported this bug to me and the possibility that lsof might trigger it.

The error, known as the Stale Segment ID bug, hangs the kernel in its dir_search() function, thus hanging the application process that called it so tightly that the application process can neither be killed nor stopped. The bug does not directly affect lsof, but may cause the hang when the kernel is searching directories for other processes. 00FAQ and 00README describe the Stale Segment ID bug in more detail. Consult dialects/aix/machine.h for options on enabling or disabling readx() by default, or permanently enabling or disabling it with the HASXOPT and HASXOPT_VALUE definitions.

When not using readx(), AIX lsof may not report fully on all text and loader references. Changes to the kernel getuser() function in AIX 4.1.1 appear to have eliminated the text file and loader file reference information that once led lsof to use readx(); of course, without that information, lsof can no longer report on the executing text file or shared libraries in 4.1.1.

Changed the Configure script to use a single

abbreviation, aix, for AIX. Configure now uses /usr/bin/oslevel to determine the AIX version; in the absence of /usr/bin/oslevel, Configure issues a warning and assumes the version is 3.2.0. Source code changes were made to dialects/aix/*.ch] to accommodate the new form of the _AIXV value.

3.30 June 8, 1995

Added -c to the installation of the man page in the Ultrix Makefile's install rule. Thanks go to Jules van Weerden <Jules.vanWeerden@let.ruu.nl> for noticing this omission.

Made FreeBSD 2.0 changes: 1) added automatic sensing of the FreeBSD 2.0 boot file path, using the getbootfile(3) function (suggested by Ade Barkah); 2) changed kvm_getprocs(3) function call to use KERN_PROC_ALL symbol from <sys/sysctl.h>, thus eliminating incorrect use of the <sys/kinfo.h> and <sys/kinfo_proc.h> header files; and 3) removed <sys/kinfo.h> and <sys/kinfo_proc.h> header files from the dialects/freebsd/include/2/sys subdirectory of distribution.

Tested under AIX 4.1.2.

3.31 June 16, 1995

Added the NOUSAGEONERR definition to allow lsof to be compiled with the displaying of usage information after option error messages disabled. Lsof is distributed without the NOUSAGEONERR definition -- i.e., usage output is displayed after option error messages.

Worked on documentation in the 00* files and the man page, adding tables of contents, making usage more consistent, trying to insure proper dialect titles, and inserting some notes about distribution restrictions (few) and warranty (none).

Fixed Motorola V88 R32V3 bug in handling Internet files. This bug was introduced some time ago, but I have only recently been able to test under R32V3 again.

3.32 June 23, 1995

Added the ability to the Linux nlist() function to automatically detect that the kernel binary is COFF or ELF form. Also corrected the UID_ARG cast from int to u_int. These changes were suggested by Michael Shields <shields@tembel.org>. Joseph J. Nuspl Jr. <nuspl@nvwls.cc.purdue.edu> provided a test system.

Updated lsof for HP-UX 10. Richard Allen <ra@rhi.hi.is> provided a test system. The hpux stanza in the HP-UX configure script was updated to sense the HP-UX version automatically, and to sense the availability of CCITT header files in /etc/conf/x25.

3.33 June 28, 1994

Added options to select "field" output that can be parsed by a subsequent program. (The -f, -F, and -0 options form the selection set.) Provided sample awk and Perl scripts for parsing and displaying field output. This feature was suggested by Dan Bernstein <djb@silverton.berkeley.edu>.

Tested under PTX 4.0.3.

3.34 June 30, 1995

Changed display of file offset to decimal in the form "0t12345678" if it is less than 100,000,000. The offset is displayed in hexadecimal in the form "0x12abcdef" if it is larger than 99,999,999.

Changed inode field output from signed to unsigned decimal. Updated the list_fields.{awk,perl} and list_NULf.perl5 scripts.

Documented the truncated inode output form (leading `*' and 5 digits) for inodes that are too large for the output field; thanks go to Leonard Sitongia <sitongia@zia.hao.ucar.edu> for pointing out that this wasn't documented.

3.35 July 9, 1995

Added loopback file system support to Solaris with advice from Casper Dik <casper@Holland.Sun.COM>.

Removed the NOUSAGEONERR compile option in favor of producing a shortened

usage message when option errors are detected.

Marty Leisner <leisner@sdsp.mc.xerox.com> provided code to validate the Linux system map file (/System.map or /zSystem.map). If lsof detects that the system map file doesn't match the booted kernel, it complains and quits.

Updated host name cache to include dot forms -- e.g., when the host name can't be obtained via gethostbyaddr(). This prevents subsequent lookup delays for the same address.

3.36 July 20, 1995

Updated kernel name cache handling to assume a default size for pointer-linked caches (DEC OSF/1, FreeBSD, NetBSD, and SGI IRIX 5.3) when the kernel's cache size variable has a value of zero. A warning is issued, but lsof proceeds to read and use the name cache.

Folded rdev1.frag into rdev.frag by supporting a HASDNAMLEN #define for those dialects whose DIRTYPE structure has a d_namlen definition.

Updated Linux distribution to avoid using d_namlen from struct dirent if the Linux version is 1.2.10 or greater. This avoidance might work on earlier version of Linux, too, but I have no way of telling.

Added support for FreeBSD 2.0.5. Ade Barkah <mbarkah@hemi.com> provided a test system.

Added WARNDEVACCESS definition to machine.h control the default issuance of device directory and subdirectory access errors.

Changed options:

- m (mount warning) option deleted
- c (core file) option changed to -m
- c option redesignated as command selector
- d (device warning) option deleted
- d option redesignated as file descriptor selector
- O (order) option changed to less-overhead option
- r option added to enable repeat mode

Added a repeat mode in which lsof will display

output, sleep for the number of seconds defined by the repeat-mode option, -r <seconds>, and then display output again, doing this repetitively until it receives an interrupt or quit signal. This option is much more efficient for monitoring a file than calling lsof repeatedly from a shell script, since it entails only one set of lsof startup operations.

The CANDOCHILD compile-time option has been removed. The -O run-time option will do the same thing.

3.37 July 27, 1995

Fixed incorrect setting of low-overhead flag from -O option.

Marty Leisner reports that d_namlen is not needed under Linux 1.2.8. Changed the #if test that sets HASDNAMLEN accordingly.

Made more changes to option processing: combined -f, -F, and -0 into -F (-0 becomes a field identifier value for -F); now allow -F, -g, -r, and -S to have an optional value; made -F? (help) and -F0 (all fields plus NUL terminator) special forms of -F; and added support for --. These option processing changes are handled with a local getopt() function (named GetOpt()) to avoid confusion).

Made yet another attempt to create "standard" install and deinstall SunOS/Solaris Makefile rules.

Corrected improper use of examine_lproc() when in repeat mode.

3.38 August 3, 1995

Modified Linux and PTX to show TCP's "send next" sequence number as the offset for TCP socket files.

Added some version tests for Linux 1.3.0, provided by Roman Gollent <roman@portal.stwing.upenn.edu>.

Added some more PTX tests around code that shouldn't be active when the NFS layered product is unavailable. Mark Vasoll <vasoll@a.cs.okstate.edu> provided them.

3.39 August 10, 1995

Added generic support for dialect-specific elements in the lfile structure. The HASLFILEADD and SETLFILEADD macros are used in lsof.h to define the elements and in proc.c to preset them. Field identifiers `1' through `9' are allocated to dialect-specific files. The HASFIELDAP<x> strings define the -F? help text for the FieldSel[] table of store.c, and LISTLFILEAP<x> are macros, used in the print_proc() function of proc.c, to list fields. (<x> is the field identifier.) Other private element and field processing should be done in dialect-specific modules.

Used {HAS,SET}LFILEADD, HASFIELDAP[12], and LISTLFILEAP[12] to define and list link count and inode address lfile elements under PTX. Used the -X option to control when the values are displayed.

3.40 August 25, 1995

Added support for Solaris 2.5-BETA, including rudimentary support for door files and extensive support for fattach'ed files with the help of Henry Katz <hkatz@panix.com>, Joseph Kowalski <jek3@jurassic.Eng.Sun.COM>, and Mike Tracy <mtrac@jurassic-45.Eng.Sun.COM>.

Changed most dialects to use slightly safer fchown() on the device cache file. Changed dvch.frag to avoid creating a device cache file that is owned by root. Cleared caches when reading of device cache file fails and removed extra NL from device cache error messages.

After receiving yet another complaint about Makefile install rules, I decided to remove all install and deinstall rules from the distribution Makefiles. The Makefiles now contain a set of comments (echo commands) that describe what the install rule might be. The lsof user is now free to construct install and deinstall rules that meet local conventions and preferences.

3.41 September 5, 1995

Changed Linux kernel symbol handling to avoid the stripping of leading `_ ' characters that was

installed in revision 3.32. (Recent Linux kernels have some symbols that are the same except for the leading `_'.)

The Linux kernel loader format is now determined by testing for "_system_utsname" (COFF) and "system_utsname" (ELF) in the symbols returned by the get_kernel_syms() syscall. If neither or both symbols are present, a warning is issued and COFF format is assumed. If the loader format is COFF, then kernel symbols important to lsof are assumed to have a leading `_'.

Because recent Linux releases add a parameter hashing suffix to kernel symbols, lsof removes it before comparing kernel symbol names and addresses to those in /[z]System.map.

Marty

Leisner, Keith Parks <emkxp01@mtcc.demon.co.uk>, and Michael Shields helped me with the Linux changes.

After much discussion of the security of the device cache file on the bugtraq mailing list, I adopted a suggestion from Dave Sill <de5@sws5.CTD.ORNL.GOV>. His suggestion removes the world-writable device cache file from /tmp and creates instead a mode 0600 device cache file in the home directory of the real user ID that is executing lsof. Lsof issues a warning message when it does this. (The warning can be suppressed with -w.) The HASDCACHE definition becomes a relative path. When lsof is run from root, it will create a device cache file in root's home directory, e.g., / or /root, but the file will be readable and writable only by root. This should make the device cache file much more secure.

Added support for SGI IRIX 6.1. Dave Olson provided technical support and Przemek Klosowski supplied a test system. Since Przemek's system formerly supported my testing of lsof for IRIX 6.0, its update to 6.1 means I have not tested lsof under IRIX 6.0 since revision 3.39.

Changed name list structure element initialization for V/88 to make gcc happy. Albert Chin-A-Young

<china@cig.mot.com> suggested this.

3.42 September 7, 1995

Changed device cache file naming process to add a suffix formed of an underscore, followed by the first component of the host name returned by `gethostname(2)`. This allows `lsof` to create separate device cache files for each host from which it is run for the same UID when the UID's home directory is shared by the hosts via NFS.

3.43 September 12, 1995

Enabled SCO searching for stream files and Release 5.0 Unix domain socket files by name.

Defined `HASDOPTPATH` for dialects that can supply a path with `-Db`, `-Dr`, and `-Du`. Defined it for all but `DC/OSx`, `UnixWare`, and `V/88`. Used it in the `ctrl_dcache()` function of `arg.c` to enable and disable `-Db`, `-Dr`, and `-Du`.

Used `is_readable()` in `dvch.frag` when opening the device cache file for reading.

3.44 September 19, 1995

Added test for `setuid-root` state so that some security-sensitive code now disabled by `#define`'s can be dynamically disabled.

Enhanced, extended, improved, secured, and documented formation and use of the device cache file path. More options, more carefully controlled are now available. A separate documentation file, `00DCACHE`, accompanies the distribution to explain the device cache file path handling.

Where possible, `lsof` now drops `setgid` permission as soon as possible. Two exceptions are the Solaris and SunOS versions of `lsof` which need to close and re-open `kvm` access. `Setuid-root lsof` implementations must retain that permission to access files in `/proc`.

Improved the `README.lsof_<revision>` file that appears in the `lsof` wrapper tar file with help from Jon A. Tankersley <tank@amoco.com>.

Added Veritas file system support

to the HP-UX
dialect port.

Albert Chin-A-Young tested lsof under Motorola V/88
R40V4.1 and provided #if/#else/#endif changes.

3.45 September 20, 1995

Enabled setgid permission surrender for Solaris
and SunOS dialects.

3.46 October 5, 1995

Added more conversions to HASPERSDC, based on
suggestions from John Gardiner Myers <jgm+@CMU.EDU>.
They make it possible to locate the personal device
cache file in /tmp, for example. A new -D function,
'?', reports device cache file name formation
information.

Gained access to AIX 4.1.3, compiled lsof there, and
found that it seems to work.

Tested lsof under FreeBSD 2.1.0-950726-SNAP. John
Clear <jac@dragonfly.vet.purdue.edu> kindly provided
a test system.

Added a Customize script that helps with the job
of modifying some important (e.g., security-related)
compile-time options. Configure calls Customize,
but can be told not to with the -n|-nocust options.

Fixed over-sensitivity to unexpected kernel
file
structure pointer values in HP-UX version that led
to premature exit. Lionel Cons <cons@dxcern.cern.ch>
pointed out the problem.

With the help of Leif Hedstrom <leif@infoseek.com>
identified a pair of conflicting Solaris 2.4 patches
that prevent lsof from working. A work-around is
described in section 00FAQ.

3.47 October 16, 1995

Enabled suppression of an HP-UX pstat() warning
message. Added big_brother.perl5 to field output
scripts/ subdirectory. Both changes are courtesy
of Lionel Cons <Lionel.Cons@cern.ch>.

Added a test for automount detritus in the SCO mount table.

Added kernel name cache support to SCO dialect.
Modified most name cache support to report full path names without the intervening `` -- " when possible.

Added an Inventory script to check the contents of the distribution, using a new file, 00MANIFEST.
The Configure script normally calls Inventory.
Changed the -n option to Configure to avoid calling the Customize and Inventory scripts and dropped the -nocust option. The presence of .neverCust suppresses the calling of Customize; .neverInv, Inventory. The Inventory script creates .ck00MAN when it completes, so that subsequent calls to Inventory won't check the inventory again -- although the caller is given the opportunity to have the inventory rechecked.

Added PTX 4.1.0 support, courtesy of a test system supplied by Kevin Smallwood <kcs@sequent.com>.

Picked lint for gcc in the V/88 dproc.c from hints provided by Albert Chin-A-Young <chinay@cig.mot.com>.

3.48 October 20, 1995

Improved root directory detection during name cache lookup.

Remove the Novell UnixWare and Pyramid DC/OSx ports from the distribution, because I have not been able to test them for 40 or more revisions. Their pieces may now be found on vic.cc.purdue.edu in pub/tools/unix/lsof/OLD/{binaries,dialects}.

Corrected an error in Customize that caused it to incorrectly redefine HASSYSDC to HASSYSDCPATH. This was reported by Michael Beirne <beirne@dcsv0.fnal.gov>.

Made sure that lsof will compile when HASDCACHE is undefined. A problem with a reference to the DChelp symbol was reported by Vasco Pedro <vp@fct.unl.pt> and resolved by always defining DChelp.

Corrected handling of -c and -m options.

Corrected the reading of the SCO /etc/mnttab. Bela Lubkin <belal@sco.com> helped me understand its special multi-line format. The "nothing/nowhere" lines are continuations of the file system directory and device names when either are > 31 characters.

Corrected SCO version list in Configure help output.

Update special SCO name cache code to make it more robust.

Add support for IRIX 6.0.1 with the help of Eberhard Mater <system@grzap1.rz.go.dlr.de>.

3.49 October 25, 1995

Removed need for dialects/sgi/irix601hdr subdirectory, replacing it with one created by dialects/sgi/Mksrc and composed of symbolic links to dialects/sgi/irix6hdr. Eberhard Mater did the testing.

Added file system inode number to the local file structures of the DEC OSF/1, DYNIX, EP/IX, HP-UX, NeXT, PTX, RISCos, SGI, Sun, and V/88 dialects. Added code to name cache, node, and VFS functions to set the file system inode number and use it for faster recognition of files on the file system mount point.

Added kernel name cache support to Linux. This has been tested only under release 1.2.13.

3.50 October 31, 1995

Updated 00FAQ: reorganized and renumbered sections; added some DEC OSF/1 sections; section about the Solaris and SunOS Sun KERNELBASE.

Added an alternative readdir() function, called ReadDir(), to dialects/osf/ddev.c This function was supplied by Duncan McEwan <duncan@comp.vuw.ac.nz>, who discovered that the getdirentries() function in DEC OSF/1 versions 3.[02] returns an incorrect length for the /dev/fd directory when it is a file system mount point. Modified the Configure script to

define USELOCALREADDIR for 3.[02] to enable using this local function.

Modified the Solaris/SunOS Mksrc to create a dummy (empty) kernelbase.h for Solaris 2.5 (5.5).

3.51 November 8, 1995

Modified the Configure script to declare the kernel state definitions appropriate to IRIX 6.1 on IP21 and IP26 platforms. News of the need for this came from Kate Fissell <Kate.Fissell@IUS4.IUS.CS.CMU.EDU> and Dave Olson <olson@anchor.engr.sgi.com>.

Modified the SGI IRIX dproc.c to provide more information when the kernel's idea of the size of a proc structure doesn't match sizeof(struct proc). This mismatch can occur if the wrong kernel state definitions are used to condition the header files (e.g., <sys/proc.h>) included when compiling dproc.c.

Made the -i option with no arguments equivalent to the -n option -- i.e., they both select the listing of all open Internet files.

Supplied a missing "you" in the Customize script introduction. John Jackson <jrj@cc.purdue.edu> noticed the omission.

Modified the Customize script to put long messages in here documents rather than echo statements, so that changing and reformatting them is easier. John Jackson offered this helpful suggestion.

Fixed a port number cast bug in Solaris 2.[45], courtesy of information and code supplied by Allan Black <allan@scotnet.co.uk>.

Automated the detection of Solaris 2.4 patches 101945-32 and 102303-02 that cause the installed kernel's user structure to differ from the one defined by <sys/user.h> because of a patch to <sys/auxv.h> that wasn't applied when the kernel was built. The Configure script invokes an alternate auxv.h file and warns that it is doing so.

Fixed a problem with Inventory script that shows up on systems where echo is not an sh built-in. The

bug was reported by Scott Ballew <smb@cc.purdue.edu>.

3.52 November 27, 1995

Added support for Linux versions 1.3.22 and above,
courtesy of changes supplied
by Keith Parks
<emkxp01@mtcc.demon.co.uk>.

Changed -d option processing to allow specification
of a comma-separated list of file descriptors.

Modified SCO support to allow NFS code to be optional
at the request of Dave Gilbert
<agere!dgilbert%peapod.com@zool.interaccess.com>.

Enabled HP-UX 10.x version to display device and
inode numbers for FIFOs. The problem was reported
by Jeff Earickson <jaearick@colby.edu>.

3.53 December 8, 1995

Enhanced NeXTSTEP FIFO reporting.

Fixed a formatting problem in the man page, reported
by Angel Li <angel@flipper.rsmas.miami.edu>.

Added support for DEC OSF/1 4.0-BETA. Angel Li
provided the test system.

Added a -v option to display lsof version information.
Marty Leisner <leisner@sdsp.mc.xerox.com> suggested
this.

Replaced touch with echo in Inventory script to avoid
DEC OSF/1 4.0 complaint.

Tested under PTX 4.1.2.

3.54 December 15, 1995

Added support for IRIX 6.2-BETA. The support for
older IRIX
versions changed considerably in the
process. Revision 3.54 has been tested under these
older IRIX versions: 5.3 and 6.1. Angel Li
<angel@flipper.rsmas.miami.edu> provided a test
system and Jim Brown <jim@guanabana.rsmas.miami.edu>
helped.

Tested under AIX 4.1.4.

Decommissioned the DYNIX port -- I no longer have access to a test system.

Added the HASXOPT_ROOT define to allow the lsof builder to restrict the use of the dialect-specific X option (AIX and PTX currently) to processes whose real user ID is root. Updated the Customize script to provide an easy mechanism to change HASXOPT_ROOT. AIX uses HASXOPT_ROOT; PTX does not. This change was suggested by R. Lindsay Todd <toddr@rpi.edu>.

3.55 December 22, 1995

Eliminated need for modified DEC OSF/1 headers by using #undef and #define statements. Chip Stettler <STETTLERC@wlmpl.wilm.ge.com> helped test.

Added quick start documentation file, 00QUICKSTART, containing examples and explanations of lsof use.

Verified that lsof works under the released Solaris 2.5.

3.56 January 2, 1996

Corrected lock reporting for Solaris 2.[345].

Corrected Linux malloc() kernel symbol handling bug, reported by Keith Parks <emkxp01@mtcc.demon.co.uk>.

Corrected AIX loader text file selection bug; it caused all process IDs to be listed when the -t option and one file system name was specified. The bug was reported by Christopher C. Evert <cevert@wii.com>.

Made sure Solaris Kb variable is zeroed before first use.

3.57 January 12, 1996

Updated SunOS port to obtain lock information from v_filocks and the lock_list struct to which it points.

Changed -H to -n. The function formerly performed by -n can be done by using -i with no address.

Updated Linux FIFO support so that the display for FIFOs

contains device number, inode number, and NAME. Johannes Kroeger <jkroeger@squirrel.owl.de> reported the lack of these items in the Linux FIFO display.

Added

RCS identification to header files, Makefiles, and common fragments.

Added BSDI BSD/OS support for 2.0, 2.0.1, and 2.1-BETA.

Terry Kennedy <terry@spcvxa.spc.edu> kindly provided a 2.1-BETA test system and did the 2.0.1 testing.

Modified the Inventory script to compensate for dialects that have an expr that doesn't set its exit code when string matches fail.

Converted internal representations of file offset and size to unsigned long.

Corrected bug in NetBSD lock handling.

Corrected bug in FreeBSD file system type name handling.

Keith Parks <emkxp01@mtcc.demon.co.uk> reports lsof 3.57 compiles and runs under Linux 1.3.56.

3.58 February 7, 1996

Changed Solaris 2.3 configuration to pass the level of patch 101318 to the source code. This allows a Solaris 2.3 lock handling difference to be accommodated.

Updated 00QUICKSTART to reflect -n and -H changes made in revision 3.57. (Ooops!)

Changed Configure script to compile lsof for SCO versions

beyond 3.2v5.0.0 as it is compiled for 3.2v5.0.0. Bill Campbell <bill@celestial.com> reported he has done this successfully.

Added information to 00FAQ about a Linux kernel symbol problem (section 3.7.6) and included a <linux/random.h> patch to work around it. The patch was supplied by Keith Parks <emkxp01@mtcc.demon.co.uk>.

3.59 February 21, 1996

In response to a query from Louis Rayman

<lou@asahi.ps.quotron.com>, added special support for Solaris "sockmod" streams, used for Unix domain sockets, that allows their file system device type and inode number to be displayed. It also allows lsof to search for them by name or type (-U).

Added range handling to -d argument.

Added the display of CDFS file size to DEC OSF/1 output.

Added an include of <rpc/xdr.h> to keep gcc on HP-UX 10 happy. Blair Zajac <blair@olympia.gps.caltech.edu> suggested it.

Added Ultrix 4.5 to support list, courtesy of a notification from Gregory Neil Shapiro <gshapiro@WPI.EDU>.

Added AFS support for Solaris 2.4 at the request of Michael L. Lewis <mlewis@morgan.com> and Phillip Moore <wpm@morgan.com>. Phillip helped me locate a test host, generously provided by Heidi Hornstein <heidi@cmf.nrl.navy.mil> with support from Chaskiel Moses Grundman <cg2v+@andrew.cmu.edu> and Sushila R. Subramanian <sushi@cmf.nrl.navy.mil>. Lsof is configured for AFS with a new script, AFSSConfig.

Used a SunOS 4.1.4 test system, provided by Chaskiel, to extend Solaris AFS support to cover SunOS. Used another test system, provided by Chaskiel, to extend AFS support to NEXTSTEP 3.2.

Tested lsof under AFS on yet another Chaskiel-provided system, running Linux 1.2.13 and AFS 3.3, and found that lsof needed no changes to recognize its AFS files.

Used a test system, provided by Curt Freeland <curt@grumpy.cse.nd.edu> and Terry McCoy <terry@anubis.cc.nd.edu> to extend Solaris AFS support to Solaris 2.5 with AFS 3.4-Alpha.

Added the [-A A] option for specifying the name list file that contains dynamic kernel module addresses. This is defined for the NEXTSTEP, SunOS, and Solaris implementations.

Added stty isig handling (where appropriate) to

the Customize and Inventory scripts.

Added support to Solaris for the nfs3 file system type. Its absence was reported by Patrick D. Sullivan <pds@snt.bellsouth.com>.

In response to a report from Tigran Aivazian <bs_s641@ceres.king.ac.uk> corrected bug in Linux local nlist() function and based the default kernel loader format on a Configure test for CONFIG_KERNEL_ELF in /usr/src/linux/include/linux/autoconf.h.

Fixed a bug in name cache exploration for BSD-derived dialects -- e.g., FreeBSD.

Updated for NetBSD 1.1.

3.60 February 27, 1996

Improved Unix domain socket reporting for Solaris. Louis Rayman <lou@asahi.ps.quotron.com> helped test.

Added warning messages about absence of Linux CONFIG_MODULES definition in autoconf.h, leading to lack of get_kernel_syms() support. Tigran Aivazian <bs_s641@ceres.king.ac.uk> supplied the information.

3.61 March 8, 1996

Added AFS support for AIX and HP-UX and verified that the lsof Ultrix version needs no additions for AFS. Chaskiel Moses Grundman <cg2v+@andrew.cmu.edu> provided the HP-UX and Ultrix test systems. Jan Tax <jan_tax@unc.edu> provided an AIX 4.1.4 test system. Bob Cook <bobcook@SLAC.Stanford.EDU> provided 3.2.5 and 4.1.4 test systems.

Fixed minor problems and made improvements to NEXTSTEP, Solaris, and SunOS AFS support. Changed the AFSCconfig script to ask for AFS version.

During the Hp-UX AFS work, added the hpuxgcc abbreviation to the Configure script for configuring lsof to be compiled with gcc under lsof.

Fixed a NetBSD mount structure array referencing bug, reported by Peter Svensson <petersv@df.lth.se>.

Dropped support for Motorola V/88, because I no longer have access to test systems.

Added rudimentary support for the IRIX XFS file system type, pending more information.

3.61 March 12, 1996

Corrected misuse of the LSOFF_DINC shell variable in the Configure script for HP-UX and Solaris. Larry Rogers <lrr@cert.org> pointed out this problem. Also removed an obsolete irix52 abbreviation from Configure.

I didn't consider this change sufficient to warrant a new version number, but just rebuilt the 3.61 distribution.

3.62 March 26, 1996

Updated AFS comments in 00README.

Supplied missing break statement in a N_VXFS case clause in the HP-UX dnode.c.

Added Veritas file support to PTX, courtesy of code supplied by Laurent Montaron <lpm@sequent.com> and help from Kevin Smallwood <kcs@sequent.com>. Created two new source modules (dnode[12].c) to separate PTX header file node definitions and thus eliminate symbol conflicts. Laurent did most of the testing.

Added tests to BSDI, FreeBSD, HP-UX, IRIX, NetBSD, NEXTSTEP, PTX, Solaris and SunOS lsof versions that allow them to report on unknown file system types.

Added IRIX 6.0.1 #if/#else/#endif support in response to a report and suggested modifications from Scott Presnell <srp@zgi.com>.

With the help of Dave Olson <olson@anchor.engr.sgi.com> improved the IRIX 6.2-BETA XFS support.

3.62 March 27, 1996

Corrected SunOS incompatibility with last-minute addition of Solaris MVFS support. The problem was reported by Larry W. Virden <lvirden@cas.org>.

I didn't consider this change sufficient to warrant a new version number, but just rebuilt the 3.62 distribution.

3.63 April 11, 1996

Upgraded Solaris MVFS support. In the process, enlarged Solaris and SunOS DEVICE output column.

Changed SunOS 4.1.x Configure to make -DNOCONST Makefile definition dependent on SC version.

At the suggestion of John DiMarco <jdd@cdf.toronto.edu> suppressed two warning messages: the device cache file creation warning when -Db has been specified; and the one issued when -D? is used with a non-writable system-wide device cache file and there is no other writable path. Also at John's suggestion redid the manner in which child processes are used to avoid kernel calls that might block; the net effect of the change is that normally one child process is required, rather than one per kernel call.

Refined the NetBSD test for <nfs/nfsproto.h> with a Configure script change.

Modified Configure script to compute AIX version with ``uname -rv" when /usr/bin/oslevel can't be executed. Stephen C. Woods <scw@seas.ucla.edu> suggested this.

Disabled conflicting prototype definitions in the local netdb.h used when the SCO 3.0 netdb.h is missing. Disabled #include of <strings.h> unless the SCO version is 5.0 or above. Don Kirouac <dkirouac@minicom.com> pointed out these problems.

3.63 April 15, 1996

Improved Configure's SunOS 4.1.x CC test for compiler support of the const keyword and avoided Configure's ``test -f {Customize,Inventory}" (because the Ultrix test doesn't grok -x) in response to a report from Larry Schwimmer <rosebud@cyclone.Stanford.EDU>.

I didn't consider this change sufficient to warrant a new version number, but just rebuilt the 3.63

distribution.

3.64 April 26, 1996

Added a negate option for entries of the -u list.

Kurt Hillig <khillig@Chem.LSA.umich.edu> suggested it.

Added a check for legal protocols in the -i option.

Adjusted the Configure and SGI MkKernOpts scripts to handle more IRIX situations per instructions from Dave Olson <olson@anchor.engr.sgi.com>.

Added support for HP-UX 10.10, courtesy of a test system provided by Mark Bixby <markb@cccd.edu>.

3.65 May 20, 1995

Corrected errors, reported by Arne H. Juul <arnej@pvv.unit.no>, in use of IRIX stat structure.

Added support for the IRIX 6.2 cacheefs, following a report from Peter Van Epp <vanep@sfu.ca>.

Added clone support for AIX 4.1.4 and above.

Adjusted the IRIX configuration to work properly for 64 bit IRIX 6.2 systems. Richard Chycoski <richard@sfu.ca> and Peter Van Epp <vanep@sfu.ca> provided a test system.

3.66 June 19, 1996

Improved the HP-UX VXFS test in the Configure script, based on a report from Robert Hall <rjh6810@misty.ca.boeing.com>.

Added SCO information to 00FAQ. Added information about lsof slowness and nameserver.

Added an untested Configure abbreviation for Solaris 2.5.1.

Ambrose Li <ambrose@www.mingpaoxpress.com> supplied a Linux change that avoids a conflict with the d_namlen definition in versions 1.99.8 and above.

Added compiler version identification to the Configure script for AIX and Solaris cc.

Added support for FreeBSD 2.2-960612-SNAP. Ade Barkah <mbarkah@hemi.com> provided a test system.

3.67 Jul 1, 1996

Made miscellaneous documentation corrections.

Added support for gcc under AIX 4.1 and above, including an aixgcc Configure abbreviation, and a work-around

for an long long alignment problem.

Stuart D. Gathman <stuart@bmsi.com> and Waldemar Zurowski <bilbo@pwr.wroc.pl> helped me to understand the gcc problem and devise the work-around.

3.68 July 17, 1996

Malgorzata Roos <groos@rzusun.unizh.ch>: pointed out the AIX lsof didn't report the inode number for named pipes (FIFOs) and wouldn't locate them by name; `_and_` supplied a fix. (Now `_that's_` the kind of bug report I like. :-)

Update Configure script to clean out aix41* subdirectories created by the AIX gcc work-around.

Taught IRIX lsof how to report the correct device number, inode number, and size for named NFS pipes.

Taught HP-UX 9.x lsof how to report size/offset and inode number for named NFS pipes. (HP-UX 10.x already knows.)

Taught DEC OSF/1 (errr, Digital Unix) lsof to report device and inode numbers correctly for named pipes. Because `stat(2)` under DEC OSF/1 V3.2 doesn't report the device number correctly for named pipes, lsof can't locate them by name, but it can do that under DEC OSF/1 V2.0.

Taught EP/IX 2.1.1 lsof to report device and inode numbers correctly for named pipes.

Taught versions of lsof for PTX 2.1.6 and 4.1.2 to report device and inode numbers correctly for named pipes.

Taught RISC/os 4.52 lsof to report device and inode

numbers correctly for named pipes.

Taught versions of lsof for Ultrix 4.2 and above to report inode numbers and file systems names correctly for named pipes (FIFOs).

Added safety check when trying to get a sockaddr_un structure from a BSDI, FreeBSD, or NetBSD mbuf.

Improved documentation on install permissions in 00README at the suggestion of Paul Wickman <Paul.Wickman@amd.com>.

Installed support for the DTYPE_PIPE file structure in FreeBSD 2.2. Changed the FreeBSD version symbol from _FREEBSDV to FREEBSDV.

Added support for NetBSD 1.2.

3.69 July 30, 1996

Added block device name caching and reporting for all dialects.

Improved

(I think) IRIX 6.2 64 bit configuration.

Eliminated C name space pollution by removing the leading `_` from all dialect version symbols that had it: _AIXV, _BSDIV, _OSF1V, _ADVFSV, _EPIXV, _HPUXV, _IRIXV, _PTXV, _RISCOSV, and _SCOV.

Changed decosf stanza in Configure script to automatically detect the subdirectory of /sys (or /usr/sys) that contain's the configuration header files for the machine. Added a 00FAQ entry about this.

3.70 August 9, 1996

Set the execute bits on scripts/big_brother.perl5.

Changed -H in scripts/watch_a_file.perl to -n.

Retained all the command name characters that are available in the proc or user struct for field output. Improved sample install rules for BSDI and HP-UX. Strengthened HP-UX CCITT test in the Configure script. Gildas Perrot <perrot@francenet.fr> suggested these changes.

Improved Solaris local TCP address reporting, based

on a bug report from John Caruso <jcaruso@csg.com>.

Improved HP-UX VFS handling,
and corrected a bug
in VFS handling, based on bug reports from David
Capshaw <David.Capshaw@SEMATECH.Org>.

Added support to -i argument handling to allow port
lists and ranges, and service name lists to be
specified. John DuBois <spcedt@armory.com>
suggested this.

Dropped support for IRIX 4.0.5H. Revived support
for IRIX 5.2, courtesy of a test system from Dan
Trinkle <trinkle@cs.purdue.edu>.

3.71 August 15, 1996

Improved handling of port ranges specified with
the -i option. Improved performance when the only
option is -i.

3.72 August 28, 1996

Fixed bugs and typos in SCO mount table handling.

Added support for OpenBSD (only the i386 architecture
type has been tested), using the NetBSD dialect
sources. David Mazieres <dm@amsterdam.lcs.mit.edu>
provided a test system.

Added fdesc file system support to FreeBSD, NetBSD
and OpenBSD. Changed the way proc file system
support is activated with additions to the Configure
script and
changes to the dialect machine.h files.
Dropped the distribution of the FreeBSD <procfs/procfs.h>
header file.

Added support for PTX 4.1.4.

3.73 September 5, 1996

Added information to 00FAQ for missing CCITT HP-UX
header file x25L3.h. Pasi Kaara <ppk@atk.tpo.fi>
provided the information.

Changed AIX header file #include pattern to prevent
gcc's loader from complaining about multiply defined
etherbroadcastaddr[], fddi_broadcastaddr[], and
ie5_broadcastaddr[] CONST u_char arrays from

<net/net_globals.h>. (The AIX loader doesn't complain.) David Capshaw <David.Capshaw@SEMATECH.Org> reported this problem.

Removed the HASPWSTAYOPEN definition; it was only used for two dialects that are no longer supported.

Corrected a bug in UID cacheing that appeared during long repeat-mode (-r) operations. The bug was reported by Peter Van Epp <vanep@sfu.ca>. When in repeat mode the UID cache will be cleared when /etc/passwd changes.

Fixed a bug in FreeBSD support that causes a segmentation fault on VBAD vnodes.

Deleted ultrix22 from Configure and RHF from Ultrix source files. Dropped 2.2 from support list.

3.74 September 6, 1996

Corrected a bug in FreeBSD's proc table handling, reported by David O'Brien <obrien@Nuxi.cs.ucdavis.edu>.

3.75 September 9, 1996

Added FreeBSD proc table handling fix from revision 3.74 to BSDI, NetBSD, and OpenBSD dialects.

Improved Solaris VFS handling.

Added pipe handling to OpenBSD. Changed Configure script to define OPENBSDV for OpenBSD and used that definition to include the pipe support in the NetBSD sources. The Configure script defines NETBSDV for NetBSD. So far neither dialect has any #if/#else/#endif blocks that depend on version number.

Added support for AIX 4.2.

3.76 September 21, 1996

Plugged a memory leak in command handling, introduced in revision 3.70. The bug was reported by Peter Van Epp <vanep@sfu.ca>.

Fixed a bug in the reporting of size for IRIX 5.3

EFS files, introduced in revision 3.69 by the name space pollution abatement. The _IRIXV definition

was used in the IRIX 5.x private `efs_inode.h` header file to configure the inode structure for IRIX 5.3, so I changed the tests to use IRIXV.

Changed information on the AIX Stale Segment ID bug to reflect the fact that IBM now says they won't fix it. They have closed the APAR.

Disabled the AIX gcc long long alignment hack under AIX 4.2, because it doesn't work there. Installed a fatal error message in Configure that gcc can't be used to compile `lsf` under AIX 4.2 until a work-around can be developed.

Upgraded BSDI, FreeBSD (2.0 and above), NetBSD (1.1B and above), and OpenBSD lock reporting. David Mazieres <dm@amsterdam.lcs.mit.edu> reported the need for the upgrade.

Made similar lock reporting upgrades to (versions tested are in parentheses): AIX (4.1.4 and 4.2); DEC OSF/1 (2.0 and 3.2d); EP/IX (2.1.1); HP-UX (9.x and 10.10); IRIX (5.2, 5.3, and 6.2); Linux; NEXTSTEP (3.1); PTX (2.1.6 and 4.2); RISCos; SCO (releases 3.0 and 5.0); Solaris (2.5); SunOS (4.1.3); and Ultrix (4.2).

Updated man page and 00FAQ with more information on lock reporting.

Updated PTX `lsf` for 4.2. Upgraded HP-UX `lsf` for 10.20. Used a test system, provided by Richard Allen <ra@rhi.hi.is>, and received testing assistance from Marc Winkler <marc@healthchex.com>.

Changed handling of Internet addresses to avoid DNS lookup operations when the address has clearly not been selected. John DuBois <johnd@sco.COM> suggested this.

3.77 October 2, 1996

Changed SCO Configure stanza to call `nm` by its full path, thus avoiding possible confusion. The change was suggested by Jean-Pierre Radley <jpr@jpr.com>.

Added changes to allow `lsf` to be compiled by gcc under AIX 4.2 -- enabled some gcc-specific typedef's

in the AIX machine.h and disabled the Configure script's rejection of aixgcc for AIX

4.2. The

typedef's were supplied by Henry Grebler <henryg@optimization.com.au>.

Based on information supplied by Henry and David J. Wilson <davidw@optimization.com.au>, invented a description and processing for an unknown file struct that is established by AIX 4.2 (at least) for X processes when DISPLAY=:0.0. For convenience I gave its type the DTYPE_PIPE definition, but that may be incorrect.

Fixed some Solaris 2.[34] errors in locking code, added at 3.76, that I couldn't test. Rainer Orth <ro@TechFak.Uni-Bielefeld.DE> reported the problem and supplied the fixes.

Made Configure script supply NeXTSTEP 3.x version in Makefile so that the shadow vnode locking code, introduced in 3.76, would be disabled for NeXTSTEP 3.0. Rainer Orth discovered this problem, too.

Added reporting of UNIX domain socket inode numbers for Linux version 2.0 and above. The addition was supplied by Matthew Burt <BurtM@poole.siemens.co.uk>.

Enhanced file searching to report all instances of references to automounted file systems, even when they're direct mounts not yet realized. Enhanced Solaris 2.5 lsof to grok autofs nodes. Victoria H. Lau <vlau@mssmail2.hac.com> pointed out the need for these enhancements and helped test them.

Changed AIX lock length test so it will work with gcc under AIX 4.2.

Changed PTX HAS_VXFS symbol, indicating presence of VxFS, to HASVXFS for consistency with the HP-UX form of the symbol.

3.78 October 14, 1996

Changed strtol() call in private Linux nlist() function to strtoul(). Linux kernel addresses at 2.1.0 have their top bit set and appear to be negative to strtol(). This information was provided

by Marty Leisner <leisner@sdsp.mc.xerox.com>. Marty also notes that other, unknown-as-of-yet problems prevent lsof from working under 2.1. He is investigating, since I don't have access to a 2.1 system.

Added definitions to machine.h for a private file struct type (HASPRIVFILETYPE and PRIVFILETYPE) that can be accommodated without changing prfp.frag, much as HASPIPEFN works for PIPE file struct types.

Used the new private file struct type support to support the AIX f_type=0xf that DISPLAY=:0.0 causes. Changed its output TYPE from PIPE to SMT; displayed file size as buffer size less free bytes in buffer; enabled recognition under AIX 4.1.4. Mike Feldman <feldman@charm.urbana.mcd.mot.com> and others helped me identify this file as a Shared Memory Transport (SMT) socket.

Corrected a function prototype in the HP-UX dnode.c for HP-UX 10 and greater; gcc objected; HP's cc did not. Christian Krackowizer <kra1@technodat.co.at> reported the problem.

Made AFSScript more capable of locating the cell's root directory. Updated AFS documentation in 00FAQ and 00README. Both were suggested by Timothy Miller <tsm@cs.brown.edu>.

Installed update to big_brother.perl5 script from Lionel Cons <Lionel.Cons@cern.ch>.

3.79 October
29, 1996

Added support for IRIX 6.4, courtesy of a test system provided by Angel Li <angel@rrsl.rsmas.miami.edu>. Fixed FIFO and NFS3 bugs in IRIX 6.2 lsof in the process. Lsof has not been tested under IRIX 6.3, but the Configure script has a stanza for it.

Changed device functions to use stat() instead of lstat(). Used WARNDEVACCESS to suppress stat(2) failure messages.

Tested under OpenBSD 2.0.

3.80 November 8, 1996

Corrected comments in 00README about using the sunos413 and sunos413cc Configure abbreviations.

Made some Configure and Customize script changes, suggested by Bruce Jerrick <bruce@cse.ogi.edu>.

Added missing elements to definition of local Solaris 2.3 lock_descriptor structure so that dnode.c will compile and work properly under it. Corrected a bug in Solaris 2.[34] lock descriptor handling.

3.81 November 14, 1996

Corrected error in the "invented" HP-UX 10.20 proc struct. The erroneous struct definition named the set-UID member as the UID member, resulting in occasional incorrect UID attributions in lsof output.

At the suggestion of Larry Schwimmer <schwim@cyclone.stanford.edu>, changed AFSConfig to use awk to get the cell name from /usr/etc/vice/ThisCell, thus avoiding a problem when the cell name line has more than one word.

Added -DSWASH to IRIX 6.2 options propagated from the kernel build CCOPTS to lsof's Makefile. Randolph J. Herber <herber@dcdtrjh.fnal.gov> did the detective work that revealed the need for this. IRIX 6.2 patch 1488 added -DSWASH and its effects.

3.82 December 11, 1996

Updated Configure script for FreeBSD 3.0 and SCO OpenServer 5.0.[24]. FreeBSD Configure script change was supplied by David E. O'Brien <obrien@NUXI.com> and SCO Configure script change was supplied by Bela Lubkin <belal@sco.COM>.

Tested lsof under FreeBSD 3.0, courtesy of a test system provided by Ade Barkah <mbarkah@hemi.com>.

Added changes to support SCO OpenServer 5.0.4 (Comet), supplied by Bela Lubkin <belal@sco.COM>.

Added support for UnixWare 2.1. D. Chris Daniels

<chrisd@dlpco.com> provided a test system and Bela Lubkin provided technical assistance.

Added support for Pyramid DC/OSx 1.1 and Reliant UNIX 5.43. Bruce Beare <bjb@pyramid.com> and Kevin Smith <kevin@pyramid.com> provided test systems and technical assistance. This dialect version must run setuid-root, since it accesses proc and user structures via the /proc file system.

Tested under PTX 2.1.9 and added support for PTX 4.2.1.

At Bela Lubkin's suggestion added a commercial to the lsof man page, -h option, and -v option output, telling where to get the latest revision. This entailed large scale rearrangement of the -h output to keep it as short as possible. It also involved shortening the -X explanation for PTX.

Made sure that address segment access errors didn't incorrectly force the listing of a process. This fix was needed by the Sun, Pyramid, and UnixWare ports.

Corrected bug in the way the local device table is sorted.

3.83 December 30, 1996

Added support for Solaris 2.6 (Beta) with help from Casper Dik <casper@holland.Sun.COM>, May Jackson <methalya.jackson@eng.sun.com>, Joseph Kowalski <jek3@Eng.Sun.COM>, and the Solaris 2.6 Beta test program.

Fixed an inode file system type processing bug in SCO OpenServ 5.0 and greater, reported by Robert Lipe <robertl@arnet.com>.

Fixed bugs in SCO kernel name cache probing, courtesy of code and suggestions from Bela Lubkin <belal@sco.COM>.

Revised kernel name list handling to remove the need for changing two files (dlsof.h and dstore.c) when altering, removing, or adding name list symbols. All dialects were affected.

Added support for SCO OpenServer event "clones."
Robert Lipe need for their support and Bela Lubkin
provided technical assistance in identifying them.

Added display of bound name to Solaris UNIX
domain
socket file handling.

Correct bug in SunOS address space ("txt" file)
handling.

Tested under UnixWare 2.1.1.

Changed SGI IRIX lsof to use the kernel's proc
struct size when striding through its proc table
(IRIX versions below 6.4). The proc struct size
difference warning is still issued, and lsof still
uses the proc struct size and proc struct from
<sys/proc.h> to read and process proc table
information. Added a note to 00FAQ about this.

Deferred Internet host and port name lookups to
print time, thus avoiding lookups for files that
are not listed.

3.84 January 13, 1997

Updated the Pyramid private configuration script,
MkKernOpts, to propagate the R4000 definition for
DC/OSx systems so equipped. Anthony Shortland
<anthony.shortland@FMR.COM> pointed out the need
for this and Kevin Smith <kevin@pyramid.com> provided
access to a test system.

Added information to 00FAQ about UDP ports for
which lsof can't find users, because the
ports are
reserved to the kernel and aren't associated with
open files.

3.85 January 17, 1987

The DEC OSF/1 kernel name cache can be processed
as a simple table, rather than a linked list, so
changed the interface to rnam.frag accordingly.

Added a new optional output field, parent process
ID (PPID). The -R option (for paRent) selects it,
and the `R' field identifier labels it. Updated
some scripts to handle it and developed two new

scripts, idrlogin.perl and idrlogin.perl5, to use it in locating network (rlogind and telnetd) source addresses for shell processes. Added some information about the new scripts to 00QUICKSTART.

3.86 January 30, 1997

Add explanation of why device warning messages disappear when the device cache file is used.

Changed Linux Configure stanza to check more places for the [z]System.map file and warn if the one located differs in date from /vmlinuz. Bjorn S. Nilsson <NILSSON@nbivms.nbi.dk> suggested this for easier configuration at Linux 2.0.28.

Changed Linux Configure stanza to check for the presence of fl_fd, fl_file, and fl_whence in the file_lock structure of <linux.fs.h> and define symbols appropriately.

Changed Linux lock testing to test task structure pointer (fl_owner) from file_lock struct as well as (possibly) the file struct pointer (fl_file) or file descriptor number (fl_fd) to identify the lock owner, depending on what HAS_FL_* symbols were defined by Configure's file_lock structure examination. Added section to Linux Problems in 00FAQ about this.

Corrected 00FAQ reference in Configure's Solaris 2.4 stanza.

3.87 February 11, 1997

Corrected setting of VxFS device number for HP-UX and PTX.

Added VM map flag test #if/#else/#endif for recent versions of FreeBSD 3.0, supplied by Chris Timmons <skynyrd@opus.cts.cwu.edu>.

Added a #define that removes a conflict between a signal() prototype in the IRIX 6.4 <sys/system.h> and one in its <sys/signal.h>, exposed when cachefs support is enabled. Wolfgang Hecht <hecht@zedat.fu-berlin.de> identified the need for this addition and helped test it. Refined IRIX proc struct size test, warning, and use.

Revised Linux system map file handling (yet again)
to search for the file at execution time, rather
than in the Configure script. Marty Leisner
<leisner@sdsp.mc.xerox.com> suggested this.

Added VxFS support to Solaris lsof with help from
Peter Radig <radig@DresdnerBank.de>. Philip Kizer
<pckizer@tamu.edu> helped test.

Added support for PTX 4.3, thanks to access provided
by Peter Jordan <petej@sequent.com>.

3.87 February 11, 1997
supplement Updated FreeBSD kernel name list handling.

3.88 February 17, 1997
Added documentation files -- 00.README.FIRST[_<version>]
and 00RELEASE.SUMMARY_<version> -- to the distribution.

Vic Abell <abe@purdue.edu>
Purdue University Computing Center
February 17, 1997

Found in path(s):
* /opt/cola/permits/1402400301_1661782874.918154/0/lsof-4-93-2-dfsg-orig-1-tar-xz/lsof-
4.93.2/OLD/lsof3_00DIST
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- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/aix/dproc.c
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/aix/ddev.c
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/hpux/kmem/dproc.c
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/darwin/kmem/dproc.c
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/hpux/kmem/dstore.c
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/aix/dfile.c
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/n+os/dstore.c
- *
- /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/hpux/kmem/machine.h
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/sun/dfile.c
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/n+os/dlsof.h
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/aix/dproto.h
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/freebsd/dstore.c
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/aix/dmnt.c
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/du/dnode.c
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/n+os/dnode.c
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/n+obsd/machine.h
- *
- /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/du/dstore.c
- * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/darwin/kmem/dstore.c

* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/du/dfile.c
 * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/n+obsd/dproto.h
 * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/sun/dproc.c
 * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/du/dlsof.h
 * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/proc.c
 * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/store.c
 * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/aix/dsock.c
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 * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/aix/dstore.c
 * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/darwin/kmem/dproto.h
 * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/n+os/machine.h
 * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/hpux/kmem/dnode.c
 * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/sun/dlsof.h
 * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/OLD/proc.c
 * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/hpux/kmem/dmnt.c
 *
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 * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/arg.c
 * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/lsf.h
 * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/aix/machine.h
 * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/sun/dproto.h
 * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/misc.c
 * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/n+obsd/dnode.c
 * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/OLD/lsf.h
 * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/lsf_fields.h
 *
 /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/darwin/kmem/dnode.c
 * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/darwin/kmem/dmnt.c
 * /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/n+os/dsock.c

* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/sun/ddev.c

* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/du/dmnt.c

* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/n+os/dproc.c

* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/darwin/kmem/ddev.c

* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/freebsd/dproc.c

* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/n+obsd/dmnt.c

*

/opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/freebsd/dproto.h

* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/du/dproc.c

* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/hpux/kmem/dsock.c

* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/freebsd/dmnt.c

* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/freebsd/dlsof.h

* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/du/dproto.h

* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/n+os/dproto.h

* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/node.c

*

/opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/darwin/kmem/dsock.c

* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/darwin/kmem/machine.h

* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/n+obsd/dstore.c

* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/sun/dnode.c

* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/du/machine.h

* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/hpux/kmem/dfile.c

* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/OLD/misc.c

* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/n+obsd/dlsof.h

* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/aix/dnode.c

*

/opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/hpux/kmem/dproto.h
* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/freebsd/dnode.c
* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/du/dsock.c
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* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/n+obsd/dproc.c
* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/sun/dmnt.c
* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/darwin/kmem/dlsof.h
* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/sun/dstore.c
*
/opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/freebsd/dsock.c
* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/proto.h
* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/freebsd/machine.h
* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-4.93.2/dialects/sun/machine.h

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*  
* $Id: pfsnode.h,v 1.1 1993/12/12 12:26:39 davidg Exp $  
*/
```

Found in path(s):

```
* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-  
4.93.2/dialects/freebsd/include/procfs/pfsnode.h
```

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# along with this program (in the main directory of the Linux-NTFS
```

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```
* /opt/cola/permits/1402400301_1661782874.918154/0/lsf-4-93-2-dfsg-orig-1-tar-xz/lsf-  
4.93.2/scripts/sort_res.perl5
```

1.150 liburi-perl 5.10-1

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```
<one line to give the program's name and a brief idea of what it does.>  
Copyright (C) 19yy <name of author>
```

```
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the Free Software Foundation; either version 1, or (at your option)  
any later version.
```

```
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```

```
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along with this program; if not, write to the Free Software  
Foundation, Inc., 51 Franklin Street,  
Fifth Floor, Boston MA 02110-1301 USA
```

Also add information on how to contact you by electronic and paper mail.

If the program is interactive, make it output a short notice like this when it starts in an interactive mode:

```
Gnomovision version 69, Copyright (C) 19xx name of author
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.
```

The hypothetical commands `show w' and `show c' should show the appropriate parts of the General Public License. Of course, the commands you use may be called something other than `show w' and `show c'; they could even be mouse-clicks or menu items--whatever suits your program.

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```
Yoyodyne, Inc., hereby disclaims all
copyright interest in the
program `Gnomovision' (a program to direct compilers to make passes
at assemblers) written by James Hacker.
```

```
<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
```

That's all there is to it!

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The End

1.151 libfcgi-perl 0.82+ds-1build1

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1.152 libterm-readkey-perl 2.38-1build4

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Term::ReadKey 2.36 - Change terminal modes, and perform non-blocking reads.

Copyright (C) 1994-1999 Kenneth Albanowski.
2001-2016 Jonathan Stowe and others

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This module, ReadKey, provides ioctl control for terminals and Win32 consoles

so the input modes can be changed (thus allowing reads of a single character at a time), and also provides non-blocking reads of stdin, as well as several other terminal related features, including retrieval/modification of the screen size, and retrieval/modification of the control characters. Installation requires MakeMaker 3.5 or higher (MakeMaker 3.7 is included with perl 5.001, so now is a good time to upgrade if you haven't already.)

To install, unpack somewhere, type "perl Makefile.PL", and then "make test". If the compilation and the tests are successful, then change to root and run "make install".

As of 2.17 the interactive test has been removed as the default for the convenience of automated installers, CPAN-Testers and so on. The non interactive tests whilst confirming that the module has built correctly and has a good chance of working correctly cannot determine whether the effect as observed on the screen is correct so you might want to run:

```
perl -Mblib  
example/test.pl interactive
```

before you run 'make install'.

Also from 2.17 this module has to provide its own support for compilers that can't take function prototypes as with Perl 5.8.0 this last vestige of support for non-ANSI compilers will disappear. The requirement for an ANSI C compiler has been present since Perl 5.005 so it is likely that at some point in the future this module will follow that requirement too. If you have any difficulties with older Perl's please contact the maintainer.

The module has support for Win32 since version 2.10. Version 2.17 has been

tested with ActivePerl build 623 and Visual Studio 6 and found to work as expected, but do not be surprised if it fails with another compiler or distribution. There are some limitations, with the ReadLine call being unavailable, and ReadKey possibly generating bad results if you are reading from multiple consoles, and key repeat is used. For Win32 users without a C compiler there is a precompiled version of this module available

as a package for ActivePerl, it is probably a few versions behind the latest release but has been reported to work well.

VERY IMPORTANT: In 2.00, the ReadKey/ReadLine arguments changed. Now, if you want a call that is non-blocking and returns immediately if no character is waiting, please call it with -1, instead of 1. Positive arguments now indicate a timeout, so 1 would wait a second before timing out.

As older versions will accept -1, it is recommended to change all code that uses ReadMode.

The terminal mode function is controlled by the "ReadMode" function, which takes a single numeric argument, and an optional filehandle. This argument should be one of the following:

0: (Reset) Restore original settings.

1: (Cooked) Change to what is commonly the default mode, echo on, buffered, signals enabled, Xon/Xoff possibly enabled, and 8-bit mode possibly disabled.

2: (Cooked-Invisible) Same as 1, just with echo off. Nice for reading passwords.

3:

(CBreak) Echo off, unbuffered, signals enabled, Xon/Xoff possibly enabled, and 8-bit mode possibly enabled.

4: (Raw) Echo off, unbuffered, signals disabled, Xon/Xoff disabled, and 8-bit mode possibly disabled.

5: (Really-Raw) Echo off, unbuffered, signals disabled, Xon/Xoff disabled, 8-bit mode enabled if parity permits, and CR to CR/LF translation turned off.

If you just need to read a key at a time, then modes 3 or 4 are probably sufficient. Mode 4 is a tad more flexible, but needs a bit more work to control. If you use ReadMode 3, then you should install a SIGINT or END handler to reset the terminal (via ReadMode 0) if the user aborts the

program via ^C. (For any mode, an END handler consisting of "ReadMode 0" is actually a good idea.)

Non-blocking support is provided via the ReadKey and ReadLine functions. If they are passed no argument, or an argument of zero, they will act like a normal `getc(STDIN)` or `scalar(<STDIN>)`. If they are passed a negative argument, then they will immediately return undef if no input is present. If passed a positive argument, then they will wait until that time in seconds has passed before returning undef. In most situations, you will probably want to use "ReadKey -1".

Note that a non-blocking ReadLine probably won't do what you expect, although it is perfectly predictable, and that the ReadMode will have to be 1 or 0 for it to make sense at all.

A routine is also provided to get the current terminal size, "GetTerminalSize". This will either return a four value array containing the width and height of the screen in characters and then in pixels, or nothing (if the OS can't return that info). SetTerminalSize allows the stored settings to be modified. Note that this does *not* change the physical size of the screen, it will only change the size reported by GetTerminalSize, and other programs that check the terminal size in the same manner.

GetControlChars returns a hash containing all of the valid control characters, such as ("INTERRUPT" => "\x3", etc.). SetControlChars takes an array (or a hash) as a parameter that should consist of similar name/value pairs and will modify the control character settings.

Note that it is entirely possible that there are portability problems with the routines in ReadKey.xs. If you find any problems, including compilation failures, or control characters not supported by Set/GetControlChars, *please* tell me about them, by mailing the maintainer at jns@gellyfish.co.uk, or lastly contacting perl5-porters@perl.org. Any problems will get fixed if at all possible, but that's not going to happen if I don't know about them.

The code is available at <https://github.com/jonathanstowe/TermReadKey> so as ever patches are kindly welcomed, especially for platforms such as Windows that I am unable to test on.

Oh, you may also be interested in the Configure.pm module. It provides tools to make porting stuff easier -- calling the compiler, finding headers, etc.

It contains documentation inside it, and you are welcome to use it in your own modules. If you make use of it, I'd be grateful for a message sent to the above address.

Found in path(s):

```
* /opt/cola/permits/1402400313_1661783000.2195435/0/libterm-readkey-perl-2-38-orig-1-tar-gz/TermReadKey-2.38/README
```

No license file was found, but licenses were detected in source scan.

```
#! perl
```

```
package Term::ReadKey;
```

```
# This also needs to be adjusted in the generated code below
```

```
# and in the Makefile.PL
```

```
use vars qw($VERSION);
```

```
$VERSION = '2.38';
```

```
use Config;
```

```
use File::Basename qw(&basename &dirname);
```

```
use File::Spec;
```

```
use Cwd;
```

```
# List explicitly here the variables you want Configure to  
# generate. Metaconfig only looks for shell variables, so you  
# have to mention them as if they were shell variables, not  
# %Config entries. Thus you write
```

```
# $startperl
```

```
# to ensure Configure will look for $Config{startperl}.
```

```
# Wanted: $archlibexp
```

```
# This forces PL files to create target in same directory as PL file.
```

```
# This is so that make depend always knows where to find PL derivatives.
```

```
my $origdir = cwd;
```

```
my $dir = dirname($0);
```

```
chdir $dir;
```

```
my $file = 'ReadKey.pm';
```

```
open OUT, ">", $file or die "Can't create $file: $!";
```

```
print "Creating $file\n";
```

```
print OUT <<'!FIRSTPART';
```

```
# -*- buffer-read-only: t -*-
```

```
#
```

```
# This file
```

```
is auto-generated. ***ANY*** changes here will be lost
```

```
#
```

```
package Term::ReadKey;
```

```
use strict;
use warnings;
```

=head1 NAME

Term::ReadKey - A perl module for simple terminal control

=head1 SYNOPSIS

```
use Term::ReadKey;
ReadMode 4; # Turn off controls keys
while (not defined ($key = ReadKey(-1))) {
    # No key yet
}
print "Get key $key\n";
ReadMode 0; # Reset tty mode before exiting
```

=head1 DESCRIPTION

Term::ReadKey is a compiled perl module dedicated to providing simple control over terminal driver modes (cbreak, raw, cooked, etc..) support for non-blocking reads, if the architecture allows, and some generalized handy functions for working with terminals. One of the main goals is to have the functions as portable as possible, so you can just plug in "use Term::ReadKey" on any architecture and have a good likelihood of it working.

Version 2.30.01:

Added handling of arrows, page up/down, home/end, insert/delete keys under Win32. These keys emit xterm-compatible sequences.

Works with Term::ReadLine::Perl.

=over 4

=item ReadMode MODE [, Filehandle]

Takes an integer argument or a string synonym (case insensitive), which can currently be one of the following values:

INT	SYNONYM	DESCRIPTION
-----	---------	-------------

0	'restore'	Restore original settings.
---	-----------	----------------------------

1	'normal'	Change to what is commonly the default mode, echo on, buffered, signals enabled, Xon/Xoff possibly enabled, and 8-bit mode possibly disabled.
---	----------	---

2	'noecho'	Same as 1, just with echo off. Nice for
---	----------	---

reading passwords.

- 3 'cbreak' Echo off, unbuffered, signals enabled, Xon/Xoff possibly enabled, and 8-bit mode possibly enabled.
 - 4 'raw' Echo off, unbuffered, signals disabled, Xon/Xoff disabled, and 8-bit mode possibly disabled.
 - 5 'ultra-raw' Echo off, unbuffered, signals disabled, Xon/Xoff disabled, 8-bit mode enabled
- if parity permits,
and CR to CR/LF translation turned off.

These functions are automatically applied to the STDIN handle if no other handle is supplied. Modes 0 and 5 have some special properties worth mentioning: not only will mode 0 restore original settings, but it cause the next ReadMode call to save a new set of default settings. Mode 5 is similar to mode 4, except no CR/LF translation is performed, and if possible, parity will be disabled (only if not being used by the terminal, however. It is no different from mode 4 under Windows.)

If you just need to read a key at a time, then modes 3 or 4 are probably sufficient. Mode 4 is a tad more flexible, but needs a bit more work to control. If you use ReadMode 3, then you should install a SIGINT or END handler to reset the terminal (via ReadMode 0) if the user aborts the program via C<^C>. (For any mode, an END handler consisting of "ReadMode 0" is actually a good idea.)

If you are executing another program
that may be changing the terminal mode,
you will either want to say

```
ReadMode 1;      # same as ReadMode 'normal'  
system('someprogram');  
ReadMode 1;
```

which resets the settings after the program has run, or:

```
$somemode=1;  
ReadMode 0;      # same as ReadMode 'restore'  
system('someprogram');  
ReadMode 1;
```

which records any changes the program may have made, before resetting the mode.

=item ReadKey MODE [, Filehandle]

Takes an integer argument, which can currently be one of the following values:

- 0 Perform a normal read using `getc`
- 1 Perform a non-blocked read
- >0 Perform a timed read

If the filehandle is not supplied, it will default to `STDIN`. If there is nothing waiting in the buffer during a non-blocked read, then `undef` will be returned. In most situations, you will probably want to use `C<ReadKey -1>`.

I<NOTE> that if the OS does not provide any known mechanism for non-blocking reads, then a `C<ReadKey -1>` can die with a fatal error. This will hopefully not be common.

If `MODE` is greater than zero, then `ReadKey` will use it as a timeout value in seconds (fractional seconds are allowed), and won't return `C<undef>` until that time expires.

I<NOTE>, again, that some OS's may not support this timeout behaviour.

If `MODE` is less than zero, then this is treated as a timeout of zero, and thus will return immediately if no character is waiting. A `MODE` of zero, however, will act like a normal `getc`.

I<NOTE>, there are currently some limitations with this call under Windows. It may be possible that non-blocking reads will fail when reading repeating keys from more than one console.

=item `ReadLine MODE [, Filehandle]`

Takes an integer argument, which can currently be one of the following values:

- 0 Perform a normal read using `scalar(<FileHandle>)`
- 1 Perform a non-blocked read
- >0 Perform a timed read

If there is nothing waiting in the buffer during a non-blocked read, then `undef` will be returned.

I<NOTE>, that if the OS does not provide any known mechanism for non-blocking reads, then a `C<ReadLine 1>` can die with a fatal error. This will hopefully not be common.

I<NOTE> that a non-blocking test is only performed for the first character in the line, not the entire line. This call will probably B<not> do what you assume, especially with C<ReadMode> MODE values higher than 1. For example, pressing Space and then Backspace would appear to leave you where you started, but any timeouts would now be suspended.

B<This call is currently not available under Windows>.

=item GetTerminalSize [Filehandle]

Returns either an empty array if this operation is unsupported, or a four element array containing: the width of the terminal in characters, the height of the terminal in character, the width in pixels, and the height in pixels. (The pixel size will only be valid in some environments.)

I<NOTE>, under Windows, this function must be called with an B<output> filehandle, such as C<STDOUT>, or a handle opened to C<CONOUT\$>.

=item SetTerminalSize WIDTH,HEIGHT,XPIX,YPIX [, Filehandle]

Return -1 on failure, 0 otherwise.

I<NOTE> that this terminal size is only for B<informative> value, and changing the size via this mechanism will B<not> change the size of the screen. For example, XTerm uses a call like this when it resizes the screen. If any of the new measurements vary from the old, the OS will probably send a SIGWINCH signal to anything reading that tty or pty.

B<This call does not work under Windows>.

=item GetSpeed [, Filehandle]

Returns either an empty array if the operation is unsupported, or a two value array containing the terminal in and out speeds, in B<decimal>. E.g, an in speed of 9600 baud and an out speed of 4800 baud would be returned as (9600,4800). Note that currently the in and out speeds will always be identical in some OS's.

B<No speeds are reported under Windows>.

=item GetControlChars [, Filehandle]

Returns an array containing key/value pairs suitable for a hash. The pairs consist of a key, the name of the control character/signal, and the value of that character, as a single character.

B<This call does nothing under Windows>.

Each key will be an entry from the following list:

DISCARD
DSUSPEND
EOF
EOL
EOL2
ERASE
ERASEWORD
INTERRUPT
KILL
MIN
QUIT
QUOTENEXT
REPRINT
START
STATUS
STOP
SUSPEND
SWITCH
TIME

Thus, the following will always return the current interrupt character, regardless of platform.

```
%keys = GetControlChars;  
$int = $keys{INTERRUPT};
```

```
=item SetControlChars [, Filehandle]
```

Takes an array containing key/value pairs, as a hash will produce. The pairs should consist of a key that is the name of a legal control character/signal, and the value should be either a single character, or a number in the range 0-255. SetControlChars will die with a runtime error if an invalid character name is passed or there is an error changing the settings. The list of valid names is easily available via

```
%cchars  
= GetControlChars();  
@cnames = keys %cchars;
```

B<This call does nothing under Windows>.

```
=back
```

=head1 AUTHOR

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=head1 SUPPORT

The code is maintained at

<https://github.com/jonathanstowe/TermReadKey>

Please feel free to fork and suggest patches.

=head1 LICENSE

Prior to the 2.31 release the license statement was:

Copyright (C) 1994-1999 Kenneth Albanowski.
2001-2005 Jonathan Stowe and others

Unlimited distribution and/or modification is allowed as long as this
copyright notice remains intact.

And was only stated in the README file.

Because I believe the original author's intent was to be more open than the
other commonly used licenses I would like to leave that in place. However if
you or your lawyers require something with some more words you can optionally
choose to license this under the standard Perl license:

This
module is free software; you can redistribute it and/or modify it
under the terms of the Artistic License. For details, see the full
text of the license in the file "Artistic" that should have been provided
with the version of perl you are using.

This program is distributed in the hope that it will be useful, but
without any warranty; without even the implied warranty of merchantability
or fitness for a particular purpose.

=cut

```
use vars qw($VERSION);
```

```
$VERSION = '2.38';
```

```

require Exporter;
require DynaLoader;

use vars qw(@ISA @EXPORT_OK @EXPORT);

@ISA = qw(Exporter DynaLoader);

# Items to export into callers namespace by default
# (move infrequently used names to @EXPORT_OK below)

@EXPORT = qw(
  ReadKey
  ReadMode
  ReadLine
  GetTerminalSize
  SetTerminalSize
  GetSpeed
  GetControlChars
  SetControlChars
);

@EXPORT_OK = qw();

bootstrap Term::ReadKey;

# Should we use LINES and COLUMNS to try and get the terminal size?
# Change this to zero
# if you have systems where these are commonly
# set to erroneous values. (But if either are near zero, they won't be
# used anyhow.)

use vars qw($UseEnv $CurrentMode %modes);

$UseEnv = 1;

$CurrentMode = 0;

%modes = (
    # lowercase is canonical
    original => 0,
    restore  => 0,
    normal   => 1,
    noecho   => 2,
    cbreak   => 3,
    raw      => 4,
    'ultra-raw' => 5
);

```

```

# reduce Carp memory footprint, only load when needed
sub croak { require Carp; goto &Carp::croak; }
sub carp { require Carp; goto &Carp::carp; }

sub ReadMode
{
    my $mode = $modes{ lc $_[0] }; # lowercase is canonical
    my $fh = normalizehandle( ( @_ > 1 ? $_[1] : \*STDIN ) );

    if ( defined($mode) ) { $CurrentMode = $mode }
    elsif ( $_[0] =~ /^d/ ) { $CurrentMode = $_[0] }
    else { croak("Unknown terminal mode `$_[0]'"); }

    SetReadMode($CurrentMode, $fh);
}

sub normalizehandle
{
    my ($file) = @_; # allows fake signature
    optimization

    no strict;
    # print "Handle = $file\n";
    if ( ref($file) ) { return $file; } # Reference is fine

    # if ($file =~ /^\/\*/) { return $file; } # Type glob is good
    if ( ref( \ $file ) eq 'GLOB' ) { return $file; } # Glob is good

    # print "Caller = ",(caller(1))[0],"\n";
    return \*{ ( ( caller(1) )[0] ) . "::$file" };
}

sub GetTerminalSize
{
    my $file = normalizehandle( ( @_ > 0 ? $_[0] : \*STDOUT ) );

    my (@results, @fail);

    if ( &termsoptions() & 1 ) # VIO
    {
        @results = GetTermSizeVIO($file);
        push( @fail, "VIOGetMode call" );
    }
    elsif ( &termsoptions() & 2 ) # GWINSZ
    {
        @results = GetTermSizeGWINSZ($file);
        push( @fail, "TIOCGWINSZ ioctl" );
    }
}

```

```

elseif ( &termsoptions() & 4 )          # GSIZE
{
    @results = GetTermSizeGSIZE($file);
    push( @fail, "TIOCGSIZE ioctl" );
}
elseif ( &termsoptions() & 8
)          # WIN32
{
    @results = GetTermSizeWin32($file);
    push( @fail, "Win32 GetConsoleScreenBufferInfo call" );
}
else
{
    @results = ();
}

if ( @results < 4 and $UseEnv )
{
    my ($C) = defined( $ENV{COLUMNS} ) ? $ENV{COLUMNS} : 0;
    my ($L) = defined( $ENV{LINES} ) ? $ENV{LINES} : 0;
    if ( ( $C >= 2 ) and ( $L >= 2 ) )
    {
        @results = ( $C + 0, $L + 0, 0, 0 );
    }
    push( @fail, "COLUMNS and LINES environment variables" );
}

if ( @results < 4 && $^O ne 'MSWin32')
{
    my ($prog) = "resize";

    # Workaround for Solaris path silliness
    if ( -f "/usr/openwin/bin/resize" ) {
        $prog = "/usr/openwin/bin/resize";
    }

    my ($resize) = scalar( $prog 2>/dev/null );
    if (defined $resize
        and ( $resize =~ /COLUMNS\s*=\s*(\d+)/
            or $resize =~ /setenv\s+COLUMNS\s+'?(\d+)/ )
        )
    {
        $results[0] = $1;
        if ( $resize =~ /LINES\s*=\s*(\d+)/
            or $resize =~ /setenv\s+LINES\s+'?(\d+)/ )
        {
            $results[1] = $1;
            @results[ 2, 3 ] = ( 0, 0 );
        }
    }
}

```

```

    }
    else
    {
        @results = ();
    }
}
else
{
    @results = ();
}
push( @fail, "resize program" );
}

if ( @results < 4 && $^O ne 'MSWin32' )
{
    my ($prog) = "stty size";

    my ($stty) = scalar( $prog 2>/dev/null );
    if (defined $stty
        and ( $stty =~ /(\d+) (\d+)/ )
        )
    {
        $results[0] = $2;
        $results[1] = $1;
        @results[ 2, 3 ] = ( 0, 0 );
    }
    else
    {
        @results = ();
    }
    push( @fail, "stty program" );
}

if ( @results != 4 )
{
    carp("Unable to get Terminal Size."
        . join( "", map( " The $_ didn't
work.", @fail ) ));
    return undef;
}

@results;
}

!FIRSTPART

close OUT;
# preload the XS module needed for the blockoptions() expansions below

```

```

# does not work with miniperl
package Term::ReadKey;
require DynaLoader;
our @ISA = qw(DynaLoader);

print "Bootstrapping the XS for blockoptions: ";
bootstrap Term::ReadKey or die;
print blockoptions()."\n";

open OUT, ">>", $file or die "Can't append to $file: $!";
print OUT "# blockoptions: \n";
if ( &blockoptions() & 1 ) # Use nodelay
{
    print OUT "#nodelay\n";
    if ( &blockoptions() & 2 ) #poll
    {
        print OUT <<'!NO!SUBS!';
# poll
sub ReadKey {
    my $File = normalizehandle((@_>1?$_[1]:\*STDIN));
    if (defined $_[0] && $_[0] > 0) {
        if ($_[0]) {
            return undef if &pollfile($File,$_[0]) == 0;
        }
    }
    if (defined $_[0] && $_[0] < 0) { &setnodelay($File,1); }
    my $value = getc $File;
    if (defined $_[0] && $_[0] < 0) { &setnodelay($File,0); }
    $value;
}
sub ReadLine {
    my $File = normalizehandle((@_>1?$_[1]:\*STDIN));
    if (defined $_[0] && $_[0] > 0) {
        if ($_[0]) {
            return undef if &pollfile($File,$_[0]) == 0;
        }
    }
    if (defined $_[0] && $_[0] < 0) { &setnodelay($File,1) };
    my $value = scalar(<$File>);
    if (defined $_[0] && $_[0] < 0) { &setnodelay($File,0) };
    $value;
}
!NO!SUBS!

}
elsif ( &blockoptions() & 4 ) #select
{
    print OUT <<'!NO!SUBS!';

```



```

#select
sub ReadKey {
    my $File = normalizehandle((@_>1?$_[1]:\*STDIN));
    if (defined $_[0] && $_[0] > 0) {
        if ($_[0]) { return undef if &selectfile($File,$_[0]) == 0 }
        }
    if (defined $_[0] && $_[0] < 0) { &setnodelay($File,1); }
    my $value = getc $File;
    if (defined $_[0] && $_[0] < 0) { &setnodelay($File,0); }
    $value;
}
sub ReadLine {
    my $File = normalizehandle((@_>1?$_[1]:\*STDIN));
    if (defined $_[0] && $_[0] > 0) {
        if ($_[0]) { return undef if &selectfile($File,$_[0]) == 0 }
        }
    if (defined $_[0] && $_[0]
< 0) { &setnodelay($File,1) };
    my $value = scalar(<$File>);
    if (defined $_[0] && $_[0] < 0) { &setnodelay($File,0) };
    $value;
}
!NO!SUBS!

}
else
{ #nothing
    print OUT <<'!NO!SUBS!';
sub ReadKey {
    my $File = normalizehandle((@_>1?$_[1]:\*STDIN));
    if (defined $_[0] && $_[0] > 0) {
        # Nothing better seems to exist, so I just use time-of-day
        # to timeout the read. This isn't very exact, though.
        $starttime = time;
        $endtime = $starttime + $_[0];
        &setnodelay($File,1);
        my $value;
        while (time < $endtime) { # This won't catch wraparound!
            $value = getc $File;
            last if defined($value);
        }
        &setnodelay($File,0);
        return $value;
    }
    if (defined $_[0] && $_[0] < 0) { &setnodelay($File,1); }
    my $value = getc $File;
    if (defined $_[0] && $_[0] < 0) { &setnodelay($File,0); }
    $value;
}

```

```

}
sub ReadLine {
    my $File = normalizehandle((@_>1?$_[1]:\*STDIN));
    if
    (defined $_[0] && $_[0] > 0) {
        # Nothing better seems to exist, so I just use time-of-day
        # to timeout the read. This isn't very exact, though.
        $starttime = time;
        $endtime = $starttime + $_[0];
        &setnodelay($File,1);
        my $value;
        while (time < $endtime) { # This won't catch wraparound!
            $value = scalar(<$File>);
            last if defined($value);
        }
        &setnodelay($File,0);
        return $value;
    }
    if (defined $_[0] && $_[0] < 0) { &setnodelay($File,1) };
    my $value = scalar(<$File>);
    if (defined $_[0] && $_[0] < 0) { &setnodelay($File,0) };
    $value;
}
!NO!SUBS!

}
}
else {
    print OUT "#no nodelay\n";

    if ( &blockoptions() & 2 ) # Use poll
    {
        print OUT <<'!NO!SUBS!';
    }
#poll
sub ReadKey {
    my $File = normalizehandle((@_>1?$_[1]:\*STDIN));
    if (defined $_[0] && $_[0] != 0) {
        return undef if &pollfile($File,$_[0]) == 0
    }
   getc $File;
}
sub ReadLine {
    my $File = normalizehandle((@_>1?$_[1]:\*STDIN));
    if (defined $_[0] && $_[0] != 0) {
        return undef if &pollfile($File,$_[0]) == 0;
    }
    scalar(<$File>);
}
}

```

!NO!SUBS!

```
}
elseif ( &blockoptions() & 4 ) # Use select
{
    print OUT <<'!NO!SUBS!';
#select
sub ReadKey {
    my $File = normalizehandle((@_>1?$_[1]:\*STDIN));
    if (defined $_[0] && $_[0] != 0) {
        return undef if &selectfile($File,$_[0]) == 0
    }
    getc $File;
}
```

```
sub ReadLine {
    my $File = normalizehandle((@_>1?$_[1]:\*STDIN));
    if (defined $_[0] && $_[0] != 0) {
        return undef if &selectfile($File,$_[0]) == 0;
    }
    scalar(<$File>);
}
```

!NO!SUBS!

```
}
elseif ( &blockoptions() & 8 ) # Use Win32
{
    print OUT <<'!NO!SUBS!';
#Win32
sub ReadKey {
    my $File = normalizehandle((@_>1?$_[1]:\*STDIN));
    if ($_[0] || $CurrentMode >= 3) {
        Win32PeekChar($File, $_[0]);
    } else {
        getc $File;
    }
    #if ($_[0]!=0) {return undef if !Win32PeekChar($File, $_[0])};
    #getc $File;
}
```

```
sub ReadLine {
    my $File = normalizehandle((@_>1?$_[1]:\*STDIN));
    #if ($_[0]!=0) {return undef if !Win32PeekChar($File, $_[0])};
    #scalar(<$File>);
    if ($_[0]) {
        croak("Non-blocking ReadLine is not supported on this architecture")
    }
    scalar(<$File>);
}
```

!NO!SUBS!

```

    }
    else
    {
        print OUT <<'!NO!SUBS!';
sub ReadKey {
    my $File = normalizehandle((@_>1?$_[1]:\*STDIN));
    if ($_[0]) {
        croak("Non-blocking ReadKey is not supported on this architecture")
    }
    getc $File;
}
sub ReadLine {
    my $File = normalizehandle((@_>1?$_[1]:\*STDIN));
    if ($_[0]) {
        croak("Non-blocking ReadLine is not supported on this architecture")
    }
    scalar(<$File>);
}
!NO!SUBS!

    }
}

print OUT <<'EOF';
1;
# ex: set ro:
EOF

close OUT;
if (-s $file < 1000) {
    warn "WARNING: $file probably too small";
} else {
    print "Done\n";
}

Found in path(s):
* /opt/cola/permits/1402400313_1661783000.2195435/0/libterm-readkey-perl-2-38-orig-1-tar-gz/TermReadKey-
2.38/ReadKey.pm.PL
No license file was found, but licenses were detected in source scan.

/*
-----

ppport.h -- Perl/Pollution/Portability Version 3.21

Automatically created by Devel::PPPort running under perl 5.014004.

```

Do NOT edit this file directly! -- Edit PPPort_pm.PL and the includes in parts/inc/ instead.

Use 'perldoc ppport.h' to view the documentation below.

SKIP

=pod

=head1 NAME

ppport.h - Perl/Pollution/Portability version 3.21

=head1 SYNOPSIS

perl ppport.h [options] [source files]

Searches current directory for files if no [source files] are given

--help show short help

--version show version

--patch=file write one patch file with changes

--copy=suffix write changed copies with suffix

--diff=program use diff program and options

--compat-version=version

 provide compatibility with Perl version

--cplusplus accept C++ comments

--quiet don't output anything except fatal errors

--nodiag don't show diagnostics

--nohints don't show hints

--nochanges don't suggest changes

--nofilter don't filter input files

--strip strip all script and doc functionality from
 ppport.h

--list-provided list provided API

--list-unsupported list unsupported API

--api-info=name show Perl API portability information

=head1 COMPATIBILITY

This version of F<ppport.h> is designed to support operation with Perl installations back to 5.003, and has been tested up to 5.11.5.

=head1 OPTIONS

=head2 --help

Display a brief usage summary.

=head2 --version

Display the version of F<ppport.h>.

=head2 --patch=I<file>

If this option is given, a single patch file will be created if any changes are suggested. This requires a working diff program to be installed on your system.

=head2 --copy=I<suffix>

If this option is given, a copy of each file will be saved with the given suffix that contains the suggested changes. This does not require any external programs. Note that this does not automagically add a dot between the original filename and the suffix. If you want the dot, you have to include it in the option argument.

If neither C<--patch> or C<--copy> are given, the default is to simply print the diffs for each file. This requires either C<Text::Diff> or a C<diff> program to be installed.

=head2 --diff=I<program>

Manually set the diff program and options to use. The default is to use C<Text::Diff>, when installed, and output unified context diffs.

=head2 --compat-version=I<version>

Tell F<ppport.h> to check for compatibility with the given Perl version. The default is to check for compatibility with Perl version 5.003.

You can use this option to reduce the output of F<ppport.h> if you intend to be backward compatible only down to a certain Perl version.

=head2 --cplusplus

Usually, F<ppport.h> will detect C++ style comments and replace them with C style comments for portability reasons. Using this option instructs F<ppport.h> to leave C++ comments untouched.

=head2 --quiet

Be quiet. Don't print anything except fatal errors.

=head2 --nodiag

Don't output any diagnostic messages. Only portability alerts will be printed.

=head2 --nohints

Don't output any hints. Hints often contain useful portability notes. Warnings will still be displayed.

=head2 --nochanges

Don't suggest any changes. Only give diagnostic output and hints unless these are also deactivated.

=head2 --nofilter

Don't filter the list of input files. By default, files not looking like source code (i.e. not *.xs, *.c, *.cc, *.cpp or *.h) are skipped.

=head2 --strip

Strip all script and documentation functionality from F<ppport.h>.

This

reduces the size of F<ppport.h> dramatically and may be useful if you want to include F<ppport.h> in smaller modules without increasing their distribution size too much.

The stripped F<ppport.h> will have a C<--unstrip> option that allows you to undo the stripping, but only if an appropriate C<Devel::PPPport> module is installed.

=head2 --list-provided

Lists the API elements for which compatibility is provided by F<ppport.h>. Also lists if it must be explicitly requested, if it has dependencies, and if there are hints or warnings for it.

=head2 --list-unsupported

Lists the API elements that are known not to be supported by F<ppport.h> and below which version of Perl they probably won't be available or work.

=head2 --api-info=I<name>

Show portability information for API elements matching I<name>. If I<name> is surrounded by slashes, it is interpreted as a regular expression.

=head1 DESCRIPTION

In order for a Perl extension (XS) module to be as portable as possible across differing versions of Perl itself, certain steps need to be taken.

=over 4

=item *

Including this header is the first major one. This alone will give you access to a large part of the Perl API that hasn't been available in earlier Perl releases. Use

```
perl ppport.h --list-provided
```

to see which API elements are provided by ppport.h.

=item *

You should avoid using deprecated parts of the API. For example, using global Perl variables without the C<PL_> prefix is deprecated. Also, some API functions used to have a C<perl_> prefix. Using this form is also deprecated. You can safely use the supported API, as F<ppport.h> will provide wrappers for older Perl versions.

=item *

If you use one of a few functions or variables that were not present in earlier versions of Perl, and that can't be provided using a macro, you have to explicitly request support for these functions by adding one or more C<#define>s in your source code before the inclusion of F<ppport.h>.

These functions or

variables will be marked C<explicit> in the list shown by C<--list-provided>.

Depending on whether your module has a single or multiple files that use such functions or variables, you want either C<static> or global variants.

For a C<static> function or variable (used only in a single source file), use:

```
#define NEED_function
#define NEED_variable
```

For a global function or variable (used in multiple source files), use:

```
#define NEED_function_GLOBAL
#define NEED_variable_GLOBAL
```

Note that you mustn't have more than one global request for the same function or variable in your project.

Function / Variable	Static Request	Global Request
PL_parser	NEED_PL_parser	NEED_PL_parser_GLOBAL
PL_signals	NEED_PL_signals	NEED_PL_signals_GLOBAL
eval_pv()	NEED_eval_pv	NEED_eval_pv_GLOBAL
grok_bin()	NEED_grok_bin	NEED_grok_bin_GLOBAL
grok_hex()	NEED_grok_hex	NEED_grok_hex_GLOBAL
grok_number()	NEED_grok_number	NEED_grok_number_GLOBAL
grok_numeric_radix()	NEED_grok_numeric_radix	NEED_grok_numeric_radix_GLOBAL
grok_oct()	NEED_grok_oct	NEED_grok_oct_GLOBAL
load_module()	NEED_load_module	NEED_load_module_GLOBAL
my_snprintf()	NEED_my_snprintf	NEED_my_snprintf_GLOBAL
my_sprintf()	NEED_my_sprintf	NEED_my_sprintf_GLOBAL
my_strlcat()	NEED_my_strlcat	NEED_my_strlcat_GLOBAL
my_strlcpy()	NEED_my_strlcpy	NEED_my_strlcpy_GLOBAL
newCONSTSUB()	NEED_newCONSTSUB	NEED_newCONSTSUB_GLOBAL
newRV_noinc()	NEED_newRV_noinc	NEED_newRV_noinc_GLOBAL
newSV_type()	NEED_newSV_type	NEED_newSV_type_GLOBAL
newSVpv_flags()	NEED_newSVpv_flags	NEED_newSVpv_flags_GLOBAL
newSVpv_share()	NEED_newSVpv_share	NEED_newSVpv_share_GLOBAL
pv_display()	NEED_pv_display	NEED_pv_display_GLOBAL
pv_escape()	NEED_pv_escape	NEED_pv_escape_GLOBAL
pv_pretty()	NEED_pv_pretty	NEED_pv_pretty_GLOBAL
sv_2pv_flags()	NEED_sv_2pv_flags	NEED_sv_2pv_flags_GLOBAL
sv_2pvbyte()	NEED_sv_2pvbyte	NEED_sv_2pvbyte_GLOBAL
sv_catpvf_mg()	NEED_sv_catpvf_mg	NEED_sv_catpvf_mg_GLOBAL

```

sv_catpvf_mg_nocontext()  NEED_sv_catpvf_mg_nocontext  NEED_sv_catpvf_mg_nocontext_GLOBAL
sv_pvn_force_flags()     NEED_sv_pvn_force_flags    NEED_sv_pvn_force_flags_GLOBAL
sv_setpvf_mg()           NEED_sv_setpvf_mg
NEED_sv_setpvf_mg_GLOBAL
sv_setpvf_mg_nocontext() NEED_sv_setpvf_mg_nocontext  NEED_sv_setpvf_mg_nocontext_GLOBAL
vload_module()          NEED_vload_module        NEED_vload_module_GLOBAL
vnewSVpvf()             NEED_vnewSVpvf          NEED_vnewSVpvf_GLOBAL
warner()                NEED_warner              NEED_warner_GLOBAL

```

To avoid namespace conflicts, you can change the namespace of the explicitly exported functions / variables using the C<DPPP_NAMESPACE> macro. Just C<#define> the macro before including C<ppport.h>:

```

#define DPPP_NAMESPACE MyOwnNamespace_
#include "ppport.h"

```

The default namespace is C<DPPP_>.

=back

The good thing is that most of the above can be checked by running F<ppport.h> on your source code. See the next section for details.

=head1 EXAMPLES

To verify whether F<ppport.h> is needed for your module, whether you should make any changes to your code, and whether any special defines should be used, F<ppport.h> can be run as a Perl script to check your source code. Simply say:

```
perl ppport.h
```

The result will usually be a list of patches suggesting changes that should at least be acceptable, if not necessarily the most efficient solution, or a fix for all possible problems.

If you know that your XS module uses features only available in newer Perl releases, if you're aware that it uses C++ comments, and if you want all suggestions as a single patch file, you could use something like this:

```
perl ppport.h --compat-version=5.6.0 --cplusplus --patch=test.diff
```

If you only want your code to be scanned without any suggestions for changes, use:

```
perl ppport.h --nochanges
```

You can specify a different `C<diff>` program or options, using the `C<--diff>` option:

```
perl ppport.h --diff='diff -C 10'
```

This would output context diffs with 10 lines of context.

If you want to create patched copies of your files instead, use:

```
perl ppport.h --copy=.new
```

To display portability information for the `C<newSVpv<pv>>` function, use:

```
perl ppport.h --api-info=newSVpv<pv>
```

Since the argument to `C<--api-info>` can be a regular expression, you can use

```
perl ppport.h --api-info=/_nomg$/
```

to display portability information for all `C<_nomg>` functions or

```
perl ppport.h --api-info=/.</>
```

to display information for all known API elements.

=head1 BUGS

If this version of `F<ppport.h>` is causing failure during the compilation of this module, please check if newer versions of either this module or `C<Devel::PPPort>` are available on CPAN before sending a bug report.

If `F<ppport.h>` was generated using the latest version of `C<Devel::PPPort>` and is causing failure of this module, please file a bug report using the CPAN Request Tracker at [L<http://rt.cpan.org/>](http://rt.cpan.org/).

Please include the following information:

=over 4

=item 1.

The complete output from running "perl -V"

=item 2.

This file.

=item 3.

The name and version of the module you were trying to build.

=item 4.

A full log of the build that failed.

=item

5.

Any other information that you think could be relevant.

=back

For the latest version of this code, please get the C<Devel::PPPort> module from CPAN.

=head1 COPYRIGHT

Version 3.x, Copyright (c) 2004-2013, Marcus Holland-Moritz.

Version 2.x, Copyright (C) 2001, Paul Marquess.

Version 1.x, Copyright (C) 1999, Kenneth Albanowski.

This program is free software; you can redistribute it and/or modify it under the same terms as Perl itself.

=head1 SEE ALSO

See L<Devel::PPPort>.

=cut

use strict;

Disable broken TRIE-optimization

BEGIN { eval '\${^RE_TRIE_MAXBUF} = -1' if \$] >= 5.009004 && \$] <= 5.009005 }

my \$VERSION = 3.21;

my %opt = (

```

quiet => 0,
diag => 1,
hints => 1,
changes => 1,
cplusplus => 0,
filter => 1,
strip => 0,
version => 0,
);

my($ppport) = $0 =~ /([\w.]+)$/;
my $LF = '(?:\r\n|[\r\n])'; # line feed
my $HS = "[\t]";          # horizontal whitespace

# Never use C comments in this file!
my $ccs = '/'.!.*';
my
  $cce = '*'.!./';
my $rcs = quotemeta $ccs;
my $rce = quotemeta $cce;

eval {
  require Getopt::Long;
  Getopt::Long::GetOptions(\%opt, qw(
    help quiet diag! filter! hints! changes! cplusplus strip version
    patch=s copy=s diff=s compat-version=s
    list-provided list-unsupported api-info=s
  )) or usage();
};

if ($@ and grep /^-/, @ARGV) {
  usage() if "@ARGV" =~ /^--?h(?:elp)?$/;
  die "Getopt::Long not found. Please don't use any options.\n";
}

if ($opt{version}) {
  print "This is $0 $VERSION.\n";
  exit 0;
}

usage() if $opt{help};
strip() if $opt{strip};

if (exists $opt{'compat-version'}) {
  my($r,$v,$s) = eval { parse_version($opt{'compat-version'}) };
  if ($@) {
    die "Invalid version number format: '$opt{'compat-version'}'\n";
  }
}

```

```

die "Only Perl 5 is supported\n" if $r != 5;
die "Invalid version number: $opt{'compat-version'}\n" if $v >= 1000 || $s >= 1000;
$opt{'compat-version'} = sprintf "%d.%03d%03d", $r, $v, $s;
}
else {
$opt{'compat-version'} = 5;
}

```

```

my
%API = map { /^(w+)(([^\w]*)|([^\w]*)|(\w*))$/
  ? ( $1 => {
    ($2          ? ( base   => $2 ) : ()),
    ($3          ? ( todo   => $3 ) : ()),
    (index($4, 'v') >= 0 ? ( varargs => 1 ) : ()),
    (index($4, 'p') >= 0 ? ( provided => 1 ) : ()),
    (index($4, 'n') >= 0 ? ( nothxarg => 1 ) : ()),
  } )
  : die "invalid spec: $_" } qw(

```

```

AvFILLp|5.004050||p
AvFILL|||
BhkDISABLE||5.019003|
BhkENABLE||5.019003|
BhkENTRY_set||5.019003|
BhkENTRY|||
BhkFLAGS|||
CALL_BLOCK_HOOKS|||
CLASS|||n
CPERLscope|5.005000||p
CX_CURPAD_SAVE|||
CX_CURPAD_SV|||
CopFILEAV|5.006000||p
CopFILEGV_set|5.006000||p
CopFILEGV|5.006000||p
CopFILESV|5.006000||p
CopFILE_set|5.006000||p
CopFILE|5.006000||p
CopSTASHPV_set|5.006000||p
CopSTASHPV|5.006000||p
CopSTASH_eq|5.006000||p
CopSTASH_set|5.006000||p
CopSTASH|5.006000||p
CopyD|5.009002|5.004050|p
Copy||5.004050|
CvPADLIST||5.008001|
CvSTASH|||
CvWEAKOUTSIDE|||
DEFSV_set|5.010001||p
DEFSV|5.004050||p

```

END_EXTERN_C|5.005000||p
ENTER||
ERRSV|5.004050||p
EXTEND||
EXTERN_C|5.005000||p
F0convert||n
FREETMPS||
GIMME_V|5.004000|n
GIMME||n
GROK_NUMERIC_RADIX|5.007002||p
G_ARRAY||
G_DISCARD||
G_EVAL||
G_METHOD|5.006001||p
G_NOARGS||
G_SCALAR||
G_VOID|5.004000|
GetVars||
GvAV||
GvCV||
GvHV||
GvSVn|5.009003||p
GvSV||
Gv_AMupdate|5.011000|
HEf_SVKEY|5.004000|
HeHASH|5.004000|
HeKEY|5.004000|
HeKLEN|5.004000|
HePV|5.004000|
HeSVKEY_force|5.004000|
HeSVKEY_set|5.004000|
HeSVKEY|5.004000|
HeUTF8|5.010001|
HeVAL|5.004000|
HvENAMELEN|5.015004|
HvENAMEUTF8|5.015004|
HvENAME|5.013007|
HvNAMELEN_get|5.009003||p
HvNAMELEN|5.015004|
HvNAMEUTF8|5.015004|
HvNAME_get|5.009003||p
HvNAME||
INT2PTR|5.006000||p
IN_LOCALE_COMPILETIME|5.007002||p
IN_LOCALE_RUNTIME|5.007002||p
IN_LOCALE|5.007002||p
IN_PERL_COMPILETIME|5.008001||p
IS_NUMBER_GREATER_THAN_UV_MAX|5.007002||p

IS_NUMBER_INFINITY|5.007002||p
IS_NUMBER_IN_UV|5.007002||p
IS_NUMBER_NAN|5.007003||p
IS_NUMBER_NEG|5.007002||p
IS_NUMBER_NOT_INT|5.007002||p
IVSIZE|5.006000||p
IVTYPE|5.006000||p
IVdf|5.006000||p
LEAVE|||
LINKLIST||5.013006|
LVRET|||
MARK|||
MULTICALL||5.019003|
MY_CXT_CLONE|5.009002||p
MY_CXT_INIT|5.007003||p
MY_CXT|5.007003||p
MoveD|5.009002|5.004050|p
Move||5.004050|
NOOP|5.005000||p
NUM2PTR|5.006000||p
NVTYPE|5.006000||p
NVef|5.006001||p
NVff|5.006001||p
NVgf|5.006001||p
Newxc|5.009003||p
Newxz|5.009003||p
Newx|5.009003||p
Nullav|||
Nullch|||
Nullcv|||
Nullhv|||
Nullsv|||
OP_CLASS||5.013007|
OP_DESC||5.007003|
OP_NAME||5.007003|
ORIGMARK|||
PAD_BASE_SV|||
PAD_CLONE_VARS|||
PAD_COMPNAME_FLAGS|||
PAD_COMPNAME_GEN_set|||
PAD_COMPNAME_GEN|||
PAD_COMPNAME_OURSTASH|||
PAD_COMPNAME_PV|||
PAD_COMPNAME_TYPE|||
PAD_RESTORE_LOCAL|||
PAD_SAVE_LOCAL|||
PAD_SAVE_SETNULLPAD|||
PAD_SETSV|||

PAD_SET_CUR_NOSAVE|||
PAD_SET_CUR|||
PAD_SV1|||
PAD_SV|||
PERLIO_FUNCS_CAST|5.009003||p
PERLIO_FUNCS_DECL|5.009003||p
PERL_ABS|5.008001||p
PERL_BCDVERSION|5.019002||p
PERL_GCC_BRACE_GROUPS_FORBIDDEN|5.008001||p
PERL_HASH|5.004000||p
PERL_INT_MAX|5.004000||p
PERL_INT_MIN|5.004000||p
PERL_LONG_MAX|5.004000||p
PERL_LONG_MIN|5.004000||p
PERL_MAGIC_arylen|5.007002||p
PERL_MAGIC_backref|5.007002||p
PERL_MAGIC_bm|5.007002||p
PERL_MAGIC_collxfrm|5.007002||p
PERL_MAGIC_dbfile|5.007002||p
PERL_MAGIC_dbline|5.007002||p
PERL_MAGIC_defelem|5.007002||p
PERL_MAGIC_envelem|5.007002||p
PERL_MAGIC_env|5.007002||p
PERL_MAGIC_ext|5.007002||p
PERL_MAGIC_fm|5.007002||p
PERL_MAGIC_glob|5.019002||p
PERL_MAGIC_isaelem|5.007002||p
PERL_MAGIC_isa|5.007002||p
PERL_MAGIC_mutex|5.019002||p
PERL_MAGIC_nkeys|5.007002||p
PERL_MAGIC_overload_elem|5.019002||p
PERL_MAGIC_overload_table|5.007002||p
PERL_MAGIC_overload|5.019002||p
PERL_MAGIC_pos|5.007002||p
PERL_MAGIC_qr|5.007002||p
PERL_MAGIC_regdata|5.007002||p
PERL_MAGIC_regdatum|5.007002||p
PERL_MAGIC_regex_global|5.007002||p
PERL_MAGIC_shared_scalar|5.007003||p
PERL_MAGIC_shared|5.007003||p
PERL_MAGIC_sigelem|5.007002||p
PERL_MAGIC_sig|5.007002||p
PERL_MAGIC_substr|5.007002||p
PERL_MAGIC_sv|5.007002||p
PERL_MAGIC_taint|5.007002||p
PERL_MAGIC_tiedelem|5.007002||p
PERL_MAGIC_tiedscalar|5.007002||p
PERL_MAGIC_tied|5.007002||p

PERL_MAGIC_utf8|5.008001||p
PERL_MAGIC_uvar_elem|5.007003||p
PERL_MAGIC_uvar|5.007002||p
PERL_MAGIC_vec|5.007002||p
PERL_MAGIC_vstring|5.008001||p
PERL_PV_ESCAPE_ALL|5.009004||p
PERL_PV_ESCAPE_FIRSTCHAR|5.009004||p
PERL_PV_ESCAPE_NOBACKSLASH|5.009004||p
PERL_PV_ESCAPE_NOCLEAR|5.009004||p
PERL_PV_ESCAPE_QUOTE|5.009004||p
PERL_PV_ESCAPE_RE|5.009005||p
PERL_PV_ESCAPE_UNI_DETECT|5.009004||p
PERL_PV_ESCAPE_UNI|5.009004||p
PERL_PV_PRETTY_DUMP|5.009004||p
PERL_PV_PRETTY_ELLIPSES|5.010000||p
PERL_PV_PRETTY_LTGT|5.009004||p
PERL_PV_PRETTY_NOCLEAR|5.010000||p
PERL_PV_PRETTY_QUOTE|5.009004||p
PERL_PV_PRETTY_REGPROP|5.009004||p
PERL_QUAD_MAX|5.004000||p
PERL_QUAD_MIN|5.004000||p
PERL_REVISION|5.006000||p
PERL_SCAN_ALLOW_UNDERSCORES|5.007003||p
PERL_SCAN_DISALLOW_PREFIX|5.007003||p
PERL_SCAN_GREATER_THAN_UV_MAX|5.007003||p
PERL_SCAN_SILENT_ILLDIGIT|5.008001||p
PERL_SHORT_MAX|5.004000||p
PERL_SHORT_MIN|5.004000||p
PERL_SIGNALS_UNSAFE_FLAG|5.008001||p
PERL_SUBVERSION|5.006000||p
PERL_SYS_INIT3|5.010000|
PERL_SYS_INIT|5.010000|
PERL_SYS_TERM|5.019003|
PERL_UCHAR_MAX|5.004000||p
PERL_UCHAR_MIN|5.004000||p
PERL_UINT_MAX|5.004000||p
PERL_UINT_MIN|5.004000||p
PERL_ULONG_MAX|5.004000||p
PERL_ULONG_MIN|5.004000||p
PERL_UNUSED_ARG|5.009003||p
PERL_UNUSED_CONTEXT|5.009004||p
PERL_UNUSED_DECL|5.007002||p
PERL_UNUSED_VAR|5.007002||p
PERL_UQUAD_MAX|5.004000||p
PERL_UQUAD_MIN|5.004000||p
PERL_USE_GCC_BRACE_GROUPS|5.009004||p
PERL_USHORT_MAX|5.004000||p
PERL_USHORT_MIN|5.004000||p

PERL_VERSION|5.006000|p
PL_DBsignal|5.005000|p
PL_DBsingle||pn
PL_DBsub||pn
PL_DBtrace||pn
PL_Sv|5.005000|p
PL_bufend|5.019002|p
PL_bufptr|5.019002|p
PL_check|5.006000|
PL_compiling|5.004050|p
PL_comppad_name||5.017004|
PL_comppad|5.008001|
PL_copline|5.019002|p
PL_curcop|5.004050|p
PL_curpad||5.005000|
PL_curstash|5.004050|p
PL_debstash|5.004050|p
PL_defgv|5.004050|p
PL_diehook|5.004050|p
PL_dirty|5.004050|p
PL_dowarn||pn
PL_errgv|5.004050|p
PL_error_count|5.019002|p
PL_expect|5.019002|p
PL_hexdigit|5.005000|p
PL_hints|5.005000|p
PL_in_my_stash|5.019002|p
PL_in_my|5.019002|p
PL_keyword_plugin||5.011002|
PL_last_in_gv||n
PL_laststatval|5.005000|p
PL_lex_state|5.019002|p
PL_lex_stuff|5.019002|p
PL_linestr|5.019002|p
PL_modglobal||5.005000|n
PL_na|5.004050|pn
PL_no_modify|5.006000|p
PL_ofsgv||n
PL_opfreehook||5.011000|n
PL_parser|5.009005|5.009005|p
PL_peekp||5.007003|n
PL_perl_destruct_level|5.004050|p
PL_perldb|5.004050|p
PL_ppaddr|5.006000|p
PL_rpeekp||5.013005|n
PL_rsfilters|5.019002|p
PL_rsfp|5.019002|p
PL_rs||n

PL_signals|5.008001||p
PL_stack_base|5.004050||p
PL_stack_sp|5.004050||p
PL_statcache|5.005000||p
PL_stdingv|5.004050||p
PL_sv_arenaroot|5.004050||p
PL_sv_no|5.004050||pn
PL_sv_undef|5.004050||pn
PL_sv_yes|5.004050||pn
PL_tainted|5.004050||p
PL_tainting|5.004050||p
PL_tokenbuf|5.019002||p
POP_MULTICALL||5.019003|
POPi|||n
POPi|||n
POPn|||n
POPpbytex||5.007001|n
POPpx||5.005030|n
POPp|||n
POPs|||n
PTR2IV|5.006000||p
PTR2NV|5.006000||p
PTR2UV|5.006000||p
PTR2nat|5.009003||p
PTR2ul|5.007001||p
PTRV|5.006000||p
PUSHMARK|||
PUSH_MULTICALL||5.019003|
PUSHi|||
PUSHmortal|5.009002||p
PUSHn|||
PUSHp|||
PUSHs|||
PUSHu|5.004000||p
PUTBACK|||
PadARRAY||5.019003|
PadMAX||5.019003|
PadlistARRAY||5.019003|
PadlistMAX||5.019003|
PadlistNAMESARRAY||5.019003|
PadlistNAMESMAX||5.019003|
PadlistNAMES||5.019003|
PadlistREFCNT||5.017004|
PadnameIsOUR|||
PadnameIsSTATE|||
PadnameLEN||5.019003|
PadnameOURSTASH|||
PadnameOUTER|||

PadnamePV||5.019003|
PadnameSV||5.019003|
PadnameTYPE||
PadnameUTF8||5.019003|
PadnamelistARRAY||5.019003|
PadnamelistMAX||5.019003|
PerlIO_clearerr||5.007003|
PerlIO_close||5.007003|
PerlIO_context_layers||5.009004|
PerlIO_eof||5.007003|
PerlIO_error||5.007003|
PerlIO_fileno||5.007003|
PerlIO_fill||5.007003|
PerlIO_flush||5.007003|
PerlIO_get_base||5.007003|
PerlIO_get_bufsiz||5.007003|
PerlIO_get_cnt||5.007003|
PerlIO_get_ptr||5.007003|
PerlIO_read||5.007003|
PerlIO_seek||5.007003|
PerlIO_set_cnt||5.007003|
PerlIO_set_ptrcnt||5.007003|
PerlIO_setlinebuf||5.007003|
PerlIO_stderr||5.007003|
PerlIO_stdin||5.007003|
PerlIO_stdout||5.007003|
PerlIO_tell||5.007003|
PerlIO_unread||5.007003|
PerlIO_write||5.007003|
Perl_signbit||5.009005|n
PoisonFree|5.009004||p
PoisonNew|5.009004||p
PoisonWith|5.009004||p
Poison|5.008000||p
READ_XDIGIT||5.017006|
RETVL||n
Renewc||
Renew||
SAVECLEARSV||
SAVECOMPPAD||
SAVEPADSV||
SAVETMPS||
SAVE_DEFSV|5.004050||p
SPAGAIN||
SP||
START_EXTERN_C|5.005000||p
START_MY_CXT|5.007003||p
STMT_END||p

STMT_START|||p
STR_WITH_LEN|5.009003||p
ST|||
SV_CONST_RETURN|5.009003||p
SV_COW_DROP_PV|5.008001||p
SV_COW_SHARED_HASH_KEYS|5.009005||p
SV_GMAGIC|5.007002||p
SV_HAS_TRAILING_NUL|5.009004||p
SV_IMMEDIATE_UNREF|5.007001||p
SV_MUTABLE_RETURN|5.009003||p
SV_NOSTEAL|5.009002||p
SV_SMAGIC|5.009003||p
SV_UTF8_NO_ENCODING|5.008001||p
SVfARG|5.009005||p
SVf_UTF8|5.006000||p
SVf|5.006000||p
SVt_INVLIST||5.019002|
SVt_IV|||
SVt_NULL|||
SVt_NV|||
SVt_PVAV|||
SVt_PVCV|||
SVt_PVFM|||
SVt_PVGV|||
SVt_PVHV|||
SVt_PVIO|||
SVt_PVIV|||
SVt_PVLV|||
SVt_PVMG|||
SVt_PVNV|||
SVt_PV|||
SVt_REGEX||5.011000|
Safefree|||
Slab_Alloc|||
Slab_Free|||
Slab_to_ro|||
Slab_to_rw|||
StructCopy|||
SvCUR_set|||
SvCUR|||
SvEND|||
SvGAMAGIC||5.006001|
SvGETMAGIC|5.004050||p
SvGROW|||
SvIOK_UV||5.006000|
SvIOK_notUV||5.006000|
SvIOK_off|||
SvIOK_only_UV||5.006000|

SvIOK_only|||
SvIOK_on|||
SvIOKp|||
SvIOK|||
SvIVX|||
SvIV_nomg|5.009001||p
SvIV_set|||
SvIVx|||
SvIV|||
SvIsCOW_shared_hash|5.008003|
SvIsCOW|5.008003|
SvLEN_set|||
SvLEN|||
SvLOCK|5.007003|
SvMAGIC_set|5.009003||p
SvNIOK_off|||
SvNIOKp|||
SvNIOK|||
SvNOK_off|||
SvNOK_only|||
SvNOK_on|||
SvNOKp|||
SvNOK|||
SvNVX|||
SvNV_nomg|5.013002|
SvNV_set|||
SvNVx|||
SvNV|||
SvOK|||
SvOOK_offset|5.011000|
SvOOK|||
SvPOK_off|||
SvPOK_only_UTF8|5.006000|
SvPOK_only|||
SvPOK_on|||
SvPOKp|||
SvPOK|||
SvPVX_const|5.009003||p
SvPVX_mutable|5.009003||p
SvPVX|||
SvPV_const|5.009003||p
SvPV_flags_const_nolen|5.009003||p
SvPV_flags_const|5.009003||p
SvPV_flags_mutable|5.009003||p
SvPV_flags|5.007002||p
SvPV_force_flags_mutable|5.009003||p
SvPV_force_flags_nolen|5.009003||p
SvPV_force_flags|5.007002||p

SvPV_force_mutable|5.009003||p
SvPV_force_nolen|5.009003||p
SvPV_force_nomg_nolen|5.009003||p
SvPV_force_nomg|5.007002||p
SvPV_force|||p
SvPV_mutable|5.009003||p
SvPV_nolen_const|5.009003||p
SvPV_nolen|5.006000||p
SvPV_nomg_const_nolen|5.009003||p
SvPV_nomg_const|5.009003||p
SvPV_nomg_nolen|5.013007||p
SvPV_nomg|5.007002||p
SvPV_renew|5.009003||p
SvPV_set|||
SvPVbyte_force||5.009002|
SvPVbyte_nolen||5.006000|
SvPVbytex_force||5.006000|
SvPVbytex||5.006000|
SvPVbyte|5.006000||p
SvPVutf8_force||5.006000|
SvPVutf8_nolen||5.006000|
SvPVutf8x_force||5.006000|
SvPVutf8x||5.006000|
SvPVutf8||5.006000|
SvPVx|||
SvPV|||
SvREFCNT_dec_NN||5.017007|
SvREFCNT_dec|||
SvREFCNT_inc_NN|5.009004||p
SvREFCNT_inc_simple_NN|5.009004||p
SvREFCNT_inc_simple_void_NN|5.009004||p
SvREFCNT_inc_simple_void|5.009004||p
SvREFCNT_inc_simple|5.009004||p
SvREFCNT_inc_void_NN|5.009004||p
SvREFCNT_inc_void|5.009004||p
SvREFCNT_inc|||p
SvREFCNT|||
SvROK_off|||
SvROK_on|||
SvROK|||
SvRV_set|5.009003||p
SvRV|||
SvRXOK||5.009005|
SvRX||5.009005|
SvSETMAGIC|||
SvSHARED_HASH|5.009003||p
SvSHARE||5.007003|
SvSTASH_set|5.009003||p

SvSTASH|||
SvSetMagicSV_nosteal|5.004000|
SvSetMagicSV|5.004000|
SvSetSV_nosteal|5.004000|
SvSetSV|||
SvTAINTED_off|5.004000|
SvTAINTED_on|5.004000|
SvTAINTED|5.004000|
SvTAINT|||
SvTHINKFIRST|||
SvTRUE_nomg|5.013006|
SvTRUE|||
SvTYPE|||
SvUNLOCK|5.007003|
SvUOK|5.007001|5.006000|p
SvUPGRADE|||
SvUTF8_off|5.006000|
SvUTF8_on|5.006000|
SvUTF8|5.006000|
SvUVXx|5.004000|p
SvUVX|5.004000|p
SvUV_nomg|5.009001|p
SvUV_set|5.009003|p
SvUVx|5.004000|p
SvUV|5.004000|p
SvVOK|5.008001|
SvVSTRING_mg|5.009004|p
THIS||n
UNDERBAR|5.009002|p
UTF8_MAXBYTES|5.009002|p
UVSIZE|5.006000|p
UVTYPE|5.006000|p
UVXf|5.007001|p
UVof|5.006000|p
UVuf|5.006000|p
UVxf|5.006000|p
WARN_ALL|5.006000|p
WARN_AMBIGUOUS|5.006000|p
WARN_ASSERTIONS|5.019002|p
WARN_BAREWORD|5.006000|p
WARN_CLOSED|5.006000|p
WARN_CLOSURE|5.006000|p
WARN_DEBUGGING|5.006000|p
WARN_DEPRECATED|5.006000|p
WARN_DIGIT|5.006000|p
WARN_EXEC|5.006000|p
WARN_EXITING|5.006000|p
WARN_GLOB|5.006000|p

WARN_INPLACE|5.006000||p
WARN_INTERNAL|5.006000||p
WARN_IO|5.006000||p
WARN_LAYER|5.008000||p
WARN_MALLOC|5.006000||p
WARN_MISC|5.006000||p
WARN_NEWLINE|5.006000||p
WARN_NUMERIC|5.006000||p
WARN_ONCE|5.006000||p
WARN_OVERFLOW|5.006000||p
WARN_PACK|5.006000||p
WARN_PARENTHESES|5.006000||p
WARN_PIPE|5.006000||p
WARN_PORTABLE|5.006000||p
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sv_setiv|||
sv_setnv_mg|5.006000||p
sv_setnv|||
sv_setpv_mg|5.004050||p
sv_setpvf_mg_nocontext|||pvn
sv_setpvf_mg|5.006000|5.004000|pv
sv_setpvf_nocontext|||vn
sv_setpvf|5.004000|v
sv_setpviv_mg|5.008001|
sv_setpviv|5.008001|
sv_setpvn_mg|5.004050||p
sv_setpvn|||
sv_setpvs_mg|5.013006|
sv_setpvs|5.009004||p
sv_setpv|||
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sv_setsv_mg|5.004050||p
sv_setsv_nomg|5.007002||p
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sv_setuv_mg|5.004050||p
sv_setuv|5.004000||p
sv_tainted||5.004000|
sv_taint||5.004000|
sv_true||5.005000|
sv_unglob|||
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sv_unref_flags||5.007001|
sv_unref|||
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sv_utf8_upgrade_flags||5.007002|
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sv_utf8_upgrade||5.007001|
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sv_vcatpvf_mg|5.006000|5.004000|p
sv_vcatpvfn_flags||5.017002|
sv_vcatpvfn||5.004000|
sv_vcatpvf|5.006000|5.004000|p
sv_vsetpvf_mg|5.006000|5.004000|p
sv_vsetpvfn||5.004000|
sv_vsetpvf|5.006000|5.004000|p
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toLOWER_utf8|5.015007|
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toUPPER|5.004000|
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to_uni_fold|5.007003|
to_uni_lower_lc|5.006000|
to_uni_lower|5.007003|
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to_uni_title|5.007003|
to_uni_upper_lc|5.006000|
to_uni_upper|5.007003|
to_utf8_case|5.007003|
to_utf8_fold|5.015007|
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utf8_to_uvchr_buf|5.015009|
utf8_to_uvchr|5.007001|
utf8_to_uvuni_buf|5.015009|
utf8_to_uvuni|5.007001|
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utf8n_to_uvuni|5.007001|
utilize|||
uvchr_to_utf8_flags|5.007003|
uvchr_to_utf8|||
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```

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xs_version_bootcheck|||
yyerror_pvn|||
yyerror_pv|||
yyerror|||
yylex|||
yyparse|||
yyunlex|||
yywarn|||
);

if
(exists $opt{'list-unsupported'}) {
my $f;
for $f (sort { lc $a cmp lc $b } keys %API) {
next unless $API{$f}{todo};
print "$f ", 'x'(40-length($f)), " ", format_version($API{$f}{todo}), "\n";
}
}
exit 0;

```

```

}

# Scan for possible replacement candidates

my(%replace, %need, %hints, %warnings, %depends);
my $replace = 0;
my($hint, $define, $function);

sub find_api
{
    my $code = shift;
    $code =~ s{
        /(?: \*[^*]*\*+(?:[^\$ccs][^*]*\*+)* /|/^\r\n)*
        | "[^"\\]*(?:\\.["\\])*"
        | '[^'\\]*(?:\\.['\\])*' }{ }egsx;
    grep { exists $API{$_} } $code =~ /(\w+)/mg;
}

while (<DATA>) {
    if ($hint) {
        my $h = $hint->[0] eq 'Hint' ? \%hints : \%warnings;
        if (m{^s*\s*(.*)s*$}) {
            for (@{$hint->[1]}) {
                $h->{$_} ||= ""; # suppress warning with older perls
                $h->{$_} .= "$1\n";
            }
        }
        else { undef $hint }
    }

    $hint = [$1, [split /,?\s+/, $2]]
        if m{^s*$rccs\s+(Hint|Warning):\s+(\w+(?:,\s+\w+)*)\s*$};

    if ($define) {
        if ($define->[1] =~ /\$/) {
            $define->[1] .= $_;
        }
        else {
            if (exists $API{$define->[0]} && $define->[1] !~ /^DPPP_\(/) {
                my @n = find_api($define->[1]);
                push @{$depends{$define->[0]}}, @n if @n;
            }
            undef $define;
        }
    }

    $define = [$1, $2] if m{^s*#\s*define\s+(\w+)(?:\([^\)]*\))?\s+(.*)};
}

```

```

if ($function) {
  if (/^/) {
    if (exists $API{$function->[0]}) {
      my @n = find_api($function->[1]);
      push @{$depends{$function->[0]}}, @n if @n
    }
    undef $function;
  }
  else {
    $function->[1] .= $_;
  }
}

$function = [$1, " ] if m{^DPPP_(my_(\w+))};

$replace = $1 if m{^s*$rccs\s+Replace:\s+(\d+)\s+$rcces*$};
$replace{$2} = $1 if $replace
and m{^s*#\s*define\s+(\w+)(?:\s*\s*)?\s+(\w+)};
$replace{$2} = $1 if m{^s*#\s*define\s+(\w+)(?:\s*\s*)?\s+(\w+).*rccs\s+Replace\s+$rcces};
$replace{$1} = $2 if m{^s*$rccs\s+Replace (\w+) with (\w+)\s+$rcces*$};

if (m{^s*$rccs\s+(\w+(s*,\s*\w+)*)\s+depends\s+on\s+(\w+(s*,\s*\w+)*)\s+$rcces*$}) {
  my @deps = map { s/\s+//g; $_ } split /\s/, $3;
  my $d;
  for $d (map { s/\s+//g; $_ } split /\s/, $1) {
    push @{$depends{$d}}, @deps;
  }
}

$need{$1} = 1 if m{^#\s+defined\((NEED_(\w+)(?:_GLOBAL)?)\)};
}

for (values %depends) {
  my %s;
  $_ = [sort grep !$s{$_}++, @$_];
}

if (exists $opt{'api-info'}) {
  my $f;
  my $count = 0;
  my $match = $opt{'api-info'} =~ m!^(.*)/$! ? $1 : "\Q$opt{'api-info'}\E\$";
  for $f (sort { lc $a cmp lc $b } keys %API) {
    next unless $f =~ /$match/;
    print "\n=== $f ===\n\n";
    my $info = 0;
    if ($API{$f}{base} || $API{$f}{todo}) {
      my $base = format_version($API{$f}{base} || $API{$f}{todo});
    }
  }
}

```



```

print "Supported at least starting from perl-$base.\n";
$info++;
}
if ($API{$f}{provided}) {
my $todo = $API{$f}{todo} ? format_version($API{$f}{todo}) : "5.003";
print "Support by $ppport provided back to perl-$todo.\n";
print "Support needs to be explicitly requested by NEED_$.f.\n" if exists $need{$f};
print "Depends on: ", join(', ', @{$depends{$f}}), ".\n" if exists $depends{$f};
print "\n$hints{$f}" if exists $hints{$f};
print "\nWARNING:\n$warnings{$f}" if exists $warnings{$f};
$info++;
}
print "No portability information available.\n" unless $info;
$count++;
}
$count or print "Found no API matching '$opt{'api-info'}'.";
print "\n";
exit 0;
}

```

```

if (exists $opt{'list-provided'}) {
my $f;
for $f (sort { lc $a cmp lc $b } keys %API) {
next unless $API{$f}{provided};
my @flags;
push @flags, 'explicit' if exists $need{$f};
push @flags, 'depend' if exists $depends{$f};
push @flags, 'hint'
if exists $hints{$f};
push @flags, 'warning' if exists $warnings{$f};
my $flags = @flags ? ' [' . join(', ', @flags) . '] : ";
print "$f$flags\n";
}
exit 0;
}

```

```

my @files;
my @srcext = qw( .xs .c .h .cc .cpp -c.inc -xs.inc );
my $srcext = join '|', map { quotemeta $_ } @srcext;

```

```

if (@ARGV) {
my %seen;
for (@ARGV) {
if (-e) {
if (-f) {
push @files, $_ unless $seen{$_}++;
}
else { warn "'$_' is not a file.\n" }
}
}
}

```

```

}
else {
  my @new = grep { -f } glob $_
  or warn "'$_' does not exist.\n";
  push @files, grep { !$seen{$_}++ } @new;
}
}
}
else {
eval {
  require File::Find;
  File::Find::find(sub {
    $File::Find::name =~ /($srcext)$/i
    and push @files, $File::Find::name;
  }, '.');
};
if ($@) {
  @files = map { glob ".*$_" } @srcext;
}
}

if (!@ARGV || $opt{filter}) {
  my(@in, @out);
  my %xsc = map { /(.*)\.xs$/ ? ("1.c" => 1, "1.cc" => 1) : () } @files;
  for (@files) {
    my $out = exists $xsc{$_} || /\bQ$ppport\E$/i || !/($srcext)$/i;
    push @{$out ? \@out : \@in }, $_;
  }
  if (@ARGV && @out) {
    warning("Skipping the following files (use --nofilter to avoid this):\n| ", join "\n| ", @out);
  }
  @files = @in;
}

die "No input files given!\n" unless @files;

my(%files, %global, %revreplace);
%revreplace = reverse %replace;
my $filename;
my $patch_opened = 0;

for $filename (@files) {
  unless (open IN, "<$filename") {
    warn "Unable to read from $filename: $!\n";
    next;
  }

  info("Scanning $filename ...");

```

```

my $c = do { local $/; <IN> };
close IN;

my %file = (orig => $c, changes => 0);

# Temporarily remove C/XS comments and strings from the code
my @ccom;

$c =~ s{
  ( ^$HS*#$HS*include\b[^\r\n]+\b(?:\Q$ppport\E|XSUB\.h)\b[^\r\n]*
  | ^$HS*#$HS*(?:define|elif|if(?:def?))\b[^\r\n]* )
| ( ^$HS*#[^\r\n]*
  | "[^"\\]*(?:\\.[^"\\])*"
  | '[^'\\]*(?:\\.[^'\\])*'
  | /(?:\*[^\*]*\*(?:\^[^$ccs][^\*]*\*+)* /|/[^\r\n]*
) )
}{ defined $2 and push @ccom, $2;
  defined $1 ? $1 : "$ccs$#ccom$cce" }mgsex;

$file{ccom} = \@ccom;
$file{code} = $c;
$file{has_inc_ppport} = $c =~ /^$HS*#$HS*include[^\r\n]+\b\Q$ppport\E\b/m;

my $func;

for $func (keys %API) {
  my $match = $func;
  $match .= "$$revreplace{$func}" if exists $revreplace{$func};
  if ($c =~ /\b(?:Perl_)?($match)\b/) {
    $file{uses_replace}{$1}++ if exists $revreplace{$func} && $1 eq $revreplace{$func};
    $file{uses_Perl}{$func}++ if $c =~ /\bPerl_{$func}\b/;
    if (exists $API{$func}{provided}) {
      $file{uses_provided}{$func}++;
      if (!exists $API{$func}{base} || $API{$func}{base} > $opt{'compat-version'}) {
        $file{uses}{$func}++;
        my @deps = rec_depend($func);
        if (@deps) {
          $file{uses_deps}{$func} = \@deps;
          for (@deps) {
            $file{uses}{$_} = 0 unless exists $file{uses}{$_};
          }
        }
      }
      for ($func, @deps) {
        $file{needs}{$_} = 'static' if exists $need{$_};
      }
    }
  }
}

```

```

}
if (exists $API{$func}{todo} && $API{$func}{todo} > $opt{'compat-version'}) {
  if ($c =~ /\b$func\b/) {
    $file{uses_todo}{$func}++;
  }
}
}
}

while ($c =~ /^$HS*#$HS*define$HS+(NEED_(\w+?)(_GLOBAL?))\b/mg) {
  if (exists $need{$2}) {
    $file{defined $3 ? 'needed_global' : 'needed_static'}{$2}++;
  }
  else { warning("Possibly wrong #define $1 in $filename") }
}

for (qw(uses needs uses_todo needed_global needed_static)) {
  for $func (keys % {$file{$_}}) {
    push @{$global{$_}{$func}}, $filename;
  }
}

$files{$filename} = \%file;
}

# Globally resolve NEED_'s
my $need;
for $need (keys % {$global{needs}}) {
  if (@{$global{needs}{$need}} > 1) {
    my @targets = @{$global{needs}{$need}};
    my @t = grep $files{$_}{needed_global}{$need}, @targets;
    @targets = @t if @t;
    @t = grep /\.xs$/i, @targets;
    @targets = @t if @t;
    my
$target = shift @targets;
    $files{$target}{needs}{$need} = 'global';
    for (@{$global{needs}{$need}}) {
      $files{$_}{needs}{$need} = 'extern' if $_ ne $target;
    }
  }
}

for $filename (@files) {
  exists $files{$filename} or next;

  info("=== Analyzing $filename ===");
}

```

```

my %file = %{$files{$filename}};
my $func;
my $c = $file{code};
my $warnings = 0;

for $func (sort keys %{$file{uses_Perl}}) {
  if ($API{$func}{varargs}) {
    unless ($API{$func}{nothxarg}) {
      my $changes = ($c =~ s{\b(Perl_$func\s*(\s*)(?!aTHX_?)()\[^\s]*\)}
        { $1 . ($2 eq ' ') ? 'aTHX' : 'aTHX_ ' ) . $2 }ge);
      if ($changes) {
        warning("Doesn't pass interpreter argument aTHX to Perl_$func");
        $file{changes} += $changes;
      }
    }
  }
  else {
    warning("Uses Perl_$func instead of $func");
    $file{changes} += ($c =~ s{\bPerl_$func(\s*)(\s*aTHX_?)?\s*}
      {$func$1{}g);
  }
}

for $func (sort keys %{$file{uses_replace}}) {
  warning("Uses $func instead of $replace{$func}");
  $file{changes} += ($c =~ s/\b$func\b/$replace{$func}/g);
}

for $func (sort keys %{$file{uses_provided}}) {
  if ($file{uses}{$func}) {
    if (exists $file{uses_deps}{$func}) {
      diag("Uses $func, which depends on ", join(', ', @{$file{uses_deps}{$func}}));
    }
    else {
      diag("Uses $func");
    }
  }
}
$warnings += hint($func);
}

unless ($opt{quiet}) {
  for $func (sort keys %{$file{uses_todo}}) {
    print "**** WARNING: Uses $func, which may not be portable below perl ",
      format_version($API{$func}{todo}), ", even with 'Sppport\n";
    $warnings++;
  }
}

```

```

for $func (sort keys %{$file{needed_static}}) {
  my $message = "";
  if (not exists $file{uses}{$func}) {
    $message = "No need to define NEED_$func if $func is never used";
  }
  elsif (exists $file{needs}{$func} && $file{needs}{$func} ne 'static') {
    $message = "No need to define NEED_$func when already needed globally";
  }
  if ($message) {
    diag($message);
    $file{changes} += ($c =~ s/^\$HS*#\$HS*define\$HS+NEED_$func\b.*$LF//mg);
  }
}

for $func (sort keys %{$file{needed_global}}) {
  my $message = "";
  if (not exists $global{uses}{$func}) {
    $message = "No need to define NEED_${func}_GLOBAL if $func is never used";
  }
  elsif (exists $file{needs}{$func}) {
    if ($file{needs}{$func} eq 'extern') {
      $message = "No need to define NEED_${func}_GLOBAL when already needed globally";
    }
    elsif ($file{needs}{$func} eq 'static') {
      $message = "No need to define NEED_${func}_GLOBAL when only used in this file";
    }
  }
  if ($message) {
    diag($message);
    $file{changes} += ($c =~ s/^\$HS*#\$HS*define\$HS+NEED_${func}_GLOBAL\b.*$LF//mg);
  }
}

$file{needs_inc_ppport} = keys %{$file{uses}};

if ($file{needs_inc_ppport}) {
  my $pp = "";

  for $func
(sort keys %{$file{needs}}) {
  my $type = $file{needs}{$func};
  next if $type eq 'extern';
  my $suffix = $type eq 'global' ? '_GLOBAL' : "";
  unless (exists $file{"needed_$type"}{$func}) {
    if ($type eq 'global') {
      diag("Files [@{$global{needs}{$func}}] need $func, adding global request");
    }
    else {

```

```

    diag("File needs $func, adding static request");
  }
  $pp .= "#define NEED_$func$suffix\n";
}
}

if ($pp && ($c =~ s/^(?=$HS*#$HS*define$HS+NEED_\w+)/$pp/m)) {
  $pp = "";
  $file{changes}++;
}

unless ($file{has_inc_ppport}) {
  diag("Needs to include '$ppport'");
  $pp .= qq(#include "$ppport"\n)
}

if ($pp) {
  $file{changes} += ($c =~ s/^(($HS*#$HS*define$HS+NEED_\w+.*?)/$1$pp/ms)
    || ($c =~ s/^(?=$HS*#$HS*include.*\Q$ppport\E)/$pp/m)
    || ($c =~ s/^(($HS*#$HS*include.*XSUB.*\s*)/s*/$1$pp/m)
    || ($c =~ s/^\$pp/);
}
}
else {
  if ($file{has_inc_ppport}) {
    diag("No need to include '$ppport'");
    $file{changes} += ($c =~ s/^\$HS*?#$HS*include.*\Q$ppport\E.*?$LF//m);
  }
}

# put back in our C comments
my $ix;
my $cpc = 0;
my @ccom = @{$file{ccom}};
for $ix (0 .. $#ccom) {
  if (!$opt{cplusplus} && $ccom[$ix] =~ s!^/!!) {
    $cpc++;
    $file{changes} += $c =~ s/$rccs$ix$rcce/$ccs$ccom[$ix] $cce/;
  }
  else {
    $c =~ s/$rccs$ix$rcce/$ccom[$ix]/;
  }
}

if ($cpc) {
  my $s = $cpc != 1 ? 's' : '';
  warning("Uses $cpc C++ style comment$s, which is not portable");
}

```

```

my $s = $warnings != 1 ? 's' : '';
my $warn = $warnings ? " ($warnings warning$s)" : "";
info("Analysis completed$warn");

if ($file{changes}) {
  if (exists $opt{copy}) {
    my $newfile = "$filename$opt{copy}";
    if (-e $newfile) {
      error("$newfile' already exists, refusing to write copy of '$filename'");
    }
    else {
      local
      *F;
      if (open F, ">$newfile") {
        info("Writing copy of '$filename' with changes to '$newfile'");
        print F $c;
        close F;
      }
      else {
        error("Cannot open '$newfile' for writing: $!");
      }
    }
  }
  elseif (exists $opt{patch} || $opt{changes}) {
    if (exists $opt{patch}) {
      unless ($patch_opened) {
        if (open PATCH, ">$opt{patch}") {
          $patch_opened = 1;
        }
        else {
          error("Cannot open '$opt{patch}' for writing: $!");
          delete $opt{patch};
          $opt{changes} = 1;
          goto fallback;
        }
      }
      mydiff(\*PATCH, $filename, $c);
    }
    else {
      fallback:
      info("Suggested changes:");
      mydiff(\*STDOUT, $filename, $c);
    }
  }
  else {
    my $s = $file{changes} == 1 ? '' : 's';
    info("$file{changes} potentially required change$s detected");
  }
}

```



```

    }
  }
  else {
    info("Looks good");
  }
}

close
PATCH if $patch_opened;

exit 0;

sub try_use { eval "use @_;"; return "$@" eq " }

sub mydiff
{
  local *F = shift;
  my($file, $str) = @_;
  my $diff;

  if (exists $opt{diff}) {
    $diff = run_diff($opt{diff}, $file, $str);
  }

  if (!defined $diff and try_use("Text::Diff")) {
    $diff = Text::Diff::diff($file, \$str, { STYLE => 'Unified' });
    $diff = <<HEADER . $diff;
    --- $file
    +++ $file.patched
    HEADER
  }

  if (!defined $diff) {
    $diff = run_diff('diff -u', $file, $str);
  }

  if (!defined $diff) {
    $diff = run_diff('diff', $file, $str);
  }

  if (!defined $diff) {
    error("Cannot generate a diff. Please install Text::Diff or use --copy.");
    return;
  }

  print F $diff;
}

```

```

sub run_diff
{
my($prog, $file, $str) = @_;
my $tmp = 'dppptemp';
my $suf = 'aaa';
my $diff = "";
local *F;

while (-e "$tmp.$suf") { $suf++ }
$tmp = "$tmp.$suf";

if (open F, ">$tmp") {
print F $str;
close F;

if (open F, "$prog $file $tmp |") {
while (<F>)
{
s/^Q$tmp\E/$file.patched/;
$diff .= $_;
}
close F;
unlink $tmp;
return $diff;
}

unlink $tmp;
}
else {
error("Cannot open '$tmp' for writing: $!");
}

return undef;
}

sub rec_depend
{
my($func, $seen) = @_;
return () unless exists $depends{$func};
$seen = {%{$seen|{}}};
return () if $seen->{$func}++;
my %s;
grep !${$_}++, map { ($_, rec_depend($_, $seen)) } @{$depends{$func}};
}

sub parse_version
{

```

```

my $ver = shift;

if ($ver =~ /^(d+)\.(d+)\.(d+)$/) {
    return ($1, $2, $3);
}
elsif ($ver !~ /^(d+)\.[d_]+$/) {
    die "cannot parse version '$ver'\n";
}

$ver =~ s/_//g;
$ver =~ s/$/000000/;

my($r,$v,$s) = $ver =~ /(\d+)\.(\d{3})(\d{3})/;

$v = int $v;
$s = int $s;

if ($r < 5 || ($r == 5 && $v < 6)) {
    if ($s % 10) {
        die "cannot parse version '$ver'\n";
    }
}

return ($r, $v, $s);
}

sub format_version
{
    my $ver = shift;

    $ver =~ s/$/000000/;
    my($r,$v,$s) =
    $ver =~ /(\d+)\.(\d{3})(\d{3})/;

    $v = int $v;
    $s = int $s;

    if ($r < 5 || ($r == 5 && $v < 6)) {
        if ($s % 10) {
            die "invalid version '$ver'\n";
        }
        $s /= 10;

        $ver = sprintf "%d.%03d", $r, $v;
        $s > 0 and $ver .= sprintf "_%02d", $s;

        return $ver;
    }
}

```

```

return sprintf "%d.%d.%d", $r, $v, $s;
}

sub info
{
    $opt{quiet} and return;
    print @_, "\n";
}

sub diag
{
    $opt{quiet} and return;
    $opt{diag} and print @_, "\n";
}

sub warning
{
    $opt{quiet} and return;
    print "*** ", @_, "\n";
}

sub error
{
    print "*** ERROR: ", @_, "\n";
}

my %given_hints;
my %given_warnings;
sub hint
{
    $opt{quiet} and return;
    my $func = shift;
    my $rv = 0;
    if (exists $warnings{$func} && !$given_warnings{$func}++) {
        my $warn = $warnings{$func};
        $warn =~ s/^\!*** !mg;
        print "*** WARNING: $func\n", $warn;
        $rv++;
    }
    if ($opt{hints} && exists $hints{$func} && !$given_hints{$func}++) {
        my $hint = $hints{$func};
        $hint =~ s/^\ /mg;
        print
        " --- hint for $func ---\n", $hint;
    }
    $rv;
}

```

```

sub usage
{
my($usage) = do { local(@ARGV,$/)=($0); <> } =~ /^=head\d$HS+SYNOPSIS\s*^(.*?)\s*^=/ms;
my %M = ( 'T' => '*' );
$usage =~ s/^\s*perl\s+\S+/$^X $0/;
$usage =~ s/([A-Z])<([>]+)>/M{$1}$2M{$1}/g;

```

```
print <<ENDUSAGE;
```

Usage: \$usage

See perldoc \$0 for details.

ENDUSAGE

```

exit 2;
}

```

```
sub strip
```

```

{
my $self = do { local(@ARGV,$/)=($0); <> };
my($copy) = $self =~ /^=head\d\s+COPYRIGHT\s*^(.*?)^=\w+/ms;
$copy =~ s/^(?=\S+)/ /gms;
$self =~ s/^\$HS+Do NOT edit.*?(?=-)/$copy/ms;
$self =~ s/^\$SKIP.*(?:=__DATA__)/SKIP
if (\@ARGV && $ARGV[0] eq '--unstrip') {
eval { require Devel::PPPport };
\$_@ and die "Cannot require Devel::PPPport, please install.\n";
if (eval $Devel::PPPport::VERSION < $VERSION) {
die "$0 was originally generated with Devel::PPPport $VERSION.\n"
. "Your Devel::PPPport is only version $Devel::PPPport::VERSION.\n"
. "Please install a newer version, or --unstrip will not work.\n";
}
Devel::PPPport::WriteFile(\$0);
exit 0;
}
print <<END;

```

Sorry, but this is a stripped version of \\$0.

To be able to use its original script and doc functionality,
please try to regenerate this file using:

```
\$X \$0 --unstrip
```

END

```
/ms;
```

```

my($pl, $c) = $self =~ /(.*^__DATA__)(.*)/ms;
$c =~ s{
  /(?: \^[^*]*\*(?:\^[^$ccs][^*]*\*)* /|/^\r\n)*
| ("^\\"*(?:\.[^\\"]*)"
| '^\\"*(?:\.[^\\"]*)' )
| ($HS+) }{ defined $2 ? ' ' : ($1 || " ) }gsex;
$c =~ s!\s+#!mg;
$c =~ s!$LF#!mg;
$c =~ s!\s*#\s*#!mg;
$c =~ s!\s+#!mg;

```

```

open OUT, ">$0" or die "cannot strip $0: $!\n";
print OUT "$pl$c\n";

```

```

exit 0;
}

```

```

__DATA__
*/

```

Found in path(s):

```

* /opt/cola/permits/1402400313_1661783000.2195435/0/libterm-readkey-perl-2-38-orig-1-tar-gz/TermReadKey-2.38/ppport.h

```

No license file was found, but licenses were detected in source scan.

abstract: 'Change terminal modes, and perform non-blocking reads.'

author:

- 'Kenneth Albanowski'
- 'Jonathan Stowe'

build_requires:

ExtUtils::MakeMaker: '6.58'

configure_requires:

ExtUtils::MakeMaker: '6.58'

dynamic_config: 1

generated_by: 'ExtUtils::MakeMaker version 7.34, CPAN::Meta::Converter version 2.150010'

license: perl

meta-spec:

url: <http://module-build.sourceforge.net/META-spec-v1.4.html>

version: '1.4'

name: TermReadKey

no_index:

file:

- Configure.pm

package:

- Configure

provides:

Term::ReadKey:

file: ReadKey.pm.PL
version: '2.38'
resources:
repository: <https://github.com/jonathanstowe/TermReadKey.git>
version: '2.38'
x_serialization_backend: 'CPAN::Meta::YAML version 0.018'

Found in path(s):

* /opt/cola/permits/1402400313_1661783000.2195435/0/libterm-readkey-perl-2-38-orig-1-tar-gz/TermReadKey-2.38/META.yml

1.153 libhttp-message-perl 6.36-1

1.153.1 Available under license :

HTTP-MESSAGE CONTRIBUTORS

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```
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```

```
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```

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```

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```

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```
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```

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```
Yoyodyne, Inc., hereby disclaims all
```

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1.154 libclone-perl 0.45-1build3

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Found in path(s):

* /opt/cola/permits/1402400233_1661782994.3091583/0/libclone-perl-0-45-orig-tar-gz/Clone-0.45/README.md

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;
under the same terms as Perl itself.

Found in path(s):

* /opt/cola/permits/1402400233_1661782994.3091583/0/libclone-perl-0-45-orig-tar-gz/Clone-0.45/t/dump.pl

No license file was found, but licenses were detected in source scan.

=head1 NAME

Clone - recursively copy Perl datatypes

=for html

```
<a href="https://travis-ci.org/garu/Clone"></a>
<a href="https://coveralls.io/r/garu/Clone?branch=master"></a>
<a href="https://metacpan.org/pod/Clone"></a>
```

=head1 SYNOPSIS

```
use Clone 'clone';

my $data = {
    set => [ 1 .. 50 ],
    foo => {
        answer => 42,
        object => SomeObject->new,
    },
};

my $cloned_data = clone($data);

$cloned_data->{foo}{answer} = 1;
print $cloned_data->{foo}{answer}; # '1'
print $data->{foo}{answer};      # '42'
```

You can also add it to your class:

```
package Foo;
use parent 'Clone';
sub new { bless {}, shift }

package
main;

my $obj = Foo->new;
my $copy = $obj->clone;
```

=head1 DESCRIPTION

This module provides a `C<clone()>` method which makes recursive copies of nested hash, array, scalar and reference types, including tied variables and objects.

`C<clone()>` takes a scalar argument and duplicates it. To duplicate lists, arrays or hashes, pass them in by reference, e.g.

```
my $copy = clone (\@array);
```

```
# or
```

```
my %copy = %{ clone (\%hash) };
```

=head1 SEE ALSO

L<Storable>'s C<dclone()> is a flexible solution for cloning variables, albeit slower for average-sized data structures. Simple and naive benchmarks show that Clone is faster for data structures with 3 or fewer levels, while C<dclone()> can be faster for structures 4 or more levels deep.

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=head1 AUTHOR

Ray Finch C<< <rdf@cpan.org> >>

Breno G. de Oliveira

C<< <garu@cpan.org> >> and

Florian Ragwitz C<< <rafl@debian.org> >> perform routine maintenance releases since 2012.

=cut

Found in path(s):

```
* /opt/cola/permits/1402400233_1661782994.3091583/0/libclone-perl-0-45-orig-tar-gz/Clone-0.45/Clone.pm
```

No license file was found, but licenses were detected in source scan.

Revision history for Perl module Clone

0.45 2020-04-23 14:46:00 atomic

- bump B::COW requirement to fix big-endian issue

0.44 2020-04-20 11:30:00 atomic

- support Perls with COW disabled (plicease)

- bump B::COW requirement for testing

0.43 2019-07-29 13:47:42 atomic

- fix an issue when cloning a NULL mg_ptr pointer

- 0.42 2019-07-19 23:06:04 garu
- make handling of mg_ptr safer (ATOOMIC, Harald Jörg)
 - change license wording on some test files to make the entire dist released under the same terms as Perl itself (fixes GH#20) (GARU)
- 0.41 2018-10-25 10:20:03 garu
- Check the CowREFCNT of a COWed PV (ATOOMIC) this should fix some issues people have been having with 0.40 on DBD drives and DBIx::Class
 - Make buildtools files not executable (Mohammad S Anwar)
 - Move bugtracker to Github (GARU)
- 0.40 2018-10-23 20:00:49 garu
- reuse COWed PV when cloning (fixes RT97535) (ATOOMIC)
 - extra protection against potential infinite loop (ATOOMIC)
 - improved tests
- 0.39 2017-04-07 13:06:00 garu
- use explicit '.' in tests since it may not be in @INC anymore in newer perls (fixes RT120648) (PLICEASE, SIMCOP)
- 0.38 2015-01-18 19:27:41 garu
- typo fixes and improvements to the README (zmughal)
 - travis/coveralls integration (zmughal)
- 0.37 2014-05-15 16:45:33 garu
- removed Carp dependency (GARU)
 - silenced some clang warnings (JACQUESG)
 - added a README (GARU)
- 0.36 2013-12-07 17:36:04 garu
- fixed compilation issue on AIX and C89 (GAAS)
- 0.35 2013-09-05 13:26:54 garu
- SV's can be NULL (shit happens) (fixes RT86217) (HMBRAND)
 - making tests compatible with older versions of Test::More (GARU)
- 0.34 2012-12-09 14:46:09 garu
- making some tests optional (fixes RT81774) (GARU)
 - modernizing synopsis (GARU)
- 0.33 2012-11-24 11:37:22 garu
- fix typo in croak message (Salvatore Bonaccorso)
- 0.32 2012-11-22 12:14:07 garu
- Stop skipping

SvROK handling for all magical scalars. This fixes

- RT issues 67105, 79730 and 80201 (FLORA).
- making the Changes file compliant to the CPAN::Changes spec (GARU).
- Fixing tests when Scalar::Util::weaken is not available. As a result, tests should now pass even in odd OpenBSD versions (GARU).
- removed dubious documentation on the optional parameter until it is 'fixed'. Right now it just increases the refcount when it's 0, and clones otherwise (which isn't exactly what it says). This fixes RT issue 57773 (GARU).
- updated remark on Storable's dclone() to address RT issue 50174 (GARU)
- updated Makefile.PL to include test dependencies (GARU)

0.31 2009-01-20 04:54:37 ray

- Made changes for build failure on Solaris, apparently compiler warnings from the last patch are errors in Solaris.
- Also, brought Changes file up to date.

0.30 2008-12-14 03:33:14 ray

- Updating log: Applied patches from RT # 40957 and #41551.

0.29 2008-12-14 03:32:41

ray

- Updating log: Applied patches supplied by Andreas Koenig, see RT #34317.

0.28 2008-12-14 03:31:33 ray

- Updating log: Made a change in CLONE_KEY to the way Clone stores refs in the ref hash.
- Perl no longer uses the SvANY part of the SV struct in the same way which means the old way of storing the hash key is no longer unique.
- Thanks to Slaven Rezic for the patch.

0.27 2008-12-14 03:30:40 ray

- Updating Log: Latest patch from Ruslan Zakirov. Patched another memory leak.

0.26 2007-10-15 04:52:42 ray

- Made a change in CLONE_KEY to the way Clone stores refs in the ref hash.
- Perl no longer uses the SvANY part of the SV struct in the same way which means the old way of storing the hash key is no longer unique.
- Thanks to Slaven Rezic for the patch.

0.25 2007-07-25 03:41:04 ray

- Latest patch from Ruslan Zakirov. Patched another memory leak.

0.24 2007-07-25 03:33:57 ray

- Bug fix for 5.9.*, for some reason the 'visible' logic is no longer working. I #if 'ed it out until I figure out what is going on.

- Also removed an old redundant CLONE_STORE, could have been the cause of some memory leaks.

0.23 2007-04-20 05:40:27 ray

- Applied patch so clone will continue to work with newer perls.
- Also fixed test to work with older perls.

0.22 2006-10-08 05:35:19 ray

- D'oh! The 0.21 tarball that I just uploaded to CPAN contained the 0.20 Clone.xs file. This release is just in case any of the 0.21 releases get mirrored.

0.21 2006-10-08 04:02:56 ray

- Clone was segfaulting due to a null SV object in a magical reference (a PERL_MAGIC_utf8).
- 21859: Clone segfault (isolated example)

0.20 2006-03-08 17:15:23 ray

- Commented out VERSION causes errors with DynaLoader in perl 5.6.1 (and probably all earlier versions. It was removed.

0.19 2006-03-06 07:22:32 ray

- added a test and fix for tainted variables.
- use a static VERSION in Clone.pm.

0.18 2005-05-23 15:34:31

ray

- moved declaration to top of function, M\$ (and other) C compilers choke.

0.17 2005-05-05 22:26:01 ray

- Changed PERL_MAGIC_backref to '<' for compatibility with 5.6

0.16 2005-04-20 15:49:35 ray

- Bug fix for id 11997, "Clone dies horribly when Scalar::Util::weaken is around" see <http://rt.cpan.org/Ticket/Display.html?id=11997> for details.

0.15.2.1 2005-05-05 21:55:30 ray

- changed PERL_MAGIC_backref to '<' for backward compatibility with 5.6

0.15 2003-09-07 22:02:35 ray

- VERSION 0.15

0.13.2.3 2003-09-07 21:51:03 ray

- added support for unicode hash keys. This is only really a bug in 5.8.0 and the test in t/03scalar supports this.

0.14 2003-09-07 05:48:10 ray

- VERSION 0.14

0.13.2.2 2003-09-07 05:45:52 ray

- bug fix: refs to a qr (regex) expression was causing a segfault.

0.13.2.1 2003-09-06 20:18:37 ray

- Bug fix on cloning references, only set ROK in clone if it's set in ref.

0.13 2002-02-03 02:12:29 ray

- VERSION 0.13

0.11.2.1

2002-02-03 02:10:30 ray

- removed dependency on Storable for tests.

0.12 2001-09-30 20:35:27 ray

- Version 0.12 release.

0.11 2001-07-29 19:30:27 ray

- VERSION 0.11

0.10.2.3 2001-07-28 21:53:03 ray

- fixed memory leaks on un-blessed references.

0.10.2.2 2001-07-28 21:52:41 ray

- added test cases for circular reference bugs and memory leaks.

0.10.2.1 2001-07-28 21:52:15 ray

- fixed circular reference bugs.

0.10 2001-04-29 21:48:45 ray

- VERSION 0.10

0.09.2.3 2001-03-11 00:54:41 ray

- change call to rv_clone in clone to sv_clone; this allows any scalar to be cloned.

0.09.2.2 2001-03-11 00:50:01 ray

- version 0.09.3: cleaned up code, consolidated MAGIC.

0.09.2.1 2001-03-05 16:01:52 ray

- added support for double-types.

0.09 2000-08-21 23:05:55 ray

- added support for code refs

0.08 2000-08-11 17:08:24 ray

- Release 0.08.

0.07 2000-08-01 00:31:24 ray

- release 0.07.

0.06.2.3 2000-07-28 20:40:25 ray

- added

support for circular references

0.06.2.2 2000-07-28 19:04:14 ray

- first pass at circular references.

0.06.2.1 2000-07-28 18:54:33 ray

- added support for scalar types.

0.06 Thu May 25 17:48:59 2000 GMT

- initial release to CPAN.

0.01 Tue May 16 08:55:10 2000

- original version; created by h2xs 1.19

Found in path(s):

* /opt/cola/permits/1402400233_1661782994.3091583/0/libclone-perl-0-45-orig-tar-gz/Clone-0.45/Changes

No license file was found, but licenses were detected in source scan.

under the same terms as Perl itself.

Found in path(s):

* /opt/cola/permits/1402400233_1661782994.3091583/0/libclone-perl-0-45-orig-tar-gz/Clone-0.45/t/dclone.t

* /opt/cola/permits/1402400233_1661782994.3091583/0/libclone-perl-0-45-orig-tar-gz/Clone-0.45/t/tied.pl

No license file was found, but licenses were detected in source scan.

abstract: 'recursively copy Perl datatypes'

author:

- 'Ray Finch <rdf@cpan.org>'

build_requires:

B::COW: '0.004'

ExtUtils::MakeMaker: '0'

Test::More: '0'

configure_requires:

ExtUtils::MakeMaker: '0'

dynamic_config: 1

generated_by: 'ExtUtils::MakeMaker version 7.44, CPAN::Meta::Converter version 2.150010'

license: perl

meta-spec:

url: <http://module-build.sourceforge.net/META-spec-v1.4.html>

version: '1.4'

name: Clone

no_index:
directory:
- t
- inc
resources:
bugtracker: <https://github.com/garu/Clone/issues>
license: <http://dev.perl.org/licenses/>
repository: <http://github.com/garu/Clone>
version: '0.45'
x_serialization_backend: 'CPAN::Meta::YAML version 0.018'

Found in path(s):

* /opt/cola/permits/1402400233_1661782994.3091583/0/libclone-perl-0-45-orig-tar-gz/Clone-0.45/META.yml

1.155 libsigsegv 2.13-1ubuntu3

1.155.1 Available under license :

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Version 2, June 1991

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```
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```

```
<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
```

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1.156 gawk 5.1.0-1build3

1.156.1 Available under license :

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Version 2, June 1991

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The reason we have a separate public license for some libraries is that they blur the distinction we usually make between modifying or adding to a program and simply using it. Linking a program with a library, without changing the library, is in some sense simply using the library, and is analogous to running a utility program or application program. However, in a textual and legal sense, the linked executable is a combined work, a derivative of the original library, and the ordinary General Public License treats it as such.

Because of this blurred distinction, using the ordinary General Public License for libraries did not effectively promote software sharing, because most developers did not use the libraries. We concluded that weaker conditions might promote sharing better.

However, unrestricted linking of non-free programs would deprive the users of those programs of all benefit from the free status of the libraries themselves. This Library General Public License is intended to permit developers of non-free programs to use free libraries, while preserving your freedom as a user of such programs to change the free libraries that are incorporated in them. (We have not seen how to achieve this as regards changes in header files, but we have achieved it as regards changes in the actual functions of the Library.) The hope is that this will lead to faster development of free libraries.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, while the latter only

works together with the library.

Note that it is possible for a library to be covered by the ordinary General Public License rather than by this special one.

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0. This License Agreement applies to any software library which contains a notice placed by the copyright holder or other authorized party saying it may be distributed under the terms of this Library General Public License (also called "this License"). Each licensee is addressed as "you".

A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

1. You may copy and distribute verbatim copies of the Library's complete source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and distribute a copy of this License along with the

Library.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

a) The modified work must itself be a software library.

b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.

c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.

d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must

be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest

your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition,

mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.

Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of the

Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library

creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also compile or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

- a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified

executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

- b) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.
- c) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.
- d) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

7. You may place library facilities that are a work based on the Library side-by-side in a single library together with other library facilities not covered by this License, and distribute such a combined library, provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise permitted, and provided that you do these two things:

- a) Accompany the combined library with a copy of the same work based on the Library, uncombined with any other library facilities. This must be distributed under the terms of the Sections above.
- b) Give prominent notice with the combined library of the fact that part of it is a work based on the

Library, and explaining

where to find the accompanying uncombined form of the same work.

8. You may not copy, modify, sublicense, link with, or distribute the Library except as expressly provided under this License. Any attempt otherwise to copy, modify, sublicense, link with, or distribute the Library is void, and will automatically terminate your rights under this License. However, parties who have received copies, or rights, from you under this License will not have their licenses terminated so long as such parties remain in full compliance.

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If any portion of this section is held invalid or unenforceable under any particular circumstance, the balance of the section is intended to apply, and the section as a whole is intended to apply in other circumstances.

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patents or other property right claims or to contest validity of any such claims; this section has the sole purpose of protecting the integrity of the free software distribution system which is implemented by public license practices. Many people have made generous contributions to the wide range of software distributed through that system in reliance on consistent application of that system;

it is up to the author/donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice.

This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License.

12. If the distribution and/or use of the Library is restricted in certain countries either by patents or by copyrighted interfaces, the original copyright holder who places the Library under this License may add an explicit geographical distribution limitation excluding those countries, so that distribution is permitted only in or among countries not thus excluded. In such case, this License incorporates the limitation as if written in the body of this License.

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Each

version is given a distinguishing version number. If the Library specifies a version number of this License which applies to it and "any later version", you have the option of following the terms and conditions either of that version or of any later version published by the Free Software Foundation. If the Library does not specify a license version number, you may choose any version ever published by the Free Software Foundation.

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END OF TERMS AND CONDITIONS

Appendix: How to Apply These Terms to Your New Libraries

If you develop a new library, and you want it to be of the greatest possible use to the public, we recommend making it free software that everyone can redistribute and change. You can do so by permitting redistribution under these terms (or, alternatively, under the terms of the ordinary General Public License).

To apply these terms, attach the following notices to the library. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

<one line to give the library's name and a brief idea of what it does.>
Copyright (C) <year>
<name of author>

This library is free software; you can redistribute it and/or modify it under the terms of the GNU Library General Public License as published by the Free Software Foundation; either version 2 of the License, or (at your option) any later version.

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You should have received a copy of the GNU Library General Public License along with this library; if not, write to the Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor, Boston, MA 02110-1301, USA

Also add information on how to contact you by electronic and paper mail.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a "copyright disclaimer" for the library, if necessary.

Here is a sample; alter the names:

Yoyodyne, Inc., hereby disclaims all copyright interest in the library `Frob' (a library for tweaking knobs) written by James Random Hacker.

<signature of Ty Coon>, 1 April 1990
Ty Coon, President of Vice

That's all there is to it!

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Version 3, 29 June 2007

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When we speak of free software, we are referring to freedom, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for them if you wish), that you receive source code or can get it if you

want it, that you can change the software or use pieces of it in new free programs, and that you know you can do these things.

To protect your rights, we need to prevent others from denying you these rights or asking you to surrender the rights. Therefore, you have certain responsibilities if you distribute copies of the software, or if you modify it: responsibilities to respect the freedom of others.

For example, if you distribute copies of such a program, whether gratis or for a fee, you must pass on to the recipients the same freedoms that you received. You must make sure that they, too, receive or can get the source code. And you must show them these terms so they know their rights.

Developers that use the GNU GPL protect your rights with two steps:

(1)

assert copyright on the software, and (2) offer you this License giving you legal permission to copy, distribute and/or modify it.

For the developers' and authors' protection, the GPL clearly explains that there is no warranty for this free software. For both users' and authors' sake, the GPL requires that modified versions be marked as changed, so that their problems will not be attributed erroneously to authors of previous versions.

Some devices are designed to deny users access to install or run modified versions of the software inside them, although the manufacturer can do so. This is fundamentally incompatible with the aim of protecting users' freedom to change the software. The systematic pattern of such abuse occurs in the area of products for individuals to use, which is precisely where it is most unacceptable. Therefore, we have designed this version of the GPL to prohibit the practice for those products. If such problems arise substantially in other domains, we stand ready to extend this provision to those domains in future versions of the GPL, as needed to protect the freedom of users.

Finally, every program is threatened constantly by software patents. States should not allow patents to restrict development and use of software on general-purpose computers, but in those that do, we wish to avoid the special danger that patents applied to a free program could make it effectively proprietary. To prevent this, the GPL assures that patents cannot be used to render the program non-free.

The precise terms and conditions for copying, distribution and modification follow.

TERMS AND CONDITIONS

0. Definitions.

"This License" refers to version 3 of the GNU General Public License.

"Copyright" also means copyright-like laws that apply to other kinds of works, such as semiconductor masks.

"The Program" refers to any copyrightable work licensed under this License. Each licensee is addressed as "you". "Licensees" and "recipients" may be individuals or organizations.

To "modify" a work means to copy from or adapt all or part of the work in a fashion requiring copyright permission, other than the making of an exact copy. The resulting work is called a "modified version" of the earlier work or a work "based on" the earlier work.

A "covered work" means either the unmodified Program or a work based on the Program.

To "propagate" a work means to do anything with it that, without permission, would make you directly or secondarily liable for infringement under applicable copyright law, except executing it on a computer or modifying a private copy. Propagation includes copying, distribution (with or without modification), making available to the public, and in some countries other activities as well.

To "convey" a work means any kind of propagation that enables other parties to make or receive copies. Mere interaction with a user through a computer network, with no transfer of a copy, is not conveying.

An interactive user interface displays "Appropriate Legal Notices" to the extent that it includes a convenient and prominently visible feature that (1) displays an appropriate copyright notice, and (2) tells the user that there is no warranty for the work (except to the extent that warranties are provided), that licensees may convey the work under this License, and how to view a copy of this License. If the interface presents a list of user commands or options, such as a menu, a prominent item in the list meets this criterion.

1. Source Code.

The "source code" for a work means the preferred form of the work for making modifications to it. "Object code" means any non-source form of a work.

A "Standard Interface" means an interface that either is an official standard defined by a recognized standards body, or, in the case of interfaces specified for a particular programming language, one that is widely used among developers working in that language.

The

"System Libraries" of an executable work include anything, other than the work as a whole, that (a) is included in the normal form of packaging a Major Component, but which is not part of that Major Component, and (b) serves only to enable use of the work with that Major Component, or to implement a Standard Interface for which an implementation is available to the public in source code form. A "Major Component", in this context, means a major essential component (kernel, window system, and so on) of the specific operating system (if any) on which the executable work runs, or a compiler used to produce the work, or an object code interpreter used to run it.

The "Corresponding Source" for a work in object code form means all the source code needed to generate, install, and (for an executable work) run the object code and to modify the work, including scripts to control those activities. However, it does not include the work's System Libraries, or general-purpose tools or generally available free programs which are used unmodified in performing those activities but which are not part of the work. For example, Corresponding Source includes interface definition files associated with source files for the work, and the source code for shared libraries and dynamically linked subprograms that the work is specifically designed to require, such as by intimate data communication or control flow between those subprograms and other parts of the work.

The Corresponding Source need not include anything that users can regenerate automatically from other parts of the Corresponding Source.

The Corresponding Source for a work in source code form is that same work.

2. Basic Permissions.

All rights granted under this License are granted for the term of copyright on the Program, and are irrevocable provided the stated conditions are met. This License explicitly affirms your unlimited permission to run the unmodified Program. The output from running a covered work is covered

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You may make, run and propagate covered works that you do not convey, without conditions so long as your license otherwise remains in force. You may convey covered works to others for the sole purpose of having them make modifications exclusively for you, or provide you with facilities for running those works, provided that you comply with the terms of this License in conveying all material for which you do not control copyright. Those thus making or running the covered works for you must do so exclusively on your behalf, under your direction and control, on terms that prohibit them from making any copies of your copyrighted material outside their relationship with you.

Conveying under any other circumstances is permitted solely under the conditions stated below. Sublicensing is not allowed; section 10 makes it unnecessary.

3. Protecting Users' Legal Rights From Anti-Circumvention Law.

No covered work shall be deemed part of an effective technological measure under any applicable law fulfilling obligations under article 11 of the WIPO copyright treaty adopted on 20 December 1996, or similar laws prohibiting or restricting circumvention of such measures.

When you convey a covered work, you waive any legal power to forbid circumvention of technological measures to the extent such circumvention is effected by exercising rights under this License with respect to the covered work, and you disclaim any intention to limit operation or modification of the work as a means of enforcing, against the work's users, your or third parties' legal rights to forbid circumvention of technological measures.

4. Conveying Verbatim Copies.

You may convey verbatim copies of the Program's source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice; keep intact all notices stating that this License and any non-permissive terms added in accord with section 7 apply to the code; keep intact all notices of the absence of any warranty; and give all recipients a copy of this License along with the Program.

You may charge any price or no price for each copy that you convey, and you may offer support or warranty protection for a fee.

5. Conveying Modified Source Versions.

You may convey a work based on the Program, or the modifications to produce it from the Program, in the form of source code under the terms of section 4, provided that you also meet all of these conditions:

- a) The work must carry prominent notices stating that you modified it, and giving a relevant date.
- b) The work must carry prominent notices stating that it is released under this License and any conditions added under section 7. This requirement modifies the requirement in section 4 to "keep intact all notices".
- c) You must license the entire work, as a whole, under this License to anyone who comes into possession of a copy. This License will therefore apply, along with any applicable section 7 additional terms, to the whole of the work, and all its parts, regardless of how they are packaged. This License gives no permission to license the work in any other way, but it does not invalidate such permission if you have separately received it.
- d) If the work has interactive user interfaces, each must display Appropriate Legal Notices; however, if the Program has interactive interfaces that do not display Appropriate Legal Notices, your work need not make them do so.

A compilation of a covered work with other separate and independent works, which are not by their nature extensions of the covered work, and which are not combined with it such as to form a larger program, in or on a volume of a storage or distribution medium, is called an "aggregate" if the compilation and its resulting copyright are not used to limit the access or legal rights of the compilation's users beyond what the individual works permit. Inclusion of a covered work in an aggregate does not cause this License to apply to the other parts of the aggregate.

6. Conveying Non-Source Forms.

You may convey a covered work in object code form under the terms of sections 4 and 5, provided that you also convey the machine-readable Corresponding Source under the terms of this License, in one of these ways:

- a) Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by the Corresponding Source fixed on a durable physical medium

customarily used for software interchange.

b) Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by a written offer, valid for at least three years

and valid for as

long as you offer spare parts or customer support for that product model, to give anyone who possesses the object code either (1) a copy of the Corresponding Source for all the software in the product that is covered by this License, on a durable physical medium customarily used for software interchange, for a price no more than your reasonable cost of physically performing this conveying of source, or (2) access to copy the Corresponding Source from a network server at no charge.

c) Convey individual copies of the object code with a copy of the written offer to provide the Corresponding Source. This alternative is allowed only occasionally and noncommercially, and only if you received the object code with such an offer, in accord with subsection 6b.

d) Convey the object code by offering access from a designated place (gratis or for a charge), and offer equivalent access to the Corresponding Source in the same way through the same place at no further charge. You need not require recipients to copy the Corresponding Source along with the object code. If the place to copy the object code is a network server, the Corresponding Source may be on a different server (operated by you or a third party) that supports equivalent copying facilities, provided you maintain clear directions next to the object code saying where to find the Corresponding Source. Regardless of what server hosts the Corresponding Source, you remain obligated to ensure that it is available for as long as needed to satisfy these requirements.

e) Convey the object code using peer-to-peer transmission, provided you inform other peers where the object code and Corresponding Source of the work are being offered to the general public at no charge under subsection 6d.

A separable portion of the object code, whose source code is excluded from the Corresponding Source as a System Library, need not be included in conveying the object code work.

A "User Product" is either (1) a "consumer product", which means any tangible personal property which is normally used for personal, family, or household purposes, or (2) anything designed or sold for incorporation

into a dwelling. In determining whether a product is a consumer product, doubtful cases shall be resolved in favor of coverage. For a particular product received by a particular user, "normally used" refers to a typical or common use of that class of product, regardless of the status of the particular user or of the way in which the particular user actually uses, or expects or is expected to use, the product. A product is a consumer product regardless of whether the product has substantial commercial, industrial or non-consumer uses, unless such uses represent the only significant mode of use of the product.

"Installation Information" for a User Product means any methods, procedures, authorization keys, or other information required to install and execute modified versions of a covered work in that User Product from a modified version of its Corresponding Source. The information must suffice to ensure that the continued functioning of the modified object code is in no case prevented or interfered with solely because modification has been made.

If you convey an object code work under this section in, or with, or specifically for use in, a User Product, and the conveying occurs as part of a transaction in which the right of possession and use of the User Product is transferred to the recipient in perpetuity or for a fixed term (regardless of how the transaction is characterized), the Corresponding Source conveyed under this section must be accompanied by the Installation Information. But this requirement does not apply if neither you nor any third party retains the ability to install modified object code on the User Product (for example, the work has been installed in ROM).

The requirement to provide Installation Information does not include a requirement to continue to provide support service, warranty, or updates for a work that has been modified or installed by the recipient, or for the User Product in which it has been modified or installed. Access to a network may be denied when the modification itself materially and adversely affects the operation of the network or violates the rules and protocols for communication across the network.

Corresponding Source conveyed, and Installation Information provided, in accord with this section must be in a format that is publicly documented (and with an implementation available to the public in source code form), and must require no special password or key for unpacking, reading or copying.

7. Additional Terms.

"Additional permissions" are terms that supplement the terms of this

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1.157 kmod 29-1ubuntu1

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```

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```
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```

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1.159 popt 1.18-3build1

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1.162 fcgi 2.4.2-2build2

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1.164 open-ldap 2.5.13+dfsg-0ubuntu0.22.04.1

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* /opt/cola/permits/1411214203_1665121727.5478497/0/cron-3-0pl1-orig-tar-gz/cron-3.0pl1.orig/cron.8
* /opt/cola/permits/1411214203_1665121727.5478497/0/cron-3-0pl1-orig-tar-gz/cron-3.0pl1.orig/crontab.1
* /opt/cola/permits/1411214203_1665121727.5478497/0/cron-3-0pl1-orig-tar-gz/cron-3.0pl1.orig/crontab.5
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* /opt/cola/permits/1411214203_1665121727.5478497/0/cron-3-0pl1-orig-tar-gz/cron-3.0pl1.orig/popen.c
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*
* @(#)bitstring.h 5.2
(Berkeley) 4/4/90
*/

Found in path(s):

* /opt/cola/permits/1411214203_1665121727.5478497/0/cron-3-0pl1-orig-tar-gz/cron-3.0pl1.orig/bitstring.h
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* Paul Vixie <paul@vix.com> uunet!decwrl!vixie!paul
*/

Found in path(s):

* /opt/cola/permits/1411214203_1665121727.5478497/0/cron-3-0pl1-orig-tar-gz/cron-3.0pl1.orig/compat.c
* /opt/cola/permits/1411214203_1665121727.5478497/0/cron-3-0pl1-orig-tar-gz/cron-3.0pl1.orig/do_command.c
*
/opt/cola/permits/1411214203_1665121727.5478497/0/cron-3-0pl1-orig-tar-gz/cron-3.0pl1.orig/misc.c
* /opt/cola/permits/1411214203_1665121727.5478497/0/cron-3-0pl1-orig-tar-gz/cron-3.0pl1.orig/entry.c
* /opt/cola/permits/1411214203_1665121727.5478497/0/cron-3-0pl1-orig-tar-gz/cron-3.0pl1.orig/database.c
* /opt/cola/permits/1411214203_1665121727.5478497/0/cron-3-0pl1-orig-tar-gz/cron-3.0pl1.orig/cron.c
* /opt/cola/permits/1411214203_1665121727.5478497/0/cron-3-0pl1-orig-tar-gz/cron-3.0pl1.orig/env.c
* /opt/cola/permits/1411214203_1665121727.5478497/0/cron-3-0pl1-orig-tar-gz/cron-3.0pl1.orig/crontab.c
* /opt/cola/permits/1411214203_1665121727.5478497/0/cron-3-0pl1-orig-tar-gz/cron-3.0pl1.orig/job.c
* /opt/cola/permits/1411214203_1665121727.5478497/0/cron-3-0pl1-orig-tar-gz/cron-3.0pl1.orig/config.h

```
* /opt/cola/permits/1411214203_1665121727.5478497/0/cron-3-0pl1-orig-tar-gz/cron-3.0pl1.orig/user.c
*
/opt/cola/permits/1411214203_1665121727.5478497/0/cron-3-0pl1-orig-tar-gz/cron-3.0pl1.orig/cron.h
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```

```
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# * Send bug reports, bug fixes, enhancements, requests, flames, etc., and
# * I'll try to keep a version up to date. I can be reached as follows:
# * Paul Vixie    <paul@vix.com>    uunet!decwrl!vixie!paul
# */
```

Vixie Cron V3.0
December 27, 1993
[V2.2 was some time in 1992]
[V2.1 was May 29, 1991]
[V2.0 was July 5, 1990]
[V2.0-beta
was December 9, 1988]
[V1.0 was May 6, 1987]
Paul Vixie

This is a version of 'cron' that is known to run on BSD 4.[23] systems. It is functionally based on the SysV cron, which means that each user can have their own crontab file (all crontab files are stored in a read-protected directory, usually /var/cron/tabs). No direct support is provided for 'at'; you can continue to run 'atrun' from the crontab as you have been doing. If you don't have atrun (i.e., System V) you are in trouble.

A messages is logged each time a command is executed; also, the files "allow" and "deny" in /var/cron can be used to control access to the "crontab" command (which installs crontabs). It hasn't been tested on SysV, although some effort has gone into making the port an easy one.

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To use this: Sorry, folks, there is no cutesy 'Configure' script. You'll have to go edit a couple of files... So, here's the checklist:

Read all the FEATURES, INSTALL, and CONVERSION files

Edit config.h

Edit Makefile

(both of these files have instructions inside; note that some things in config.h are definable in Makefile and are therefore surrounded by #ifndef...#endif)

'make'

'su' and 'make install'

(you may have to install the man pages by hand)

kill your existing cron process

(actually you can run your existing cron if you want, but why?)

build new crontabs using /usr/lib/{crontab,crontab.local}

(either put them all in "root"'s crontab, or divide it up and rip out all the 'su' commands, collapse the lengthy lists into

ranges with steps -- basically, this step is

as much work as you want to make it)

start up the new cron

(must be done as root)

watch it. test it with 'crontab -r' and watch the daemon track your changes.

if you like it, change your /etc/{rc,rc.local} to use it instead of the old one.

\$Id: README,v 2.3 1993/12/28 08:34:43 vixie Exp \$

Found in path(s):

* /opt/cola/permits/1411214203_1665121727.5478497/0/cron-3-0p11-orig-tar-gz/cron-3.0p11.orig/README

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* I'll try to keep a version up to date. I can be reached as follows:
* Paul Vixie <paul@vix.com> uunet!decwrl!vixie!paul
*/

\$Id: INSTALL,v 2.5 1994/01/15 20:43:43 vixie Exp \$

Read the comments at the top of the Makefile, then edit the area marked 'configurable stuff'.

Edit config.h. The stuff I expect you to change is down a bit from the top of the file, but it's clearly marked. Also look at pathnames.h.

You don't have to create the /var/cron or /var/cron/tabs directories, since both the daemon and the `crontab' program will do this the first time they run if they don't exist. You do need to have a /var, though -- just "mkdir /var" if you don't have one, or you can "mkdir /usr/var; ln -s /usr/var /var" if you expect your /var to have a lot of stuff in it.

You will also need /usr/local/etc and /usr/local/bin directories unless you change the Makefile. These will have to be created by hand, but if you are a long-time Usenet user you probably have them already. /usr/local/man is where I keep my man pages, but I have the source for `man' and you probably do not. Therefore you may have to put the man pages into /usr/man/man1, which will be hard since there will be name collisions. (Note that the man command was originally written by Bill Joy before he left Berkeley, and it contains no AT&T code, so it is in UUNET's archive of freely-distributable BSD code.)

LINUX note: /usr/include/paths.h on some linux systems shows _PATH_SENDMAIL to be /usr/bin/sendmail even though sendmail is installed in /usr/lib. you should check this out.

say:
make all

su and say:
make install

Note that if I can get you to "su and say" something just by asking, you have a very serious security problem on your system and you should look into it.

Edit your /usr/lib/crontab file into little pieces -- see the CONVERSION file for help on this.

Use the `crontab` command to install all the little pieces you just created. Some examples (see below before trying any of these!)

```
crontab -u uucp -r /usr/lib/uucp/crontab.src
crontab -u news -r /usr/lib/news/crontab.src
crontab -u root -r /usr/adm/crontab.src
```

Notes on above examples: (1) the .src files are copied at the time the command is issued; changing the source files later will have no effect until they are reinstalled with another `crontab -r` command. (2) The crontab command will affect the crontab of the person using the command unless `-u USER` is given; `-u` only works for root. When using most `su` commands under most BSD's, `crontab` will still think of you as yourself even though you may think of yourself as root -- so use `-u` liberally. (3) the `-r` option stands for `replace`; check the man page for crontab(1) for other possibilities.

Kill your existing cron daemon -- do `ps aux` and look for /etc/cron.

Edit your /etc/rc or /etc/rc.local, looking for the line that starts up /etc/cron. Comment it out and add a line to start the new cron daemon -- usually /usr/local/etc/cron, unless you changed it in the Makefile.

Start up this cron daemon yourself as root. Just type /usr/local/etc/cron (or whatever); no '&' is needed since the daemon forks itself and the process you executed returns immediately.

ATT notes: for those people unfortunate enough to be stuck on a AT&T UNIX, you will need the public-domain "libndir", found in the B News source and in any comp.sources.unix archive. You will also need to hack the code some.

Found in path(s):

* /opt/cola/permits/1411214203_1665121727.5478497/0/cron-3-0p11-orig-tar-gz/cron-3.0p11.orig/INSTALL

1.167 cracklib 2.9.6-3.4build4

1.167.1 Available under license :

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Version 2.1, February 1999

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END OF TERMS AND CONDITIONS

^L

How to Apply These Terms to Your New Libraries

If you develop a new library, and you want it to be of the greatest possible use to the public, we recommend making it free software that everyone can redistribute and change. You can do so by permitting redistribution under these terms (or, alternatively, under the terms of the ordinary General Public License).

To apply these terms, attach the following notices to the library.

It is safest to attach them to the start of each source

file to most

effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

<one line to give the library's name and a brief idea of what it does.>

Copyright (C) <year> <name of author>

This library is free software; you can redistribute it and/or modify it under the terms of the GNU Lesser General Public License as published by the Free Software Foundation; either version 2 of the License, or (at your option) any later version.

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Also add information on how to contact you by electronic and paper mail.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a "copyright disclaimer" for the library, if necessary. Here is a sample; alter the names:

Yoyodyne, Inc., hereby disclaims all copyright interest in the library `Frob' (a library for tweaking knobs) written by James Random Hacker.

<signature of Ty Coon>, 1 April 1990

Ty Coon, President of Vice

That's all there is to it!

This package was debianized by Jean Pierre LeJacq

<jplejacq@quoininc.com> on Wed, 25 Feb 1998. Martin Pitt

<martin@piware.de> was the package's maintainer up to version

2.7.19-1. The current maintainer is Jan Dittberner

<jandd@debian.org>.

It was downloaded from <http://sourceforge.net/projects/cracklib>

Copyright (c) 1993 Alec Muffett <alecm@crypto.dircon.co.uk>,

Copyright (c) 2005-2009 Nathan Neulinger <nneul@umr.edu>,

Copyright (c) 2008-2009 Jan Dittberner <jan@dittberner.info>

Modifications: Added cronjob, configuration file, and man pages.

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Copyright information:

CrackLib was originally licensed with a variant of the Artistic license. In the interests of wider acceptance and more modern licensing, it was switched with the original author's blessing to GPL v2.

This approval was carried out in email discussions in 2005, and has been reconfirmed as of 2007-10-01 with the following email from Alec Muffett. Cracklib's license was changed from the GPL to the LGPL after consensus of all previous developers in October 2008, effective with release 2.8.15 released on 2009-11-19. See the email discussion below

for both license changes.

EFFECTIVE

OCT 2008, LICENSE IS BEING CHANGED TO LGPL-2.1 (though not reflected in released code until Nov 2009 - slow release cycle...)

Discussion thread from mailing list archive, with approval from everyone actively involved or holding original licensing rights included.

[Cracklib-devel] cracklib license

From: Mike Frysinger <vapier@ge...> - 2007-10-02 01:16

Attachments: Message as HTML

looks like 2.8.11 is out and marked as "GPL-2" ... releasing libraries unde=
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GPL-2 is not desirable at all ... this is why the LGPL-2.1 exists
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Re: [Cracklib-devel] cracklib license

From: Neulinger, Nathan <nneul@um...> - 2007-10-02 01:18

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-- Nathan

=20

Nathan Neulinger EMail: nneul@um...

University of Missouri - Rolla Phone: (573) 341-6679

UMR Information Technology Fax: (573) 341-4216

> -----Original Message-----

> From: cracklib-devel-bounces@li...

> [mailto:cracklib-devel-bounces@li...] On Behalf Of

> Mike Frysinger

> Sent: Monday, October 01, 2007 8:15 PM

> To: cracklib-devel@li...
> Subject: [Cracklib-devel] cracklib license
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> -mike

Re: [Cracklib-devel] cracklib license
From: Mike Frysinger <vapier@ge...> - 2007-10-02 01:33

Attachments: Message as HTML

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From: Neulinger, Nathan <nneul@um...> - 2007-10-02 01:46
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Nathan Neulinger EMail: nneul@um...

University of Missouri - Rolla Phone: (573) 341-6679
UMR Information Technology Fax: (573) 341-4216

> -----Original Message-----

> From: cracklib-devel-bounces@li...
> [mailto:cracklib-devel-bounces@li...] On Behalf Of
> Mike Frysinger
> Sent: Monday, October 01, 2007 8:33 PM
> To: Neulinger, Nathan
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Cc: cracklib-devel@li...; Alec Muffett

> Subject: Re: [Cracklib-devel] cracklib license
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> -mike

Re: [Cracklib-devel] cracklib license

From: Alec Muffett <alecm@cr...> - 2007-10-02 08:57

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I am sympathetic. Guys, what do you reckon?

What I am hearing so far is that LGPL makes sense, since it can be linked with any code, not just GPL...

-a

Re: [Cracklib-devel] cracklib license

From: Devin Reade <gdr@gn...> - 2007-10-02 15:04

I would

like to see it under LGPL as well. I think it is in everyone's best interests to have as secure systems as possible, and I think tainting it via GPL will just make it less likely that the library gets used, and will not usually cause companies/developers to GPL the dependent code (where it is not already GPL).

I like GPL, I use it when I can, but I don't think that it's the correct license in this situation.

Devin

--

If it's sinful, it's more fun.

Re: [Cracklib-devel] cracklib license

From: Nalin Dahyabhai <nalin@re...> - 2008-01-28 16:32

On Tue, Oct 02, 2007 at 09:57:31AM +0100, Alec Muffett wrote:

>> Seems like the ideal thing here would be for you and the other distro
>> maintainers to get together with Alec in a conversation and come to a
>> decision as to what licensing scheme y'all want. I haven't really done
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>> bit of
>> additional code, so whatever licensing y'all come up with is fine
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> I am sympathetic. Guys, what do you reckon?

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> What I am hearing so far is that LGPL makes sense, since it can be
> linked with any code, not just GPL...

My apologies for not chiming in in anything resembling a reasonable timeframe.

I'd also suggest the LGPL, for the reason you noted above. Alternately,

GPLv2 with the option of using the library under a later version of the GPL would permit applications which were released under version 3 of the GPL to use the library, too, which would be sufficient for the packages which are included in Fedora. FWIW, I'd personally lean toward LGPL.

In any case, I thank you both for working on sorting this out.

Cheers,

Nalin

Re: [Cracklib-devel] cracklib license

From: Mike Frysinger <vapier@ge...> - 2008-10-05 21:27

Attachments: Message as HTML

On Monday 28 January 2008, Nalin Dahyabhai wrote:

> On Tue, Oct 02, 2007 at 09:57:31AM +0100, Alec Muffett wrote:

>>> Seems like the ideal thing here would be for you and the other distro
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> In any case, I thank you both for working on sorting this out.

looks like everyone is OK with LGPL-2.1 (GNU Lesser license), so can we make
the change now ?

-mike

Re: [Cracklib-devel] cracklib license

From: Alec Muffett <alecm@cr...> - 2008-10-05 23:18

>> In any case, I thank you both for working on sorting this out.

>

> looks like everyone is OK with LGPL-2.1 (GNU Lesser license), so can we make
> the change now ?

yes. go for it. thanks++

-a

Re: [Cracklib-devel] cracklib license

From: Mike Frysinger <vapier@ge...> - 2008-10-25 22:34

Attachments: Message

as HTML

On Sunday 05 October 2008, Alec Muffett wrote:

> >> In any case, I thank you both for working on sorting this out.

> >

> > looks like everyone is OK with LGPL-2.1 (GNU Lesser license), so can we
> > make the change now ?

>

> yes. go for it. thanks++

Nathan Neulinger is the only one who can actually make said change ...

-mike

BELOW IS ORIGINAL LICENSING DISCUSSION RE CHANGING TO GPL from Artistic.

CrackLib was originally licensed with a variant of the Artistic license. In the interests of wider acceptance and more modern licensing, it was switched with the original author's blessing to GPL v2.

This approval was carried out in email discussions in 2005, and has been reconfirmed as of 2007-10-01 with the following email from Alec Muffett.

The below email references nneul@umr.edu address, as that is the address that was used at the time. For any future emails regarding this, please use
nneul@neulinger.org.

From alecm@crypticide.com Mon Oct 1 12:26:03 2007
Received: from umr-exproto2.cc.umn.edu ([131.151.0.192]) by UMR-CMAIL1.umn.edu with Microsoft SMTPSVC(6.0.3790.3959);
Mon, 1 Oct 2007 12:26:03 -0500
Received: from scansrv2.srv.mst.edu ([131.151.1.114]) by umr-exproto2.cc.umn.edu with Microsoft SMTPSVC(6.0.3790.3959);
Mon, 1 Oct 2007 12:26:02 -0500
Received: (qmail 8022 invoked from network); 1 Oct 2007 16:59:55 -0000
Received: from smtp1.srv.mst.edu (131.151.1.43)
by scanin-ipvs.cc.umn.edu with SMTP; 1 Oct 2007 16:59:55 -0000
Received: from spunkymail-mx8.g.dreamhost.com (mx1.spunky.mail.dreamhost.com [208.97.132.47])
by smtp1.srv.mst.edu (8.13.1/8.13.1) with ESMTP id I91Gxtpr020623
for <nneul@umn.edu>; Mon, 1 Oct 2007 11:59:55 -0500
Received: from rutherford.zen.co.uk (rutherford.zen.co.uk [212.23.3.142])
by spunkymail-mx8.g.dreamhost.com (Postfix) with ESMTP id 2C7734D311
for <nneul@neulinger.org>; Mon, 1 Oct
2007 09:59:50 -0700 (PDT)
Received: from [82.68.43.14] (helo=[192.168.1.3])
by rutherford.zen.co.uk with esmtp (Exim 4.50)
id 1IcOcX-0004Qt-6L
for nneul@neulinger.org; Mon, 01 Oct 2007 16:59:49 +0000
Mime-Version: 1.0 (Apple Message framework v752.2)
In-Reply-To: <1b1b3fd80710010908k11dac0afp1f2dd471059ff9a4@mail.gmail.com>
References: <1190922867.3457.147.camel@localhost.localdomain>
<EC90713277D2BE41B7110CCD74E235CEF44F38@UMR-CMAIL1.umn.edu>
<1b1b3fd80710010908k11dac0afp1f2dd471059ff9a4@mail.gmail.com>
Content-Type: text/plain; charset=US-ASCII; delsp=yes; format=flowed
Message-Id: <117A1264-F6DC-4E25-B0DD-56FBFE6E9F@crypticide.com>
Content-Transfer-Encoding: 7bit
From: Alec Muffett <alecm@crypticide.com>
Subject: Re: cracklib license
Date: Mon, 1 Oct 2007 17:59:46 +0100
To: Nathan Neulinger <nneul@neulinger.org>
X-Mailer: Apple Mail (2.752.2)
X-Originating-Rutherford-IP: [82.68.43.14]
Return-Path: alecm@crypticide.com
X-OriginalArrivalTime: 01 Oct 2007 17:26:03.0008 (UTC) FILETIME=[2420C000:01C80450]
Status:
RO
Content-Length: 585
Lines: 21

>
> ----- Forwarded message -----
> From: Neulinger, Nathan <nneul@umn.edu>
> Date: Sep 27, 2007 2:58 PM
> Subject: RE: cracklib license

> To: alecm@crypto.dircon.co.uk
>
> Any chance you could write me a self-contained email stating clearly
> that the license is being changed to GPL, so I could include that
> email
> in the repository and clean up the repository/tarballs? I have all the
> original discussion, but something succinct and self contained
> would be
> ideal.

The license for my code in the Cracklib distribution is henceforth GPL.

Happy now? :-)

-a

EFFECTIVE OCT 2008, LICENSE IS BEING CHANGED TO LGPL-2.1 (though not reflected
in released code until Nov 2009 - slow release cycle...)

Discussion thread from mailing list archive, with approval from everyone actively
involved or holding original licensing rights included.

[Cracklib-devel] cracklib license

From: Mike Frysinger <vapier@ge...> - 2007-10-02 01:16

Attachments: Message as HTML

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GPL-2 is not desirable at all ... this is why the LGPL-2.1 exists
=2Dmike

Re: [Cracklib-devel] cracklib license

From: Neulinger, Nathan <nneul@um...> - 2007-10-02 01:18

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and see if he wants to relicense his code as LGPL... but at this point,
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Nathan Neulinger EMail: nneul@um...

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> [mailto:cracklib-devel-bounces@li...] On Behalf Of

> Mike Frysinger

> Sent: Monday, October 01, 2007 8:15 PM

> To: cracklib-devel@li...

> Subject: [Cracklib-devel] cracklib license

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Nalin

Re: [Cracklib-devel] cracklib license
From: Mike Frysinger <vapier@ge...> - 2008-10-05 21:27

Attachments: Message as HTML

On Monday 28 January 2008, Nalin Dahyabhai wrote:

> On Tue, Oct 02, 2007 at 09:57:31AM +0100, Alec Muffett wrote:
>>> Seems like the ideal thing here would be for you and the other distro
>>> maintainers to get together with Alec in a conversation and come to a
>>> decision as to what licensing scheme y'all want. I haven't really done
>>> much other than cleaning up the packaging and patches and a small
>>> bit of
>>> additional code, so whatever licensing y'all come up with is fine
>>> by me.

>>

>> I am sympathetic. Guys, what do you reckon?

>>

>> What I am hearing so far is that LGPL makes sense, since it can be
>> linked with any code, not just GPL...

>

> My apologies for not chiming in in anything resembling a reasonable
> timeframe.

>

> I'd also suggest the LGPL, for the reason you noted above. Alternately,
> GPLv2 with the option of using

the library under a later version of the

> GPL would permit applications which were released under version 3 of the

> GPL to use the library, too, which would be sufficient for the packages

> which are included in Fedora. FWIW, I'd personally lean toward LGPL.

>

> In any case, I thank you both for working on sorting this out.

looks like everyone is OK with LGPL-2.1 (GNU Lesser license), so can we make the change now ?

-mike

Re: [Cracklib-devel] cracklib license

From: Alec Muffett <alecm@cr...> - 2008-10-05 23:18

>> In any case, I thank you both for working on sorting this out.

>

> looks like everyone is OK with LGPL-2.1 (GNU Lesser license), so can we make the change now ?

yes. go for it. thanks++

-a

Re: [Cracklib-devel] cracklib license

From: Mike Frysinger <vapier@ge...> - 2008-10-25 22:34

Attachments: Message as HTML

On Sunday 05 October

2008, Alec Muffett wrote:

> >> In any case, I thank you both for working on sorting this out.

> >

> > looks like everyone is OK with LGPL-2.1 (GNU Lesser license), so can we

> > make the change now ?

>

> yes. go for it. thanks++

Nathan Neulinger is the only one who can actually make said change ...

-mike

BELOW IS ORIGINAL LICENSING DISCUSSION RE CHANGING TO GPL from Artistic.

CrackLib was originally licensed with a variant of the Artistic license. In the interests of wider acceptance and more modern licensing, it was switched with the original author's blessing to GPL v2.

This approval was carried out in email discussions in 2005, and has been reconfirmed as of 2007-10-01 with the following email from Alec Muffett.

The below email references nneul@umr.edu address, as that is the address that was used at the time. For any future emails regarding this, please use nneul@neulinger.org.

From
alecm@crypticide.com Mon Oct 1 12:26:03 2007
Received: from umr-exproto2.cc.umr.edu ([131.151.0.192]) by UMR-CMAIL1.umr.edu with Microsoft SMTPSVC(6.0.3790.3959);
Mon, 1 Oct 2007 12:26:03 -0500
Received: from scansrv2.srv.mst.edu ([131.151.1.114]) by umr-exproto2.cc.umr.edu with Microsoft SMTPSVC(6.0.3790.3959);
Mon, 1 Oct 2007 12:26:02 -0500
Received: (gmail 8022 invoked from network); 1 Oct 2007 16:59:55 -0000
Received: from smtp1.srv.mst.edu (131.151.1.43)
by scanin-ipvs.cc.umr.edu with SMTP; 1 Oct 2007 16:59:55 -0000
Received: from spunkymail-mx8.g.dreamhost.com (mx1.spunky.mail.dreamhost.com [208.97.132.47])
by smtp1.srv.mst.edu (8.13.1/8.13.1) with ESMTP id 191Gxtpr020623
for <nneul@umr.edu>; Mon, 1 Oct 2007 11:59:55 -0500
Received: from rutherford.zen.co.uk (rutherford.zen.co.uk [212.23.3.142])
by spunkymail-mx8.g.dreamhost.com (Postfix) with ESMTP id 2C7734D311
for <nneul@neulinger.org>; Mon, 1 Oct 2007 09:59:50 -0700 (PDT)
Received: from
[82.68.43.14] (helo=[192.168.1.3])
by rutherford.zen.co.uk with esmtp (Exim 4.50)
id 1IcOcX-0004Qt-6L
for nneul@neulinger.org; Mon, 01 Oct 2007 16:59:49 +0000
Mime-Version: 1.0 (Apple Message framework v752.2)
In-Reply-To: <1b1b3fd80710010908k11dac0afp1f2dd471059ff9a4@mail.gmail.com>
References: <1190922867.3457.147.camel@localhost.localdomain>
<EC90713277D2BE41B7110CCD74E235CEF44F38@UMR-CMAIL1.umr.edu>
<1b1b3fd80710010908k11dac0afp1f2dd471059ff9a4@mail.gmail.com>
Content-Type: text/plain; charset=US-ASCII; delsp=yes; format=flowed
Message-Id: <117A1264-F6DC-4E25-B0DD-56FBFEBE6E9F@crypticide.com>
Content-Transfer-Encoding: 7bit
From: Alec Muffett <alecm@crypticide.com>
Subject: Re: cracklib license
Date: Mon, 1 Oct 2007 17:59:46 +0100
To: Nathan Neulinger <nneul@neulinger.org>
X-Mailer: Apple Mail (2.752.2)
X-Originating-Rutherford-IP: [82.68.43.14]
Return-Path: alecm@crypticide.com
X-OriginalArrivalTime: 01 Oct 2007 17:26:03.0008 (UTC) FILETIME=[2420C000:01C80450]
Status: RO

Content-Length:

585

Lines: 21

>

> ----- Forwarded message -----

> From: Neulinger, Nathan <nneul@umr.edu>

> Date: Sep 27, 2007 2:58 PM

> Subject: RE: cracklib license

> To: alecm@crypto.dircon.co.uk

>

> Any chance you could write me a self-contained email stating clearly

> that the license is being changed to GPL, so I could include that

> email

> in the repository and clean up the repository/tarballs? I have all the

> original discussion, but something succinct and self contained

> would be

> ideal.

The license for my code in the Cracklib distribution is henceforth GPL.

Happy now? :-)

-a

1.168 cron 3.0pl1-137ubuntu3

1.168.1 Available under license :

No license file was found, but licenses were detected in source scan.

```
#!/* Copyright 1988,1990,1993 by Paul Vixie
# * All rights reserved
# *
# * Distribute freely, except: don't remove my name from the source or
# * documentation (don't take credit for my work), mark your changes (don't
# * get me blamed for your possible bugs), don't alter or remove this
# * notice. May be sold if buildable source is provided to buyer. No
# * warrantee of any kind, express or implied, is included with this
# * software; use at your own risk, responsibility for damages (if any) to
# * anyone resulting from the use of this software rests entirely with the
# * user.
# *
# * Send bug reports, bug fixes, enhancements, requests, flames, etc., and
# * I'll try to keep a version up to date. I can be reached as follows:
# * Paul Vixie <paul@vix.com> uunet!decwrl!vixie!paul
# */
```

Vixie Cron V3.0

December 27, 1993

[V2.2 was some time in 1992]

[V2.1 was May 29, 1991]

[V2.0 was July 5, 1990]

[V2.0-beta

was December 9, 1988]

[V1.0 was May 6, 1987]

Paul Vixie

This is a version of 'cron' that is known to run on BSD 4.[23] systems. It is functionally based on the SysV cron, which means that each user can have their own crontab file (all crontab files are stored in a read-protected directory, usually /var/cron/tabs). No direct support is provided for 'at'; you can continue to run 'atrun' from the crontab as you have been doing. If you don't have atrun (i.e., System V) you are in trouble.

A message is logged each time a command is executed; also, the files "allow" and "deny" in /var/cron can be used to control access to the "crontab" command (which installs crontabs). It hasn't been tested on SysV, although some effort has gone into making the port an easy one.

This is more or less the copyright that USENET contributed software usually has. Since ATT couldn't use this version if they had to freely distribute source, and since I'd love to see them use it, I'll offer some ridiculously low license fee just to have them take it. In the unlikely event that they do this, I will continue to support and distribute the pseudo-PD version, so please, don't flame me for wanting my work to see a wider distribution.

To use this: Sorry, folks, there is no cutesy 'Configure' script. You'll have to go edit a couple of files... So, here's the checklist:

Read all the FEATURES, INSTALL, and CONVERSION files

Edit config.h

Edit Makefile

(both of these files have instructions inside; note that some things in config.h are definable in Makefile and are therefore surrounded by #ifndef...#endif)

'make'

'su' and 'make install'

(you may have to install the man pages by hand)

kill your existing cron process

(actually you can run your existing cron if you want, but why?)

build new crontabs using /usr/lib/{crontab,crontab.local}

(either put them all in "root"'s crontab, or divide it up

and rip out all the 'su' commands, collapse the lengthy

lists into

ranges with steps -- basically, this step is
as much work as you want to make it)
start up the new cron
(must be done as root)
watch it. test it with 'crontab -r' and watch the daemon track your
changes.
if you like it, change your /etc/{rc,rc.local} to use it instead of
the old one.

\$Id: README,v 2.3 1993/12/28 08:34:43 vixie Exp \$

Found in path(s):

* /opt/cola/permits/1411214195_1662634382.433482/0/cron-3-0pl1-orig-1-tar-gz/cron-3.0pl1.orig/README
No license file was found, but licenses were detected in source scan.

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Found in path(s):

* /opt/cola/permits/1411214195_1662634382.433482/0/cron-3-0pl1-orig-1-tar-gz/cron-3.0pl1.orig/bitstring.3
No license file was found, but licenses were detected in source scan.

.\" * All rights reserved
.\" * Distribute freely, except: don't remove my name from the source or

Found in path(s):

* /opt/cola/permits/1411214195_1662634382.433482/0/cron-3-0pl1-orig-1-tar-gz/cron-3.0pl1.orig/crontab.5
* /opt/cola/permits/1411214195_1662634382.433482/0/cron-3-0pl1-orig-1-tar-gz/cron-3.0pl1.orig/crontab.1
* /opt/cola/permits/1411214195_1662634382.433482/0/cron-3-0pl1-orig-1-tar-gz/cron-3.0pl1.orig/cron.8
No license file was found, but licenses were detected in source scan.

/*

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*
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* Paul Vixie.
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* from this software without specific prior written permission.
* THIS SOFTWARE IS PROVIDED ``AS IS" AND WITHOUT ANY EXPRESS OR
* IMPLIED WARRANTIES, INCLUDING, WITHOUT LIMITATION, THE IMPLIED
* WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.
*
* @(#)bitstring.h 5.2
(Berkeley) 4/4/90
*/

Found in path(s):

* /opt/cola/permits/1411214195_1662634382.433482/0/cron-3-0pl1-orig-1-tar-gz/cron-3.0pl1.orig/bitstring.h
No license file was found, but licenses were detected in source scan.

/*

* Copyright (c) 1988 The Regents of the University of California.
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*
* This code is derived from software written by Ken Arnold and
* published in UNIX Review, Vol. 6, No. 8.
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* THIS SOFTWARE IS PROVIDED ``AS IS" AND WITHOUT ANY EXPRESS OR
* IMPLIED WARRANTIES, INCLUDING, WITHOUT LIMITATION, THE IMPLIED
* WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.
*
*/

Found in path(s):

* /opt/cola/permits/1411214195_1662634382.433482/0/cron-3-0pl1-orig-1-tar-gz/cron-3.0pl1.orig/popen.c
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Found in path(s):

* /opt/cola/permits/1411214195_1662634382.433482/0/cron-3-0pl1-orig-1-tar-gz/cron-3.0pl1.orig/Makefile

No license file was found, but licenses were detected in source scan.

```
/* Copyright 1988,1990,1993,1994 by Paul Vixie
* All rights reserved
*
* Distribute freely, except: don't remove my name from the source or
* documentation (don't take credit for my work), mark your changes (don't
* get me blamed for your possible bugs), don't alter or remove this
* notice. May be sold if buildable source is provided to buyer. No
* warrantee of any kind, express or implied, is included with this
* software; use at your own risk, responsibility for damages (if any) to
* anyone resulting from the use of this software rests entirely with the
* user.
*
* Send bug reports, bug fixes, enhancements, requests, flames, etc., and
* I'll try to keep a version up to date. I can be reached as follows:
* Paul Vixie <paul@vix.com> uunet!decwrl!vixie!paul
*/
```

Found in path(s):

```
* /opt/cola/permits/1411214195_1662634382.433482/0/cron-3-0pl1-orig-1-tar-gz/cron-3.0pl1.orig/user.c
* /opt/cola/permits/1411214195_1662634382.433482/0/cron-3-0pl1-orig-1-tar-gz/cron-3.0pl1.orig/job.c
*
/opt/cola/permits/1411214195_1662634382.433482/0/cron-3-0pl1-orig-1-tar-gz/cron-3.0pl1.orig/entry.c
* /opt/cola/permits/1411214195_1662634382.433482/0/cron-3-0pl1-orig-1-tar-gz/cron-3.0pl1.orig/do_command.c
* /opt/cola/permits/1411214195_1662634382.433482/0/cron-3-0pl1-orig-1-tar-gz/cron-3.0pl1.orig/env.c
* /opt/cola/permits/1411214195_1662634382.433482/0/cron-3-0pl1-orig-1-tar-gz/cron-3.0pl1.orig/misc.c
* /opt/cola/permits/1411214195_1662634382.433482/0/cron-3-0pl1-orig-1-tar-gz/cron-3.0pl1.orig/cron.h
* /opt/cola/permits/1411214195_1662634382.433482/0/cron-3-0pl1-orig-1-tar-gz/cron-3.0pl1.orig/compat.c
* /opt/cola/permits/1411214195_1662634382.433482/0/cron-3-0pl1-orig-1-tar-gz/cron-3.0pl1.orig/cron.c
* /opt/cola/permits/1411214195_1662634382.433482/0/cron-3-0pl1-orig-1-tar-gz/cron-3.0pl1.orig/crontab.c
* /opt/cola/permits/1411214195_1662634382.433482/0/cron-3-0pl1-orig-1-tar-gz/cron-3.0pl1.orig/database.c
*
/opt/cola/permits/1411214195_1662634382.433482/0/cron-3-0pl1-orig-1-tar-gz/cron-3.0pl1.orig/config.h
No license file was found, but licenses were detected in source scan.
```

```
/* Copyright 1993,1994 by Paul Vixie
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*
* Distribute freely, except: don't remove my name from the source or
* documentation (don't take credit for my work), mark your changes (don't
* get me blamed for your possible bugs), don't alter or remove this
* notice. May be sold if buildable source is provided to buyer. No
* warrantee of any kind, express or implied, is included with this
* software; use at your own risk, responsibility for damages (if any) to
* anyone resulting from the use of this software rests entirely with the
* user.
*
*
```


* Send bug reports, bug fixes, enhancements, requests, flames, etc., and
* I'll try to keep a version up to date. I can be reached as follows:
* Paul Vixie <paul@vix.com> uunet!decwrl!vixie!paul
*/

Found in path(s):

* /opt/cola/permits/1411214195_1662634382.433482/0/cron-3-0pl1-orig-1-tar-gz/cron-3.0pl1.orig/externs.h
* /opt/cola/permits/1411214195_1662634382.433482/0/cron-3-0pl1-orig-1-tar-gz/cron-3.0pl1.orig/pathnames.h
*

/opt/cola/permits/1411214195_1662634382.433482/0/cron-3-0pl1-orig-1-tar-gz/cron-3.0pl1.orig/compat.h

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*

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* notice. May be sold if buildable source is provided to buyer. No
* warrantee of any kind, express or implied, is included with this
* software; use at your own risk, responsibility for damages (if any) to
* anyone resulting from the use of this software rests entirely with the
* user.

*

* Send bug reports, bug fixes, enhancements, requests, flames, etc., and
* I'll try to keep a version up to date. I can be reached as follows:

* Paul Vixie <paul@vix.com> uunet!decwrl!vixie!paul

*/

\$Id: INSTALL,v 2.5 1994/01/15 20:43:43 vixie Exp \$

Read the comments at the top of the Makefile, then edit the area marked
'configurable
stuff'.

Edit config.h. The stuff I expect you to change is down a bit from the
top of the file, but it's clearly marked. Also look at pathnames.h.

You don't have to create the /var/cron or /var/cron/tabs directories, since
both the daemon and the `crontab' program will do this the first time they
run if they don't exist. You do need to have a /var, though -- just "mkdir
/var" if you don't have one, or you can "mkdir /usr/var; ln -s /usr/var /var"
if you expect your /var to have a lot of stuff in it.

You will also need /usr/local/etc and /usr/local/bin directories unless you
change the Makefile. These will have to be created by hand, but if you are
a long-time Usenet user you probably have them already. /usr/local/man is
where I keep my man pages, but I have the source for `man' and you probably

do not. Therefore you may have to put the man pages into /usr/man/man1, which will be hard since there will be name collisions. (Note that the man command was originally written by Bill Joy before he left Berkeley, and it contains no AT&T code, so it is in UUNET's archive of freely-distributable BSD code.)

LINUX note: /usr/include/paths.h on some linux systems shows _PATH_SENDMAIL to be /usr/bin/sendmail even though sendmail is installed in /usr/lib. you should check this out.

say:
make all

su and say:
make install

Note that if I can get you to "su and say" something just by asking, you have a very serious security problem on your system and you should look into it.

Edit your /usr/lib/crontab file into little pieces -- see the CONVERSION file for help on this.

Use the `crontab' command to install all the little pieces you just created. Some examples (see below before trying any of these!)

```
crontab -u uucp -r /usr/lib/uucp/crontab.src
crontab -u news -r /usr/lib/news/crontab.src
crontab -u root -r /usr/adm/crontab.src
```

Notes on above examples: (1) the .src files are copied at the time the command is issued; changing the source files later will have no effect until they are reinstalled with another `crontab -r' command. (2) The crontab command will affect the crontab of the person using the command unless `u USER' is given; `u' only works for root. When using most `su' commands under most BSD's, `crontab' will still think of you as yourself even though you may think of yourself as root -- so use `u' liberally. (3) the `-r' option stands for `replace'; check the man page for crontab(1) for other possibilities.

Kill your existing cron daemon -- do `ps aux' and look for /etc/cron.

Edit your /etc/rc or /etc/rc.local, looking for the line that starts up /etc/cron. Comment it out and add a line to start the new cron daemon -- usually /usr/local/etc/cron, unless you changed it in the Makefile.

Start up this cron daemon yourself as root. Just type /usr/local/etc/cron

(or whatever); no '&' is needed since the daemon forks itself and the process you executed returns immediately.

ATT notes: for those people unfortunate enough to be stuck on a AT&T UNIX, you will need the public-domain "libndir", found in the B News source and in any comp.sources.unix archive. You will also need to hack the code some.

Found in path(s):

* /opt/cola/permits/1411214195_1662634382.433482/0/cron-3-0pl1-orig-1-tar-gz/cron-3.0pl1.orig/INSTALL

1.169 python-httpplib2 0.20.2-2

1.169.1 Available under license :

Httpplib2 Software License

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1.170 gobject-introspection 1.72.0-1

1.170.1 Available under license :

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Version 2, June 1991

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treats it as such.

Because

of this blurred distinction, using the ordinary General Public License for libraries did not effectively promote software sharing, because most developers did not use the libraries. We concluded that weaker conditions might promote sharing better.

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of
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1.171 python-cryptography 3.4.8-1ubuntu2

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1.173 xfsprogs 5.13.0-1ubuntu2

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-->

<!-- Generate ISC copyright comments from Docbook copyright metadata. -->

<xsl:stylesheet version="1.0"

xmlns:xsl="http://www.w3.org/1999/XSL/Transform"

xmlns:xi="http://www.w3.org/2001/XInclude"

xmlns:db="http://docbook.org/ns/docbook">

```

<xsl:template name="isc.copyright.format">
  <xsl:param name="text"/>
  <xsl:value-of select="$isc.copyright.leader"/>
  <xsl:value-of select="normalize-space(substring-before($text, '&#10;'))"/>
  <xsl:text>&#10;</xsl:text>
  <xsl:variable name="rest" select="substring-after($text, '&#10;')"/>
  <xsl:if test="translate($rest, '&#9;&#32;', ')">

    <xsl:call-template name="isc.copyright.format">
      <xsl:with-param name="text" select="$rest"/>
    </xsl:call-template>
  </xsl:if>
</xsl:template>

```

```

<xsl:variable name="isc.copyright.text">
  <xsl:text>
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    License, v. 2.0. If a copy of the MPL was not distributed with this
    file, You can obtain one at http://mozilla.org/MPL/2.0/.
  </xsl:text>
</xsl:variable>

```

```

<xsl:variable name="isc.copyright">
  <xsl:call-template name="isc.copyright.format">
    <xsl:with-param name="text">
      <xsl:for-each select="book/info/copyright | refentry/docinfo/copyright">
        <xsl:text>Copyright (C) </xsl:text>
        <xsl:call-template name="copyright.years">
          <xsl:with-param name="years" select="year"/>
        </xsl:call-template>
        <xsl:text> </xsl:text>
        <xsl:value-of select="holder"/>
        <xsl:value-of select="$isc.copyright.breakline"/>
        <xsl:text>&#10;</xsl:text>
      </xsl:for-each>
    <xsl:value-of
      select="$isc.copyright.text"/>
    </xsl:with-param>
  </xsl:call-template>
</xsl:variable>
</xsl:stylesheet>

```

```

<!--
- Local variables:
- mode: sgml
- End:
-->

```

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1.180 lazr-restfulclient 0.14.4-1

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Version 3, 29 June 2007

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1.181 libnl3 3.5.0-0.1

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1.182 ptyprocess 0.7.0-3

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1.183 parted 3.4-2build1

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1.185 libusb 1.0.25-1ubuntu2

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1.187 netifaces 0.11.0-1build2

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<!-- Generate ISC copyright comments from Docbook copyright metadata. -->

<xsl:stylesheet version="1.0"

xmlns:xsl="http://www.w3.org/1999/XSL/Transform"

xmlns:xi="http://www.w3.org/2001/XInclude"

xmlns:db="http://docbook.org/ns/docbook">

<xsl:template name="isc.copyright.format">

<xsl:param name="text"/>

<xsl:value-of select="\$isc.copyright.leader"/>

<xsl:value-of select="normalize-space(substring-before(\$text, '
'))"/>

<xsl:text>
</xsl:text>

<xsl:variable name="rest" select="substring-after(\$text, '
')"/>

<xsl:if test="translate(\$rest, '	 ', '')">

<xsl:call-template name="isc.copyright.format">

<xsl:with-param name="text" select="\$rest"/>

</xsl:call-template>

</xsl:if>

</xsl:template>

<xsl:variable name="isc.copyright.text">

<xsl:text>

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```
</xsl:text>
</xsl:variable>

<xsl:variable name="isc.copyright">
  <xsl:call-template name="isc.copyright.format">
    <xsl:with-param name="text">
      <xsl:for-each select="book/info/copyright | refentry/docinfo/copyright">
        <xsl:text>Copyright (C) </xsl:text>
        <xsl:call-template name="copyright.years">
          <xsl:with-param name="years" select="year"/>
        </xsl:call-template>
        <xsl:text> </xsl:text>
        <xsl:value-of select="holder"/>
        <xsl:value-of select="$isc.copyright.breakline"/>
        <xsl:text>&#10;</xsl:text>
      </xsl:for-each>
      <xsl:value-of
select="$isc.copyright.text"/>
    </xsl:with-param>
  </xsl:call-template>
</xsl:variable>
</xsl:stylesheet>
```

<!--

- Local variables:
- mode: sgml
- End:

-->

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1.189 busybox 1.30.1-7ubuntu3

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1.191 libinih 53-1ubuntu3

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1.192 libsodium 1.0.18-1build2

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Also add information on how to contact you by electronic and paper mail.

If the program does terminal interaction, make it output a short notice like this when it starts in an interactive mode:

```
<program> Copyright (C) <year> <name of author>  
This program comes with ABSOLUTELY NO WARRANTY; for details type `show w'.  
This is free software, and you are welcome to redistribute it
```

under certain conditions; type ``show c'` for details.

The hypothetical commands ``show w'` and ``show c'` should show the appropriate parts of the General Public License. Of course, your program's commands might be different; for a GUI interface, you would use an "about box".

You should also get your employer (if you work as a programmer) or school, if any, to sign a "copyright disclaimer" for the program, if necessary. For more information on this, and how to apply and follow the GNU GPL, see <http://www.gnu.org/licenses/>.

The GNU General Public License does not permit incorporating your program into proprietary programs. If your program is a subroutine library, you may consider it more useful to permit linking proprietary applications with the library. If this is what you want to do, use the GNU Lesser General Public License instead of this License. But first, please read <http://www.gnu.org/philosophy/why-not-lgpl.html>.

1.196 pci-ids 0.0~2022.01.22-1

1.196.1 Available under license :

No license file was found, but licenses were detected in source scan.

This repository contains the history of the pci.ids file, which is automatically generated from the PCI ID Database at <http://pci-ids.ucw.cz/>.

The contents of the database and the generated files can be distributed under the terms of either the GNU General Public License (version 2 or later) or of the 3-clause BSD License.

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Found in path(s):

```
* /opt/cola/permits/1411688236_1665240125.3823578/0/pci-ids-0-0-2020-03-20-orig-tar-xz/pci-ids-0.0~2020.03.20/README
```

No license file was found, but licenses were detected in source scan.

```
#  
# List of PCI ID's  
#  
# Version: 2020.03.20  
# Date: 2020-03-20 03:15:02  
#  
# Maintained by Albert Pool, Martin Mares, and other volunteers from
```



```
# the PCI ID Project at https://pci-ids.ucw.cz/.
#
# New data are always welcome, especially if they are accurate. If you have
# anything to contribute, please follow the instructions at the web site.
#
# This file can be distributed under either the GNU General Public License
# (version 2 or higher) or the 3-clause BSD License.
#
# The database is a compilation of factual data, and as such the copyright
# only covers the aggregation and formatting. The copyright is held by
# Martin Mares and Albert Pool.
#

# Vendors, devices and subsystems. Please keep sorted.

# Syntax:
# vendor vendor_name
# device device_name <-- single tab
# subvendor subdevice subsystem_name <-- two tabs

0001 SafeNet (wrong ID)
0010 Allied Telesis, Inc (Wrong ID)
# This is a relabelled RTL-8139
8139
  AT-2500TX V3 Ethernet
0014 Loongson Technology LLC
7a00 Hyper Transport Bridge Controller
7a02 APB (Advanced Peripheral Bus) Controller
7a03 Gigabit Ethernet Controller
7a04 OTG USB Controller
7a05 Vivante GPU (Graphics Processing Unit)
7a06 DC (Display Controller)
7a07 HDA (High Definition Audio) Controller
7a08 SATA AHCI Controller
7a09 PCI-to-PCI Bridge
7a0b SPI Controller
7a0c LPC Controller
7a0f DMA (Direct Memory Access) Controller
7a14 EHCI USB Controller
7a15 Vivante GPU (Graphics Processing Unit)
7a19 PCI-to-PCI Bridge
7a24 OHCI USB Controller
7a29 PCI-to-PCI Bridge
001c PEAK-System Technik GmbH
0001 PCAN-PCI CAN-Bus controller
  001c 0004 2 Channel CAN Bus SJC1000
  001c 0005 2 Channel CAN Bus SJC1000 (Optically Isolated)
003d Lockheed Martin-Marietta Corp
```

Real TJN ID is e159, but they got it wrong several times --mj
0059 Tiger Jet Network Inc. (Wrong ID)
0070 Hauppauge computer works Inc.
7801 WinTV HVR-1800 MCE
0071
Nebula Electronics Ltd.
0095 Silicon Image, Inc. (Wrong ID)
0680 Ultra ATA/133 IDE RAID CONTROLLER CARD
Wrong ID used in subsystem ID of the TELES.S0/PCI 2.x ISDN adapter
00a7 Teles AG (Wrong ID)
0100 nCipher Security
0123 General Dynamics
0128 Dell (wrong ID)
018a is not LevelOne but there is a board misprogrammed
018a LevelOne
0106 FPC-0106TX misprogrammed [RTL81xx]
01de Oxide Computer Company
021b is not Compaq but there is a board misprogrammed
021b Compaq Computer Corporation
8139 HNE-300 (RealTek RTL8139c) [iPaq Networking]
0270 Hauppauge computer works Inc. (Wrong ID)
0291 Davicom Semiconductor, Inc. (Wrong ID)
SpeedStream is Efficient Networks, Inc, a Siemens Company
02ac SpeedStream
1012 1012 PCMCIA 10/100 Ethernet Card [RTL81xx]
02e0 XFX Pine Group Inc. (Wrong ID)
0303 Hewlett-Packard Company (Wrong ID)
0308 ZyXEL Communications Corporation (Wrong ID)
0315 SK-Electronics Co., Ltd.
0357 TTTech Computertechnik AG (Wrong ID)
000a TTP-Monitoring
Card V2.0
0432 SCM Microsystems, Inc.
0001 Pluto2 DVB-T Receiver for PCMCIA [EasyWatch MobilSet]
0497 Dell Inc. (wrong ID)
0675 Dynalink
1700 IS64PH ISDN Adapter
1702 IS64PH ISDN Adapter
1703 ISDN Adapter (PCI Bus, DV, W)
1704 ISDN Adapter (PCI Bus, D, C)
0721 Sapphire, Inc.
0777 Ubiquiti Networks, Inc.
0795 Wired Inc.
6663 Butane II (MPEG2 encoder board)
6666 MediaPress (MPEG2 encoder board)
07d1 D-Link System Inc
0824 T1042 [Freescale]
0925 VIA Technologies, Inc. (Wrong ID)

0a89 BREA Technologies Inc
0b0b Rhino Equipment Corp.
0105 R1T1
0205 R4FXO
0206 RCB4FXO 4-channel FXO analog telephony card
0305 R4T1
0405 R8FXX
0406 RCB8FXX 8-channel modular analog telephony card
0505 R24FXX
0506 RCB24FXS 24-Channel FXS analog telephony card
0605 R2T1
0705 R24FXS
0706 RCB24FXO 24-Channel FXO analog telephony card
0905 R1T3 Single T3 Digital Telephony Card
0906 RCB24FXX 24-channel modular analog telephony card
0a06 RCB672FXX 672-channel modular
analog telephony card
0e11 Compaq Computer Corporation
0001 PCI to EISA Bridge
0002 PCI to ISA Bridge
0046 Smart Array 64xx
0e11 4091 Smart Array 6i
0e11 409a Smart Array 641
0e11 409b Smart Array 642
0e11 409c Smart Array 6400
0e11 409d Smart Array 6400 EM
0049 NC7132 Gigabit Upgrade Module
004a NC6136 Gigabit Server Adapter
005a Remote Insight II board - Lights-Out
007c NC7770 1000BaseTX
007d NC6770 1000BaseTX
0085 NC7780 1000BaseTX
00b1 Remote Insight II board - PCI device
00bb NC7760
00ca NC7771
00cb NC7781
00cf NC7772
00d0 NC7782
00d1 NC7783
00e3 NC7761
0508 Netelligent 4/16 Token Ring
1000 Triflex/Pentium Bridge, Model 1000
2000 Triflex/Pentium Bridge, Model 2000
3032 QVision 1280/p
3033 QVision 1280/p
3034 QVision 1280/p
4000 4000 [Triflex]
4040 Integrated Array

4048 Compaq Raid LC2
4050 Smart Array 4200
4051 Smart Array 4250ES
4058 Smart Array 431
4070 Smart Array 5300
4080 Smart Array 5i
4082 Smart
Array 532
4083 Smart Array 5312
4091 Smart Array 6i
409a Smart Array 641
409b Smart Array 642
409c Smart Array 6400
409d Smart Array 6400 EM
6010 HotPlug PCI Bridge 6010
7020 USB Controller
a0ec Fibre Channel Host Controller
a0f0 Advanced System Management Controller
0e11 b0f3 ProLiant DL360
a0f3 Triflex PCI to ISA Bridge
a0f7 PCI Hotplug Controller
8086 002a PCI Hotplug Controller A
8086 002b PCI Hotplug Controller B
a0f8 ZFMicro Chipset USB
a0fc FibreChannel HBA Tachyon
ae10 Smart-2/P RAID Controller
0e11 4030 Smart-2/P Array Controller
0e11 4031 Smart-2SL Array Controller
0e11 4032 Smart Array 3200 Controller
0e11 4033 Smart Array 3100ES Controller
0e11 4034 Smart Array 221 Controller
ae29 MIS-L
ae2a MPC
ae2b MIS-E
ae31 System Management Controller
ae32 Netelligent 10/100 TX PCI UTP
ae33 Triflex Dual EIDE Controller
ae34 Netelligent 10 T PCI UTP
ae35 Integrated NetFlex-3/P
ae40 Netelligent Dual 10/100 TX PCI
UTP
ae43 Netelligent Integrated 10/100 TX UTP
ae69 CETUS-L
ae6c Northstar
ae6d NorthStar CPU to PCI Bridge
b011 Netelligent 10/100 TX Embedded UTP
b012 Netelligent 10 T/2 PCI UTP/Coax
b01e NC3120 Fast Ethernet NIC

b01f NC3122 Fast Ethernet NIC
b02f NC1120 Ethernet NIC
b030 Netelligent 10/100 TX UTP
b04a 10/100 TX PCI Intel WOL UTP Controller
b060 Smart Array 5300 Controller
b0c6 NC3161 Fast Ethernet NIC
b0c7 NC3160 Fast Ethernet NIC
b0d7 NC3121 Fast Ethernet NIC
b0dd NC3131 Fast Ethernet NIC
b0de NC3132 Fast Ethernet Module
b0df NC6132 Gigabit Module
b0e0 NC6133 Gigabit Module
b0e1 NC3133 Fast Ethernet Module
b123 NC6134 Gigabit NIC
b134 NC3163 Fast Ethernet NIC
b13c NC3162 Fast Ethernet NIC
b144 NC3123 Fast Ethernet NIC
b163 NC3134 Fast Ethernet NIC
b164 NC3165 Fast Ethernet Upgrade Module
b178 Smart Array 5i/532
0e11 4080 Smart Array 5i
0e11 4082 Smart Array 532
0e11 4083 Smart Array 5312
b1a4 NC7131 Gigabit Server Adapter
b200
Memory Hot-Plug Controller
b203 Integrated Lights Out Controller
b204 Integrated Lights Out Processor
c000 Remote Insight Lights-Out Edition
f130 NetFlex-3/P ThunderLAN 1.0
f150 NetFlex-3/P ThunderLAN 2.3
0e55 HaSoTec GmbH
0eac SHF Communication Technologies AG
0008 Ethernet Powerlink Managing Node 01
0f62 Acrox Technologies Co., Ltd.
1000 Broadcom / LSI
0001 53c810
1000 1000 LSI53C810AE PCI to SCSI I/O Processor
0002 53c820
0003 53c825
1000 1000 LSI53C825AE PCI to SCSI I/O Processor (Ultra Wide)
0004 53c815
0005 53c810AP
0006 53c860
1000 1000 LSI53C860E PCI to Ultra SCSI I/O Processor
000a 53c1510
0e11 b143 Integrated Dual Channel Wide Ultra2 SCSI Controller
1000 1000 LSI53C1510 PCI to Dual Channel Wide Ultra2 SCSI Controller (Nonintelligent mode)

000b 53C896/897
0e11 6004 EOB003 Series SCSI host adapter
1000 1000 LSI53C896/7 PCI to Dual Channel Ultra2 SCSI Multifunction Controller
1000 1010 LSI22910 PCI to Dual Channel
Ultra2 SCSI host adapter
1000 1020 LSI21002 PCI to Dual Channel Ultra2 SCSI host adapter
13e9 1000 6221L-4U (Dual U2W SCSI, dual 10/100TX, graphics)
000c 53c895
1000 1010 LSI8951U PCI to Ultra2 SCSI host adapter
1000 1020 LSI8952U PCI to Ultra2 SCSI host adapter
1de1 3906 DC-390U2B SCSI adapter
1de1 3907 DC-390U2W
000d 53c885
000f 53c875
0e11 7004 Embedded Ultra Wide SCSI Controller
1000 1000 LSI53C876/E PCI to Dual Channel SCSI Controller
1000 1010 LSI22801 PCI to Dual Channel Ultra SCSI host adapter
1000 1020 LSI22802 PCI to Dual Channel Ultra SCSI host adapter
1092 8760 FirePort 40 Dual SCSI Controller
1775 10d0 V5D Single Board Computer Wide Ultra SCSI
1775 10d1 V5D Single Board Computer Ultra SCSI
1de1 3904 DC390F/U Ultra Wide SCSI Adapter
4c53 1000 CC7/CR7/CP7/VC7/VP7/VR7 mainboard
4c53 1050 CT7 mainboard
0010 53C1510
0e11 4040 Integrated Smart Array Controller
0e11 4048 RAID LC2 Controller
1000 1000 53C1510 PCI
to Dual Channel Wide Ultra2 SCSI Controller (Intelligent mode)
0012 53c895a
1000 1000 LSI53C895A PCI to Ultra2 SCSI Controller
0013 53c875a
1000 1000 LSI53C875A PCI to Ultra SCSI Controller
0014 MegaRAID Tri-Mode SAS3516
1028 1f3a PERC H745 Adapter
1028 1f3b PERC H745 Front
1028 1fd4 PERC H745P MX
1137 020e UCSC-RAID-M5 12G Modular RAID Controller
1d49 0602 ThinkSystem RAID 930-16i 4GB Flash PCIe 12Gb Adapter
1d49 0604 ThinkSystem RAID 930-8e 4GB Flash PCIe 12Gb Adapter
1d49 0607 ThinkSystem RAID 930-16i 8GB Flash PCIe 12Gb Adapter
8086 352d Integrated RAID Module RMSP3AD160F
8086 9460 RAID Controller RSP3TD160F
8086 9480 RAID Controller RSP3MD088F
0015 MegaRAID Tri-Mode SAS3416
1028 1f3c PERC H345 Adapter
1028 1f3d PERC H345 Front
1d49 0503 ThinkSystem RAID 530-16i PCIe 12Gb Adapter

0016 MegaRAID Tri-Mode SAS3508
1028 1fc9 PERC H840 Adapter
1028 1fcb PERC H740P Adapter
1028 1fcd PERC H740P Mini
1028 1fcf PERC H740P Mini
1d49
0601 ThinkSystem RAID 930-8i 2GB Flash PCIe 12Gb Adapter
1d49 0603 ThinkSystem RAID 930-24i 4GB Flash PCIe 12Gb Adapter
8086 352e Integrated RAID Module RMSP3CD080F
8086 352f Integrated RAID Module RMSP3HD080E
8086 9461 RAID Controller RSP3DD080F
0017 MegaRAID Tri-Mode SAS3408
1d49 0500 ThinkSystem RAID 530-8i PCIe 12Gb Adapter
1d49 0502 ThinkSystem RAID 530-8i Dense Adapter
8086 3528 Integrated RAID RMSP3LD060
8086 3529 Integrated RAID RMSP3LD060
8086 9441 RAID Controller RSP3WD080E
001b MegaRAID Tri-Mode SAS3504
1d49 0605 ThinkSystem RAID 930-4i 2GB Flash Flex Adapter
001c MegaRAID Tri-Mode SAS3404
1d49 0501 ThinkSystem RAID 530-4i Flex Adapter
0020 53c1010 Ultra3 SCSI Adapter
1000 1000 LSI53C1010-33 PCI to Dual Channel Ultra160 SCSI Controller
107b 1040 Server Onboard 53C1010-33
1de1 1020 DC-390U3W
0021 53c1010 66MHz Ultra3 SCSI Adapter
1000 1000 LSI53C1000/1000R/1010R/1010-66 PCI to Ultra160 SCSI Controller
1000
1010 Asus TR-DLS onboard 53C1010-66
103c 1300 Ultra160 SCSI [AB306A]
103c 1310 Ultra160 SCSI [A9918A]
103c 1330 Ultra160 SCSI [A7059A]
103c 1340 Ultra160 SCSI [A7060A]
124b 1070 PMC-USCSI3
4c53 1080 CT8 mainboard
4c53 1300 P017 mezzanine (32-bit PMC)
4c53 1310 P017 mezzanine (64-bit PMC)
002f MegaRAID SAS 2208 IOV [Thunderbolt]
1028 1f39 SPERC8-e
1028 1f3e SPERC 8
0030 53c1030 PCI-X Fusion-MPT Dual Ultra320 SCSI
0e11 00da ProLiant ML 350
1028 0123 LSI Logic 1020/1030
1028 014a LSI Logic 1020/1030
1028 016c PowerEdge 1850 MPT Fusion SCSI/RAID (Perc 4)
1028 0183 LSI Logic 1020/1030
1028 018a PERC 4/IM
1028 1010 LSI U320 SCSI Controller

103c 12c5 Ultra320 SCSI [A7173A]
103c 1323 Core I/O LAN/SCSI Combo [AB314A]
103c 3108 Single Channel Ultra320 SCSI HBA G2
103c 322a SC11Xe Ultra320 Single Channel PCIe x4 SCSI Host Bus Adapter (412911-B21)
124b 1170 PMC-USCSI320
VMware's emulation of this device. Was missing from the
list.
15ad 1976 LSI Logic Parallel SCSI Controller
1734 1052 PRIMERGY BX/RX/TX S2 series onboard SCSI(IME)
0031 53c1030ZC PCI-X Fusion-MPT Dual Ultra320 SCSI
0032 53c1035 PCI-X Fusion-MPT Dual Ultra320 SCSI
1000 1000 LSI53C1020/1030 PCI-X to Ultra320 SCSI Controller
0033 1030ZC_53c1035 PCI-X Fusion-MPT Dual Ultra320 SCSI
0040 53c1035 PCI-X Fusion-MPT Dual Ultra320 SCSI
1000 0033 MegaRAID SCSI 320-2XR
1000 0066 MegaRAID SCSI 320-2XRWS
0041 53C1035ZC PCI-X Fusion-MPT Dual Ultra320 SCSI
0050 SAS1064 PCI-X Fusion-MPT SAS
1028 1f04 SAS 5/E
1028 1f09 SAS 5i/R
0052 MegaRAID SAS-3 3216/3224 [Cutlass]
0053 MegaRAID SAS-3 3216/3224 [Cutlass]
1000 9350 MegaRAID SAS 9341-16i
1000 9351 MegaRAID SAS 9341-24i
0054 SAS1068 PCI-X Fusion-MPT SAS
1028 1f04 SAS 5/E Adapter Controller
1028 1f05 SAS 5/i Adapter Controller
1028 1f06 SAS 5/i Integrated Controller
1028 1f07 SAS 5/iR Integrated RAID Controller
1028 1f08 SAS 5/iR Integrated RAID Controller
1028
1f09 SAS 5/iR Adapter RAID Controller
15ad 1976 SAS Controller
0055 SAS1068 PCI-X Fusion-MPT SAS
1033 8336 SAS1068
0056 SAS1064ET PCI-Express Fusion-MPT SAS
1014 03bb ServeRAID BR10il SAS/SATA Controller v2
8086 34dc AXX4SASMOD RAID Controller
0057 M1064E MegaRAID SAS
8086 346c Embedded Software RAID Technology II (ESTRII)
0058 SAS1068E PCI-Express Fusion-MPT SAS
1000 3140 SAS3081E-R 8-Port SAS/SATA Host Bus Adapter
1028 021d SAS 6/iR Integrated Workstations RAID Controller
1028 1f0e SAS 6/iR Adapter RAID Controller
1028 1f0f SAS 6/iR Integrated Blades RAID Controller
1028 1f10 SAS 6/iR Integrated RAID Controller
103c 3229 SC44Ge Host Bus Adapter
0059 MegaRAID SAS 8208ELP/8208ELP

005a SAS1066E PCI-Express Fusion-MPT SAS
005b MegaRAID SAS 2208 [Thunderbolt]
1000 9265 MegaRAID SAS 9265-8i
1000 9266 MegaRAID SAS 9266-8i
1000 9267 MegaRAID SAS 9267-8i
1000 9268 MegaRAID SAS 9265CV-8i / 9270CV-8i
1000 9269 MegaRAID SAS
9266-4i
1000 9270 MegaRAID SAS 9270-8i
1000 9271 MegaRAID SAS 9271-8i
1000 9272 MegaRAID SAS 9272-8i
1000 9273 MegaRAID SAS 9270CV-8i
1000 9274 MegaRAID SAS 9270-4i
1000 9275 MegaRAID SAS 9271-8iCC
1000 9276 MegaRAID SAS 9271-4i
1000 9285 MegaRAID SAS 9285-8e
1000 9288 MegaRAID SAS 9285CV-8e
1000 9290 MegaRAID SAS 9286-8e
1000 9291 MegaRAID SAS 9286CV-8e
1000 9295 MegaRAID SAS 9286CV-8eCC
1014 040b ServeRAID M5110 SAS/SATA Controller
1014 040c ServeRAID M5120 SAS/SATA Controller
1014 0412 ServeRAID M5110e SAS/SATA Controller
1028 1f2d PERC H810 Adapter
1028 1f30 PERC H710 Embedded
1028 1f31 PERC H710P Adapter
1028 1f33 PERC H710P Mini (for blades)
1028 1f34 PERC H710P Mini (for monolithics)
1028 1f35 PERC H710 Adapter
1028 1f37 PERC H710 Mini (for blades)
1028 1f38 PERC H710 Mini (for monolithics)
15d9 0690 LSI MegaRAID ROMB
8086 3510 RMS25PB080 RAID Controller
8086 3511 RMS25PB040 RAID Controller
8086 3512
RMT3PB080 RAID Controller
8086 3513 Integrated RAID Module RMS25CB080
8086 3514 RMS25CB040 RAID Controller
8086 351c RMS25PB080N RAID Controller
8086 351d RMS25CB080N RAID Controller
8086 9265 RS25DB080 RAID Controller
8086 9268 RS25AB080 RAID Controller
8086 9285 RS25NB008 RAID Controller
8086 9288 RS25SB008 RAID Controller
005c SAS1064A PCI-X Fusion-MPT SAS
005d MegaRAID SAS-3 3108 [Invader]
1000 9361 MegaRAID SAS 9361-8i
1000 9363 MegaRAID SAS 9361-4i

1000 9364 MegaRAID SAS 9364-8i
1000 936a MegaRAID SAS 9364-8i
1028 1f41 PERC H830 Adapter
1028 1f42 PERC H730P Adapter
1028 1f43 PERC H730 Adapter
1028 1f47 PERC H730P Mini
1028 1f48 PERC H730P Mini (for blades)
1028 1f49 PERC H730 Mini
1028 1f4a PERC H730 Mini (for blades)
1028 1f4d PERC FD33xS
1028 1f4f PERC H730P Slim
1028 1f54 PERC FD33xD
1028 1fd1 PERC H730P MX
17aa 1052 ThinkServer RAID 720i
17aa 1053 ThinkServer RAID 720ix
1bd4 0014 12G SAS3108
2G
1bd4 0015 12G SAS3108 4G
1d49 0600 ThinkSystem RAID 730-8i 1GB Cache PCIe 12Gb Adapter
1d49 0608 ThinkSystem RAID 730-8i 2GB Flash PCIe 12Gb Adapter
1d49 0609 ThinkSystem RAID 730-8i 4GB Flash PCIe 12Gb Adapter
8086 351e RMS3CC080 RAID Controller
8086 351f RMS3CC040 RAID Controller
8086 9360 RS3DC080 RAID Controller
8086 9362 RS3DC040 RAID Controller
8086 9380 RS3SC008 RAID Controller
8086 9381 RS3MC044 RAID Controller
005e SAS1066 PCI-X Fusion-MPT SAS
005f MegaRAID SAS-3 3008 [Fury]
1028 1f44 PERC H330 Adapter
1028 1f4b PERC H330 Mini
1028 1f4c PERC H330 Mini (for blades)
1028 1f4d PERC H330 Embedded (for monolithic)
1054 306a SAS 3004 iMR ROMB
1d49 04db ServeRAID M1210 SAS/SATA Controller
1d49 0504 ThinkSystem RAID 520-8i PCIe 12Gb Adapter
0060 MegaRAID SAS 1078
1000 1006 MegaRAID SAS 8888ELP
1000 100a MegaRAID SAS 8708ELP
1000 100e MegaRAID SAS 8884E
1000 100f MegaRAID SAS 8708E
1000 1010 MegaRAID SATA 350-8ELP
1000
1011 MegaRAID SATA 350-4ELP
1000 1012 MegaRAID SAS 8704ELP
1000 1016 MegaRAID SAS 8880EM2
1014 0363 MegaRAID SAS PCI Express ROMB
1014 0364 SystemX MegaRAID SAS 8808E

1014 0365 SystemX MegaRAID SAS 8884E
1014 0379 SystemX MegaRAID SAS 8880EM2
1028 1f0a PERC 6/E Adapter RAID Controller
1028 1f0b PERC 6/i Adapter RAID Controller
1028 1f0c PERC 6/i Integrated RAID Controller
1028 1f0d PERC 6/i Integrated RAID Controller
1028 1f11 CERC 6/i Integrated RAID Controller
1033 835a MegaRAID SAS PCI Express ROMB
1043 824d MegaRAID SAS PCI Express ROMB
1170 002f MegaRAID SAS PCI Express ROMB
1170 0036 MegaRAID SAS PCI Express ROMB
15d9 c080 MegaRAID SAS PCI Express ROMB
17aa 6b7c MegaRAID SAS PCI Express ROMB
18a1 0003 LSI MegaRAID SAS PCI Express ROMB
8086 1006 RAID Controller SRCSAS28EP
8086 100a RAID Controller SRCSAS28EV
8086 1010 RAID Controller SRCSATA28E
8086 34cc Integrated RAID Controller SROMBSAS28E
8086 34cd
Integrated RAID Controller SROMBSAS28E
8086 3505 Integrated RAID Controller SROMBSASMP2
0062 SAS1078 PCI-Express Fusion-MPT SAS
1000 0062 SAS1078 PCI-Express Fusion-MPT SAS
0064 SAS2116 PCI-Express Fusion-MPT SAS-2 [Meteor]
1000 3030 9200-16e 6Gb/s SAS/SATA PCIe x8 External HBA
1000 30c0 SAS 9201-16i
1000 30d0 9201-16e 6Gb/s SAS/SATA PCIe x8 External HBA
0065 SAS2116 PCI-Express Fusion-MPT SAS-2 [Meteor]
006e SAS2308 PCI-Express Fusion-MPT SAS-2
0070 SAS2004 PCI-Express Fusion-MPT SAS-2 [Spitfire]
1000 3010 SAS9211-4i
1014 040e ServeRAID H1110
0071 MR SAS HBA 2004
0072 SAS2008 PCI-Express Fusion-MPT SAS-2 [Falcon]
1000 3040 9210-8i
1000 3080 9200-8e [LSI SAS 6Gb/s SAS/SATA PCIe x8 External HBA]
1000 30b0 9200-8e [LSI SAS 6Gb/s SAS/SATA PCIe x8 External HBA]
1028 1f1c 6Gbps SAS HBA Adapter
1028 1f1d PERC H200 Adapter
1028 1f1e PERC H200 Integrated
1028 1f1f PERC H200 Modular
1028 1f20 PERC H200 Embedded
1028 1f22 PERC H200
Internal Tape Adapter
Fujitsu D2607 SAS2008 HBA controller
1734 1177 HBA Ctrl SAS 6G 0/1 [D2607]
1bd4 000d 6G SAS2008IT
1bd4 000e 6G SAS2008IR

1bd4 000f 6G SAS2008IT SA5248
1bd4 0010 6G SAS2008IR SA5248
8086 350f RMS2LL040 RAID Controller
8086 3700 SSD 910 Series
0073 MegaRAID SAS 2008 [Falcon]
1000 9240 MegaRAID SAS 9240-8i
1000 9241 MegaRAID SAS 9240-4i
1000 92a0 MegaRAID SAS 9220-8i
1014 03b1 ServeRAID M1015 SAS/SATA Controller
1014 040d ServeRAID M1115 SAS/SATA Controller
1028 1f4e PERC H310 Adapter
1028 1f4f PERC H310 Integrated
1028 1f50 PERC H310 Mini Blades
1028 1f51 PERC H310 Mini Monolithics
1028 1f52 PERC H310 Embedded1
1028 1f53 PERC H310 Embedded2
1028 1f54 PERC H310 Reserved
1028 1f78 PERC H310
1054 3035 LSI MegaRAID SAS 9240-8i
1137 0072 2004 iMR ROMB
1137 0073 2008 ROMB
1137 00b0 UCSC RAID SAS 2008M-8i
1137 00b1 UCSC RAID SAS 2008M-8i
1137 00c2 UCS E-Series Double Wide
1137 00c3 UCS E-Series
Single Wide
15d9 0400 Supermicro SMC2008-iMR
1734 1177 RAID Ctrl SAS 6G 0/1 (D2607)
17aa 1051 ThinkServer RAID 510i
8086 350d RMS2AF040 RAID Controller
8086 9240 RAID Controller RS2WC080
8086 9241 RAID Controller RS2WC040
0074 SAS2108 PCI-Express Fusion-MPT SAS-2 [Liberator]
0076 SAS2108 PCI-Express Fusion-MPT SAS-2 [Liberator]
0077 SAS2108 PCI-Express Fusion-MPT SAS-2 [Liberator]
0079 MegaRAID SAS 2108 [Liberator]
1000 9251 MegaRAID SAS 9260-4ix
1000 9256 MegaRAID SAS 9260-8ix
1000 9260 MegaRAID SAS 9260-4i
1000 9261 MegaRAID SAS 9260-8i
1000 9262 MegaRAID SAS 9262-8i
1000 9263 MegaRAID SAS 9261-8i
1000 9264 MegaRAID SAS 9264-8i
1000 9267 MegaRAID SAS 9260CV-4i
1000 9268 MegaRAID SAS 9260CV-8i
1000 9275 MegaRAID SAS 9280-8ex
1000 9276 MR9260-16i
1000 9280 MegaRAID SAS 9280-8e

1000 9281 MegaRAID SAS 9281-8E
1000 9282 MegaRAID SAS 9280-4i4e
1000 9290 MegaRAID SAS 9280DE-24i4e
1014 03b2 ServeRAID M5015 SAS/SATA
Controller
1014 03b3 ServeRAID M5025 SAS/SATA Controller
1028 1f15 PERC H800 Adapter
1028 1f16 PERC H700 Adapter
1028 1f17 PERC H700 Integrated
1028 1f18 PERC H700 Modular
1028 1f1a PERC H800 Proto Adapter
1028 1f1b PERC H700 Integrated
1043 8480 PIKE-2108 16PD
1734 1176 RAID Ctrl SAS 6G 5/6 512MB (D2616)
1734 1177 RAID Ctrl SAS 6G 0/1 (D2607)
8086 350b RMS2MH080 RAID Controller
8086 9256 MegaRAID SAS 9260DE-8i RS2BL080DE
8086 9260 RAID Controller RS2BL040
8086 9261 RAID Controller RS2BL080
8086 9264 RAID Controller RT3WB080 Warm Beach (Caster Lite)
8086 9267 RAID Controller RS2VB040
8086 9268 RAID Controller RS2VB080
8086 9275 RAID Controller RS2PI008DE
8086 9276 RAID Controller RS2WG160
8086 9280 RAID Controller RS2PI008
8086 9282 RAID Controller RS2MB044
8086 9290 RAID Controller RS2SG244
007c MegaRAID SAS 1078DE
1014 0395 ServeRAID-AR10is SAS/SATA Controller
007e SSS6200 PCI-Express Flash SSD
1000 0504 Nytro
NWD-BLP4-800
1000 0507 Nytro NWD-BLP4-1600
1000 0581 Nytro NWD-BLP4-400
1000 100d Nytro NWD-BFH6-1200
1000 100e Nytro NWD-BFH8-1600
1000 107e Nytro NWD-BFH8-3200
1000 1310 Nytro XP6302-8B1536
1000 1311 Nytro XP6302-8B2048
1000 1314 Nytro XP6302-8B4096
1000 150c Nytro XP6210-4A2048
1000 150f Nytro XP6210-4B2048
1000 160b Nytro XP6209-4A1024
1000 1613 Nytro XP6209-4B2048
108e 050a Nytro ELP4x200_4d_n
108e 0581 Nytro ELP4x100_4d_n
0080 SAS2208 PCI-Express Fusion-MPT SAS-2
0081 SAS2208 PCI-Express Fusion-MPT SAS-2

0082 SAS2208 PCI-Express Fusion-MPT SAS-2
0083 SAS2208 PCI-Express Fusion-MPT SAS-2
0084 SAS2208 PCI-Express Fusion-MPT SAS-2
0085 SAS2208 PCI-Express Fusion-MPT SAS-2
0086 SAS2308 PCI-Express Fusion-MPT SAS-2
15d9 0690 Onboard MegaRAID SAS2208 [Thunderbolt]
15d9 0691 Onboard SAS2308 PCI-Express Fusion-MPT SAS-2
0087 SAS2308 PCI-Express Fusion-MPT SAS-2
1000 3020 9207-8i SAS2.1 HBA
1000 3030 SAS9207-4i4e
1000
3040 9207-8e SAS2.1 HBA
1000 3050 SAS9217-8i
1000 3060 SAS9217-4i4e
1014 0472 N2125 External Host Bus Adapter
1590 0041 H220i
1590 0042 H221 / 9207-8e
1590 0044 H220i
1bd4 0009 6G SAS2308IR
1bd4 000a 6G SAS2308IT
8086 3000 RS25GB008 RAID Controller
8086 3060 RS25FB044 RAID Controller
8086 3516 RMS25JB080 RAID Controller
8086 3517 RMS25JB040 RAID Controller
8086 3518 RMS25KB080 RAID Controller
8086 3519 RMS25KB040 RAID Controller
8086 351a RMS25LB040 RAID Controller
8086 351b RMS25LB080 RAID Controller
008f 53c875J
1092 8000 FirePort 40 SCSI Controller
1092 8760 FirePort 40 Dual SCSI Host Adapter
0090 SAS3108 PCI-Express Fusion-MPT SAS-3
0091 SAS3108 PCI-Express Fusion-MPT SAS-3
0094 SAS3108 PCI-Express Fusion-MPT SAS-3
0095 SAS3108 PCI-Express Fusion-MPT SAS-3
0096 SAS3004 PCI-Express Fusion-MPT SAS-3
0097 SAS3008 PCI-Express Fusion-MPT SAS-3
1000 3090 SAS9311-8i
1000 30a0 SAS9300-8e
1000 30e0 SAS9300-8i
1000
3130 SAS 9300-16i
1028 1f45 HBA330 Adapter
1028 1f46 12Gbps HBA
1028 1f53 HBA330 Mini
1028 1fd2 HBA330 MX
1028 1fd3 HBA330 MMZ
Supermicro AOC-S3008L-L8e uses 0808 for their SAS3008 SAS controller

15d9 0808 AOC-S3008L-L8e
1bd4 000b 12G SAS3008IR
1bd4 000c 12G SAS3008IT
1bd4 0011 Inspur 12Gb 8i-3008 IT SAS HBA
1bd4 0012 12Gb SAS3008IR UDM
1bd4 0026 12G SAS3008IT RACK
1bd4 0027 12G SAS3008IMR RACK
1bd4 0028 12G SAS3008IR RACK
00ab SAS3516 Fusion-MPT Tri-Mode RAID On Chip (ROC)
8 Internal and 8 External port channel 9400 HBA
1000 3040 HBA 9400-8i8e
8086 3530 Integrated RAID Module RMSP3JD160J
00ac SAS3416 Fusion-MPT Tri-Mode I/O Controller Chip (IOC)
Channel 16 internal port HBA
1000 3000 HBA 9400-16i
Channel 16 external port HBA
1000 3020 HBA 9400-16e
1028 1fe3 HBA345 Adapter
1028 1fe4 HBA345 Front
1d49 0201 ThinkSystem 430-16i SAS/SATA 12Gb HBA
1d49 0203 ThinkSystem 430-16e SAS/SATA 12Gb HBA
8086 3000
RAID Controller RSP3QD160J
8086 3020 RAID Controller RSP3GD016J
00ae SAS3508 Fusion-MPT Tri-Mode RAID On Chip (ROC)
00af SAS3408 Fusion-MPT Tri-Mode I/O Controller Chip (IOC)
1000 3010 HBA 9400-8i
9400 Channel 8 external port HBA
1000 3030 HBA 9400-8e
1d49 0200 ThinkSystem 430-8i SAS/SATA 12Gb HBA
1d49 0202 ThinkSystem 430-8e SAS/SATA 12Gb HBA
1d49 0204 ThinkSystem 430-8i SAS/SATA 12Gb Dense HBA
00be SAS3504 Fusion-MPT Tri-Mode RAID On Chip (ROC)
00bf SAS3404 Fusion-MPT Tri-Mode I/O Controller Chip (IOC)
00c0 SAS3324 PCI-Express Fusion-MPT SAS-3
00c1 SAS3324 PCI-Express Fusion-MPT SAS-3
00c2 SAS3324 PCI-Express Fusion-MPT SAS-3
00c3 SAS3324 PCI-Express Fusion-MPT SAS-3
00c4 SAS3224 PCI-Express Fusion-MPT SAS-3
00c5 SAS3316 PCI-Express Fusion-MPT SAS-3
00c6 SAS3316 PCI-Express Fusion-MPT SAS-3
00c7 SAS3316 PCI-Express Fusion-MPT SAS-3
00c8 SAS3316 PCI-Express Fusion-MPT SAS-3
00c9 SAS3216 PCI-Express Fusion-MPT SAS-3
00ce MegaRAID SAS-3
3316 [Intruder]
1000 9371 MegaRAID SAS 9361-16i
1000 9390 MegaRAID SAS 9380-8i8e

00cf MegaRAID SAS-3 3324 [Intruder]
1000 9370 MegaRAID SAS 9361-24i
00d0 SAS3716 Fusion-MPT Tri-Mode RAID Controller Chip (ROC)
9405W 16 internal port channel HBA
1000 3050 HBA 9405W-16i
9405W 8 internal and 8 external port channel HBA
1000 3070 HBA 9405W-8i8e
00d1 SAS3616 Fusion-MPT Tri-Mode I/O Controller Chip (IOC)
9405W 16 external port Channel HBA
1000 3080 HBA 9405W-16e
9405W 16 internal port Channel HBA
1000 3090 HBA 9405W-16i
00d3 MegaRAID Tri-Mode SAS3716W
00e0 Fusion-MPT 12GSAS/PCIe Unsupported SAS39xx
00e1 Fusion-MPT 12GSAS/PCIe SAS39xx
00e2 Fusion-MPT 12GSAS/PCIe Secure SAS39xx
00e3 Fusion-MPT 12GSAS/PCIe Unsupported SAS39xx
00e4 Fusion-MPT 12GSAS/PCIe Unsupported SAS38xx
Invalid part
1028 200b HBA355i Adapter Invalid
Invalid part
1028 200c HBA355i Front Invalid
Invalid part
1028 200d HBA355e Adapter Invalid
Invalid part
1028 200e
HBA350i MX Invalid
Soft Secure
00e5 Fusion-MPT 12GSAS/PCIe SAS38xx
Soft Secure
1028 200b HBA355i Adapter
Soft Secure
1028 200c HBA355i Front
Soft Secure
1028 200d HBA355e Adapter
Soft Secure
1028 200e HBA350i MX
1d49 0205 ThinkSystem 440-16i SAS/SATA PCIe Gen4 12Gb Internal HBA
1d49 0206 ThinkSystem 440-16e SAS/SATA PCIe Gen4 12Gb HBA
00e6 Fusion-MPT 12GSAS/PCIe Secure SAS38xx
1028 200b HBA355i Adapter
1028 200c HBA355i Front
1028 200d HBA355e Adapter
1028 200e HBA355i MX
1d49 0205 ThinkSystem 440-16i SAS/SATA PCIe Gen4 12Gb Internal HBA
1d49 0206 ThinkSystem 440-16e SAS/SATA PCIe Gen4 12Gb HBA
00e7 Fusion-MPT 12GSAS/PCIe Unsupported SAS38xx
Tampered part

1028 200b HBA355i Adapter Tampered
Tampered part
1028 200c HBA355i Front Tampered
Tampered part
1028 200d HBA355e Adapter Tampered
Tampered part
1028 200e HBA350i MX Tampered
02b0 Virtual Endpoint on PCIe Switch
1d49 0001 ThinkSystem 1610-4P NVMe Switch Adapter
1d49
0002 ThinkSystem 810-4P NVMe Switch Adapter
02b1 Virtual Endpoint on PCIe Switch (9749)
1d49 0004 ThinkSystem 1610-8P NVMe Switch Adapter
0407 MegaRAID
1000 0530 MegaRAID 530 SCSI 320-0X RAID Controller
1000 0531 MegaRAID 531 SCSI 320-4X RAID Controller
1000 0532 MegaRAID 532 SCSI 320-2X RAID Controller
1028 0531 PowerEdge Expandable RAID Controller 4/QC
1028 0533 PowerEdge Expandable RAID Controller 4/QC
8086 0530 MegaRAID Intel RAID Controller SRCZCRX
8086 0532 MegaRAID Intel RAID Controller SRCU42X
0408 MegaRAID
1000 0001 MegaRAID SCSI 320-1E RAID Controller
1000 0002 MegaRAID SCSI 320-2E RAID Controller
1025 004d MegaRAID ACER ROMB-2E RAID Controller
1028 0001 PowerEdge RAID Controller PERC4e/SC
1028 0002 PowerEdge RAID Controller PERC4e/DC
1028 0012 PowerEdge RAID Controller RAC4
1028 0015 PowerEdge RAID Controller PERC5
1028 1f03 PowerEdge RAID Controller PERC5
1734 1065 FSC MegaRAID PCI Express ROMB
8086 0002
MegaRAID Intel RAID Controller SRCU42E
8086 3449 MegaRAID Intel RAID Controller SROMBU
0409 MegaRAID
1000 3004 MegaRAID SATA 300-4X RAID Controller
1000 3008 MegaRAID SATA 300-8X RAID Controller
8086 3008 MegaRAID RAID Controller SRCS28X
8086 3431 MegaRAID RAID Controller Alief SROMBU42E
8086 3499 MegaRAID RAID Controller Harwich SROMBU42E
0411 MegaRAID SAS 1068
1000 1001 MegaRAID SAS 8408E
1000 1002 MegaRAID SAS 8480E
1000 1003 MegaRAID SAS 8344ELP
1000 1004 MegaRAID SAS 8308ELP
1000 1008 MegaRAID SAS 84016E
1000 100c MegaRAID SATA 300-12E
1000 100d MegaRAID SATA 300-16E

1000 2004 MegaRAID SATA 300-8ELP
1000 2005 MegaRAID SATA 300-4ELP
1033 8287 MegaRAID SAS PCI Express ROMB
1054 3016 MegaRAID SAS RoMB Server
1734 1081 MegaRAID SAS PCI Express ROMB
1734 10a3 MegaRAID SAS PCI Express ROMB
8086 1001 RAID Controller SRCAS18E
8086 1003 RAID Controller SRCAS144E
8086 3500 SROMBSAS18E RAID Controller
8086 3501 SROMBSAS18E
RAID Controller
8086 3504 SROMBSAS18E RAID Controller
0413 MegaRAID SAS 1068 [Verde ZCR]
1000 1005 MegaRAID SAS 8300XLP
0621 FC909 Fibre Channel Adapter
0622 FC929 Fibre Channel Adapter
1000 1020 44929 O Dual Fibre Channel card
0623 FC929 LAN
0624 FC919 Fibre Channel Adapter
0625 FC919 LAN
0626 FC929X Fibre Channel Adapter
1000 1010 7202-XP-LC Dual Fibre Channel card
0627 FC929X LAN
0628 FC919X Fibre Channel Adapter
0629 FC919X LAN
0640 FC949X Fibre Channel Adapter
0642 FC939X Fibre Channel Adapter
0646 FC949ES Fibre Channel Adapter
0701 83C885 NT50 DigitalScape Fast Ethernet
0702 Yellowfin G-NIC gigabit ethernet
1318 0000 PEI100X
0804 SA2010
0805 SA2010ZC
0806 SA2020
0807 SA2020ZC
0901 61C102
1000 63C815
10e0 MegaRAID 12GSAS/PCIe Unsupported SAS39xx
1028 1ae0 PERC H755 Adapter - Invalid Device
1028 1ae1 PERC H755 Front - Invalid Device
1028 1ae2 PERC H755N Front - Invalid Device
1028 1ae3 PERC H755 MX -
Invalid Device
10e1 MegaRAID 12GSAS/PCIe SAS39xx
1028 1ae0 PERC H755 Adapter
1028 1ae1 PERC H755 Front
1028 1ae2 PERC H755N Front
1028 1ae3 PERC H755 MX

1d49 060a ThinkSystem RAID 940-8i 4GB Flash PCIe Gen4 12Gb Adapter
1d49 060b ThinkSystem RAID 940-8i 8GB Flash PCIe Gen4 12Gb Adapter
1d49 060c ThinkSystem RAID 940-16i 8GB Flash PCIe Gen4 12Gb Adapter
1d49 060d ThinkSystem RAID 940-16i 8GB Flash PCIe Gen4 12Gb Internal Adapter
1d49 060e ThinkSystem RAID 940-32i 8GB Flash PCIe Gen4 12Gb Adapter
1d49 060f ThinkSystem RAID 940-8e 4GB Flash PCIe Gen4 12Gb Adapter
10e2 MegaRAID 12GSAS/PCIe Secure SAS39xx
1028 1ae0 PERC H755 Adapter
1028 1ae1 PERC H755 Front
1028 1ae2 PERC H755N Front
1028 1ae3 PERC H755 MX
1d49 060a ThinkSystem RAID 940-8i 4GB Flash PCIe Gen4 12Gb Adapter
1d49 060b ThinkSystem RAID 940-8i 8GB Flash PCIe Gen4 12Gb Adapter
1d49 060c ThinkSystem RAID 940-16i 8GB Flash PCIe Gen4 12Gb Adapter
1d49 060d ThinkSystem RAID 940-16i
8GB Flash PCIe Gen4 12Gb Internal Adapter
1d49 060e ThinkSystem RAID 940-32i 8GB Flash PCIe Gen4 12Gb Adapter
1d49 060f ThinkSystem RAID 940-8e 4GB Flash PCIe Gen4 12Gb Adapter
10e3 MegaRAID 12GSAS/PCIe Unsupported SAS39xx
1028 1ae0 PERC H755 Adapter - Tampered Device
1028 1ae1 PERC H755 Front - Tampered Device
1028 1ae2 PERC H755N Front - Tampered Device
1028 1ae3 PERC H755 MX - Tampered Device
10e4 MegaRAID 12GSAS/PCIe Unsupported SAS38xx
10e5 MegaRAID 12GSAS/PCIe SAS38xx
10e6 MegaRAID 12GSAS/PCIe Secure SAS38xx
10e7 MegaRAID 12GSAS/PCIe Unsupported SAS38xx
1960 MegaRAID
1000 0518 MegaRAID 518 SCSI 320-2 Controller
1000 0520 MegaRAID 520 SCSI 320-1 Controller
1000 0522 MegaRAID 522 i4 133 RAID Controller
1000 0523 MegaRAID SATA 150-6 RAID Controller
1000 4523 MegaRAID SATA 150-4 RAID Controller
1000 a520 MegaRAID ZCR SCSI 320-0 Controller
1028 0518 MegaRAID 518 DELL PERC 4/DC RAID Controller
1028 0520 MegaRAID 520 DELL PERC
4/SC RAID Controller
1028 0531 PowerEdge Expandable RAID Controller 4/QC
1028 0533 PowerEdge Expandable RAID Controller 4/QC
8086 0520 MegaRAID RAID Controller SRCU41L
8086 0523 MegaRAID RAID Controller SRCS16
3050 SAS2008 PCI-Express Fusion-MPT SAS-2
6001 DX1 Multiformat Broadcast HD/SD Encoder/Decoder
1001 Kolter Electronic
0010 PCI 1616 Measurement card with 32 digital I/O lines
0011 OPTO-PCI Opto-Isolated digital I/O board
0012 PCI-AD/DA Analogue I/O board
0013 PCI-OPTO-RELAIS Digital I/O board with relay outputs

0014 PCI-Counter/Timer Counter Timer board
0015 PCI-DAC416 Analogue output board
0016 PCI-MFB Analogue I/O board
0017 PROTO-3 PCI Prototyping board
9100 INI-9100/9100W SCSI Host
nee ATI Technologies, Inc.
1002 Advanced Micro Devices, Inc. [AMD/ATI]
1304 Kaveri
1305 Kaveri
1306 Kaveri
1307 Kaveri
1308 Kaveri HDMI/DP Audio Controller
17aa 3988 Z50-75
1309 Kaveri [Radeon R6/R7 Graphics]
17aa 3830 Z50-75
130a Kaveri [Radeon
R6 Graphics]
130b Kaveri [Radeon R4 Graphics]
130c Kaveri [Radeon R7 Graphics]
130d Kaveri [Radeon R6 Graphics]
130e Kaveri [Radeon R5 Graphics]
130f Kaveri [Radeon R7 Graphics]
1310 Kaveri
1311 Kaveri
1312 Kaveri
1313 Kaveri [Radeon R7 Graphics]
1314 Wrestler HDMI Audio
174b 1001 PURE Fusion Mini
1315 Kaveri [Radeon R5 Graphics]
1316 Kaveri [Radeon R5 Graphics]
1317 Kaveri
1318 Kaveri [Radeon R5 Graphics]
131b Kaveri [Radeon R4 Graphics]
131c Kaveri [Radeon R7 Graphics]
131d Kaveri [Radeon R6 Graphics]
13e9 Ariel
1478 Navi 10 XL Upstream Port of PCI Express Switch
1479 Navi 10 XL Downstream Port of PCI Express Switch
154c Kryptos
154e Garfield
1551 Arlene
1552 Pooky
1561 Anubis
15d8 Picasso
103c 8615 Pavilion Laptop 15-cw1xxx
17aa 5124 ThinkPad E595
15dd Raven Ridge [Radeon Vega Series / Radeon Vega Mobile Series]
103c 83c6 Radeon Vega 8 Mobile

1458 d000 Radeon RX Vega 11
15de Raven/Raven2/Fenghuang HDMI/DP Audio
Controller
103c 8615 Pavilion Laptop 15-cw1xxx
17aa 5124 ThinkPad E595
15df Raven/Raven2/Fenghuang/Renoir Cryptographic Coprocessor
103c 8615 Pavilion Laptop 15-cw1xxx
15ff Fenghuang [Zhongshan Subor Z+]
1607 Arden
1636 Renoir
1714 BeaverCreek HDMI Audio [Radeon HD 6500D and 6400G-6600G series]
103c 168b ProBook 4535s
3150 RV380/M24 [Mobility Radeon X600]
103c 0934 nx8220
3151 RV380 GL [FireMV 2400]
3152 RV370/M22 [Mobility Radeon X300]
3154 RV380/M24 GL [Mobility FireGL V3200]
3155 RV380 GL [FireMV 2400]
3171 RV380 GL [FireMV 2400] (Secondary)
3e50 RV380 [Radeon X600]
3e54 RV380 GL [FireGL V3200]
3e70 RV380 [Radeon X600] (Secondary)
4136 RS100 [Mobility IGP 320M]
4137 RS200 [Radeon IGP 340]
4144 R300 [Radeon 9500]
4146 R300 [Radeon 9700 PRO]
4147 R300 GL [FireGL Z1]
4148 R350 [Radeon 9800/9800 SE]
4150 RV350 [Radeon 9550/9600/X1050 Series]
1002 0002 R9600 Pro primary (Asus OEM for HP)
1002 0003 R9600 Pro secondary (Asus
OEM for HP)
1002 4722 All-in-Wonder 2006 AGP Edition
1458 4024 GV-R96128D
148c 2064 R96A-C3N
148c 2066 R96A-C3N
174b 7c19 Atlantis Radeon 9600 Pro
174b 7c29 GC-R9600PRO
17ee 2002 Radeon 9600 256Mb Primary
18bc 0101 GC-R9600PRO (Primary)
4151 RV350 [Radeon 9600 Series]
1043 c004 A9600SE
174b 7c37 Radeon 9600SE 128M DDR V/D/VO
4152 RV360 [Radeon 9600/X1050 Series]
1002 0002 Radeon 9600XT
1002 4772 All-in-Wonder 9600 XT
1043 c002 Radeon 9600 XT TVD
1043 c01a A9600XT/TD

1462 9510 RX9600XT (MS-8951)
174b 7c29 Radeon 9600XT
1787 4002 Radeon 9600 XT
4153 RV350 [Radeon 9550]
1043 010c A9550GE/TD
1462 932c RX9550SE-TD128 (MS-8932)
4154 RV350 GL [FireGL T2]
4155 RV350 [Radeon 9600]
4157 RV350 GL [FireGL T2]
4158 68800AX [Graphics Ultra Pro PCI]
4164 R300 [Radeon 9500 PRO] (Secondary)
4165 R300 [Radeon 9700 PRO] (Secondary)
4166 R300 [Radeon 9700 PRO] (Secondary)
4168 RV350 [Radeon 9800 SE] (Secondary)
4170 RV350
[Radeon 9550/9600/X1050 Series] (Secondary)
1002 0003 R9600 Pro secondary (Asus OEM for HP)
1002 4723 All-in-Wonder 2006 AGP Edition (Secondary)
1458 4025 GV-R96128D (Secondary)
148c 2067 R96A-C3N (Secondary)
174b 7c28 GC-R9600PRO (Secondary)
17ee 2003 Radeon 9600 256Mb (Secondary)
18bc 0100 GC-R9600PRO (Secondary)
4171 RV350 [Radeon 9600] (Secondary)
1043 c005 A9600SE (Secondary)
174b 7c36 Radeon 9600SE 128M DDR V/D/VO (secondary)
4172 RV350 [Radeon 9600/X1050 Series] (Secondary)
1002 0003 Radeon 9600XT (Secondary)
1002 4773 All-in-Wonder 9600 XT (Secondary)
1043 c003 A9600XT (Secondary)
1043 c01b A9600XT/TD (Secondary)
174b 7c28 Radeon 9600XT (Secondary)
1787 4003 Radeon 9600 XT (Secondary)
4173 RV350 [Radeon 9550] (Secondary)
1043 010d A9550GE/TD (Secondary)
4242 R200 [All-In-Wonder Radeon 8500 DV]
1002 02aa Radeon 8500 AIW DV Edition
4243 R200 PCI Bridge [All-in-Wonder Radeon 8500DV]
4336 RS100 [Radeon IGP 320M]
1002
4336 Pavilion ze4300 ATI Radeon Mobility U1 (IGP 320 M)
103c 0024 Pavilion ze4400 builtin Video
161f 2029 eMachines M5312 builtin Video
4337 RS200M [Radeon IGP 330M/340M/345M/350M]
1014 053a ThinkPad R40e
103c 0850 Radeon IGP 345M
4341 SB200 AC97 Audio Controller
4342 SB200 PCI to PCI Bridge

4345 SB200 EHCI USB Controller
4346 Crayola 6 [XENOS Parent Die (XBOX 360)]
4347 SB200 OHCI USB Controller #1
4348 SB200 OHCI USB Controller #2
4349 SB200 IDE Controller
434c SB200 PCI to LPC Bridge
434d SB200 AC97 Modem Controller
4353 SB200 SMBus Controller
4354 215CT [Mach64 CT PCI]
4358 Mach64 CX [Graphics Xpression]
4361 SB300 AC'97 Audio Controller
4362 SB300 PCI to PCI Bridge
4363 SB300 SMBus Controller
4365 SB300 USB Controller (EHCI)
4367 SB300 USB Controller (EHCI)
4368 SB300 USB Controller (EHCI)
4369 SB300 IDE Controller
436c SB300 PCI to LPC Bridge
436d SB300 AC97 Modem Controller
436e SB300 Serial ATA Controller
4370 IXP SB400
AC'97 Audio Controller
1025 0079 Aspire 5024WLMMi
1025 0091 Aspire 5032WXMi
103c 2a05 Pavilion t3030.de Desktop PC
103c 308b MX6125
105b 0c81 Realtek ALC 653
107b 0300 MX6421
1462 0131 MS-1013 Notebook
4371 IXP SB4x0 PCI-PCI Bridge
103c 308b MX6125
1462 7217 Aspire L250
4372 IXP SB4x0 SMBus Controller
1025 0080 Aspire 5024WLMMi
103c 2a20 Pavilion t3030.de Desktop PC
103c 308b MX6125
1462 0131 MS-1013 Notebook
1462 7217 Aspire L250
4373 IXP SB4x0 USB2 Host Controller
1025 0080 Aspire 5024WLMMi
103c 2a20 Pavilion t3030.de Desktop PC
103c 308b MX6125
1462 7217 Aspire L250
4374 IXP SB4x0 USB Host Controller
103c 2a20 Pavilion t3030.de Desktop PC
103c 308b MX6125
1462 7217 Aspire L250
4375 IXP SB4x0 USB Host Controller

1025 0080 Aspire 5024WLMMi
103c 2a20 Pavilion t3030.de Desktop PC
103c 308b MX6125
1462 7217 Aspire L250
4376 IXP SB4x0 IDE Controller
1025 0080 Aspire 5024WLMMi
103c 2a20 Pavilion
t3030.de Desktop PC
103c 308b MX6125
1462 0131 MS-1013 Notebook
1462 7217 Aspire L250
4377 IXP SB4x0 PCI-ISA Bridge
1025 0080 Aspire 5024WLMi
103c 2a20 Pavilion t3030.de Desktop PC
103c 308b MX6125
1462 7217 Aspire L250
4378 IXP SB400 AC'97 Modem Controller
1025 0080 Aspire 5024WLMMi
103c 308b MX6125
1462 0131 MS-1013 Notebook
4379 IXP SB4x0 Serial ATA Controller
1462 7141 Aspire L250
437a IXP SB400 Serial ATA Controller
1002 4379 4379 Serial ATA Controller
1002 437a 437A Serial ATA Controller
1462 7141 Aspire L250
14f1 8800 Leadtek WinFast TV2000XP Expert
437b IXP SB4x0 High Definition Audio Controller
1002 437b IXP SB4x0 High Definition Audio Controller
10cf 1326 Fujitsu Lifebook A3040
1734 10b8 Realtek High Definition Audio
4380 SB600 Non-Raid-5 SATA
103c 2813 DC5750 Microtower
1179 ff50 Satellite P305D-S8995E
1458 b003 GA-MA790FX-DS5 (rev. 1.0)
1458 b005 Gigabyte GA-MA69G-S3H Motherboard
1462 7327 K9AG
Neo2
17f2 5999 KI690-AM2 Motherboard
4381 SB600 SATA Controller (RAID 5 mode)
4382 SB600 AC97 Audio
4383 SBx00 Azalia (Intel HDA)
1019 2120 A785GM-M
103c 1611 Pavilion dm1z-3000
103c 280a DC5750 Microtower
1043 8230 M3A78-EH Motherboard
1043 836c M4A785TD Motherboard
1043 8410 M4A89GTD PRO/USB3 Motherboard

1043 841b M5A88-V EVO
1043 8445 M5A78L LE
105b 0e13 N15235/A74MX mainboard / AMD SB700
1179 ff50 Satellite P305D-S8995E
1458 a022 GA-MA770-DS3rev2.0 Motherboard
17f2 5000 KI690-AM2 Motherboard
4384 SBx00 PCI to PCI Bridge
4385 SBx00 SMBus Controller
1019 2120 A785GM-M
103c 1611 Pavilion DM1Z-3000
103c 280a DC5750 Microtower
1043 82ef M3A78-EH Motherboard
1043 8389 M4A785TD Motherboard
105b 0e13 N15235/A74MX mainboard / AMD SB700
1179 ff50 Satellite P305D-S8995E
1458 4385 GA-MA770-DS3rev2.0 Motherboard
1462 7368 K9AG Neo2
15d9 a811 H8DGU
174b 1001 PURE Fusion Mini
17f2 5000 KI690-AM2 Motherboard
4386
SB600 USB Controller (EHCI)
103c 280a DC5750 Microtower
1179 ff50 Satellite P305D-S8995E
1462 7368 K9AG Neo2
17f2 5000 KI690-AM2 Motherboard
4387 SB600 USB (OHCI0)
103c 280a DC5750 Microtower
1179 ff50 Satellite P305D-S8995E
1462 7368 K9AG Neo2
17f2 5000 KI690-AM2 Motherboard
4388 SB600 USB (OHCI1)
103c 280a DC5750 Microtower
1179 ff50 Satellite P305D-S8995E
1462 7368 K9AG Neo2
17f2 5000 KI690-AM2 Motherboard
4389 SB600 USB (OHCI2)
103c 280a DC5750 Microtower
1179 ff50 Satellite P305D-S8995E
1462 7368 K9AG Neo2
17f2 5000 KI690-AM2 Motherboard
438a SB600 USB (OHCI3)
103c 280a DC5750 Microtower
1179 ff50 Satellite P305D-S8995E
1462 7368 K9AG Neo2
17f2 5000 KI690-AM2 Motherboard
438b SB600 USB (OHCI4)
103c 280a DC5750 Microtower

1179 ff50 Satellite P305D-S8995E
1462 7368 K9AG Neo2
17f2 5000 KI690-AM2 Motherboard
438c SB600 IDE
103c 280a DC5750 Microtower
1179 ff50 Satellite P305D-S8995E
1458 5002
Gigabyte GA-MA69G-S3H Motherboard
1462 7368 K9AG Neo2
17f2 5000 KI690-AM2 Motherboard
438d SB600 PCI to LPC Bridge
103c 280a DC5750 Microtower
1179 ff50 Satellite P305D-S8995E
1462 7368 K9AG Neo2
17f2 5000 KI690-AM2 Motherboard
438e SB600 AC97 Modem
4390 SB7x0/SB8x0/SB9x0 SATA Controller [IDE mode]
1043 82ef M3A78-EH Motherboard
1043 8389 M4A785TD Motherboard
105b 0e13 N15235/A74MX mainboard / AMD SB700
1458 b002 GA-MA770-DS3rev2.0 Motherboard
1849 4390 Motherboard (one of many)
4391 SB7x0/SB8x0/SB9x0 SATA Controller [AHCI mode]
103c 1609 ProLiant MicroServer N36L
103c 1611 Pavilion DM1Z-3000
1043 82ef M3A78-EH Motherboard
1043 8443 M5A88-V EVO
1043 84dd M5A99X EVO (R1.0) SB950
105b 0e13 N15235/A74MX mainboard / AMD SB700
174b 1001 PURE Fusion Mini
4392 SB7x0/SB8x0/SB9x0 SATA Controller [Non-RAID5 mode]
105b 0e13 N15235/A74MX mainboard / AMD SB700
4393 SB7x0/SB8x0/SB9x0 SATA Controller [RAID5 mode]
4394 SB7x0/SB8x0/SB9x0
SATA Controller [AHCI mode]
4395 SB8x0/SB9x0 SATA Controller [Storage mode]
4396 SB7x0/SB8x0/SB9x0 USB EHCI Controller
1019 2120 A785GM-M
103c 1609 ProLiant MicroServer N36L
103c 1611 Pavilion DM1Z-3000
1043 82ef M3A78-EH Motherboard
1043 8443 M5A88-V EVO
105b 0e13 N15235/A74MX mainboard / AMD SB700
15d9 a811 H8DGU
174b 1001 PURE Fusion Mini
4397 SB7x0/SB8x0/SB9x0 USB OHCI0 Controller
1019 2120 A785GM-M
103c 1609 ProLiant MicroServer N36L

103c 1611 Pavilion DM1Z-3000
1043 82ef M3A78-EH Motherboard
1043 8443 M5A88-V EVO
105b 0e13 N15235/A74MX mainboard / AMD SB700
15d9 a811 H8DGU
174b 1001 PURE Fusion Mini
4398 SB7x0 USB OHCI1 Controller
1019 2120 A785GM-M
1043 82ef M3A78-EH Motherboard
105b 0e13 N15235/A74MX mainboard / AMD SB700
15d9 a811 H8DGU
4399 SB7x0/SB8x0/SB9x0 USB OHCI2 Controller
1019 2120 A785GM-M
1043 82ef M3A78-EH Motherboard
1043 8443 M5A88-V EVO
105b 0e13 N15235/A74MX mainboard / AMD
SB700
174b 1001 PURE Fusion Mini
439c SB7x0/SB8x0/SB9x0 IDE Controller
1002 4392 MSI MS-7713 motherboard
1019 2120 A785GM-M
103c 1609 ProLiant MicroServer N36L
1043 82ef M3A78-EH Motherboard
105b 0e13 N15235/A74MX mainboard / AMD SB700
439d SB7x0/SB8x0/SB9x0 LPC host controller
1019 2120 A785GM-M
103c 1609 ProLiant MicroServer N36L
103c 1611 Pavilion DM1Z-3000
1043 82ef M3A78-EH Motherboard
1043 8443 M5A88-V EVO
105b 0e13 N15235/A74MX mainboard / AMD SB700
174b 1001 PURE Fusion Mini
43a0 SB700/SB800/SB900 PCI to PCI bridge (PCIE port 0)
43a1 SB700/SB800/SB900 PCI to PCI bridge (PCIE port 1)
43a2 SB900 PCI to PCI bridge (PCIE port 2)
43a3 SB900 PCI to PCI bridge (PCIE port 3)
4437 RS250 [Mobility Radeon 7000 IGP]
4554 210888ET [Mach64 ET]
4630 XENOS Parent Die (XBOX 360)
4631 XENOS Daughter Die (XBOX 360)
4654 Mach64 VT
4742 Rage 3 [3D Rage PRO AGP 2X]
1002 0040 Rage Pro Turbo AGP 2X
1002 0044 Rage Pro Turbo AGP 2X
1002
0061 Rage Pro AIW AGP 2X
1002 0062 Rage Pro AIW AGP 2X
1002 0063 Rage Pro AIW AGP 2X

1002 0080 Rage Pro Turbo AGP 2X
1002 0084 Rage Pro Turbo AGP 2X
1002 4742 Rage Pro Turbo AGP 2X
1002 8001 Rage Pro Turbo AGP 2X
1028 0082 Rage Pro Turbo AGP 2X
1028 4082 Optiplex GX1 Onboard Display Adapter
1028 8082 Rage Pro Turbo AGP 2X
1028 c082 Rage Pro Turbo AGP 2X
8086 4152 Xpert 98D AGP 2X
8086 464a Rage Pro Turbo AGP 2X
4744 Rage 3 [3D Rage PRO AGP 1X]
1002 4744 Rage Pro Turbo AGP
8086 4d55 Rage 3D Pro AGP 1X [Intel MU440EX]
4749 3D Rage PRO PCI
1002 0061 Rage Pro AIW
1002 0062 Rage Pro AIW
474d Rage XL AGP 2X
1002 0004 Xpert 98 RXL AGP 2X
1002 0008 Xpert 98 RXL AGP 2X
1002 0080 Rage XL AGP 2X
1002 0084 Xpert 98 AGP 2X
1002 474d Rage XL AGP
1033 806a Rage XL AGP
474e Rage XC AGP
1002 474e Rage XC AGP
474f Rage XL
1002 0008 Rage XL
1002 474f Rage XL
4750 3D Rage Pro PCI
1002 0040 Rage Pro Turbo
1002
0044 Rage Pro Turbo
1002 0080 Rage Pro Turbo
1002 0084 Rage Pro Turbo
1002 4750 Rage Pro Turbo
4752 Rage 3 [Rage XL PCI]
0e11 001e Proliant Rage XL
1002 0008 Rage XL
1002 4752 Proliant Rage XL
1002 8008 Rage XL
1014 0240 eServer xSeries server mainboard
1028 00ce PowerEdge 1400
1028 00d1 PowerEdge 2550
1028 00d9 PowerEdge 2500
1028 0134 PowerEdge 600SC
1028 014a PowerEdge 1750
1028 0165 PowerEdge 750
103c 10e1 NetServer Rage XL

103c 3208 ProLiant DL140 G2
107b 6400 6400 Server
1734 007a PRIMERGY RX/TX series onboard VGA
1734 1073 Primergy Econel 200 D2020 mainboard
8086 3411 SDS2 Mainboard
8086 3427 S875WP1-E mainboard
8086 5744 S845WD1-E mainboard
4753 Rage XC
1002 4753 Rage XC
4754 Mach64 GT/GT-B [3D Rage I/II]
4755 Mach64 GT-B [3D Rage II+ DVD]
4756 Rage 2 [3D Rage IIC PCI]
1002 4756 Rage IIC
4757 Rage 2 [3D Rage IIC AGP]
1002 4757 Rage IIC AGP
1028 0089 Rage 3D IIC
1028 008e PowerEdge 1300
onboard video
1028 4082 Rage 3D IIC
1028 8082 Rage 3D IIC
1028 c082 Rage 3D IIC
4758 Mach64 GX [WinTurbo]
4759 Rage 3 [3D Rage IIC PCI]
475a 3D Rage IIC AGP
1002 0084 Rage 3D Pro AGP 2x XPERT 98
1002 0087 Rage 3D IIC
1002 475a Rage IIC AGP
4845 Xilleon 220 HBIU for HDTV2
4846 Xilleon 220 IDE for HDTV2
4847 Xilleon 220 USB for HDTV2
4848 Xilleon 220 DAIO-0 for HDTV2
4849 Xilleon 220 DAIO-1 for HDTV2
484a Xilleon 220 LPC for HDTV2
4850 Xilleon 215 HBIU for X215
4851 Xilleon 215 IDE for X215
4852 Xilleon 215 USB for X215
4853 Xilleon 215 DAIO-0 for X215
4854 Xilleon 215 DAIO-1 for X215
4855 Xilleon 225 HBIU for X225
4856 Xilleon 225 IDE for X225
4857 Xilleon 225 USB for X225
4858 Xilleon 225 DAIO-0 for X225
4859 Xilleon 225 DAIO-1 for X225
4860 Xilleon 210 HBIU for X210
4861 Xilleon 210 IDE for X210
4862 Xilleon 210 USB for X210
4863 Xilleon 210 DAIO-0 for X210
4864 Xilleon 210 DAIO-1 for X210

4865 Xilleon 226 HBIU for
X226
4866 Xilleon 226 IDE for X226
4867 Xilleon 226 USB for X226
4868 Xilleon 226 DAIO-0 for X226
4869 Xilleon 226 DAIO-1 for X226
486a Xilleon 240S HBIU for X240S
486b Xilleon 240H HBIU for X240H
486c Xilleon 240S USB for X240S
486d Xilleon 240H USB for X240H
486e Xilleon 250 USB 1.1 for X250
486f Xilleon 260 USB 1.1 for X260
4870 Xilleon 250 HBIU for X250
4871 Xilleon 250 IDE for X250
4872 Xilleon 234/235 HBIU for X234/X235
4873 Xilleon 244/245 HBIU for X244/X245
4874 Xilleon 234/235 USB 1.1 for X234/X235
4875 Xilleon 260 HBIU for X260
4876 Xilleon 260 IDE for X260
4877 Xilleon 244/245 USB 1.1 for X244/X245
4878 Xilleon 270 HBIU for X270
487b Xilleon 242 HBIU for X242
487d Xilleon 242 USB 1.1 for X242
4880 Xilleon 254 HBIU for X254
4881 Xilleon 254 USB 1.1 for X254
4882 Xilleon 255 HBIU for X255
4883 Xilleon 255 USB 1.1 for X255
4884 Xilleon 243 HBIU for X243
4885 Xilleon 243 USB 1.1 for X243
4886 Xilleon 233 HBIU for X233
4887
Xilleon 233 USB 1.1 for X233
4888 Xilleon 143 HBIU for X143
4889 Xilleon 143 HBIU for X143L
488a Xilleon 143 HBIU for X143S
4966 RV250 [Radeon 9000 Series]
10f1 0002 RV250 If [Tachyon G9000 PRO]
148c 2039 RV250 If [Radeon 9000 Pro "Evil Commando"]
1509 9a00 RV250 If [Radeon 9000 "AT009"]
1681 0040 RV250 If [3D prophet 9000]
174b 7176 Radeon 9000 Pro
174b 7192 RV250 If [Radeon 9000 "Atlantis"]
17af 2005 RV250 If [Excalibur Radeon 9000 Pro]
17af 2006 RV250 If [Excalibur Radeon 9000]
496e RV250 [Radeon 9000] (Secondary)
4a49 R420 [Radeon X800 PRO/GTO AGP]
174b 2620 R420 [Radeon X800 GTO AGP]
4a4a R420 [Radeon X800 GT AGP]

4a4b R420 [Radeon X800 AGP Series]
4a4d R420 GL [FireGL X3-256]
4a4e RV420/M18 [Mobility Radeon 9800]
4a4f R420 [Radeon X850 AGP]
4a50 R420 [Radeon X800 XT Platinum Edition AGP]
4a54 R420 [Radeon X800 VE AGP]
1002 4422 All-In-Wonder X800 VE AGP
4a69 R420 [Radeon X800 PRO/GTO] (Secondary)
4a6a R420 [Radeon X800]
(Secondary)
4a6b R420 [Radeon X800 XT AGP] (Secondary)
4a70 R420 [Radeon X800 XT Platinum Edition AGP] (Secondary)
4a74 R420 [Radeon X800 VE] (Secondary)
4b49 R481 [Radeon X850 XT AGP]
4b4b R481 [Radeon X850 PRO AGP]
4b4c R481 [Radeon X850 XT Platinum Edition AGP]
4b69 R481 [Radeon X850 XT AGP] (Secondary)
4b6b R481 [Radeon X850 PRO AGP] (Secondary)
4b6c R481 [Radeon X850 XT Platinum Edition AGP] (Secondary)
4c42 Mach64 LT [3D Rage LT PRO AGP]
0e11 b0e7 Rage LT Pro (Compaq Presario 5240)
0e11 b0e8 Rage 3D LT Pro
0e11 b10e 3D Rage LT Pro (Compaq Armada 1750)
1002 0040 Rage LT Pro AGP 2X
1002 0044 Rage LT Pro AGP 2X
1002 4c42 Rage LT Pro AGP 2X
1002 8001 Rage LT Pro AGP 2X
1028 0085 Rage 3D LT Pro
4c46 Rage Mobility 128 AGP 2X/Mobility M3
1002 0155 IBM Thinkpad A22p
1014 0155 Thinkpad A22p
1028 00b1 Latitude C600
4c47 3D Rage IIC PCI / Mobility Radeon 7500/7500C
4c49 3D Rage LT PRO PCI
1002 0004 Rage LT Pro
1002 0040 Rage
LT Pro
1002 0044 Rage LT Pro
1002 4c49 Rage LT Pro
4c4d Rage Mobility AGP 2x Series
0e11 b111 Armada M700
0e11 b160 Armada E500
1002 0084 Xpert 98 AGP 2X (Mobility)
1014 0154 ThinkPad A20m/A21m
1028 00aa Latitude CPt
1028 00bb Latitude CPx
1179 ff00 Satellite 1715XCDS laptop
13bd 1019 PC-AR10

4c50 Rage 3 LT [3D Rage LT PRO PCI]
1002 4c50 Rage LT Pro
4c52 M1 [Rage Mobility-M1 PCI]
1033 8112 Versa Note VXi
4c54 264LT [Mach64 LT]
4c57 RV200/M7 [Mobility Radeon 7500]
1014 0517 ThinkPad T30
1014 0530 ThinkPad T4x Series
1028 00e6 Radeon Mobility M7 LW (Dell Inspiron 8100)
1028 012a Latitude C640
1043 1622 Mobility Radeon M7 (L3C/S)
144d c006 Radeon Mobility M7 LW in vpr Matrix 170B4
4c58 RV200/M7 GL [Mobility FireGL 7800]
4c59 RV100/M6 [Rage/Radeon Mobility Series]
0e11 b111 Evo N600c
1014 0235 ThinkPad A30/A30p (2652/2653)
1014 0239 ThinkPad X22/X23/X24
103c 0025 XE4500 Notebook
104d 80e7 VAIO PCG-GR214EP/GR214MP/GR215MP/GR314MP/GR315MP
104d
8140 PCG-Z1SP laptop
1509 1930 Medion MD9703
4c66 RV250/M9 GL [Mobility FireGL 9000/Radeon 9000]
1014 054d ThinkPad T41
4c6e RV250/M9 [Mobility Radeon 9000] (Secondary)
4d46 Rage Mobility 128 AGP 4X/Mobility M4
4d52 Theater 550 PRO PCI [ATI TV Wonder 550]
4d53 Theater 550 PRO PCIe
4e44 R300 [Radeon 9700/9700 PRO]
1002 515e Radeon ES1000
1002 5965 Radeon ES1000
4e45 R300 [Radeon 9500 PRO/9700]
1002 0002 Radeon R300 NE [Radeon 9500 Pro]
1681 0002 Hercules 3D Prophet 9500 PRO [Radeon 9500 Pro]
4e46 R300 [Radeon 9600 TX]
4e47 R300 GL [FireGL X1]
4e48 R350 [Radeon 9800 Series]
4e49 R350 [Radeon 9800]
4e4a R360 [Radeon 9800 XXL/XT]
1002 4e4a R360 [Radeon 9800 XT]
4e4b R350 GL [FireGL X2 AGP Pro]
4e50 RV350/M10 / RV360/M11 [Mobility Radeon 9600 (PRO) / 9700]
1025 005a TravelMate 290
1025 0064 Extensa 3000 series laptop: ATI RV360/M11 [Mobility Radeon 9700]
103c 088c NC8000 laptop
103c 0890 NC6000
laptop
144d c00c P35 notebook

1462 0311 MSI M510A
1734 1055 Amilo M1420W
4e51 RV350 [Radeon 9550/9600/X1050 Series]
4e52 RV350/M10 [Mobility Radeon 9500/9700 SE]
144d c00c P35 notebook
4e54 RV350/M10 GL [Mobility FireGL T2]
4e56 RV360/M12 [Mobility Radeon 9550]
4e64 R300 [Radeon 9700 PRO] (Secondary)
4e65 R300 [Radeon 9500 PRO] (Secondary)
1002 0003 Radeon R300 NE [Radeon 9500 Pro]
1681 0003 Hercules 3D Prophet 9500 PRO [Radeon 9500 Pro] (Secondary)
4e66 RV350 [Radeon 9600] (Secondary)
4e67 R300 GL [FireGL X1] (Secondary)
4e68 R350 [Radeon 9800 PRO] (Secondary)
4e69 R350 [Radeon 9800] (Secondary)
4e6a RV350 [Radeon 9800 XT] (Secondary)
1002 4e6a R360 [Radeon 9800 XT] (Secondary)
1002 4e71 M10 NQ [Radeon Mobility 9600]
4e71 RV350/M10 [Mobility Radeon 9600] (Secondary)
4f72 RV250 [Radeon 9000 Series]
4f73 RV250 [Radeon 9000 Series] (Secondary)
5044 All-In-Wonder 128 PCI
1002 0028 Rage 128 AIW
1002 0029 Rage 128 AIW
5046 Rage
4 [Rage 128 PRO AGP 4X TMDS]
1002 0004 Rage Fury Pro
1002 0008 Rage Fury Pro/Xpert 2000 Pro
1002 0014 Rage Fury Pro
1002 0018 Rage Fury Pro/Xpert 2000 Pro
1002 0028 Rage 128 Pro AIW AGP
1002 002a Rage 128 Pro AIW AGP
1002 0048 Rage Fury Pro
1002 2000 Rage Fury MAXX AGP 4x (TMDS) (VGA device)
1002 2001 Rage Fury MAXX AGP 4x (TMDS) (Extra device?!)
5050 Rage128 [Xpert 128 PCI]
1002 0008 Xpert 128
5052 Rage 128 PRO AGP 4X TMDS
5144 R100 [Radeon 7200 / All-In-Wonder Radeon]
1002 0008 Radeon 7000/Radeon VE
1002 0009 Radeon 7000/Radeon
1002 000a Radeon 7000/Radeon
1002 001a Radeon 7000/Radeon
1002 0029 Radeon AIW
1002 0038 Radeon 7000/Radeon
1002 0039 Radeon 7000/Radeon
1002 008a Radeon 7000/Radeon
1002 00ba Radeon 7000/Radeon

1002 0139 Radeon 7000/Radeon
1002 028a Radeon 7000/Radeon
1002 02aa Radeon AIW
1002 053a Radeon 7000/Radeon
5148 R200 GL [FireGL 8800]
1002 010a FireGL 8800 64Mb
1002 0152 FireGL 8800
128Mb
1002 0162 FireGL 8700 32Mb
1002 0172 FireGL 8700 64Mb
514c R200 [Radeon 8500/8500 LE]
1002 003a Radeon R200 QL [Radeon 8500 LE]
1002 013a Radeon 8500
148c 2026 R200 QL [Radeon 8500 Evil Master II Multi Display Edition]
1681 0010 Radeon 8500 [3D Prophet 8500 128Mb]
174b 7149 Radeon 8500 LE
1787 0f08 Radeon R200 QL [PowerMagic Radeon 8500]
514d R200 [Radeon 9100]
5157 RV200 [Radeon 7500/7500 LE]
1002 013a Radeon 7500
1002 0f2b ALL-IN-WONDER VE PCI
1002 103a Dell Optiplex GX260
1458 4000 RV200 QW [RADEON 7500 PRO MAYA AR]
148c 2024 RV200 QW [Radeon 7500LE Dual Display]
148c 2025 RV200 QW [Radeon 7500 Evil Master Multi Display Edition]
148c 2036 RV200 QW [Radeon 7500 PCI Dual Display]
174b 7146 RV200 QW [Radeon 7500 LE]
174b 7147 Radeon 7500 LE
174b 7161 Radeon RV200 QW [Radeon 7500 LE]
17af 0202 RV200 QW [Excalibur Radeon 7500LE]
5159 RV100 [Radeon 7000 / Radeon VE]
1002 000a Radeon 7000/Radeon VE
1002 000b Radeon
7000
1002 0038 Radeon 7000/Radeon VE
1002 003a Radeon 7000/Radeon VE
1002 00ba Radeon 7000/Radeon VE
1002 013a Radeon 7000/Radeon VE
1002 0908 XVR-100 (supplied by Sun)
The IBM card doubles as an ATI PCI video adapter
1014 029a Remote Supervisor Adapter II (RSA2)
1014 02c8 eServer xSeries server mainboard
1028 016c PowerEdge 1850 Embedded Radeon 7000/VE
1028 016d PowerEdge 2850 Embedded Radeon 7000-M
1028 0170 PowerEdge 6850 Embedded Radeon 7000/VE
1028 019a PowerEdge SC1425
103c 1292 Radeon 7000
1043 c00a A7000/T/64M

1458 4002 RV100 QY [RADEON 7000 PRO MAYA AV Series]
148c 2003 RV100 QY [Radeon 7000 Multi-Display Edition]
148c 2023 RV100 QY [Radeon 7000 Evil Master Multi-Display]
148c 2081 RV6DE
174b 0280 Radeon RV100 QY [Radeon 7000/VE]
174b 7112 Radeon VE 7000
174b 7c28 Radeon VE 7000 DDR
1787 0202 RV100 QY [Excalibur Radeon 7000]
17ee 1001 Radeon 7000 64MB DDR + DVI
515e ES1000
1028 01bb PowerEdge 1955 Embedded
ATI ES1000
1028 01df PowerEdge SC440
1028 01e6 PowerEdge 860
1028 01f0 PowerEdge R900 Embedded ATI ES1000
1028 0205 PowerEdge 2970 Embedded ATI ES1000
1028 020b PowerEdge T605 Embedded ATI ES1000
1028 020f PowerEdge R300 Embedded ATI ES1000
1028 0210 PowerEdge T300 Embedded ATI ES1000
1028 0221 PowerEdge R805 Embedded ATI ES1000
1028 0223 PowerEdge R905 Embedded ATI ES1000
1028 0225 PowerEdge T105 Embedded ATI ES1000
1028 023c PowerEdge R200 Embedded ATI ES1000
103c 1304 Integrity iLO2 Advanced KVM VGA [AD307A]
15d9 8680 X7DVL-E-O motherboard
15d9 9680 X7DBN Motherboard
8086 3476 S5000PSLSATA Server Board
5245 Rage 128 GL PCI
1002 0008 Xpert 128
1002 0028 Rage 128 AIW
1002 0029 Rage 128 AIW
1002 0068 Rage 128 AIW
5246 Rage 128 (Rage 4) series
1002 0004 Magnum/Xpert 128/Xpert 99
1002 0008 Rage 128 AGP 2x
1002 0028 Rage 128 AIW AGP
1002 0044 Rage Fury/Xpert 128/Xpert 2000
1002 0068 Rage 128 AIW AGP
1002 0448
Rage Fury
524b Rage 128 VR PCI
524c Rage 128 VR AGP
1002 0008 Xpert 99/Xpert 2000
1002 0088 Xpert 99
5346 Rage 128 SF/4x AGP 2x
1002 0048 RAGE 128 16MB VGA TVOUT AMC PAL
534d Rage 128 4X AGP 4x
1002 0008 Xpert 99/Xpert 2000

1002 0018 Xpert 2000
5354 Mach 64 VT
1002 5654 Mach 64 reference
5446 Rage 128 PRO Ultra AGP 4x
1002 0004 Rage Fury Pro
1002 0008 Rage Fury Pro/Xpert 2000 Pro
1002 0018 Rage Fury Pro/Xpert 2000 Pro
1002 0028 Rage 128 AIW Pro AGP
1002 0029 Rage 128 AIW
1002 002a Rage 128 AIW Pro AGP
1002 002b Rage 128 AIW
1002 0048 Xpert 2000 Pro
5452 Rage 128 PRO Ultra4XL VR-R AGP
1002 001c Rage 128 Pro 4XL
103c 1279 Rage 128 Pro 4XL
5460 RV370/M22 [Mobility Radeon X300]
1775 1100 CR11/VR11 Single Board Computer
5461 RV370/M22 [Mobility Radeon X300]
5462 RV380/M24C [Mobility Radeon X600 SE]
5464 RV370/M22 GL [Mobility FireGL V3100]
5549 R423 [Radeon X800 GTO]
554a R423 [Radeon X800 XT Platinum Edition]
554b
R423 [Radeon X800 GT/SE]
1002 0302 Radeon X800 SE
554d R430 [Radeon X800 XL]
1002 0322 All-In-Wonder X800 XL
1458 2124 GV-R80L256V-B (AGP)
554e R430 [All-In-Wonder X800 GT]
554f R430 [Radeon X800]
5550 R423 GL [FireGL V7100]
5551 R423 GL [FireGL V5100]
5569 R423 [Radeon X800 PRO] (Secondary)
556b R423 [Radeon X800 GT] (Secondary)
556d R430 [Radeon X800 XL] (Secondary)
1458 2125 GV-R80L256V-B (AGP)
556f R430 [Radeon X800] (Secondary)
5571 R423 GL [FireGL V5100] (Secondary)
564b RV410/M26 GL [Mobility FireGL V5000]
564f RV410/M26 [Mobility Radeon X700 XL]
5652 RV410/M26 [Mobility Radeon X700]
5653 RV410/M26 [Mobility Radeon X700]
1025 0080 Aspire 5024WLMi
103c 0940 Compaq NW8240 Mobile Workstation
5654 Mach64 VT [Video Xpression]
1002 5654 Mach64VT Reference
5655 264VT3 [Mach64 VT3]
5656 Mach64 VT4 [Video Xpression+]

5657 RV410 [Radeon X550 XTX / X700]
5830 RS300 Host Bridge
5831 RS300 Host Bridge
5832 RS300 Host Bridge
5833
RS300 Host Bridge
5834 RS300 [Radeon 9100 IGP]
5835 RS300M [Mobility Radeon 9100 IGP]
5838 RS300 AGP Bridge
5854 RS480 [Radeon Xpress 200 Series] (Secondary)
5874 RS480 [Radeon Xpress 1150] (Secondary)
5940 RV280 [Radeon 9200 PRO] (Secondary)
17af 2021 Excalibur Radeon 9250 (Secondary)
5941 RV280 [Radeon 9200] (Secondary)
1458 4019 Radeon 9200
174b 7c12 Radeon 9200
17af 200d Excalibur Radeon 9200
18bc 0050 GC-R9200-C3 (Secondary)
5944 RV280 [Radeon 9200 SE PCI]
5950 RS480/RS482/RS485 Host Bridge
1025 0080 Aspire 5024WLMMi
103c 280a DC5750 Microtower
103c 2a20 Pavilion t3030.de Desktop PC
103c 308b MX6125
1462 0131 MS-1013 Notebook
1462 7217 Aspire L250
5951 RX480/RX482 Host Bridge
5952 RD580 Host Bridge
5954 RS480 [Radeon Xpress 200 Series]
1002 5954 RV370 [Radeon Xpress 200G Series]
5955 RS480M [Mobility Radeon Xpress 200]
1002 5955 RS480 0x5955 [Radeon XPRESS 200M 5955 (PCIE)]
103c 308b MX6125
1462 0131
MS-1013 Notebook
5956 RD790 Host Bridge
5957 RX780/RX790 Host Bridge
1849 5957 A770CrossFire Motherboard
5958 RD780 Host Bridge
5960 RV280 [Radeon 9200 PRO]
17af 2020 Excalibur Radeon 9250
5961 RV280 [Radeon 9200]
1002 2f72 All-in-Wonder 9200 Series
1019 4c30 Radeon 9200 VIVO
12ab 5961 YUAN SMARTVGA Radeon 9200
1458 4018 Radeon 9200
174b 7c13 Radeon 9200
17af 200c Excalibur Radeon 9200

18bc 0050 Radeon 9200 Game Buster
18bc 0051 GC-R9200-C3
18bc 0053 Radeon 9200 Game Buster VIVO
5962 RV280 [Radeon 9200]
5964 RV280 [Radeon 9200 SE]
1002 5964 Radeon 9200 SE, 64-bit 128MB DDR, 200/166MHz
1043 c006 Radeon 9200 SE / TD / 128M
1458 4018 Radeon 9200 SE
1458 4032 Radeon 9200 SE 128MB
147b 6191 R9200SE-DT
148c 2073 CN-AG92E
174b 7c13 Radeon 9200 SE
1787 5964 Excalibur 9200SE VIVO 128M
17af 2012 Radeon 9200 SE Excalibur
18bc 0170 Sapphire Radeon 9200 SE 128MB Game Buster
18bc 0173 GC-R9200L(SE)-C3H [Radeon 9200 Game
Buster]
5965 RV280 GL [FireMV 2200 PCI]
5974 RS482/RS485 [Radeon Xpress 1100/1150]
103c 280a DC5750 Microtower
1462 7141 Aspire L250
5975 RS482M [Mobility Radeon Xpress 200]
5978 RX780/RD790 PCI to PCI bridge (external gfx0 port A)
1849 5957 A770CrossFire Motherboard
5979 RD790 PCI to PCI bridge (external gfx0 port B)
597a RD790 PCI to PCI bridge (PCI express gpp port A)
597b RX780/RD790 PCI to PCI bridge (PCI express gpp port B)
597c RD790 PCI to PCI bridge (PCI express gpp port C)
597d RX780/RD790 PCI to PCI bridge (PCI express gpp port D)
597e RD790 PCI to PCI bridge (PCI express gpp port E)
1849 5957 A770CrossFire Motherboard
597f RD790 PCI to PCI bridge (PCI express gpp port F)
1849 5957 A770CrossFire Motherboard
5980 RD790 PCI to PCI bridge (external gfx1 port A)
5981 RD790 PCI to PCI bridge (external gfx1 port B)
5982 RD790 PCI to PCI bridge (NB-SB link)
5a10 RD890 Northbridge only dual slot (2x16) PCI-e GFX Hydra part
5a11 RD890 Northbridge
only single slot PCI-e GFX Hydra part
5a12 RD890 Northbridge only dual slot (2x8) PCI-e GFX Hydra part
15d9 a811 H8DGU
5a13 RD890S/SR5650 Host Bridge
5a14 RD9x0/RX980 Host Bridge
5a15 RD890 PCI to PCI bridge (PCI express gpp port A)
5a16 RD890/RD9x0/RX980 PCI to PCI bridge (PCI Express GFX port 0)
5a17 RD890/RD9x0 PCI to PCI bridge (PCI Express GFX port 1)
5a18 RD890/RD9x0/RX980 PCI to PCI bridge (PCI Express GPP Port 0)
15d9 a811 H8DGU

5a19 RD890/RD9x0/RX980 PCI to PCI bridge (PCI Express GPP Port 1)
 5a1a RD890/RD9x0/RX980 PCI to PCI bridge (PCI Express GPP Port 2)
 5a1b RD890/RD9x0/RX980 PCI to PCI bridge (PCI Express GPP Port 3)
 5a1c RD890/RD9x0/RX980 PCI to PCI bridge (PCI Express GPP Port 4)
 5a1d RD890/RD9x0/RX980 PCI to PCI bridge (PCI Express GPP Port 5)
 5a1e RD890/RD9x0/RX980 PCI to PCI bridge (PCI Express GPP2 Port 0)
 5a1f RD890/RD990 PCI to PCI bridge (PCI Express GFX2 port 0)
 15d9 a811 H8DGU
 5a20 RD890/RD990 PCI to PCI bridge (PCI Express GFX2 port 1)
 5a23 RD890S/RD990 I/O Memory Management Unit (IOMMU)
 5a31 RC410 Host Bridge
 5a33 RS400 Host Bridge
 5a34 RS4xx PCI Express Port [ext gfx]
 5a36 RC4xx/RS4xx PCI Express Port 1
 5a37 RC4xx/RS4xx PCI Express Port 2
 5a38 RC4xx/RS4xx PCI Express Port 3
 5a39 RC4xx/RS4xx PCI Express Port 4
 5a3f RC4xx/RS4xx PCI Bridge [int gfx]
 1462 7217 Aspire L250
 5a41 RS400 [Radeon Xpress 200]
 5a42 RS400M [Radeon Xpress 200M]
 5a61 RC410 [Radeon Xpress 200/1100]
 5a62 RC410M [Mobility Radeon Xpress 200M]
 5b60 RV370 [Radeon X300]
 1043 002a Extreme AX300SE-X
 1043 032e Extreme AX300/TD
 1458 2102 GV-RX30S128D (X300SE)
 1462 0400 RX300SE-TD128E (MS-8940 REV:200)
 1462 0402 RX300SE-TD128E (MS-8940)
 174b 0500 Radeon X300 (PCIE)
 196d 1086 X300SE HM
 5b62 RV370 [Radeon X600/X600 SE]
 5b63 RV370 [Radeon X300/X550/X1050 Series]
 5b64 RV370 GL [FireGL V3100]
 5b65 RV370 GL [FireMV 2200]
 5b66 RV370X
 5b70 RV370 [Radeon X300 SE]
 # RX300SE-TD128E
 1462
 0403 Radeon X300 SE 128MB DDR
 174b 0501 Radeon X300 SE
 196d 1087 Radeon X300 SE HyperMemory
 5b72 RV380 [Radeon X300/X550/X1050 Series] (Secondary)
 5b73 RV370 [Radeon X300/X550/X1050 Series] (Secondary)
 5b74 RV370 GL [FireGL V3100] (Secondary)
 5b75 RV370 GL [FireMV 2200] (Secondary)
 5c61 RV280/M9+ [Mobility Radeon 9200 AGP]

5c63 RV280/M9+ [Mobility Radeon 9200 AGP]
1002 5c63 Apple iBook G4 2004
144d c00c P30 notebook
5d44 RV280 [Radeon 9200 SE] (Secondary)
1458 4019 Radeon 9200 SE (Secondary)
1458 4032 Radeon 9200 SE 128MB
147b 6190 R9200SE-DT (Secondary)
174b 7c12 Radeon 9200 SE (Secondary)
1787 5965 Excalibur 9200SE VIVO 128M (Secondary)
17af 2013 Radeon 9200 SE Excalibur (Secondary)
18bc 0171 Radeon 9200 SE 128MB Game Buster (Secondary)
18bc 0172 GC-R9200L(SE)-C3H [Radeon 9200 Game Buster]
5d45 RV280 GL [FireMV 2200 PCI] (Secondary)
5d48 R423/M28 [Mobility Radeon X800 XT]
5d49 R423/M28 GL [Mobility FireGL V5100]
5d4a
R423/M28 [Mobility Radeon X800]
5d4d R480 [Radeon X850 XT Platinum Edition]
5d4e R480 [Radeon X850 SE]
5d4f R480 [Radeon X800 GTO]
5d50 R480 GL [FireGL V7200]
5d52 R480 [Radeon X850 XT]
1002 0b12 PowerColor X850XT PCIe (Primary)
5d57 R423 [Radeon X800 XT]
5d6d R480 [Radeon X850 XT Platinum Edition] (Secondary)
5d6f R480 [Radeon X800 GTO] (Secondary)
5d72 R480 [Radeon X850 XT] (Secondary)
1002 0b13 PowerColor X850XT PCIe (Secondary)
5d77 R423 [Radeon X800 XT] (Secondary)
5e48 RV410 GL [FireGL V5000]
5e49 RV410 [Radeon X700 Series]
5e4a RV410 [Radeon X700 XT]
5e4b RV410 [Radeon X700 PRO]
5e4c RV410 [Radeon X700 SE]
5e4d RV410 [Radeon X700]
148c 2116 Bravo X700
5e4f RV410 [Radeon X700]
1569 1e4f Radeon X550 XT
5e6b RV410 [Radeon X700 PRO] (Secondary)
5e6d RV410 [Radeon X700] (Secondary)
148c 2117 Bravo X700 (Secondary)
5f57 R423 [Radeon X800 XT]
6600 Mars [Radeon HD 8670A/8670M/8750M]
103c 1952 ProBook 455 G1
6601 Mars [Radeon
HD 8730M]
103c 2100 FirePro M4100
6604 Opal XT [Radeon R7 M265/M365X/M465]

1025 0776 Aspire V5 Radeon R7 M265
103c 8006 FirePro M4170
103c 814f Litho XT [Radeon R7 M365X]
103c 82aa Litho XT [Radeon R7 M465]
17aa 3643 Radeon R7 A360
6605 Opal PRO [Radeon R7 M260X]
103c 2259 FirePro M4150
6606 Mars XTX [Radeon HD 8790M]
1028 0684 FirePro W4170M
6607 Mars LE [Radeon HD 8530M / R5 M240]
6608 Oland GL [FirePro W2100]
13cc 3d28 MXRT-2600
6610 Oland XT [Radeon HD 8670 / R7 250/350]
1019 0030 Radeon HD 8670
1028 2120 Radeon R7 250
1028 2322 Radeon R7 250
1462 2910 Radeon HD 8670
1462 2911 Radeon HD 8670
148c 7350 Radeon R7 350
1642 3c81 Radeon HD 8670
1642 3c91 Radeon HD 8670
1642 3f09 Radeon R7 350
6611 Oland [Radeon HD 8570 / R7 240/340 / Radeon 520 OEM]
1028 210b Radeon R5 240 OEM
1642 1869 Radeon 520 OEM
174b 4248 Radeon R7 240 OEM
174b a240 Radeon R7 240 OEM
174b d340 Radeon R7 340 OEM
1b0a 90d3 Radeon R7
240 OEM
6613 Oland PRO [Radeon R7 240/340]
148c 7340 Radeon R7 340
1682 7240 R7 240 2048 MB
6631 Oland
6640 Saturn XT [FirePro M6100]
106b 014b Tropo XT [Radeon R9 M380 Mac Edition]
6641 Saturn PRO [Radeon HD 8930M]
6646 Bonaire XT [Radeon R9 M280X]
6647 Saturn PRO/XT [Radeon R9 M270X/M280X]
1043 223d N551ZU laptop Radeon R9 M280X
6649 Bonaire [FirePro W5100]
1002 0b0c FirePro W4300
103c 0b0c Bonaire [FirePro W4300]
103c 230c FirePro W5100
13cc 3d2a MXRT-5600
6650 Bonaire
6651 Bonaire
6658 Bonaire XTX [Radeon R7 260X/360]

1043 04d3 AMD Radeon R7 260X
148c 0907 Radeon R7 360
1682 0907 Radeon R7 360
1682 7360 Radeon R7 360
665c Bonaire XT [Radeon HD 7790/8770 / R7 360 / R9 260/360 OEM]
1043 0452 Radeon HD 7790 DirectCU II OC
R7790-1GD5/OC
1462 2930 Radeon HD 7790 OC
1462 2932 Radeon HD 8770
1462 2934 Radeon R9 260 OEM
1462 2938 Radeon R9 360 OEM
148c 0907 Radeon R7 360
148c 9260 Radeon R9 260 OEM
148c 9360
Radeon R9 360 OEM
1682 0907 Radeon R7 360
FX-779A-CDB4 / FX-779A-CDBC
1682 3310 Radeon HD 7790 Black Edition 2 GB
100356OCL / 11210-01-20G
174b e253 Radeon HD 7790 Dual-X OC
1787 2329 Radeon HD 7790 TurboDuo
665d Bonaire [Radeon R7 200 Series]
665f Tobago PRO [Radeon R7 360 / R9 360 OEM]
1028 0b04 Radeon R9 360 OEM
1462 2938 Radeon R9 360 OEM
1462 3271 Radeon R9 360 OEM
1682 7360 Radeon R7 360
6660 Sun XT [Radeon HD 8670A/8670M/8690M / R5 M330 / M430 / Radeon 520 Mobile]
1028 05ea Radeon HD 8670M
1028 06bf Radeon R5 M335
103c 1970 Radeon HD 8670M
103c 80be Radeon R5 M330
103c 8136 Radeon R5 M330
103c 8329 Radeon R7 M520
17aa 3633 Radeon R5 A330
17aa 3804 Radeon R5 M330
17aa 3809 Radeon R5 M330
17aa 381a Radeon R5 M430
17aa 390c Radeon R5 M330
6663 Sun PRO [Radeon HD 8570A/8570M]
1025 0846 Radeon HD 8570A
17aa 3805 Radeon HD 8570M
6664 Jet XT [Radeon R5 M240]
6665 Jet PRO [Radeon R5 M230 / R7 M260DX / Radeon
520 Mobile]
17aa 1309 Z50-75 Radeon R7 M260DX
17aa 368f Radeon R5 A230
6667 Jet ULT [Radeon R5 M230]

666f Sun LE [Radeon HD 8550M / R5 M230]
66a0 Vega 20 [Radeon Instinct]
66a1 Vega 20
66a2 Vega 20
66a3 Vega 20
66a7 Vega 20 [Radeon Pro Vega 20]
66af Vega 20 [Radeon VII]
6704 Cayman PRO GL [FirePro V7900]
6707 Cayman LE GL [FirePro V5900]
6718 Cayman XT [Radeon HD 6970]
6719 Cayman PRO [Radeon HD 6950]
671c Antilles [Radeon HD 6990]
671d Antilles [Radeon HD 6990]
671f Cayman CE [Radeon HD 6930]
6720 Blackcomb [Radeon HD 6970M/6990M]
1028 048f Radeon HD 6990M
1028 0490 Alienware M17x R3 Radeon HD 6970M
1028 04a4 FirePro M8900
1028 04ba Radeon HD 6990M
1028 053f FirePro M8900
106b 0b00 Radeon HD 6970M
1558 5102 Radeon HD 6970M
1558 5104 Radeon HD 6990M
1558 7201 Radeon HD 6990M
174b e188 Radeon HD 6970M
6738 Barts XT [Radeon HD 6870]
HD-687A-ZDFC
1682 3103 Radeon HD 8670
1787 201a Barts XT [Radeon HD 6870 X2]
1787
201b Barts XT [Radeon HD 6870 X2]
6739 Barts PRO [Radeon HD 6850]
1043 03b4 EAH6850 [Radeon HD 6850]
673e Barts LE [Radeon HD 6790]
148c 7720 Radeon HD 7720 OEM
6740 Whistler [Radeon HD 6730M/6770M/7690M XT]
1019 238c Radeon HD 6730M
1019 238e Radeon HD 6730M
1019 2391 Radeon HD 6730M
1019 2392 Radeon HD 6770M
1028 04a3 Precision M4600
1028 053e FirePro M5950
103c 1630 FirePro M5950
103c 1631 FirePro M5950
103c 164b Radeon HD 6730M
103c 164e Radeon HD 6730M
103c 1657 Radeon HD 6770M
103c 1658 Radeon HD 6770M

103c 165a Radeon HD 6770M
103c 165b Radeon HD 6770M
103c 1688 Radeon HD 6770M
103c 1689 Radeon HD 6770M
103c 168a Radeon HD 6770M
103c 185e Radeon HD 7690M XT
103c 3388 Radeon HD 6770M
103c 3389 Radeon HD 6770M
103c 3582 Radeon HD 6770M
103c 366c Radeon HD 6730M
1043 1d02 Radeon HD 6730M
1043 1d12 Radeon HD 6730M
104d 9084 Radeon HD 6730M
104d 9085 Radeon HD 6730M
144d b074 Radeon
HD 6730M
144d b077 Radeon HD 6730M
144d b084 Radeon HD 6730M
144d b088 Radeon HD 6730M
17aa 3982 Radeon HD 6730M
6741 Whistler [Radeon HD 6630M/6650M/6750M/7670M/7690M]
1019 238e Radeon HD 6650M
1019 238f Radeon HD 6650M
1025 0379 Radeon HD 6650M
1025 037b Radeon HD 6650M
1025 037e Radeon HD 6650M
1025 0382 Radeon HD 6650M
1025 0384 Radeon HD 6650M
1025 0385 Radeon HD 6650M
1025 0386 Radeon HD 6650M
1025 0387 Radeon HD 6650M
1025 0388 Radeon HD 6650M
1025 0442 Radeon HD 6650M
1025 0451 Radeon HD 6650M
1025 0489 Radeon HD 6650M
1025 048b Radeon HD 6650M
1025 048c Radeon HD 6650M
1025 050a Radeon HD 6650M
1025 050b Radeon HD 6650M
1025 050c Radeon HD 6650M
1025 050e Radeon HD 6650M
1025 050f Radeon HD 6650M
1025 0513 Radeon HD 6650M
1025 0514 Radeon HD 6650M
1025 0515 Radeon HD 6650M
1025 0516 Radeon HD 6650M
1025 051e Radeon HD 6650M
1025 051f Radeon HD 6650M

1025 0520 Radeon HD 6650M
1025
0521 Radeon HD 6650M
1025 052a Radeon HD 6650M
1025 0555 Radeon HD 6650M
1025 0556 Radeon HD 6650M
1025 055d Radeon HD 6650M
1025 055e Radeon HD 6650M
1025 056d Radeon HD 6650M
1025 059a Radeon HD 6650M
1025 059b Radeon HD 6650M
1025 059e Radeon HD 6650M
1025 059f Radeon HD 6650M
1025 0600 Radeon HD 6650M
1025 0605 Radeon HD 6650M
1025 0606 Radeon HD 6650M
1025 0619 Radeon HD 6650M
1028 04c1 Radeon HD 6630M
1028 04c5 Radeon HD 6630M
1028 04cd Radeon HD 6630M
1028 04d7 Radeon HD 6630M
1028 04d9 Radeon HD 6630M
1028 052d Radeon HD 6630M
103c 1617 Radeon HD 6650M
103c 1646 Radeon HD 6750M
103c 1647 Radeon HD 6650M
103c 164b Radeon HD 6650M
103c 164e Radeon HD 6650M
103c 1688 Radeon HD 6750M
103c 1689 Radeon HD 6750M
103c 168a Radeon HD 6750M
103c 1860 Radeon HD 7690M
103c 3385 Radeon HD 6630M
103c 3560 Radeon HD 6750M
103c 358d Radeon HD 6750M
103c 3590 Radeon HD 6750M
103c 3593 Radeon
HD 6750M
103c 366c Radeon HD 6650M
1043 1cd2 Radeon HD 6650M
1043 2121 Radeon HD 6650M
1043 2122 Radeon HD 6650M
1043 2123 Radeon HD 6650M
1043 2125 Radeon HD 7670M
1043 2127 Radeon HD 7670M
104d 907b Radeon HD 6630M
104d 9080 Radeon HD 6630M
104d 9081 Radeon HD 6630M

106b 00e2 MacBookPro8,2 [Core i7, 15", Late 2011]
1179 fd63 Radeon HD 6630M
1179 fd65 Radeon HD 6630M
144d c093 Radeon HD 6650M
144d c0ac Radeon HD 6650M
144d c0b3 Radeon HD 6750M
144d c539 Radeon HD 6630M
144d c609 Radeon HD 6630M
152d 0914 Radeon HD 6650M
17aa 21e1 Radeon HD 6630M
17aa 3970 Radeon HD 6650M
17aa 3976 Radeon HD 6650M
1854 0907 Radeon HD 6650M
6742 Whistler LE [Radeon HD 6610M/7610M]
1002 6570 Turks [Radeon HD 6570]
1019 2393 Radeon HD 6610M
1043 1d82 K53SK Laptop Radeon HD 7610M
1179 fb22 Radeon HD 7610M
1179 fb23 Radeon HD 7610M
1179 fb27 Radeon HD 7610M
1179 fb2a Radeon HD 7610M
1179 fb2c Radeon HD 7610M
1179
fb30 Radeon HD 7610M
1179 fb31 Radeon HD 7610M
1179 fb32 Radeon HD 7610M
1179 fb38 Radeon HD 7610M
1179 fb39 Radeon HD 7610M
1179 fb3a Radeon HD 7610M
1179 fb3b Radeon HD 7610M
1179 fb40 Radeon HD 7610M
1179 fb41 Radeon HD 7610M
1179 fb47 Radeon HD 7610M
1179 fb48 Radeon HD 7610M
1179 fb49 Radeon HD 7610M
1179 fb51 Radeon HD 7610M
1179 fb52 Radeon HD 7610M
1179 fb53 Radeon HD 7610M
1179 fb56 Radeon HD 7610M
1179 fb81 Radeon HD 7610M
1179 fb82 Radeon HD 7610M
1179 fb83 Radeon HD 7610M
1179 fc56 Radeon HD 7610M
1179 fcd4 Radeon HD 7610M
1179 fcee Radeon HD 7610M
1458 6570 Turks [Radeon HD 6570]
1462 6570 Turks [Radeon HD 6570]
148c 6570 Turks [Radeon HD 6570]

1682 6570 Turks [Radeon HD 6570]
174b 5570 Turks [Radeon HD 5570]
174b 6570 Turks [Radeon HD 6570]
174b 7570 Turks [Radeon HD 7570]
174b 8510 Turks [Radeon HD 8510]
174b 8570 Turks [Radeon HD 8570]
1787 6570 Turks [Radeon HD 6570]
17af
6570 Turks [Radeon HD 6570]
8086 2111 Radeon HD 6625M
6743 Whistler [Radeon E6760]
6749 Turks GL [FirePro V4900]
15c3 2b06 MED-X4900
674a Turks GL [FirePro V3900]
13cc 3d22 MXRT-2500
15c3 0106 MED-X3900
6750 Onega [Radeon HD 6650A/7650A]
1462 2670 Radeon HD 6670A
17aa 3079 Radeon HD 7650A
17aa 307a Radeon HD 6650A
17aa 3087 Radeon HD 7650A
17aa 3618 Radeon HD 6650A
17aa 3623 Radeon HD 6650A
17aa 3627 Radeon HD 6650A
6751 Turks [Radeon HD 7650A/7670A]
1028 0548 Radeon HD 7650A
1462 2671 Radeon HD 7670A
1462 2672 Radeon HD 7670A
1462 2680 Radeon HD 7650A
1462 2681 Radeon HD 7650A
17aa 3087 Radeon HD 7650A
6758 Turks XT [Radeon HD 6670/7670]
1028 0b0e Radeon HD 6670
103c 6882 Radeon HD 6670
1462 250a Radeon HD 7670
148c 7670 Radeon HD 7670
1545 7670 Radeon HD 7670
1682 3300 Radeon HD 7670
174b 7670 Radeon HD 7670
174b e181 Radeon HD 6670
1787 2309 Radeon HD 6670
6759 Turks PRO [Radeon HD 6570/7570/8550]
103c
3130 Radeon HD 6570
1043 0403 Radeon HD 6570
1462 2500 Radeon HD 6570
1462 2509 Radeon HD 7570
148c 7570 Radeon HD 7570

1642 3a67 Radeon HD 6570
1682 3280 Radeon HD 7570
1682 3530 Radeon HD 8550
174b 7570 Radeon HD 7570
174b e142 Radeon HD 6570
174b e181 Radeon HD 6570
1b0a 908f Radeon HD 6570
1b0a 9090 Radeon HD 6570
1b0a 9091 Radeon HD 6570
1b0a 9092 Radeon HD 6570
1b0a 909e Radeon HD 6570
1b0a 90b5 Radeon HD 7570
1b0a 90b6 Radeon HD 7570
675b Turks [Radeon HD 7600 Series]
675d Turks PRO [Radeon HD 7570]
675f Turks LE [Radeon HD 5570/6510/7510/8510]
148c 6510 Radeon HD 6510
148c 6530 Radeon HD 6530
148c 7510 Radeon HD 7510
1545 7570 Radeon HD 7570
174b 6510 Radeon HD 6510
174b 7510 Radeon HD 7510
174b 8510 Radeon HD 8510
1787 2012 Radeon HD 5570 2GB GDDR3
1787 2314 Radeon HD 5570 1GB DDR2/GDDR3
6760 Seymour [Radeon HD 6400M/7400M Series]
1002 0124 Radeon HD 6470M
1002 0134 Radeon
HD 6470M
1019 238b Radeon HD 6470M
1019 238e Radeon HD 6470M
1019 2390 Radeon HD 6470M
1019 9985 Radeon HD 6470M
1028 04c1 Radeon HD 6470M
1028 04c3 Radeon HD 6470M
1028 04ca Radeon HD 6470M
1028 04cb Radeon HD 6470M
1028 04cc Vostro 3350
1028 04d1 Radeon HD 6470M
1028 04d3 Radeon HD 6470M
1028 04d7 Radeon HD 6470M
1028 0502 Radeon HD 6470M
1028 0503 Radeon HD 6470M
1028 0506 Radeon HD 6470M
1028 0507 Radeon HD 6470M
1028 0514 Radeon HD 6470M
1028 051c Radeon HD 6450M
1028 051d Radeon HD 6450M

103c 161a Radeon HD 6470M
103c 161b Radeon HD 6470M
103c 161e Radeon HD 6470M
103c 161f Radeon HD 6470M
103c 1622 Radeon HD 6450M
103c 1623 Radeon HD 6450M
103c 164a Radeon HD 6470M
103c 164d Radeon HD 6470M
103c 1651 Radeon HD 6470M
103c 1656 Radeon HD 6490M
103c 1658 Radeon HD 6490M
103c 1659 Radeon HD 6490M
103c 165b Radeon HD 6490M
103c 165d Radeon HD 6470M
103c 165f Radeon HD 6470M
103c
1661 Radeon HD 6470M
103c 1663 Radeon HD 6470M
103c 1665 Radeon HD 6470M
103c 1667 Radeon HD 6470M
103c 1669 Radeon HD 6470M
103c 166b Radeon HD 6470M
103c 166c Radeon HD 6470M
103c 166e Radeon HD 6470M
103c 1670 Radeon HD 6470M
103c 1672 Radeon HD 6470M
103c 167a Radeon HD 6470M
103c 167b Radeon HD 6470M
103c 167d Radeon HD 6490M
103c 167f Radeon HD 6490M
103c 168c Radeon HD 6470M
103c 168f Radeon HD 6470M
103c 1694 Radeon HD 6470M
103c 1696 Radeon HD 6470M
103c 1698 Radeon HD 6470M
103c 169a Radeon HD 6470M
103c 169c Radeon HD 6490M
103c 1855 Radeon HD 7450M
103c 1859 Radeon HD 7450M
103c 185c Radeon HD 7450M
103c 185d Radeon HD 7470M
103c 185f Radeon HD 7470M
103c 1863 Radeon HD 7450M
103c 355c Radeon HD 6490M
103c 355f Radeon HD 6490M
103c 3563 Radeon HD 6470M
103c 3565 Radeon HD 6470M
103c 3567 Radeon HD 6470M

103c 3569 Radeon HD 6470M
103c 3581 Radeon HD 6490M
103c 3584 Radeon
HD 6470M
103c 358c Radeon HD 6490M
103c 358f Radeon HD 6490M
103c 3592 Radeon HD 6490M
103c 3596 Radeon HD 6490M
103c 366b Radeon HD 6470M
103c 3671 FirePro M3900
103c 3673 Radeon HD 6470M
1043 100a Radeon HD 7470M
1043 100c Radeon HD 6470M
1043 101b Radeon HD 6470M
1043 101c Radeon HD 6470M
1043 102a Radeon HD 7450M
1043 102c Radeon HD 6470M
1043 104b Radeon HD 7470M
1043 105d Radeon HD 7470M
1043 106b Radeon HD 7470M
1043 106d Radeon HD 7470M
1043 107d Radeon HD 7470M
1043 1cb2 Radeon HD 6470M
1043 1d22 Radeon HD 6470M
1043 1d32 Radeon HD 6470M
1043 2001 Radeon HD 6470M
1043 2002 Radeon HD 7470M
1043 2107 Radeon HD 7470M
1043 2108 Radeon HD 7470M
1043 2109 Radeon HD 7470M
1043 84a0 Radeon HD 6470M
1043 84e9 Radeon HD 6470M
1043 8515 Radeon HD 7470M
1043 8517 Radeon HD 7470M
1043 855a Radeon HD 7470M
104d 907b Radeon HD 6470M
104d 9081 Radeon HD 6470M
104d 9084 Radeon HD 6470M
104d
9085 Radeon HD 6470M
1179 0001 Radeon HD 6450M
1179 0003 Radeon HD 6450M
1179 0004 Radeon HD 6450M
1179 fb22 Radeon HD 7470M
1179 fb23 Radeon HD 7470M
1179 fb2c Radeon HD 7470M
1179 fb31 Radeon HD 7470M
1179 fb32 Radeon HD 7470M

1179 fb33 Radeon HD 7470M
1179 fb38 Radeon HD 7470M
1179 fb39 Radeon HD 7470M
1179 fb3a Radeon HD 7470M
1179 fb40 Radeon HD 7470M
1179 fb41 Radeon HD 7470M
1179 fb42 Radeon HD 7470M
1179 fb47 Radeon HD 7470M
1179 fb48 Radeon HD 7470M
1179 fb51 Radeon HD 7470M
1179 fb52 Radeon HD 7470M
1179 fb53 Radeon HD 7470M
1179 fb81 Radeon HD 7470M
1179 fb82 Radeon HD 7470M
1179 fb83 Radeon HD 7470M
1179 fc51 Radeon HD 6470M
1179 fc52 Radeon HD 7470M
1179 fc56 Radeon HD 7470M
1179 fcd3 Radeon HD 7470M
1179 fcd4 Radeon HD 7470M
1179 fcee Radeon HD 7470M
1179 fdee Radeon HD 7470M
144d b074 Radeon HD 6470M
144d b084 Radeon HD 6470M
144d c095 Radeon HD 6470M
144d c0b3 Radeon
HD 6490M
144d c538 Radeon HD 6470M
144d c581 Radeon HD 6470M
144d c589 Radeon HD 6470M
144d c609 Radeon HD 7470M
144d c625 Radeon HD 7470M
144d c636 Radeon HD 7450M
1462 10ac Radeon HD 6470M
152d 0916 Radeon HD 6470M
17aa 21e5 Radeon HD 6470M
17aa 3900 Radeon HD 7450M
17aa 3902 Radeon HD 7450M
17aa 3969 Radeon HD 6470M
17aa 3970 Radeon HD 7450M
17aa 3976 Radeon HD 6470M
17aa 397b Radeon HD 6470M
17aa 397d Radeon HD 6470M
17aa 5101 Radeon HD 7470M
17aa 5102 Radeon HD 7450M
17aa 5103 Radeon HD 7450M
17aa 5106 Radeon HD 7450M
1854 0897 Radeon HD 6470M

1854 0900 Radeon HD 6470M
1854 0908 Radeon HD 6470M
1854 2015 Radeon HD 6470M
6761 Seymour LP [Radeon HD 6430M]
6763 Seymour [Radeon E6460]
6764 Seymour [Radeon HD 6400M Series]
6765 Seymour [Radeon HD 6400M Series]
6766 Caicos
6767 Caicos
6768 Caicos
6770 Caicos [Radeon HD 6450A/7450A]
17aa 308d Radeon HD 7450A
17aa 3623 Radeon HD 6450A
17aa 3627
Radeon HD 6450A
17aa 3629 Radeon HD 6450A
17aa 363c Radeon HD 6450A
17aa 3658 Radeon HD 7470A
6771 Caicos XTX [Radeon HD 8490 / R5 235X OEM]
6772 Caicos [Radeon HD 7450A]
6778 Caicos XT [Radeon HD 7470/8470 / R5 235/310 OEM]
1019 0024 Radeon HD 7470
1019 0027 Radeon HD 8470
1028 2120 Radeon HD 7470
1462 b491 Radeon HD 8470
1462 b492 Radeon HD 8470
1462 b493 Radeon HD 8470 OEM
1462 b499 Radeon R5 235 OEM
1642 3c65 Radeon HD 8470
1642 3c75 Radeon HD 8470
174b 8145 Radeon HD 8470
174b d145 Radeon R5 235 OEM
174b d335 Radeon R5 310 OEM
174b e145 Radeon HD 7470
17aa 3694 Radeon R5 A220
6779 Caicos [Radeon HD 6450/7450/8450 / R5 230 OEM]
1019 0016 Radeon HD 6450
1019 0017 Radeon HD 6450
1019 0018 Radeon HD 6450
1028 2120 Radeon HD 6450
103c 2128 Radeon HD 6450
103c 2aee Radeon HD 7450A
1092 6450 Radeon HD 6450
1462 2125 Radeon HD 6450
1462 2346 Radeon HD 7450
1462 2490 Radeon HD 6450
1462 2494 Radeon

HD 6450
1462 2496 Radeon HD 7450
148c 7450 Radeon HD 7450
148c 8450 Radeon HD 8450 OEM
1545 7470 Radeon HD 7470
1642 3a65 Radeon HD 6450
1642 3a66 Radeon HD 7450
1642 3a75 Radeon HD 6450
1642 3a76 Radeon HD 7450
1682 3200 Radeon HD 7450
174b 7450 Radeon HD 7450
174b e127 Radeon HD 6450
174b e153 Radeon HD 6450
174b e164 Radeon HD 6450 1 GB DDR3
174b e180 Radeon HD 6450
174b e201 Radeon HD 6450
17af 8450 Radeon HD 8450 OEM
1b0a 9096 Radeon HD 6450
1b0a 9097 Radeon HD 6450
1b0a 90a8 Radeon HD 6450A
1b0a 90b1 Radeon HD 6450
1b0a 90b3 Radeon HD 7450A
1b0a 90bb Radeon HD 7450A
677b Caicos PRO [Radeon HD 7450]
6780 Tahiti XT GL [FirePro W9000]
6784 Tahiti [FirePro Series Graphics Adapter]
6788 Tahiti [FirePro Series Graphics Adapter]
678a Tahiti PRO GL [FirePro Series]
1002 030c FirePro W8000
1002 0310 FirePro S9000
1002 0420 Radeon Sky 700
1002 0422 Radeon Sky 900
1002 0710 FirePro S9050
1002 0b0e
FirePro S10000 Passive
1002 0b2a FirePro S10000
1028 030c FirePro W8000
1028 0710 FirePro S9000
6798 Tahiti XT [Radeon HD 7970/8970 OEM / R9 280X]
1002 3000 Tahiti XT2 [Radeon HD 7970 GHz Edition]
1002 3001 Tahiti XTL [Radeon R9 280X]
1002 4000 Radeon HD 8970 OEM
1043 041c HD 7970 DirectCU II
1043 0420 HD 7970 DirectCU II TOP
1043 0444 HD 7970 DirectCU II TOP
1043 0448 HD 7970 DirectCU II TOP
1043 044a Tahiti XT2 [Matrix HD 7970]
1043 044c Tahiti XT2 [Matrix HD 7970 Platinum]

1043 3001 Tahiti XTL [ROG Matrix R9 280X]
1043 3006 Tahiti XTL [Radeon R9 280X DirectCU II TOP]
1043 9999 ARES II
106b 0127 FirePro D700
106b 0128 FirePro D700
1092 3000 Tahiti XT2 [Radeon HD 7970 GHz Edition]
1458 2261 Tahiti XT2 [Radeon HD 7970 GHz Edition OC]
GV-R928XOC-3GD
1458 3001 Tahiti XTL [Radeon R9 280X OC]
1462 2774 HD 7970 TwinFroze III Boost Edition OC
1682 3001 Tahiti XTL [Radeon R9 280X]
1682 3211 Double D HD 7970 Black Edition

FX-797A-TNBC
1682 3213 HD 7970 Black Edition
1682 3214 Double D HD 7970
1787 201c HD 7970 IceQ X²
Radeon HD 7970 X2
1787 2317 Radeon HD 7990
1787 3000 Tahiti XT2 [Radeon HD 7970 GHz Edition]
679a Tahiti PRO [Radeon HD 7950/8950 OEM / R9 280]
1002 0b01 Radeon HD 8950 OEM
1002 3000 Tahiti PRO2 [Radeon HD 7950 Boost]
1462 3000 Radeon HD 8950 OEM
174b a003 Radeon R9 280
679b Malta [Radeon HD 7990/8990 OEM]
1002 0b28 Radeon HD 8990 OEM
1002 0b2a Radeon HD 7990
1462 8036 Radeon HD 8990 OEM
148c 8990 Radeon HD 8990 OEM
679e Tahiti LE [Radeon HD 7870 XT]
106b 0125 FirePro D500
106b 0126 FirePro D500
1787 2328 Radeon HD 7870 Black Edition 2 GB GDDR5 [2GBD5-2DHV3E]
679f Tahiti
67a0 Hawaii XT GL [FirePro W9100]
1002 0335 FirePro S9150
1002 0735 FirePro S9170
1028 031f FirePro W9100
1028 0335 FirePro S9150
67a1 Hawaii PRO GL [FirePro W8100]
1002 0335 FirePro S9100
1028 0335 FirePro S9100
67a2 Hawaii GL
67a8 Hawaii
67a9
Hawaii
67aa Hawaii

67b0 Hawaii XT / Grenada XT [Radeon R9 290X/390X]

1028 0b00 Grenada XT [Radeon R9 390X]

103c 6566 Radeon R9 390X

1043 046a R9 290X DirectCU II

1043 046c R9 290X DirectCU II OC

1043 0474 Matrix R9 290X Platinum

1043 0476 ARES III

1043 04d7 Radeon R9 390X

1043 04db Radeon R9 390X

1043 04df Radeon R9 390X

1043 04e9 Radeon R9 390X

1458 227c R9 290X WindForce 3X OC

1458 2281 R9 290X WindForce 3X OC

1458 228c R9 290X WindForce 3X

1458 228d R9 290X WindForce 3X OC

1458 2290 R9 290X WindForce 3X

1458 22bc Radeon R9 390X

1458 22c1 Grenada PRO [Radeon R9 390]

1462 2015 Radeon R9 390X

1462 3070 R9 290X Lightning

1462 3071 R9 290X Lightning

1462 3072 R9 290X Lightning LE

1462 3080 R9 290X Gaming

1462 3082 R9 290X Gaming OC

148c 2347 Devil 13 Dual Core R9 290X

148c 2357 Grenada XT [Radeon R9 390X]

1682 9290 Double Dissipation R9 290X

1682 9395 Grenada XT [Radeon R9 390X]

174b 0e34

Radeon R9 390X

174b e282 Vapor-X R9 290X Tri-X OC

174b e285 R9 290X Tri-X OC

174b e324 Grenada XT2 [Radeon R9 390X]

1787 2020 R9 290X IceQ X² Turbo

1787 2357 Grenada XT [Radeon R9 390X]

67b1 Hawaii PRO [Radeon R9 290/390]

1043 04dd STRIX R9 390

148c 2358 Radeon R9 390

174b e324 Sapphire Nitro R9 390

67b9 Vesuvius [Radeon R9 295X2]

67be Hawaii LE

67c0 Ellesmere [Radeon Pro WX 7100 Mobile]

67c2 Ellesmere [Radeon Pro V7300X / V7350x2]

67c4 Ellesmere [Radeon Pro WX 7100]

1002 0336 Radeon Pro Duo

1002 1336 Radeon Pro Duo

67c7 Ellesmere [Radeon Pro WX 5100]

67ca Ellesmere [Polaris10]

67cc Ellesmere [Polaris10]
67cf Ellesmere [Polaris10]
67d0 Ellesmere [Radeon Pro V7300X / V7350x2]
67df Ellesmere [Radeon RX 470/480/570/570X/580/580X/590]
1002 0b37 Radeon RX 480
1028 1722 Radeon RX 570X
1028 1723 Radeon RX 580X
1043 04a8 Radeon RX 480
1043 04b0 Radeon RX 470
1043 04fb Radeon RX 480
1043 04fd Radeon RX 480 8GB
1043 056a
Radeon RX 590
106b 0161 Radeon Pro 580
106b 0162 Radeon Pro 575
106b 0163 Radeon Pro 570
1458 22f0 Radeon RX 570
1458 22f7 Radeon RX 570 Gaming 4G
1462 3411 Radeon RX 470
1462 3413 Radeon RX 480 Gaming X 8GB
1462 3416 Radeon RX 570
1462 3418 Radeon RX 580 Armor 4G OC
1462 341e Radeon RX 570 Armor 4G OC
1462 8a92 Radeon RX 580
148c 2372 Radeon RX 480 [Red Dragon]
148c 2373 Radeon RX 470
1682 9470 Radeon RX 470
1682 9480 Radeon RX 480
1682 9588 Radeon RX 580 XTR
1682 c570 Radeon RX 570
174b e347 Radeon RX 470/480
174b e349 Radeon RX 470
1787 a470 Radeon RX 470
1787 a480 Radeon RX 480
1849 5001 Phantom Gaming X RX 580 OC
1849 5030 Phantom Gaming D Radeon RX580 8G OC
1da2 e353 Radeon RX 570 Pulse 4GB
1da2 e366 Nitro+ Radeon RX 570/580/590
67e0 Baffin [Radeon Pro WX 4170]
103c 8270 Radeon Pro WX 4170
103c 8272 Radeon Pro WX 4170
67e1 Baffin [Polaris11]
67e3 Baffin [Radeon Pro WX 4100]
67e8 Baffin [Radeon
Pro WX 4130/4150]
1028 075d Radeon Pro WX 4150
1028 07b0 Radeon Pro WX 4130/4150
1028 07b1 Radeon Pro WX 4130

1028 175d Radeon Pro WX 4150
1028 17b0 Radeon Pro WX 4130/4150
1028 17b1 Radeon Pro WX 4130
103c 8275 Radeon Pro WX 4150
103c 8277 Radeon Pro WX 4150
67e9 Baffin [Polaris11]
67eb Baffin [Radeon Pro V5300X]
67ef Baffin [Radeon RX 460/560D / Pro 450/455/460/555/555X/560/560X]
1028 1703 RX 560D OEM OC 2 GB
103c 3421 Radeon RX 460
106b 0160 Radeon Pro 460
106b 0166 Radeon Pro 455
106b 0167 Radeon Pro 450
106b 0179 Radeon Pro 560
106b 017a Radeon Pro 555
106b 018f Radeon Pro 560X
106b 0190 Radeon Pro 555X
1642 1727 Polaris 21 XL [Radeon RX 560D]
1682 956d Polaris 21 XL [Radeon RX 560D]
67ff Baffin [Radeon RX 550 640SP / RX 560/560X]
1002 0b04 Radeon RX 560
1028 1721 Radeon RX 560X
1028 1726 Radeon RX 560DX
103c 8479 Radeon RX 560X Mobile
1043 04bc Radeon RX 560
1043 052f Radeon RX 560
1458 22ed
Radeon RX 560
148c 2381 Radeon RX 560
1682 9560 Radeon RX 560
1da2 e348 Radeon RX 560
1da2 e367 Radeon RX 550 640SP
6800 Wimbledon XT [Radeon HD 7970M]
1002 0124 Radeon HD 7970M
8086 2110 Radeon HD 7970M
8086 2111 Radeon HD 7970M
6801 Neptune XT [Radeon HD 8970M]
1002 0124 Radeon HD 8970M
1462 1117 Radeon R9 M290X
8086 2110 Radeon HD 8970M
8086 2111 Radeon HD 8970M
6802 Wimbledon
6806 Neptune
6808 Pitcairn XT GL [FirePro W7000]
1002 0310 FirePro S7000
1002 0420 Radeon Sky 500
103c 030c MED-X7000
13cc 3d25 MXRT-7500

15c3 030c MED-X7000
6809 Pitcairn LE GL [FirePro W5000]
13cc 3d23 MXRT-5500
13cc 3d24 MXRT-5550
15c3 0b06 MED-X5000
6810 Curacao XT / Trinidad XT [Radeon R7 370 / R9 270X/370X]
106b 012a FirePro D300
106b 012b FirePro D300
148c 0908 Radeon R9 370 OEM
1682 7370 Radeon R7 370
6811 Curacao PRO [Radeon R7 370 / R9 270/370 OEM]
1028 0b00 Trinidad PRO [Radeon R9 370 OEM]
1043 2016 Trinidad
PRO [Radeon R9 370 OEM]
1458 2016 Trinidad PRO [Radeon R9 370 OEM]
1462 2016 Trinidad PRO [Radeon R9 370 OEM]
1462 3050 R9 270 Gaming OC
148c 2016 Trinidad PRO [Radeon R9 370 OEM]
1682 2015 Trinidad PRO [Radeon R7 370]
174b 2015 NITRO Radeon R7 370
174b 2016 Trinidad PRO [Radeon R9 370 OEM]
1787 2016 Trinidad PRO [Radeon R9 370 OEM]
6816 Pitcairn
6817 Pitcairn
6818 Pitcairn XT [Radeon HD 7870 GHz Edition]
1002 0b05 Radeon HD 8870 OEM
174b 8b04 Radeon HD 8860
6819 Pitcairn PRO [Radeon HD 7850 / R7 265 / R9 270 1024SP]
1043 042c Radeon HD 7850
1682 7269 Radeon R9 270 1024SP
1682 9278 Radeon R9 270 1024SP
174b a008 Radeon R9 270 1024SP
174b e221 Radeon HD 7850 2GB GDDR5 DVI-I/DVI-D/HDMI/DP
6820 Venus XTX [Radeon HD 8890M / R9 M275X/M375X]
103c 1851 Radeon HD 7750M
17aa 3643 Radeon R9 A375
17aa 3801 Radeon R9 M275
17aa 3824 Radeon R9 M375
6821 Venus XT [Radeon HD 8870M / R9 M270X/M370X]
1002 031e FirePro SX4000
1028
05cc FirePro M5100
1028 15cc FirePro M5100
106b 0149 Radeon R9 M370X Mac Edition
6822 Venus PRO [Radeon E8860]
6823 Venus PRO [Radeon HD 8850M / R9 M265X]
6825 Heathrow XT [Radeon HD 7870M]
1028 053f FirePro M6000

1028 05cd FirePro M6000
1028 15cd FirePro M6000
103c 176c FirePro M6000
8086 2111 Chelsea PRO
6826 Chelsea LP [Radeon HD 7700M Series]
6827 Heathrow PRO [Radeon HD 7850M/8850M]
6828 Cape Verde PRO [FirePro W600]
15c3 2b1e MED-X6000
6829 Cape Verde
682a Venus PRO
682b Cape Verde PRO / Venus LE / Tropo PRO-L [Radeon HD 8830M / R7 250 / R7 M465X]
0128 079c Radeon R7 465X
1462 3012 Radeon R7 250
682c Cape Verde GL [FirePro W4100]
682d Chelsea XT GL [FirePro M4000]
682f Chelsea LP [Radeon HD 7730M]
103c 1851 Radeon HD 7750M
6835 Cape Verde PRX [Radeon R9 255 OEM]
6837 Cape Verde LE [Radeon HD 7730/8730]
1462 2796 Radeon HD 8730
1462 8092 Radeon HD 8730
148c 8730 Radeon HD 8730
1787 3000 Radeon HD 6570
683d
Cape Verde XT [Radeon HD 7770/8760 / R7 250X]
1002 0030 Radeon HD 8760 OEM
1019 0030 Radeon HD 8760 OEM
103c 6890 Radeon HD 8760 OEM
1043 8760 Radeon HD 8760 OEM
1462 2710 R7770-PMD1GD5
174b 8304 Radeon HD 8760 OEM
683f Cape Verde PRO [Radeon HD 7750/8740 / R7 250E]
1462 2790 Radeon HD 8740
1462 2791 Radeon HD 8740
1642 3b97 Radeon HD 8740
6840 Thames [Radeon HD 7500M/7600M Series]
1025 050e Radeon HD 7670M
1025 050f Radeon HD 7670M
1025 0513 Radeon HD 7670M
1025 0514 Radeon HD 7670M
1025 056d Radeon HD 7670M
1025 059a Radeon HD 7670M
1025 059b Radeon HD 7670M
1025 059e Radeon HD 7670M
1025 0600 Radeon HD 7670M
1025 0606 Radeon HD 7670M
1025 0696 Radeon HD 7650M
1025 0697 Radeon HD 7650M

1025 0698 Radeon HD 7650M
1025 0699 Radeon HD 7650M
1025 0757 Radeon HD 7670M
1028 056a Radeon HD 7670M
1028 056e Radeon HD 7670M
1028 0598 Radeon HD 7670M
1028 059d Radeon HD 7670M
1028 05a3 Radeon HD 7670M
1028
05b9 Radeon HD 7670M
1028 05bb Radeon HD 7670M
103c 1789 FirePro M2000
103c 17f1 Radeon HD 7570M
103c 17f4 Radeon HD 7650M
103c 1813 Radeon HD 7590M
103c 182f Radeon HD 7670M
103c 1830 Radeon HD 7670M
103c 1835 Radeon HD 7670M
103c 183a Radeon HD 7670M
103c 183c Radeon HD 7670M
103c 183e Radeon HD 7670M
103c 1840 Radeon HD 7670M
103c 1842 Radeon HD 7670M
103c 1844 Radeon HD 7670M
103c 1848 Radeon HD 7670M
103c 184a Radeon HD 7670M
103c 184c Radeon HD 7670M
103c 1895 Radeon HD 7670M
103c 1897 Radeon HD 7670M
103c 18a5 Radeon HD 7670M
103c 18a7 Radeon HD 7670M
103c 18f4 Radeon HD 7670M
1043 100a Radeon HD 7670M
1043 104b Radeon HD 7670M
1043 10dc Radeon HD 7670M
1043 2121 Radeon HD 7670M
1043 2122 Radeon HD 7670M
1043 2123 Radeon HD 7670M
1043 2125 Radeon HD 7670M
1043 2127 Radeon HD 7670M
1179 fb11 Radeon HD 7670M
1179 fb22 Radeon HD 7670M
1179 fb23 Radeon HD 7670M
1179 fb2c Radeon
HD 7670M
1179 fb31 Radeon HD 7670M
1179 fb32 Radeon HD 7670M
1179 fb38 Radeon HD 7670M

1179 fb39 Radeon HD 7670M
1179 fb3a Radeon HD 7670M
1179 fb40 Radeon HD 7670M
1179 fb41 Radeon HD 7670M
1179 fb47 Radeon HD 7670M
1179 fb48 Radeon HD 7670M
1179 fb51 Radeon HD 7670M
1179 fb52 Radeon HD 7670M
1179 fb53 Radeon HD 7670M
1179 fb81 Radeon HD 7670M
1179 fb82 Radeon HD 7670M
1179 fb83 Radeon HD 7670M
1179 fc56 Radeon HD 7670M
1179 fcd4 Radeon HD 7670M
1179 fcee Radeon HD 7670M
144d c0c5 Radeon HD 7690M
144d c0ce Radeon HD 7670M
144d c0da Radeon HD 7670M
17aa 3970 Radeon HD 7670M
17aa 397b Radeon HD 7670M
17aa 5101 Radeon HD 7670M
17aa 5102 Radeon HD 7670M
17aa 5103 Radeon HD 7670M
6841 Thames [Radeon HD 7550M/7570M/7650M]
1028 0561 Radeon HD 7650M
1028 056c Radeon HD 7650M
1028 057f Radeon HD 7570M
103c 17f1 Radeon HD 7570M
103c 17f4 Radeon HD 7650M
103c 1813 Radeon HD 7570M
103c 183a Radeon
HD 7650M
103c 183c Radeon HD 7650M
103c 183e Radeon HD 7650M
103c 1840 Radeon HD 7650M
103c 1842 Radeon HD 7650M
103c 1844 Radeon HD 7650M
1043 100a Radeon HD 7650M
1043 104b Radeon HD 7650M
1043 10dc Radeon HD 7650M
1043 2134 Radeon HD 7650M
1179 0001 Radeon HD 7570M
1179 0002 Radeon HD 7570M
1179 fb43 Radeon HD 7550M
1179 fb91 Radeon HD 7550M
1179 fb92 Radeon HD 7550M
1179 fb93 Radeon HD 7550M
1179 fba2 Radeon HD 7550M

1179 fba3 Radeon HD 7550M
144d c0c7 Radeon HD 7550M
6842 Thames LE [Radeon HD 7000M Series]
6843 Thames [Radeon HD 7670M]
6860 Vega 10 [Radeon Instinct MI25]
1002 0c35 Radeon PRO V320
1002 6c75 Radeon PRO V320
106b 017c Radeon Pro Vega 64
6861 Vega 10 XT [Radeon PRO WX 9100]
6862 Vega 10 XT [Radeon PRO SSG]
6863 Vega 10 XTX [Radeon Vega Frontier Edition]
6864 Vega
6867 Vega 10 XL [Radeon Pro Vega 56]
6868 Vega 10 [Radeon PRO WX 8100/8200]
686c Vega 10 [Radeon Instinct MI25 MxGPU]
687f
Vega 10 XL/XT [Radeon RX Vega 56/64]
1002 0b36 RX Vega64
1002 6b76 RX Vega56
6880 Lexington [Radeon HD 6550M]
103c 163c Pavilion dv6 Radeon HD 6550M
6888 Cypress XT [FirePro V8800]
6889 Cypress PRO [FirePro V7800]
1002 0301 FirePro V7800P
13cc 3d1f MXRT-7400
688a Cypress XT [FirePro V9800]
1002 030c FirePro V9800P
688c Cypress XT GL [FireStream 9370]
688d Cypress PRO GL [FireStream 9350]
6898 Cypress XT [Radeon HD 5870]
1002 0b00 Radeon HD 5870 Eyefinity Edition
106b 00d0 Radeon HD 5870 Mac Edition
R5870-PM2D1G
1462 8032 Radeon HD 5870 1 GB GDDR5
174b 6870 Radeon HD 6870 1600SP Edition
6899 Cypress PRO [Radeon HD 5850]
EAH5850
1043 0330 Radeon HD 5850
174b 237b Radeon HD 5850 X2
174b 6850 Radeon HD 6850 1440SP Edition
689b Cypress PRO [Radeon HD 6800 Series]
689c Hemlock [Radeon HD 5970]
1043 0352 ARES
689d Hemlock [Radeon HD 5970]
689e Cypress LE [Radeon HD 5830]
68a0 Broadway XT [Mobility Radeon HD 5870]
1028

12ef FirePro M7820
103c 1520 FirePro M7820
68a1 Broadway PRO [Mobility Radeon HD 5850]
106b 00cc iMac MC511 Mobility Radeon HD 5850 MXM Module
68a8 Granville [Radeon HD 6850M/6870M]
1025 0442 Radeon HD 6850M
1025 0451 Radeon HD 6850M
1025 050a Radeon HD 6850M
1025 050b Radeon HD 6850M
1025 050c Radeon HD 6850M
1025 050e Radeon HD 6850M
1025 050f Radeon HD 6850M
1025 0513 Radeon HD 6850M
1025 0514 Radeon HD 6850M
1025 0515 Radeon HD 6850M
1025 0516 Radeon HD 6850M
1025 0525 Radeon HD 6850M
1025 0526 Radeon HD 6850M
1025 056d Radeon HD 6850M
1028 048f Radeon HD 6870M
1028 0490 Radeon HD 6870M
1028 04b9 Radeon HD 6870M
1028 04ba Radeon HD 6870M
103c 159b Radeon HD 6850M
144d c0ad Radeon HD 6850M
68a9 Juniper XT [FirePro V5800]
13cc 3d1e MXRT-5400
13cc 3d20 MXRT-5450
68b8 Juniper XT [Radeon HD 5770]
106b 00cf MacPro5,1 [Mac Pro 2.8GHz DDR3]
68b9 Juniper LE [Radeon HD 5670 640SP Edition]
68ba Juniper
XT [Radeon HD 6770]
68be Juniper PRO [Radeon HD 5750]
148c 3000 Radeon HD 6750
68bf Juniper PRO [Radeon HD 6750]
174b 6750 Radeon HD 6750
68c0 Madison [Mobility Radeon HD 5730 / 6570M]
1019 2383 Mobility Radeon HD 5730
1028 02a2 Mobility Radeon HD 5730
1028 02fe Mobility Radeon HD 5730
1028 0419 Mobility Radeon HD 5730
103c 147d Mobility Radeon HD 5730
103c 1521 Madison XT [FirePro M5800]
103c 1593 Mobility Radeon HD 6570
103c 1596 Mobility Radeon HD 6570
103c 1599 Mobility Radeon HD 6570
1043 1c22 Mobility Radeon HD 5730

17aa 3927 Mobility Radeon HD 5730
17aa 3952 Mobility Radeon HD 5730
17aa 3978 Radeon HD 6570M
68c1 Madison [Mobility Radeon HD 5650/5750 / 6530M/6550M]
1025 0205 Mobility Radeon HD 5650
1025 0293 Mobility Radeon HD 5650
1025 0294 Mobility Radeon HD 5650
1025 0296 Mobility Radeon HD 5650
1025 0308 Mobility Radeon HD 5650
1025 030a Mobility Radeon HD 5650
1025 0311 Mobility Radeon HD 5650
1025 0312
Mobility Radeon HD 5650
1025 031c Mobility Radeon HD 5650
1025 031d Mobility Radeon HD 5650
1025 033d Mobility Radeon HD 5650
1025 033e Mobility Radeon HD 5650
1025 033f Mobility Radeon HD 5650
1025 0346 Mobility Radeon HD 5650
1025 0347 Aspire 7740G
1025 0348 Mobility Radeon HD 5650
1025 0356 Mobility Radeon HD 5650
1025 0357 Mobility Radeon HD 5650
1025 0358 Mobility Radeon HD 5650
1025 0359 Mobility Radeon HD 5650
1025 035a Mobility Radeon HD 5650
1025 035b Mobility Radeon HD 5650
1025 035c Mobility Radeon HD 5650
1025 035d Mobility Radeon HD 5650
1025 035e Mobility Radeon HD 5650
1025 0360 Mobility Radeon HD 5650
1025 0362 Mobility Radeon HD 5650
1025 0364 Mobility Radeon HD 5650
1025 0365 Mobility Radeon HD 5650
1025 0366 Mobility Radeon HD 5650
1025 0367 Mobility Radeon HD 5650
1025 0368 Mobility Radeon HD 5650
1025 036c Mobility Radeon HD 5650
1025 036d Mobility Radeon HD 5650
1025 036e Mobility
Radeon HD 5650
1025 036f Mobility Radeon HD 5650
1025 0372 Mobility Radeon HD 5650
1025 0373 Mobility Radeon HD 5650
1025 0377 Mobility Radeon HD 5650
1025 0378 Mobility Radeon HD 5650
1025 0379 Mobility Radeon HD 5650
1025 037a Mobility Radeon HD 5650

1025 037b Mobility Radeon HD 5650
1025 037e Mobility Radeon HD 5650
1025 037f Mobility Radeon HD 5650
1025 0382 Mobility Radeon HD 5650
1025 0383 Mobility Radeon HD 5650
1025 0384 Mobility Radeon HD 5650
1025 0385 Mobility Radeon HD 5650
1025 0386 Mobility Radeon HD 5650
1025 0387 Mobility Radeon HD 5650
1025 0388 Mobility Radeon HD 5650
1025 038b Mobility Radeon HD 5650
1025 038c Mobility Radeon HD 5650
1025 039a Mobility Radeon HD 5650
1025 0411 Mobility Radeon HD 5650
1025 0412 Mobility Radeon HD 5650
1025 0418 Mobility Radeon HD 5650
1025 0419 Mobility Radeon HD 5650
1025 0420 Mobility Radeon HD 5650
1025 0421 Mobility Radeon HD 5650
1025 0425 Mobility
Radeon HD 5650
1025 042a Mobility Radeon HD 5650
1025 042e Mobility Radeon HD 5650
1025 042f Mobility Radeon HD 5650
1025 0432 Mobility Radeon HD 5650
1025 0433 Mobility Radeon HD 5650
1025 0442 Mobility Radeon HD 5650
1025 044c Mobility Radeon HD 5650
1025 044e Mobility Radeon HD 5650
1025 0451 Mobility Radeon HD 5650
1025 0454 Mobility Radeon HD 5650
1025 0455 Mobility Radeon HD 5650
1025 0475 Mobility Radeon HD 5650
1025 0476 Mobility Radeon HD 5650
1025 0487 Mobility Radeon HD 5650
1025 0489 Mobility Radeon HD 5650
1025 0498 Mobility Radeon HD 5650
1025 0517 Radeon HD 6550M
1025 051a Radeon HD 6550M
1025 051b Radeon HD 6550M
1025 051c Radeon HD 6550M
1025 051d Radeon HD 6550M
1025 0525 Radeon HD 6550M
1025 0526 Radeon HD 6550M
1025 052b Radeon HD 6550M
1025 052c Radeon HD 6550M
1025 053c Radeon HD 6550M
1025 053d Radeon HD 6550M

1025 053e Radeon HD 6550M
1025 053f Radeon HD 6550M
1025 0607 Radeon
HD 6550M
1028 041b Mobility Radeon HD 5650
1028 0447 Mobility Radeon HD 5650
1028 0448 Mobility Radeon HD 5650
1028 0456 Mobility Radeon HD 5650
1028 0457 Mobility Radeon HD 5650
103c 1436 Mobility Radeon HD 5650
103c 1437 Mobility Radeon HD 5650
103c 1440 Mobility Radeon HD 5650
103c 1448 Mobility Radeon HD 5650
103c 1449 Mobility Radeon HD 5650
103c 144a Mobility Radeon HD 5650
103c 144b Mobility Radeon HD 5650
103c 147b Mobility Radeon HD 5650
103c 149c Mobility Radeon HD 5650
103c 149e Mobility Radeon HD 5650
103c 1521 Madison Pro [FirePro M5800]
1043 1bc2 Mobility Radeon HD 5650
104d 9071 Mobility Radeon HD 5650
104d 9077 Mobility Radeon HD 5650
104d 9081 Mobility Radeon HD 5650
1179 fd00 Mobility Radeon HD 5650
1179 fd12 Mobility Radeon HD 5650
1179 fd1a Mobility Radeon HD 5650
1179 fd30 Mobility Radeon HD 5650
1179 fd31 Mobility Radeon HD 5650
1179 fd50 Mobility Radeon HD 5650
1179 fd52 Radeon
HD 6530M
1179 fd63 Radeon HD 6530M
1179 fd65 Radeon HD 6530M
1179 fdd0 Mobility Radeon HD 5650
1179 fdd2 Radeon HD 6530M
144d c07e Mobility Radeon HD 5650
144d c085 Mobility Radeon HD 5650
14c0 0043 Mobility Radeon HD 5650
14c0 004d Mobility Radeon HD 5650
17aa 3928 Mobility Radeon HD 5650
17aa 3951 Mobility Radeon HD 5650
17aa 3977 Radeon HD 6550M
68c7 Pinewood [Mobility Radeon HD 5570/6550A]
1462 2241 Mobility Radeon HD 5570
1462 2243 Mobility Radeon HD 5570
1462 2244 Mobility Radeon HD 5570
1462 2245 Radeon HD 6550A

1462 2246 Radeon HD 6550A
68c8 Redwood XT GL [FirePro V4800]
68c9 Redwood PRO GL [FirePro V3800]
13cc 3d1d MXRT-2400
68d8 Redwood XT [Radeon HD 5670/5690/5730]
1028 68e0 Radeon HD 5670
174b 5690 Radeon HD 5690
174b 5730 Radeon HD 5730
174b e151 Radeon HD 5670
1787 3000 Radeon HD 5730
17af 3010 Radeon HD 5730
17af 3011 Radeon HD 5690
68d9 Redwood PRO [Radeon HD 5550/5570/5630/6510/6610/7570]
103c
6870 Radeon HD 5570
103c 6872 Radeon HD 5570
1043 03ce Radeon HD 5550
1462 2151 Radeon HD 5570
1462 2240 Radeon HD 5570
148c 3000 Radeon HD 6510
148c 3001 Radeon HD 6610
1545 5550 Radeon HD 5550
1545 7570 Radeon HD 7570
1642 3985 Radeon HD 5570
1642 3996 Radeon HD 5570
174b 3000 Radeon HD 6510
174b 6510 Radeon HD 6510
174b 6610 Radeon HD 6610
174b e142 Radeon HD 5570
1787 3000 Radeon HD 6510
17af 3000 Radeon HD 6510
17af 3010 Radeon HD 5630
68da Redwood LE [Radeon HD 5550/5570/5630/6390/6490/7570]
148c 3000 Radeon HD 6390
148c 3001 Radeon HD 6490
1545 7570 Radeon HD 7570
174b 3000 Radeon HD 6390
174b 5570 Radeon HD 5570
174b 5630 Radeon HD 5630
174b 6490 Radeon HD 6490
1787 3000 Radeon HD 5630
17af 3000 Radeon HD 6390
17af 3010 Radeon HD 5630
68de Redwood
68e0 Park [Mobility Radeon HD 5430/5450/5470]
1028 0404 Mobility Radeon HD 5450
1028 0414 Mobility Radeon HD 5450
1028 0434 Mobility

Radeon HD 5450

103c 1433 Mobility Radeon HD 5450
103c 1434 Mobility Radeon HD 5450
103c 1469 Mobility Radeon HD 5450
103c 146b Mobility Radeon HD 5450
103c 1486 TouchSmart tm2-2050er discrete GPU (Mobility Radeon HD 5450)
103c 1622 Mobility Radeon HD 5450
103c 1623 Mobility Radeon HD 5450
103c eeee Mobility Radeon HD 5450
104d 9076 Mobility Radeon HD 5450
1682 304e Caicos [Radeon HD 5450]
1682 6000 Caicos [Radeon HD 5450]
17aa 9e52 FirePro M3800
17aa 9e53 FirePro M3800
68e1 Park [Mobility Radeon HD 5430]
1043 041f Caicos [Radeon HD 7350]
1043 3000 Caicos [Radeon HD 5450]
148c 3000 Caicos [Radeon HD 5450]
148c 3001 Caicos [Radeon HD 6230]
148c 3002 Caicos [Radeon HD 6250]
148c 3003 Caicos [Radeon HD 6350]
148c 7350 Caicos [Radeon HD 7350]
148c 8350 Caicos [Radeon HD 8350]
1545 5450 Caicos [Radeon HD 5450]
1545 7350 Caicos [Radeon HD 7350]
1682 3000 Caicos [Radeon HD 5450]
1682 6000 Caicos [Radeon HD 5450]
1682
7350 Caicos [Radeon HD 7350]
174b 3000 Caicos [Radeon HD 5450]
174b 5470 Caicos [Radeon HD 5470]
174b 6000 Caicos [Radeon HD 5450]
174b 6230 Caicos [Radeon HD 6230]
174b 6350 Caicos [Radeon HD 6350]
174b 7350 Caicos [Radeon HD 7350]
1787 3000 Caicos [Radeon HD 5450]
17af 3000 Caicos [Radeon HD 5450]
17af 3001 Caicos [Radeon HD 6230]
17af 3014 Caicos [Radeon HD 6350]
17af 3015 Caicos [Radeon HD 7350]
17af 8350 Caicos [Radeon HD 8350 OEM]
68e4 Robson CE [Radeon HD 6370M/7370M]
1019 2386 Radeon HD 6350M
1019 2387 Radeon HD 6350M
1019 238d Radeon HD 6370M
1019 238e Radeon HD 6370M
1025 0382 Radeon HD 6370M
1025 0489 Radeon HD 6370M

1025 048a Radeon HD 6370M
1025 048b Radeon HD 6370M
1025 048c Radeon HD 6370M
1028 04c1 Radeon HD 6370M
1028 04ca Radeon HD 6370M
1028 04cc Radeon HD 6370M
1028 04cd Radeon HD 6370M
1028 04d7 Radeon HD 6370M
103c 1411 Radeon HD 6370M
103c 1421 Radeon HD 6370M
103c 1426
Radeon HD 6370M
103c 1428 Radeon HD 6370M
103c 142a Radeon HD 6370M
103c 142b Radeon HD 6370M
103c 143a Radeon HD 6370M
103c 143c Radeon HD 6370M
103c 1445 Radeon HD 6370M
103c 162c Radeon HD 6370M
103c 162d Radeon HD 6370M
103c 162e Radeon HD 6370M
103c 162f Radeon HD 6370M
103c 1639 Radeon HD 6370M
103c 163a Radeon HD 6370M
103c 163b Radeon HD 6370M
103c 163c Radeon HD 6370M
103c 163d Radeon HD 6370M
103c 163e Radeon HD 6370M
103c 163f Radeon HD 6370M
103c 1641 Radeon HD 6370M
103c 1643 Radeon HD 6370M
103c 3578 Radeon HD 6370M
103c 357a Radeon HD 6370M
103c 3673 Radeon HD 6370M
103c 3675 Radeon HD 6370M
1043 1c92 Radeon HD 6370M
1043 84a1 Radeon HD 6370M
1043 84ad Radeon HD 6370M
104d 9081 Radeon HD 6370M
1545 7350 Cedar [Radeon HD 7350]
1558 4510 Radeon HD 6370M
1558 5505 Radeon HD 6370M
174b 5450 Cedar [Radeon HD 5450]
17aa 21dd Radeon HD 6370M
17aa 21e9 Radeon HD 6370M
17aa 3971
Radeon HD 6370M
17aa 3972 Radeon HD 7370M

17aa 397a Radeon HD 6370M/7370M
17aa 397b Radeon HD 6370M/7370M
17aa 397f Radeon HD 7370M
68e5 Robson LE [Radeon HD 6330M]
1179 fd3c Radeon HD 6330M
1179 fd50 Radeon HD 6330M
1179 fd52 Radeon HD 6330M
1179 fd63 Radeon HD 6330M
1179 fd65 Radeon HD 6330M
1179 fd73 Radeon HD 6330M
1179 fd75 Radeon HD 6330M
1179 fdd0 Radeon HD 6330M
1179 fdd2 Radeon HD 6330M
1179 fdea Radeon HD 6330M
1179 df8 Radeon HD 6330M
148c 5450 Cedar [Radeon HD 5450]
148c 6350 Cedar [Radeon HD 6350]
148c 7350 Cedar [Radeon HD 7350]
148c 8350 Cedar [Radeon HD 8350]
1545 7350 Cedar [Radeon HD 7350]
68e8 Cedar
68e9 Cedar [ATI FirePro (FireGL) Graphics Adapter]
68f1 Cedar GL [FirePro 2460]
68f2 Cedar GL [FirePro 2270]
68f8 Cedar [Radeon HD 7300 Series]
68f9 Cedar [Radeon HD 5000/6000/7350/8350 Series]
1019 0001 Radeon HD 5450
1019 0002 Radeon HD 5450
1019 0019 Radeon HD 6350
1025 0518 Radeon
HD 5450
1025 0519 Radeon HD 5450
1028 010e XPS 8300
1028 2126 Radeon HD 6350
103c 2126 Radeon HD 6350
103c 2aac Radeon HD 5450
103c 2aae Radeon HD 5450
103c 3580 Radeon HD 5450
1043 0386 Radeon HD 5450
1043 03c2 EAH5450 SILENT/DI/512MD2 (LP)
1462 2130 Radeon HD 5450
1462 2131 Radeon HD 5450
1462 2133 Radeon HD 6350
1462 2180 Radeon HD 5450
1462 2181 Radeon HD 5450
1462 2182 Radeon HD 6350
1462 2183 Radeon HD 6350
1462 2230 Radeon HD 5450

1462 2231 Radeon HD 5450
1462 2495 Radeon HD 6350
148c 3001 Radeon HD 5530/6250
148c 3002 Radeon HD 6290
148c 3003 Radeon HD 6230
148c 3004 Radeon HD 6350
148c 7350 Radeon HD 7350
148c 8350 Radeon HD 8350
1545 7350 Radeon HD 7350
1642 3983 Radeon HD 5450
1642 3984 Radeon HD 6350
1642 3987 Radeon HD 6350
1642 3997 Radeon HD 5450
1642 3a05 Radeon HD 5450
1642 3b31 Radeon HD 6350A
1682 3270 Radeon HD 7350
174b 3000 Radeon HD 6230
174b 3987 Radeon HD 6350
174b
5470 Radeon HD 5470
174b 5490 Radeon HD 5490
174b 5530 Radeon HD 5530
174b 6230 Radeon HD 6230
174b 6250 Radeon HD 6250
174b 6290 Radeon HD 6290
174b 6350 Radeon HD 6350
174b 7350 Radeon HD 7350
174b 8350 Radeon HD 8350
174b e127 Radeon HD 5450
174b e145 Radeon HD 5450
174b e153 Radeon HD 5450
1787 3000 Radeon HD 5470
1787 3001 Radeon HD 5530
1787 3002 Radeon HD 5490
17aa 3602 Radeon HD 5450
17aa 3603 Radeon HD 5450
17aa 360f Radeon HD 5450
17aa 3619 Radeon HD 5450
17af 3000 Radeon HD 6250
17af 3001 Radeon HD 6230
17af 3002 Radeon HD 6290
17af 3011 Radeon HD 5470
17af 3012 Radeon HD 5490
17af 3013 Radeon HD 5470
17af 3014 Radeon HD 6350
68fa Cedar [Radeon HD 7350/8350 / R5 220]
1019 0019 Radeon HD 7350
1019 0021 Radeon HD 7350

1019 0022 Radeon HD 7350
1019 0026 Radeon HD 8350
103c 2adf Radeon HD 7350A
103c 2ae8 Radeon HD 7350A
1043 8350 Radeon HD 8350
1462 2128 Radeon HD 7350
1462
2184 Radeon HD 7350
1462 2186 Radeon HD 7350
1462 2495 Radeon HD 7350
1462 b490 Radeon HD 7350
1642 3985 Radeon HD 7350
174b 3510 Radeon HD 8350
174b 3521 Radeon R5 220
174b 3522 Radeon R5 220
174b 7350 Radeon HD 7350
174b 8153 Radeon HD 8350
174b e127 Radeon HD 7350
174b e153 Radeon HD 7350
174b e180 Radeon HD 7350
17af 3015 Radeon HD 7350
68fe Cedar LE
6900 Topaz XT [Radeon R7 M260/M265 / M340/M360 / M440/M445 / 530/535 / 620/625 Mobile]
1025 1056 Radeon R7 M360 / R8 M365DX
1028 0640 Radeon R7 M260/M265
1028 0643 Radeon R7 M260/M265
1028 067f Radeon R7 M260
1028 0767 Radeon R7 M445
1028 0810 Radeon 530
1028 130a Radeon R7 M260
103c 2263 Radeon R7 M260
103c 2269 Radeon R7 M260
103c 22c6 Radeon R7 M260
103c 22c8 Radeon R7 M260
103c 2b45 Radeon R7 A360
103c 808c Radeon R7 M260
103c 8099 Radeon R7 M360
103c 80b5 Radeon R7 M360
103c 80b9 Radeon R7 M360
103c 811c Radeon R7 M340
103c 8226
Radeon R7 M440
10cf 1906 Radeon R7 M260
1170 9979 Radeon R7 M360
1179 f903 Radeon R7 M260
1179 f922 Radeon R7 M260
1179 f923 Radeon R7 M260
1179 f934 Radeon R7 M260

17aa 3822 Radeon R7 M360
17aa 3824 Radeon R7 M360
17aa 5021 Radeon R7 M260
6901 Topaz PRO [Radeon R5 M255]
103c 1318 Radeon R6 M255DX
6907 Meso XT [Radeon R5 M315]
6921 Amethyst XT [Radeon R9 M295X]
6929 Tonga XT GL [FirePro S7150]
692b Tonga PRO GL [FirePro W7100]
13cc 3d2b MXRT-7600
692f Tonga XTV GL [FirePro S7150V]
6938 Tonga XT / Amethyst XT [Radeon R9 380X / R9 M295X]
1043 04f5 Radeon R9 380X
1043 04f7 Radeon R9 380X
106b 013a Radeon R9 M295X Mac Edition
1458 22c8 Radeon R9 380X
148c 2350 Radeon R9 380X
1682 9385 Radeon R9 380X
174b e308 Radeon R9 380X Nitro 4G D5
17af 2006 Radeon R9 380X
6939 Tonga PRO [Radeon R9 285/380]
148c 9380 Radeon R9 380
Make naming scheme consistent
174b e308 Radeon R9 380 Nitro 4G D5
694c Polaris 22 XT [Radeon
RX Vega M GH]
694e Polaris 22 XL [Radeon RX Vega M GL]
694f Polaris 22 MGL XL [Radeon Pro WX Vega M GL]
6980 Polaris12
6981 Lexa XT [Radeon PRO WX 3200]
6985 Lexa XT [Radeon PRO WX 3100]
6986 Polaris12
6987 Lexa [Radeon 540X/550X/630 / RX 640 / E9171 MCM]
6995 Lexa XT [Radeon PRO WX 2100]
699f Lexa PRO [Radeon 540/540X/550/550X / RX 540X/550/550X]
1028 1720 Radeon RX 550X
148c 2380 Lexa XL [Radeon RX 550]
1da2 e367 Lexa PRO [Radeon RX 550]
69a0 Vega 12
69a1 Vega 12
69a2 Vega 12
69a3 Vega 12
69af Vega 12 [Radeon Pro Vega 20]
6fdf Polaris 20 XL [Radeon RX 580 2048SP]
700f RS100 AGP Bridge
7010 RS200/RS250 AGP Bridge
7100 R520 [Radeon X1800 XT]
7101 R520/M58 [Mobility Radeon X1800 XT]

7102 R520/M58 [Mobility Radeon X1800]
7104 R520 GL [FireGL V7200]
13cc 3d0a MXRT-5100
7109 R520 [Radeon X1800 XL]
1002 0322 All-in-Wonder X1800XL
1002 0d02 Radeon X1800 CrossFire Edition
710a R520 [Radeon X1800 GTO]
1002 0b12 Radeon X1800
GTO²
710b R520 [Radeon X1800 GTO]
710e R520 GL [FireGL V7300]
13cc 3d0c MXRT-5150
710f R520 GL [FireGL V7350]
13cc 3d0e MXRT-7100
7120 R520 [Radeon X1800] (Secondary)
7124 R520 GL [FireGL V7200] (Secondary)
13cc 3d0b MXRT-5100 (Secondary)
7129 R520 [Radeon X1800] (Secondary)
1002 0323 All-In-Wonder X1800 XL (Secondary)
1002 0d03 Radeon X1800 CrossFire Edition (Secondary)
712e R520 GL [FireGL V7300] (Secondary)
13cc 3d0d MXRT-5150 (Secondary)
712f R520 GL [FireGL V7350] (Secondary)
13cc 3d0f MXRT-7100 (Secondary)
7140 RV515 [Radeon X1300/X1550/X1600 Series]
7142 RV515 PRO [Radeon X1300/X1550 Series]
1002 0322 All-in-Wonder 2006 PCI-E Edition
1043 0142 EAX1300PRO/TD/256M
7143 RV505 [Radeon X1300/X1550 Series]
7145 RV515/M54 [Mobility Radeon X1400]
17aa 2006 Thinkpad T60 model 2007
7146 RV515 [Radeon X1300/X1550]
1002 0322 All-in-Wonder 2006 PCI-E Edition
1545 1996 Radeon X1300 512MB PCI-e
7147 RV505 [Radeon X1550 64-bit]
7149
RV515/M52 [Mobility Radeon X1300]
714a RV515/M52 [Mobility Radeon X1300]
7152 RV515 GL [FireGL V3300]
7153 RV515 GL [FireGL V3350]
715f RV505 CE [Radeon X1550 64-bit]
7162 RV515 PRO [Radeon X1300/X1550 Series] (Secondary)
1002 0323 All-in-Wonder 2006 PCI-E Edition (Secondary)
7163 RV505 [Radeon X1550 Series] (Secondary)
7166 RV515 [Radeon X1300/X1550 Series] (Secondary)
1002 0323 All-in-Wonder 2006 PCI-E Edition (Secondary)
1545 1997 Radeon X1300 512MB PCI-e (Secondary)
7167 RV515 [Radeon X1550 64-bit] (Secondary)

7172 RV515 GL [FireGL V3300] (Secondary)
7173 RV515 GL [FireGL V3350] (Secondary)
7181 RV516 [Radeon X1600/X1650 Series]
7183 RV516 [Radeon X1300/X1550 Series]
7186 RV516/M64 [Mobility Radeon X1450]
7187 RV516 [Radeon X1300/X1550 Series]
7188 RV516/M64-S [Mobility Radeon X2300]
103c 30c1 6910p
718a RV516/M64 [Mobility Radeon X2300]
718b RV516/M62 [Mobility Radeon X1350]
1071 8209 Medion MIM 2240 Notebook PC [MD98100]
718c
RV516/M62-CSP64 [Mobility Radeon X1350]
718d RV516/M64-CSP128 [Mobility Radeon X1450]
7193 RV516 [Radeon X1550 Series]
7196 RV516/M62-S [Mobility Radeon X1350]
719b RV516 GL [FireMV 2250]
13cc 3d12 MXRT-1150
13cc 3d14 MXRT-2150
719f RV516 [Radeon X1550 Series]
71a0 RV516 [Radeon X1300/X1550 Series] (Secondary)
71a1 RV516 [Radeon X1600/X1650 Series] (Secondary)
71a3 RV516 [Radeon X1300/X1550 Series] (Secondary)
71a7 RV516 [Radeon X1300/X1550 Series] (Secondary)
71bb RV516 GL [FireMV 2250] (Secondary)
13cc 3d13 MXRT-1150 (Secondary)
13cc 3d15 MXRT-2150 (Secondary)
71c0 RV530 [Radeon X1600 XT/X1650 GTO]
1002 e160 Radeon X1650 GTO
174b e160 Radeon X1650 GTO
71c1 RV535 [Radeon X1650 PRO]
174b 0880 Radeon X1700 FSC
71c2 RV530 [Radeon X1600 PRO]
71c4 RV530/M56 GL [Mobility FireGL V5200]
17aa 2007 ThinkPad T60p
71c5 RV530/M56-P [Mobility Radeon X1600]
103c 309f Compaq nx9420 Notebook
103c 30a3 Compaq NW8440
1043 10b2 A6J-Q008
106b
0080 MacBook Pro
71c6 RV530LE [Radeon X1600/X1650 PRO]
71c7 RV535 [Radeon X1650 PRO]
1787 3000 PowerColor X1650 PRO AGP
71ce RV530 [Radeon X1300 XT/X1600 PRO]
71d2 RV530 GL [FireGL V3400]
13cc 3d08 MXRT-2100
71d4 RV530/M66 GL [Mobility FireGL V5250]

71d5 RV530/M66-P [Mobility Radeon X1700]
71d6 RV530/M66-XT [Mobility Radeon X1700]
71de RV530/M66 [Mobility Radeon X1700/X2500]
71e0 RV530 [Radeon X1600] (Secondary)
174b e161 Radeon X1600 GTO (Secondary)
71e1 RV535 [Radeon X1650 PRO] (Secondary)
174b 0881 Radeon X1700 FSC (Secondary)
71e2 RV530 [Radeon X1600] (Secondary)
71e6 RV530 [Radeon X1650] (Secondary)
71e7 RV535 [Radeon X1650 PRO] (Secondary)
1787 3001 Radeon X1650 PRO AGP
71f2 RV530 GL [FireGL V3400] (Secondary)
13cc 3d09 MXRT-2100 (Secondary)
7210 RV550/M71 [Mobility Radeon HD 2300]
7211 RV550/M71 [Mobility Radeon X2300 HD]
7240 R580+ [Radeon X1950 XTX]
1002 0d02 Radeon X1950 CrossFire Edition
7244 R580+ [Radeon X1950
XT]
7248 R580 [Radeon X1950]
7249 R580 [Radeon X1900 XT]
1002 0412 All-In-Wonder X1900
1002 0b12 Radeon X1900 XT/XTX
1002 0d02 Radeon X1900 CrossFire Edition
1043 0160 Radeon X1900 XTX 512 MB GDDR3
724b R580 [Radeon X1900 GT]
1002 0b12 Radeon X1900 (Primary)
1002 0b13 Radeon X1900 (Secondary)
724e R580 GL [FireGL V7350]
7269 R580 [Radeon X1900 XT] (Secondary)
726b R580 [Radeon X1900 GT] (Secondary)
726e R580 [AMD Stream Processor] (Secondary)
7280 RV570 [Radeon X1950 PRO]
7288 RV570 [Radeon X1950 GT]
7291 RV560 [Radeon X1650 XT]
1462 0810 Radeon X1700 SE
7293 RV560 [Radeon X1650 GT]
72a0 RV570 [Radeon X1950 PRO] (Secondary)
72a8 RV570 [Radeon X1950 GT] (Secondary)
72b1 RV560 [Radeon X1650 XT] (Secondary)
72b3 RV560 [Radeon X1650 GT] (Secondary)
7300 Fiji [Radeon R9 FURY / NANO Series]
1002 0b36 Radeon R9 FURY X / NANO
1002 1b36 Radeon Pro Duo
1043 049e Radeon R9 FURY
1043 04a0 Radeon R9 FURY X
174b e329 Radeon R9 FURY
7310

Navi 10
7312 Navi 10 [Radeon Pro W5700]
731f Navi 10 [Radeon RX 5600 OEM/5600 XT / 5700/5700 XT]
7340 Navi 14 [Radeon RX 5500/5500M / Pro 5500M]
7341 Navi 14 [Radeon Pro W5500]
7347 Navi 14 [Radeon Pro W5500M]
734f Navi 14 [Radeon Pro W5300M]
7833 RS350 Host Bridge
7834 RS350 [Radeon 9100 PRO/XT IGP]
7835 RS350M [Mobility Radeon 9000 IGP]
7838 RS350 AGP Bridge
7910 RS690 Host Bridge
1179 ff50 Satellite P305D-S8995E
17f2 5000 KI690-AM2 Motherboard
7911 RS690/RS740 Host Bridge
1002 7910 RS690/RS740 Host Bridge
7912 RS690/RS740 PCI to PCI Bridge (Internal gfx)
7913 RS690 PCI to PCI Bridge (PCI Express Graphics Port 0)
7915 RS690 PCI to PCI Bridge (PCI Express Port 1)
7916 RS690 PCI to PCI Bridge (PCI Express Port 2)
7917 RS690 PCI to PCI Bridge (PCI Express Port 3)
1002 7910 RS690 PCI to PCI Bridge
7919 RS690 HDMI Audio [Radeon Xpress 1200 Series]
1179 7919 Satellite P305D-S8995E
17f2 5000 KI690-AM2 Motherboard
791e RS690 [Radeon
X1200]
1462 7327 K9AG Neo2
17f2 5000 KI690-AM2 Motherboard
791f RS690M [Radeon Xpress 1200/1250/1270]
1179 ff50 Satellite P305D-S8995E
7930 RS600 Host Bridge
7932 RS600 PCI to PCI Bridge (Internal gfx)
7933 RS600 PCI to PCI Bridge (PCI Express Graphics Port 0)
7935 RS600 PCI to PCI Bridge (PCI Express Port 1)
7936 RS600 PCI to PCI Bridge (PCI Express Port 2)
7937 RS690 PCI to PCI Bridge (PCI Express Port 3)
793b RS600 HDMI Audio [Radeon Xpress 1250]
793f RS690M [Radeon Xpress 1200/1250/1270] (Secondary)
7941 RS600 [Radeon Xpress 1250]
7942 RS600M [Radeon Xpress 1250]
796e RS740 [Radeon 2100]
105b 0e13 N15235/A74MX mainboard
9400 R600 [Radeon HD 2900 PRO/XT]
1002 2552 Radeon HD 2900 XT
1002 3000 Radeon HD 2900 PRO
1002 3142 HIS Radeon HD 2900XT 512MB GDDR3 VIVO PCIe
9401 R600 [Radeon HD 2900 XT]

9403 R600 [Radeon HD 2900 PRO]
9405 R600 [Radeon HD 2900 GT]
940a R600 GL [FireGL V8650]
13cc 3d16 MXRT-7200
940b R600 GL [FireGL
V8600]
940f R600 GL [FireGL V7600]
9440 RV770 [Radeon HD 4870]
9441 R700 [Radeon HD 4870 X2]
9442 RV770 [Radeon HD 4850]
1002 0502 MSI Radeon HD 4850 512MB GDDR3
174b e810 Radeon HD 4850 512MB GDDR3
9443 R700 [Radeon HD 4850 X2]
9444 RV770 GL [FirePro V8750]
9446 RV770 GL [FirePro V7760]
944a RV770/M98L [Mobility Radeon HD 4850]
944b RV770/M98 [Mobility Radeon HD 4850 X2]
944c RV770 LE [Radeon HD 4830]
944e RV770 CE [Radeon HD 4710]
174b 3261 Radeon HD 4810
9450 RV770 GL [FireStream 9270]
9452 RV770 GL [FireStream 9250]
9456 RV770 GL [FirePro V8700]
945a RV770/M98-XT [Mobility Radeon HD 4870]
9460 RV790 [Radeon HD 4890]
9462 RV790 [Radeon HD 4860]
946a RV770 GL [FirePro M7750]
9480 RV730/M96 [Mobility Radeon HD 4650/5165]
103c 3628 Mobility Radeon HD 4650 [dv6-1190en]
9488 RV730/M96-XT [Mobility Radeon HD 4670]
9489 RV730/M96 GL [Mobility FireGL V5725]
9490 RV730 XT [Radeon HD 4670]
174b e880 Radeon HD 4670 512MB GDDR3 Dual DVI-I/TVO
9491
RV730/M96-CSP [Radeon E4690]
9495 RV730 [Radeon HD 4600 AGP Series]
1002 0028 Radeon HD 4650/4670 AGP
1092 0028 Radeon HD 4670 AGP 512MB DDR2
1458 0028 Radeon HD 4650 AGP
1682 0028 Radeon HD 4650 AGP
174b 0028 Radeon HD 4650 AGP DDR2
9498 RV730 PRO [Radeon HD 4650]
949c RV730 GL [FirePro V7750]
13cc 3d1b MXRT-7300
949e RV730 GL [FirePro V5700]
949f RV730 GL [FirePro V3750]
94a0 RV740/M97 [Mobility Radeon HD 4830]
94a1 RV740/M97-XT [Mobility Radeon HD 4860]

94a3 RV740/M97 GL [FirePro M7740]
94b3 RV740 PRO [Radeon HD 4770]
94b4 RV740 PRO [Radeon HD 4750]
94c1 RV610 [Radeon HD 2400 PRO/XT]
1028 0211 Optiplex 755
1028 0d02 Optiplex 755
94c3 RV610 [Radeon HD 2400 PRO]
1028 0302 Radeon HD 2400 Pro
174b e400 Radeon HD 2400 PRO
18bc 3550 Radeon HD 2400 PRO
94c4 RV610 LE [Radeon HD 2400 PRO AGP]
94c5 RV610 [Radeon HD 2400 LE]
94c7 RV610 [Radeon HD 2350]
94c8 RV610/M74 [Mobility Radeon HD 2400 XT]
94c9 RV610/M72-S
[Mobility Radeon HD 2400]
1002 94c9 Radeon HD2400
94cb RV610 [Radeon E2400]
94cc RV610 LE [Radeon HD 2400 PRO PCI]
9500 RV670 [Radeon HD 3850 X2]
9501 RV670 [Radeon HD 3870]
174b e620 Radeon HD 3870
9504 RV670/M88 [Mobility Radeon HD 3850]
9505 RV670 [Radeon HD 3690/3850]
148c 3000 Radeon HD 3850
174b 3000 Radeon HD 3690/3850
1787 3000 Radeon HD 3690
9506 RV670/M88 [Mobility Radeon HD 3850 X2]
9507 RV670 [Radeon HD 3830]
9508 RV670/M88-XT [Mobility Radeon HD 3870]
9509 RV670/M88 [Mobility Radeon HD 3870 X2]
950f R680 [Radeon HD 3870 X2]
9511 RV670 GL [FireGL V7700]
9513 RV670 [Radeon HD 3850 X2]
9515 RV670 PRO [Radeon HD 3850 AGP]
9519 RV670 GL [FireStream 9170]
9540 RV710 [Radeon HD 4550]
954f RV710 [Radeon HD 4350/4550]
1462 1618 R4350 MD512H (MS-V161)
9552 RV710/M92 [Mobility Radeon HD 4330/4350/4550]
1028 1103 M92 [Mobility Radeon HD 4330]
GV-R435OC-512I/FF1
1458 21ac Radeon HD 4350
GV-R455HM-512I/F41
1458 21ed Radeon
HD 4550
113-100928-J01
148c 3000 Radeon HD 4350 Go! Green 512MB GDDR3

113-2E172001-003

174b 3000 Radeon HD 4350/4550 HyperMemory DDR2
9553 RV710/M92 [Mobility Radeon HD 4530/4570/545v]

1025 015e Mobility Radeon HD 4570

1025 017d Mobility Radeon HD 4570

1025 0205 Mobility Radeon HD 4570 / 545v

1025 0206 Mobility Radeon HD 4570

1025 0237 Mobility Radeon HD 4570

1028 02be Mobility Radeon HD 4570 / 545v

1028 02e8 Mobility Radeon HD 4530

103c 143c Mobility Radeon HD 545v

103c 1446 Mobility Radeon HD 545v

103c 3624 Mobility Radeon HD 4530

103c 3628 Mobility Radeon HD 4530

103c 3636 Mobility Radeon HD 4530

1043 1b32 Mobility Radeon HD 4570

1043 1b42 Mobility Radeon HD 4570

104d 9056 Mobility Radeon HD 4570

1179 ff82 Satellite L505-13T GPU (Mobility Radeon HD 5145)

144d c07f Mobility Radeon HD 545v

144d c571 Mobility Radeon HD 545v

1462 1006 Mobility Radeon HD 545v

17aa 2129 Mobility Radeon HD 545v

17aa 215b Mobility

Radeon HD 545v

17aa 21bb Mobility Radeon HD 545v

9555 RV710/M92 [Mobility Radeon HD 4350/4550]

103c 1411 ProBook 4720s GPU (Mobility Radeon HD 4350)

9557 RV711 GL [FirePro RG220]

955f RV710/M92 [Mobility Radeon HD 4330]

9580 RV630 [Radeon HD 2600 PRO]

9581 RV630/M76 [Mobility Radeon HD 2600]

9583 RV630/M76 [Mobility Radeon HD 2600 XT/2700]

106b 0083 iMac 7,1

1734 1107 Mobility Radeon HD 2700

9586 RV630 XT [Radeon HD 2600 XT AGP]

9587 RV630 PRO [Radeon HD 2600 PRO AGP]

9588 RV630 XT [Radeon HD 2600 XT]

1458 216c Radeon HD 2600 XT, 256MB GDDR3, 2x DVI, TV-out, PCIe (GV-RX26T256H)

9589 RV630 PRO [Radeon HD 2600 PRO]

Rebranded HD 2600 PRO

1787 3000 Radeon HD 3610

958a RV630 [Radeon HD 2600 X2]

958b RV630/M76 [Mobility Radeon HD 2600 XT]

958c RV630 GL [FireGL V5600]

13cc 3d18 MXRT-5200

958d RV630 GL [FireGL V3600]

9591 RV635/M86 [Mobility Radeon HD 3650]

1002 9591 Mobility Radeon HD 3650
9593 RV635/M86 [Mobility Radeon HD 3670]
9595
RV635/M86 GL [Mobility FireGL V5700]
9596 RV635 PRO [Radeon HD 3650 AGP]
1043 0028 EAH3650 SILENT/HTDI/512M/A
9597 RV635 PRO [Radeon HD 3650 AGP]
9598 RV635 [Radeon HD 3650/3750/4570/4580]
1002 9598 Mobility Radeon HD 3600
1043 01d6 EAH3650 Silent
1043 3001 Radeon HD 4570
174b 3001 Radeon HD 3750
174b 4580 RV635 PRO [Radeon HD 4580]
17af 3011 RV635 PRO [Radeon HD 4580]
9599 RV635 PRO [Radeon HD 3650 AGP]
95c0 RV620 PRO [Radeon HD 3470]
1002 95c0 Mobility Radeon HD 3470
95c2 RV620/M82 [Mobility Radeon HD 3410/3430]
95c4 RV620/M82 [Mobility Radeon HD 3450/3470]
1002 95c4 Mobility Radeon HD 3400
95c5 RV620 LE [Radeon HD 3450]
1028 0342 OptiPlex 980
95c6 RV620 LE [Radeon HD 3450 AGP]
95c9 RV620 LE [Radeon HD 3450 PCI]
95cc RV620 GL [FirePro V3700]
95cd RV620 GL [FirePro 2450]
95cf RV620 GL [FirePro 2260]
960f RS780 HDMI Audio [Radeon 3000/3100 / HD 3200/3300]
9610 RS780 [Radeon HD 3200]
1458 d000 GA-MA78GM-S2H Motherboard
9611
RS780C [Radeon 3100]
9612 RS780M [Mobility Radeon HD 3200]
9613 RS780MC [Mobility Radeon HD 3100]
9614 RS780D [Radeon HD 3300]
9616 RS780L [Radeon 3000]
9640 Sumo [Radeon HD 6550D]
9641 Sumo [Radeon HD 6620G]
9642 SuperSumo [Radeon HD 6370D]
9643 SuperSumo [Radeon HD 6380G]
9644 SuperSumo [Radeon HD 6410D]
9645 SuperSumo [Radeon HD 6410D]
9647 Sumo [Radeon HD 6520G]
9648 Sumo [Radeon HD 6480G]
9649 SuperSumo [Radeon HD 6480G]
964a Sumo [Radeon HD 6530D]
964b Sumo
964c Sumo

964e Sumo
964f Sumo
970f RS880 HDMI Audio [Radeon HD 4200 Series]
1019 2120 A785GM-M
1043 83a2 M4A785TD Motherboard
1043 843e M5A88-V EVO
9710 RS880 [Radeon HD 4200]
1019 2120 A785GM-M
1043 83a2 M4A785TD Motherboard
9712 RS880M [Mobility Radeon HD 4225/4250]
103c 1609 ProLiant MicroServer N36L
9713 RS880M [Mobility Radeon HD 4100]
9714 RS880 [Radeon HD 4290]
9715 RS880 [Radeon HD 4250]
1043 843e M5A88-V EVO
Radeon HD 6250 too?
9802 Wrestler
[Radeon HD 6310]
174b 1001 PURE Fusion Mini
9803 Wrestler [Radeon HD 6310]
9804 Wrestler [Radeon HD 6250]
9805 Wrestler [Radeon HD 6250]
9806 Wrestler [Radeon HD 6320]
9807 Wrestler [Radeon HD 6290]
9808 Wrestler [Radeon HD 7340]
9809 Wrestler [Radeon HD 7310]
980a Wrestler [Radeon HD 7290]
9830 Kabini [Radeon HD 8400 / R3 Series]
9831 Kabini [Radeon HD 8400E]
9832 Kabini [Radeon HD 8330]
1849 9832 QC5000-ITX/PH
9833 Kabini [Radeon HD 8330E]
9834 Kabini [Radeon HD 8210]
9835 Kabini [Radeon HD 8310E]
9836 Kabini [Radeon HD 8280 / R3 Series]
9837 Kabini [Radeon HD 8280E]
9838 Kabini [Radeon HD 8240 / R3 Series]
9839 Kabini [Radeon HD 8180]
983d Temash [Radeon HD 8250/8280G]
9840 Kabini HDMI/DP Audio
1849 9840 QC5000-ITX/PH
9850 Mullins [Radeon R3 Graphics]
9851 Mullins [Radeon R4/R5 Graphics]
1179 f928 Beema [Radeon R5 Graphics]
9852 Mullins [Radeon R2 Graphics]
9853 Mullins [Radeon R2 Graphics]
9854 Mullins [Radeon R3E Graphics]
9855

Mullins [Radeon R6 Graphics]
9856 Mullins [Radeon R1E/R2E Graphics]
9857 Mullins [Radeon APU XX-2200M with R2 Graphics]
9858 Mullins
9859 Mullins
985a Mullins
985b Mullins
985c Mullins
985d Mullins
985e Mullins
985f Mullins
9874 Wani [Radeon R5/R6/R7 Graphics]
1002 1871 Radeon R5 Graphics
1002 1e20 Radeon R7 Graphics
1028 06bd Radeon R6 Graphics
103c 2b44 Radeon R6 Graphics
103c 8221 Radeon R5 Graphics
103c 8223 Radeon R5 Graphics
103c 8238 Radeon R7 Graphics
103c 8353 Radeon R7 Graphics
1458 d000 Radeon R7 Graphics
17aa 5113 Radeon R6 Graphics
17aa 5116 Radeon R6 Graphics
17aa 5118 Radeon R5 Graphics
9890 Amur
98c0 Nolan
98e4 Stoney [Radeon R2/R3/R4/R5 Graphics]
9900 Trinity [Radeon HD 7660G]
103c 1985 Pavilion 17-e163sg Notebook PC
AMD A10-5800K CPU
9901 Trinity [Radeon HD 7660D]
9902 Trinity HDMI Audio Controller
103c 194e ProBook 455 G1 Notebook
103c 1985 Pavilion 17-e163sg Notebook PC
9903
Trinity [Radeon HD 7640G]
103c 194e ProBook 455 G1 Notebook
103c 1952 ProBook 455 G1 Notebook
9904 Trinity [Radeon HD 7560D]
9905 Trinity GL [FirePro A300]
9906 Trinity GL [FirePro A320]
9907 Trinity [Radeon HD 7620G]
9908 Trinity [Radeon HD 7600G]
9909 Trinity [Radeon HD 7500G]
990a Trinity [Radeon HD 7500G]
990b Richland [Radeon HD 8650G]
990c Richland [Radeon HD 8670D]
990d Richland [Radeon HD 8550G]

990e Richland [Radeon HD 8570D]
990f Richland [Radeon HD 8610G]
9910 Trinity [Radeon HD 7660G]
9913 Trinity [Radeon HD 7640G]
9917 Trinity [Radeon HD 7620G]
9918 Trinity [Radeon HD 7600G]
9919 Trinity [Radeon HD 7500G]
991e Bishop
9920 Liverpool [Playstation 4 APU]
9921 Liverpool HDMI/DP Audio Controller
9922 Starshp
9923 Starsha2 [Kingston/Clayton]
9924 Gladius
9925 Kingston/Clayton/Jupiter/Gladius/Montego HDMI Controller
9926 Jupiter
9990 Trinity 2 [Radeon HD 7520G]
9991 Trinity 2 [Radeon HD 7540D]
9992 Trinity 2 [Radeon
HD 7420G]
9993 Trinity 2 [Radeon HD 7480D]
9994 Trinity 2 [Radeon HD 7400G]
9995 Richland [Radeon HD 8450G]
9996 Richland [Radeon HD 8470D]
9997 Richland [Radeon HD 8350G]
9998 Richland [Radeon HD 8370D]
9999 Richland [Radeon HD 8510G]
999a Richland [Radeon HD 8410G]
999b Richland [Radeon HD 8310G]
999c Richland [Radeon HD 8650D]
AMD Quad-Core A8-Series APU A8-6500T with Radeon HD 8550D
999d Richland [Radeon HD 8550D]
99a0 Trinity 2 [Radeon HD 7520G]
99a2 Trinity 2 [Radeon HD 7420G]
99a4 Trinity 2 [Radeon HD 7400G]
aa00 R600 HDMI Audio [Radeon HD 2900 GT/PRO/XT]
aa01 RV635 HDMI Audio [Radeon HD 3650/3730/3750]
aa08 RV630 HDMI Audio [Radeon HD 2600 PRO/XT / HD 3610]
aa10 RV610 HDMI Audio [Radeon HD 2350 PRO / 2400 PRO/XT / HD 3410]
174b aa10 Radeon HD 2400 PRO
18bc aa10 Radeon HD 2400 PRO
aa18 RV670/680 HDMI Audio [Radeon HD 3690/3800 Series]
aa20 RV635 HDMI Audio [Radeon HD 3650/3730/3750]
aa28 RV620 HDMI Audio [Radeon HD 3450/3470/3550/3570]
aa30
RV770 HDMI Audio [Radeon HD 4850/4870]
174b aa30 Radeon HD 4850 512MB GDDR3 PCI-E Dual Slot Fansink
aa38 RV710/730 HDMI Audio [Radeon HD 4000 series]
103c 3628 dv6-1190en

aa50 Cypress HDMI Audio [Radeon HD 5830/5850/5870 / 6850/6870 Rebrand]
aa58 Juniper HDMI Audio [Radeon HD 5700 Series]
5500, 5600 and mobile 5700 series
aa60 Redwood HDMI Audio [Radeon HD 5000 Series]
1025 033d Mobility Radeon HD 5650
1025 0347 Aspire 7740G
aa68 Cedar HDMI Audio [Radeon HD 5400/6300/7300 Series]
1028 aa68 XPS 8300
aa80 Cayman/Antilles HDMI Audio [Radeon HD 6930/6950/6970/6990]
aa88 Barts HDMI Audio [Radeon HD 6790/6850/6870 / 7720 OEM]
aa90 Turks HDMI Audio [Radeon HD 6500/6600 / 6700M Series]
1028 04a3 Precision M4600
aa98 Caicos HDMI Audio [Radeon HD 6450 / 7450/8450/8490 OEM / R5 230/235/235X OEM]
174b aa98 Radeon HD 6450 1GB DDR3
aaa0 Tahiti HDMI Audio [Radeon HD 7870 XT / 7950/7970]
aab0 Oland/Hainan/Cape Verde/Pitcairn HDMI Audio [Radeon
HD 7000 Series]
aab8 Tiran HDMI Audio
aac0 Tobago HDMI Audio [Radeon R7 360 / R9 360 OEM]
aac8 Hawaii HDMI Audio [Radeon R9 290/290X / 390/390X]
aad8 Tonga HDMI Audio [Radeon R9 285/380]
174b aad8 Radeon R9 285/380 HDMI Audio
aae0 Baffin HDMI/DP Audio [Radeon RX 550 640SP / RX 560/560X]
aae8 Fiji HDMI/DP Audio [Radeon R9 Nano / FURY/FURY X]
aaf0 Ellesmere HDMI Audio [Radeon RX 470/480 / 570/580/590]
aaf8 Vega 10 HDMI Audio [Radeon Vega 56/64]
ab00 Baffin HDMI/DP Audio [Radeon RX 550 640SP / RX 560/560X]
ab08 Polaris 22 HDMI Audio
ab10 Lexa HDMI Audio
ab18 Vega 12 HDMI Audio
ab20 Vega 20 HDMI Audio [Radeon VII]
ab38 Navi 10 HDMI Audio
ac00 Theater 506 World-Wide Analog Decoder
ac01 Theater 506 World-Wide Analog Decoder
ac02 TV Wonder HD 600 PCIe
ac03 Theater 506 PCIe
ac04 Theater 506 USB
ac05 Theater 506 USB
ac06 Theater 506 External USB
ac07 Theater 506 External USB
ac08 Theater 506A World-Wide Analog Decoder + Demodulator
ac09 Theater
506A World-Wide Analog Decoder + Demodulator
ac0a Theater 506A PCIe
ac0b Theater 506A PCIe
ac0c Theater 506A USB
ac0d Theater 506A USB
ac0e Theater 506A External USB

ac0f Theater 506A External USB
ac12 Theater HD T507 (DVB-T) TV tuner/capture device
cab0 RS100 Host Bridge
cab2 RS200 Host Bridge
cab3 RS250 Host Bridge
cbb2 RS200 Host Bridge
1003 ULSI Systems
0201 US201
1004 VLSI Technology Inc
0005 82C592-FC1
0006 82C593-FC1
0007 82C594-AFC2
0008 82C596/7 [Wildcat]
0009 82C597-AFC2
000c 82C541 [Lynx]
000d 82C543 [Lynx]
0101 82C532
0102 82C534 [Eagle]
0103 82C538
0104 82C535
0105 82C147
0200 82C975
0280 82C925
0304 QSound ThunderBird PCI Audio
1004 0304 QSound ThunderBird PCI Audio
122d 1206 DSP368 Audio
1483 5020 XWave Thunder 3D Audio
0305 QSound ThunderBird PCI Audio Gameport
1004 0305 QSound ThunderBird PCI Audio Gameport
122d 1207 DSP368 Audio Gameport
1483 5021 XWave Thunder 3D Audio Gameport
0306 QSound
ThunderBird PCI Audio Support Registers
1004 0306 QSound ThunderBird PCI Audio Support Registers
122d 1208 DSP368 Audio Support Registers
1483 5022 XWave Thunder 3D Audio Support Registers
0307 SAA7785 ThunderBird PCI Audio
1004 0703 Philips Rhythmic Edge PSC703
1004 0705 Philips Seismic Edge PSC705
1004 0706 Philips Acoustic Edge PSC706
0308 SAA7785 ThunderBird PCI Audio Gameport
0702 VAS96011 [Golden Gate II]
0703 Tollgate
1005 Avance Logic Inc. [ALI]
2064 ALG2032/2064
2128 ALG2364A
2301 ALG2301
2302 ALG2302

2364 ALG2364
2464 ALG2364A
2501 ALG2564A/25128A
1006 Reply Group
1007 NetFrame Systems Inc
1008 Epson
100a Phoenix Technologies
100b National Semiconductor Corporation
0001 DP83810
0002 87415/87560 IDE
000e 87560 Legacy I/O
000f FireWire Controller
0011 NS87560 National PCI System I/O
0012 USB Controller
0020 DP83815 (MacPhyter) Ethernet Controller
103c 0024 Pavilion ze4400 builtin Network
12d9 000c Aculab E1/T1
PMXc cPCI carrier card
1385 f311 FA311 / FA312 (FA311 with WoL HW)
1385 f312 FA312 (rev. A1) Fast Ethernet PCI Adapter
0021 PC87200 PCI to ISA Bridge
0022 DP83820 10/100/1000 Ethernet Controller
1186 4900 DGE-500T
1385 621a GA621
1385 622a GA622T
0028 Geode GX2 Host Bridge
002a CS5535 South Bridge
002b CS5535 ISA bridge
002d CS5535 IDE
002e CS5535 Audio
002f CS5535 USB
0030 Geode GX2 Graphics Processor
0035 DP83065 [Saturn] 10/100/1000 Ethernet Controller
0500 SCx200 Bridge
0501 SCx200 SMI
0502 SCx200, SC1100 IDE controller
100b 0502 IDE Controller
0503 SCx200, SC1100 Audio Controller
100b 0503 XpressAudio controller
0504 SCx200 Video
0505 SCx200 XBus
0510 SC1100 Bridge
100b 0500 GPIO and LPC support bridge
0511 SC1100 SMI & ACPI
100b 0501 SC1100 SMI & ACPI bridge
0515 SC1100 XBus
100b 0505 SC1100 PCI to XBus bridge
d001 87410 IDE

100c Tseng Labs Inc
3202 ET4000/W32p rev A
3205 ET4000/W32p rev B
3206 ET4000/W32p
rev C
3207 ET4000/W32p rev D
3208 ET6000
4702 ET6300
100d AST Research Inc
100e Weitek
9000 P9000 Viper
9001 P9000 Viper
9002 P9000 Viper
9100 P9100 Viper Pro/SE
1010 Video Logic, Ltd.
1011 Digital Equipment Corporation
0001 DECchip 21050
0002 DECchip 21040 [Tulip]
0004 DECchip 21030 [TGA]
0007 NVRAM [Zephyr NVRAM]
0008 KZPSA [KZPSA]
0009 DECchip 21140 [FasterNet]
1025 0310 21140 Fast Ethernet
10b8 2001 SMC9332BDT EtherPower 10/100
10b8 2002 SMC9332BVT EtherPower T4 10/100
10b8 2003 SMC9334BDT EtherPower 10/100 (1-port)
1109 2400 ANA-6944A/TX Fast Ethernet
1112 2300 RNS2300 Fast Ethernet
1112 2320 RNS2320 Fast Ethernet
1112 2340 RNS2340 Fast Ethernet
1113 1207 EN-1207-TX Fast Ethernet
1186 1100 DFE-500TX Fast Ethernet
1186 1112 DFE-570TX Fast Ethernet
1186 1140 DFE-660 Cardbus Ethernet 10/100
1186 1142 DFE-660 Cardbus Ethernet 10/100
11f6 0503 Freedomline Fast Ethernet
1282 9100 AEF-380TXD Fast Ethernet
1385
1100 FA310TX Fast Ethernet
2646 0001 KNE100TX Fast Ethernet
000a 21230 Video Codec
000d PBXGB [TGA2]
000f DEFPA FDDI PCI-to-PDQ Interface Chip [PFI]
1011 def1 FDDI controller (DEFPA)
103c def1 FDDI controller (3X-DEFPA)
0014 DECchip 21041 [Tulip Pass 3]
1186 0100 DE-530+
0016 DGLPB [OPPO]

0017 PV-PCI Graphics Controller (ZLXp-L)
0018 Memory Channel interface
0019 DECchip 21142/43
1011 500a DE500A Fast Ethernet
1011 500b DE500B Fast Ethernet
1014 0001 10/100 EtherJet Cardbus
1025 0315 ALN315 Fast Ethernet
1033 800c PC-9821-CS01 100BASE-TX Interface Card
1033 800d PC-9821NR-B06 100BASE-TX Interface Card
103c 125a 10/100Base-TX (PCI) [A5506B]
108d 0016 Rapidfire 2327 10/100 Ethernet
108d 0017 GoCard 2250 Ethernet 10/100 Cardbus
10b8 2005 SMC8032DT Extreme Ethernet 10/100
10b8 8034 SMC8034 Extreme Ethernet 10/100
10ef 8169 Cardbus Fast Ethernet
1109 2a00 ANA-6911A/TX Fast Ethernet
1109 2b00 ANA-6911A/TXC Fast Ethernet
1109
3000 ANA-6922/TX Fast Ethernet
1113 1207 Cheetah Fast Ethernet
1113 2220 Cardbus Fast Ethernet
115d 0002 Cardbus Ethernet 10/100
1179 0203 Fast Ethernet
1179 0204 Cardbus Fast Ethernet
1186 1100 DFE-500TX Fast Ethernet
1186 1101 DFE-500TX Fast Ethernet
1186 1102 DFE-500TX Fast Ethernet
1186 1112 DFE-570TX Quad Fast Ethernet
11f0 4235 21143 [FASTLine-II UTP 10/100]
1259 2800 AT-2800Tx Fast Ethernet
1266 0004 Eagle Fast EtherMAX
12af 0019 NetFlyer Cardbus Fast Ethernet
1374 0001 Cardbus Ethernet Card 10/100
1374 0002 Cardbus Ethernet Card 10/100
1374 0007 Cardbus Ethernet Card 10/100
1374 0008 Cardbus Ethernet Card 10/100
1385 2100 FA510
1395 0001 10/100 Ethernet CardBus PC Card
13d1 ab01 EtherFast 10/100 Cardbus (PCMP200)
1498 000a TPMC880-10 10/100Base-T and 10Base2 PMC Ethernet Adapter
1498 000b TPMC880-11 Single 10/100Base-T PMC Ethernet Adapter
1498 000c TPMC880-12 Single 10Base2 PMC Ethernet Adapter
14cb
0100 LNDL-100N 100Base-TX Ethernet PC Card
1668 2000 FastNet Pro (PE2000)
2646 0001 KNE100TX
2646 0002 KNE-CB4TX
8086 0001 EtherExpress PRO/100 Mobile CardBus 32

001a Farallon PN9000SX Gigabit Ethernet
0021 DECchip 21052
0022 DECchip 21150
0023 DECchip 21150
0024 DECchip 21152
0025 DECchip 21153
0026 DECchip 21154
0034 56k Modem Cardbus
1374 0003 56k Modem Cardbus
0045 DECchip 21553
0046 DECchip 21554
0e11 4050 Smart Array 4200 Controller
0e11 4051 Smart Array 4250ES Controller
0e11 4058 Smart Array 431 Controller
103c 10c2 NetRAID-4M
12d9 000a IP Telephony card
4c53 1050 CT7 mainboard
4c53 1051 CE7 mainboard
9005 0364 5400S (Mustang)
9005 0365 5400S (Mustang)
9005 1364 Dell PowerEdge RAID Controller 2
9005 1365 Dell PowerEdge RAID Controller 2
e4bf 1000 CC8-1-BLUES
1065 StrongARM DC21285
1069 0020 DAC960P / DAC1164P
1012 Micronics Computers Inc
1013 Cirrus Logic
0038 GD 7548
0040 GD 7555 Flat Panel
GUI Accelerator
004c GD 7556 Video/Graphics LCD/CRT Ctrlr
00a0 GD 5430/40 [Alpine]
00a2 GD 5432 [Alpine]
00a4 GD 5434-4 [Alpine]
00a8 GD 5434-8 [Alpine]
00ac GD 5436 [Alpine]
00b0 GD 5440
00b8 GD 5446
1af4 1100 QEMU Virtual Machine
00bc GD 5480
1013 00bc CL-GD5480
00d0 GD 5462
00d2 GD 5462 [Laguna I]
00d4 GD 5464 [Laguna]
00d5 GD 5464 BD [Laguna]
00d6 GD 5465 [Laguna]
13ce 8031 Barco Metheus 2 Megapixel, Dual Head
13cf 8031 Barco Metheus 2 Megapixel, Dual Head

00e8 GD 5436U
1100 CL 6729
1110 PD 6832 PCMCIA/CardBus Ctrlr
1112 PD 6834 PCMCIA/CardBus Ctrlr
1113 PD 6833 PCMCIA/CardBus Ctrlr
1200 GD 7542 [Nordic]
1202 GD 7543 [Viking]
1204 GD 7541 [Nordic Light]
4000 MD 5620 [CLM Data Fax Voice]
4400 CD 4400
6001 CS 4610/11 [CrystalClear SoundFusion Audio Accelerator]
1014 1010 CS4610 SoundFusion Audio Accelerator
6003 CS 4614/22/24/30 [CrystalClear SoundFusion Audio Accelerator]
1013 4280 Crystal SoundFusion PCI Audio Accelerator
1014
0153 ThinkPad 600X/A20m
153b 112e DMX XFire 1024
153b 1136 SiXPack 5.1+
1681 0050 Game Theater XP
1681 a010 Gamesurround Fortissimo II
1681 a011 Gamesurround Fortissimo III 7.1
5053 3357 Santa Cruz
6004 CS 4614/22/24 [CrystalClear SoundFusion Audio Accelerator]
6005 Crystal CS4281 PCI Audio
1013 4281 Crystal CS4281 PCI Audio
10cf 10a8 Crystal CS4281 PCI Audio
10cf 10a9 Crystal CS4281 PCI Audio
10cf 10aa Crystal CS4281 PCI Audio
10cf 10ab Crystal CS4281 PCI Audio
10cf 10ac Crystal CS4281 PCI Audio
10cf 10ad Crystal CS4281 PCI Audio
10cf 10b4 Crystal CS4281 PCI Audio
1179 0001 Crystal CS4281 PCI Audio
14c0 000c Crystal CS4281 PCI Audio
1014 IBM
0002 PCI to MCA Bridge
0005 Processor to I/O Controller [Alta Lite]
0007 Processor to I/O Controller [Alta MP]
000a PCI to ISA Bridge (IBM27-82376) [Fire Coral]
0017 CPU to PCI Bridge
0018 TR Auto LANstreamer
001b GXT-150P
001c Carrera
001d SCSI-2 FAST PCI Adapter
(82G2675)
0020 GXT1000 Graphics Adapter
0022 PCI to PCI Bridge (IBM27-82351)
002d Processor to I/O Controller [Python]

002e SCSI RAID Adapter [ServeRAID]
1014 002e ServeRAID-3x
1014 022e ServeRAID-4H
0031 2 Port Serial Adapter
AS400 iSeries PCI sync serial card
1014 0031 2721 WAN IOA - 2 Port Sync Serial Adapter
0036 PCI to 32-bit LocalBus Bridge [Miami]
0037 PowerPC to PCI Bridge (IBM27-82660)
003a CPU to PCI Bridge
003c GXT250P/GXT255P Graphics Adapter
003e 16/4 Token ring UTP/STP controller
1014 003e Token-Ring Adapter
1014 00cd Token-Ring Adapter + Wake-On-LAN
1014 00ce 16/4 Token-Ring Adapter 2
1014 00cf 16/4 Token-Ring Adapter Special
1014 00e4 High-Speed 100/16/4 Token-Ring Adapter
1014 00e5 16/4 Token-Ring Adapter 2 + Wake-On-LAN
1014 016d iSeries 2744 Card
0045 SSA Adapter
0046 MPIC interrupt controller
0047 PCI to PCI Bridge
0048 PCI to PCI Bridge
0049 Warhead SCSI Controller
004e ATM Controller (14104e00)
004f
ATM Controller (14104f00)
0050 ATM Controller (14105000)
0053 25 MBit ATM Controller
0054 GXT500P/GXT550P Graphics Adapter
0057 MPEG PCI Bridge
0058 SSA Adapter [Advanced SerialRAID/X]
005e GXT800P Graphics Adapter
007c ATM Controller (14107c00)
007d 3780IDSP [MWave]
008b EADS PCI to PCI Bridge
008e GXT3000P Graphics Adapter
0090 GXT 3000P
1014 008e GXT-3000P
0091 SSA Adapter
0095 20H2999 PCI Docking Bridge
0096 Chukar chipset SCSI controller
1014 0097 iSeries 2778 DASD IOA
1014 0098 iSeries 2763 DASD IOA
1014 0099 iSeries 2748 DASD IOA
009f PCI 4758 Cryptographic Accelerator
00a5 ATM Controller (1410a500)
00a6 ATM 155MBPS MM Controller (1410a600)
00b7 GXT2000P Graphics Adapter

1092 00b8 FireGL1 AGP 32Mb
00b8 GXT2000P Graphics Adapter
00be ATM 622MBPS Controller (1410be00)
00dc Advanced Systems Management Adapter (ASMA)
00fc CPC710 Dual Bridge and Memory Controller (PCI-64)
0105 CPC710 Dual Bridge and Memory Controller
(PCI-32)
010f Remote Supervisor Adapter (RSA)
0142 Yotta Video Compositor Input
1014 0143 Yotta Input Controller (ytin)
0144 Yotta Video Compositor Output
1014 0145 Yotta Output Controller (ytout)
0156 405GP PLB to PCI Bridge
015e 622Mbps ATM PCI Adapter
0160 64bit/66MHz PCI ATM 155 MMF
016e GXT4000P Graphics Adapter
0170 GXT6000P Graphics Adapter
1092 0172 Fire GL2
1092 0173 Fire GL3
1092 0174 Fire GL4
1092 0184 Fire GL4s
017d GXT300P Graphics Adapter
0180 Snipe chipset SCSI controller
1014 0241 iSeries 2757 DASD IOA
1014 0264 Quad Channel PCI-X U320 SCSI RAID Adapter (2780)
0188 EADS-X PCI-X to PCI-X Bridge
01a7 PCI-X to PCI-X Bridge
01bd ServeRAID Controller
1014 01bd ServeRAID 4Lx
1014 01be ServeRAID-4M
1014 01bf ServeRAID-4L
1014 0208 ServeRAID-4Mx
1014 020e ServeRAID-4Lx
1014 022e ServeRAID-4H
1014 0258 ServeRAID-5i
1014 0259 ServeRAID-5i
01c1 64bit/66MHz PCI ATM 155 UTP
01e6 Cryptographic Accelerator
01ef
PowerPC 440GP PCI Bridge
1734 102b PCEAS PCI-X Dual Port ESCON Adapter
1734 10f8 PCEAT PCI-Express Dual Port ESCON Adapter
01ff 10/100 Mbps Ethernet
0219 Multiport Serial Adapter
1014 021a Dual RVX
1014 0251 Internal Modem/RVX
1014 0252 Quad Internal Modem
021b GXT6500P Graphics Adapter

021c GXT4500P Graphics Adapter
0233 GXT135P Graphics Adapter
028c Citrine chipset SCSI controller
1014 028d Dual Channel PCI-X DDR SAS RAID Adapter (572E)
1014 02be Dual Channel PCI-X DDR U320 SCSI RAID Adapter (571B)
1014 02c0 Dual Channel PCI-X DDR U320 SCSI Adapter (571A)
1014 030d PCI-X DDR Auxiliary Cache Adapter (575B)
02a1 Calgary PCI-X Host Bridge
02bd Obsidian chipset SCSI controller
1014 02c1 PCI-X DDR 3Gb SAS Adapter (572A/572C)
1014 02c2 PCI-X DDR 3Gb SAS RAID Adapter (572B/571D)
1014 0338 PCI-X DDR Auxiliary Cache Adapter (575C)
0302 Winnipeg PCI-X Host Bridge
0308 CalIOC2 PCI-E Root Port
0311 FC 5740/1954 4-Port 10/100/1000 Base-TX
PCI-X Adapter for POWER
0314 ZISC 036 Neural accelerator card
032d Axon - Cell Companion Chip
1014 03a1 PCIe PowerXCell 8i Cell Accelerator Board
0339 Obsidian-E PCI-E SCSI controller
1014 030a PCIe 3Gb SAS RAID Adapter (574E)
1014 033a PCIe 3Gb SAS Adapter (57B3)
1014 035c PCIe x8 Internal 3Gb SAS adapter (57CC)
1014 0360 PCI-E Auxiliary Cache Adapter (57B7)
033d PCI-E IPR SAS Adapter (FPGA)
1014 033c PCIe2 1.8GB Cache 6Gb SAS RAID Adapter Tri-port (57B5)
1014 0353 PCIe2 3.1GB Cache 6Gb SAS RAID Enclosure (57C3)
1014 0354 PCIe2 6Gb SAS Adapter Dual-port (57C4)
1014 0356 PCIe2 1.8GB Cache 6Gb SAS RAID & SSD Adapter (574D)
1014 035f PCIe2 6Gb SAS Adapter Quad-port (57B2)
034a PCI-E IPR SAS Adapter (ASIC)
1014 033b PCIe2 6Gb SAS RAID Adapter Quad-port (57B4)
1014 0355 PCIe2 3.6GB Cache 6Gb SAS RAID Adapter Quad-port (57B1)
1014 0357 PCIe2 6Gb SAS Adapter Quad-port (57C6)
1014 035d PCIe3 1.8GB Cache RAID SAS Adapter Quad-port 6GB (57C8)
1014
035e PCIe2 3.6GB Cache 6Gb SAS RAID Adapter Quad-port (57CE)
1014 03fb PCIe3 28GB Cache RAID SAS Enclosure 6Gb x 16 (57D5)
1014 03fe PCIe3 x8 Cache SAS RAID Internal Adapter 6Gb (57D8)
1014 03ff PCIe3 x8 SAS RAID Internal Adapter 6Gb (57D7)
1014 0474 PCIe3 x16 Cache SAS RAID Internal Adapter 6Gb (57EB)
1014 0475 PCIe3 x16 SAS RAID Internal Adapter 6Gb (57EC)
1014 0499 PCIe3 x16 Cache SAS RAID Internal Adapter 6Gb (57ED)
1014 049a PCIe3 x16 SAS RAID Internal Adapter 6Gb (57EE)
1014 04c7 PCIe3 x 8 Cache SAS RAID Internal Adapter 6GB(2CCA)
1014 04c8 PCIe3 x 8 Cache SAS RAID Internal Adapter 6GB(2CD2)
1014 04c9 PCIe3 x 8 Cache SAS RAID Internal Adapter 6GB(2CCD)
03dc POWER8 Host Bridge (PHB3)

044b GenWQE Accelerator Adapter
04aa Flash Adapter 90 (PCIe2 0.9TB)
04c1 POWER9 Host Bridge (PHB4)
04da PCI-E IPR SAS+ Adapter (ASIC)
1014 04fb PCIe3 x16 20GB Cache 12Gb Quad SAS RAID+ Adapter(580B)
1014 04fc PCIe3 x8 12Gb Quad SAS RAID+ Adapter(580A)
04ed
Internal Shared Memory (ISM) virtual PCI device
3022 QLA3022 Network Adapter
4022 QLA3022 Network Adapter
ffff MPIC-2 interrupt controller
1015 LSI Logic Corp of Canada
1016 ICL Personal Systems
1017 SPEA Software AG
5343 SPEA 3D Accelerator
1018 Unisys Systems
1019 Elitegroup Computer Systems
101a AT&T GIS (NCR)
0005 100VG ethernet
0007 BYNET BIC4G/2C/2G
101a 0019 BYNET BIC2C
101a 001c BYNET BIC2G
101a 001f BYNET BIC4G
0009 PQS Memory Controller
000a BYNET BPCI Adapter
000b BYNET 4 Port BYA Switch (BYA4P)
000c BYNET 4 Port BYA Switch (BYA4G)
0010 NCR AMC Memory Controller
1dc1 BYNET BIC2M/BIC4M/BYA4M
101a 0019 BIC2M
101a 001f BIC4M
101a 0ece BYA4M
1fa8 BYNET Multi-port BIC Adapter (XBIC Based)
101a 00c3 BYNET BIC2SE
101b Vitesse Semiconductor
Maxim VSC452 Super BMC Controller with Video
0452 VSC452 [SuperBMC]
101c Western Digital
0193 33C193A
0196 33C196A
0197 33C197A
0296 33C296A
3193 7193
3197 7197
3296
33C296A
4296 34C296
9710 Pipeline 9710

9712 Pipeline 9712
c24a 90C
ID for Newly Acquired Storage Products from Vitesse
101d Maxim Integrated Products
101e American Megatrends Inc.
0009 MegaRAID 428 Ultra RAID Controller (rev 03)
1960 MegaRAID
101e 0471 MegaRAID 471 Enterprise 1600 RAID Controller
101e 0475 MegaRAID 475 Express 500/500LC RAID Controller
101e 0477 MegaRAID 477 Elite 3100 RAID Controller
101e 0493 MegaRAID 493 Elite 1600 RAID Controller
101e 0494 MegaRAID 494 Elite 1650 RAID Controller
101e 0503 MegaRAID 503 Enterprise 1650 RAID Controller
101e 0511 MegaRAID 511 i4 IDE RAID Controller
101e 0522 MegaRAID 522 i4133 RAID Controller
1028 0471 PowerEdge RAID Controller 3/QC
1028 0475 PowerEdge RAID Controller 3/SC
1028 0493 PowerEdge RAID Controller 3/DC
1028 0511 PowerEdge Cost Effective RAID Controller ATA100/4Ch
103c 60e7 NetRAID-1M
103c 60e8 NetRaid 2M [AMI MegaRaid 493]
9010 MegaRAID 428 Ultra RAID Controller
9030
EIDE Controller
9031 EIDE Controller
9032 EIDE & SCSI Controller
9033 SCSI Controller
9040 Multimedia card
9060 MegaRAID 434 Ultra GT RAID Controller
9063 MegaRAC
101e 0767 Dell Remote Assistant Card 2
101f PictureTel
1020 Hitachi Computer Products
1021 OKI Electric Industry Co. Ltd.
1022 Advanced Micro Devices, Inc. [AMD]
1100 K8 [Athlon64/Opteron] HyperTransport Technology Configuration
1101 K8 [Athlon64/Opteron] Address Map
1102 K8 [Athlon64/Opteron] DRAM Controller
1103 K8 [Athlon64/Opteron] Miscellaneous Control
1200 Family 10h Processor HyperTransport Configuration
1201 Family 10h Processor Address Map
1202 Family 10h Processor DRAM Controller
1203 Family 10h Processor Miscellaneous Control
1204 Family 10h Processor Link Control
1300 Family 11h Processor HyperTransport Configuration
1301 Family 11h Processor Address Map
1302 Family 11h Processor DRAM Controller
1303 Family 11h Processor Miscellaneous Control

1304 Family
11h Processor Link Control
1305 Griffin Function 5
1306 Griffin Function 6
1307 Griffin Function 7
1308 Kaveri Audio Controller
1314 Wrestler/Bheem/Ontario/Krishna Audio Controller
13e0 Ariel Root Complex
13e1 Ariel IOMMU
13e2 Ariel PCIe Dummy Host Bridge
13e3 Ariel PCIe GPP Bridge
13e4 Ariel PCIe Dummy Host Bridge
13e5 Ariel Internal PCIe GPP Bridge 0 to Bus A
13e6 Ariel Internal PCIe GPP Bridge 0 to Bus B
13e7 Ariel SMBus Controller
13e8 Ariel LPC Bridge
13e9 Ariel Internal GPU
13ea Ariel HD Audio Controller
13eb Ariel HD Audio Coprocessor
13ec Ariel Cryptographic Coprocessor
13ed Ariel USB 3.1 Type C: Gen2 x 1port + DP Alt Mode
13ee Ariel USB 3.1 Type A: Gen2 x 2 ports
13ef Ariel ZCN/MP4
13f0 Ariel Device 24: Function 0
13f1 Ariel Device 24: Function 1
13f2 Ariel Device 24: Function 2
13f3 Ariel Device 24: Function 3
13f4 Ariel Device 24: Function 4
13f5 Ariel Device 24: Function 5
13f6 Ariel Device 24: Function 6
13f7 Ariel
Device 24: Function 7
1400 Family 15h (Models 10h-1fh) Processor Function 0
1401 Family 15h (Models 10h-1fh) Processor Function 1
1402 Family 15h (Models 10h-1fh) Processor Function 2
1403 Family 15h (Models 10h-1fh) Processor Function 3
1404 Family 15h (Models 10h-1fh) Processor Function 4
1405 Family 15h (Models 10h-1fh) Processor Function 5
1410 Family 15h (Models 10h-1fh) Processor Root Complex
103c 1985 Pavilion 17-e163sg Notebook PC
1412 Family 15h (Models 10h-1fh) Processor Root Port
1022 1234 Trinity A-series APU
1413 Family 15h (Models 10h-1fh) Processor Root Port
1414 Family 15h (Models 10h-1fh) Processor Root Port
1022 1234 Trinity A-series APU
1415 Family 15h (Models 10h-1fh) Processor Root Port
1416 Family 15h (Models 10h-1fh) Processor Root Port
1417 Family 15h (Models 10h-1fh) Processor Root Port

1418 Family 15h (Models 10h-1fh) Processor Root Port
1419 Family 15h (Models 10h-1fh) I/O Memory Management Unit
141a Family 15h (Models
30h-3fh) Processor Function 0
141b Family 15h (Models 30h-3fh) Processor Function 1
141c Family 15h (Models 30h-3fh) Processor Function 2
141d Family 15h (Models 30h-3fh) Processor Function 3
141e Family 15h (Models 30h-3fh) Processor Function 4
141f Family 15h (Models 30h-3fh) Processor Function 5
1422 Family 15h (Models 30h-3fh) Processor Root Complex
1423 Family 15h (Models 30h-3fh) I/O Memory Management Unit
1424 Family 15h (Models 30h-3fh) Processor Root Port
1425 Kaveri P2P Bridge for GFX PCIe Port [1:0]
1426 Family 15h (Models 30h-3fh) Processor Root Port
142e Liverpool Processor HT configuration
142f Liverpool Processor Address Maps
1430 Liverpool Processor DRAM configuration
1431 Liverpool Processor Misc configuration
1432 Liverpool Processor PM configuration
1433 Liverpool Processor NB Performance Monitor
1434 Liverpool Processor SPLL Configuration
1436 Liverpool Processor Root Complex
1437 Liverpool I/O Memory Management Unit
1438 Liverpool
UMI PCIe Dummy Host Bridge
1439 Family 16h Processor Functions 5:1
143a Kingston/Clayton/Gladius/Montego Root Complex
143b Kingston/Clayton/Gladius/Montego P2P Bridge for UMI Link
1440 Matisse Device 24: Function 0
1441 Matisse Device 24: Function 1
1442 Matisse Device 24: Function 2
1443 Matisse Device 24: Function 3
1444 Matisse Device 24: Function 4
1445 Matisse Device 24: Function 5
1446 Matisse Device 24: Function 6
1447 Matisse Device 24: Function 7
1448 Renoir Device 24: Function 0
1449 Renoir Device 24: Function 1
144a Renoir Device 24: Function 2
144b Renoir Device 24: Function 3
144c Renoir Device 24: Function 4
144d Renoir Device 24: Function 5
144e Renoir Device 24: Function 6
144f Renoir Device 24: Function 7
1450 Family 17h (Models 00h-0fh) Root Complex
1451 Family 17h (Models 00h-0fh) I/O Memory Management Unit
1452 Family 17h (Models 00h-1fh) PCIe Dummy Host Bridge
1453 Family 17h (Models 00h-0fh) PCIe GPP Bridge

1454
Family 17h (Models 00h-0fh) Internal PCIe GPP Bridge 0 to Bus B
1455 Zeppelin/Renoir PCIe Dummy Function
1456 Family 17h (Models 00h-0fh) Platform Security Processor
1457 Family 17h (Models 00h-0fh) HD Audio Controller
145a Zeppelin/Raven/Raven2 PCIe Dummy Function
145b Zeppelin Non-Transparent Bridge
145c Family 17h (Models 00h-0fh) USB 3.0 Host Controller
145d Zeppelin Switch Upstream (PCIE SW.US)
145e Zeppelin Switch Downstream (PCIE SW.DS)
145f Zeppelin USB 3.0 Host controller
1460 Family 17h (Models 00h-0fh) Data Fabric: Device 18h; Function 0
1461 Family 17h (Models 00h-0fh) Data Fabric: Device 18h; Function 1
1462 Family 17h (Models 00h-0fh) Data Fabric: Device 18h; Function 2
1463 Family 17h (Models 00h-0fh) Data Fabric: Device 18h; Function 3
1464 Family 17h (Models 00h-0fh) Data Fabric: Device 18h; Function 4
1465 Family 17h (Models 00h-0fh) Data Fabric: Device 18h; Function 5
1466 Family 17h (Models 00h-0fh) Data Fabric: Device 18h; Function
6
1467 Family 17h (Models 00h-0fh) Data Fabric: Device 18h; Function 7
1468 Zeppelin Cryptographic Coprocessor NTBCCP
1480 Starship/Matisse Root Complex
1462 7c37 X570-A PRO motherboard
1481 Starship/Matisse IOMMU
1482 Starship/Matisse PCIe Dummy Host Bridge
1483 Starship/Matisse GPP Bridge
1484 Starship/Matisse Internal PCIe GPP Bridge 0 to bus[E:B]
1485 Starship/Matisse Reserved SPP
1486 Starship/Matisse Cryptographic Coprocessor PSPCPP
1487 Starship/Matisse HD Audio Controller
1462 9c37 X570-A PRO motherboard
1488 Starship Reserved SSP
1489 Starship Reserved SSP
148a Starship/Matisse PCIe Dummy Function
148b Starship/Matisse Non-Transparent Bridge
148c Starship USB 3.0 Host Controller
148d Starship/Matisse Switch Upstream (PCIE SW.US)
148e Starship/Matisse Switch Downstream (PCIE SW.DS)
148f Starship Reserved SSP
1490 Starship Device 24; Function 0
1491 Starship Device 24; Function 1
1492 Starship Device 24; Function 2
1493 Starship
Device 24; Function 3
1494 Starship Device 24; Function 4
1495 Starship Device 24; Function 5
1496 Starship Device 24; Function 6
1497 Starship Device 24; Function 7

1498 Starship/Matisse PTDMA
1499 Starship/Matisse NVMe
149a Starship PCIe GPP Bridge [1:0]
149b Starship Reserved SSP
149c Matisse USB 3.0 Host Controller
1462 7c37 X570-A PRO motherboard
1510 Family 14h Processor Root Complex
174b 1001 PURE Fusion Mini
1512 Family 14h Processor Root Port
1513 Family 14h Processor Root Port
1514 Family 14h Processor Root Port
1515 Family 14h Processor Root Port
1516 Family 14h Processor Root Port
1530 Family 16h Processor Function 0
1531 Family 16h Processor Function 1
1532 Family 16h Processor Function 2
1533 Family 16h Processor Function 3
1534 Family 16h Processor Function 4
1535 Family 16h Processor Function 5
1536 Family 16h Processor Root Complex
1849 1536 QC5000-ITX/PH
1537 Kabini/Mullins PSP-Platform Security Processor
1538
Family 16h Processor Function 0
1539 Kabini P2P Bridge for PCIe Ports[4:0]
1540 Kryptos/Cato/Garfield/Garfield+/Arlene/Pooky HT Configuration
1541 Kryptos/Cato/Garfield/Garfield+/Arlene/Pooky Address Maps
1542 Kryptos/Cato/Garfield/Garfield+/Arlene/Pooky DRAM Configuration
1543 Kryptos/Cato/Garfield/Garfield+/Arlene/Pooky Miscellaneous Configuration
1544 Kryptos/Cato/Garfield/Garfield+/Arlene/Pooky PM Configuration
1545 Kryptos/Cato/Garfield/Garfield+/Arlene/Pooky NB Performance Monitor
1546 Kryptos/Cato/Garfield/Garfield+/Arlene/Pooky Root Complex
1547 Kryptos/Cato/Garfield/Garfield+/Arlene/Pooky IOMMU
1548 Kryptos/Cato/Garfield/Garfield+/Arlene/Pooky UMI PCIe Dummy Host Bridge
1549 Kryptos/Cato/Garfield/Garfield+ P2P Bridge for PCIe Port [3:0]
154a Kryptos/Cato/Garfield/Garfield+/Arlene/Pooky Audio Processor
154b Kryptos/Cato/Garfield/Garfield+/Arlene/Pooky Security Processor
154d Kryptos/Cato/Garfield/Garfield+/Arlene/Pooky/Anubis HDMI Controller
154f
Anubis Audio Processor
1550 Garfield+/Arlene/Pooky/Anubis SPLL Configuration
1553 Arlene/Pooky P2P Bridge for PCIE (3:0)
155b Anubis Root Complex
155c Anubis IOMMU
155d Anubis UMI PCIe Dummy Bridge
155e Anubis P2P Bridge for PCIe Ports [4:0]
1560 Anubis Security Processor
1566 Family 16h (Models 30h-3fh) Processor Root Complex

1567 Mullins IOMMU
156b Family 16h (Models 30h-3fh) Host Bridge
1570 Family 15h (Models 60h-6fh) Processor Function 0
1571 Family 15h (Models 60h-6fh) Processor Function 1
1572 Family 15h (Models 60h-6fh) Processor Function 2
1573 Family 15h (Models 60h-6fh) Processor Function 3
1574 Family 15h (Models 60h-6fh) Processor Function 4
1575 Family 15h (Models 60h-6fh) Processor Function 5
1576 Family 15h (Models 60h-6fh) Processor Root Complex
1577 Family 15h (Models 60h-6fh) I/O Memory Management Unit
1578 Carrizo Platform Security Processor
1579 Carrizo Audio Processor
157a Family 15h (Models 60h-6fh) Audio Controller
157b
Family 15h (Models 60h-6fh) Host Bridge
157c Family 15h (Models 60h-6fh) Processor Root Port
157d Carrizo Audio Dummy Host Bridge
157e Carrizo Audio Controller
1580 Family 16h (Models 30h-3fh) Processor Function 0
1581 Family 16h (Models 30h-3fh) Processor Function 1
1582 Family 16h (Models 30h-3fh) Processor Function 2
1583 Family 16h (Models 30h-3fh) Processor Function 3
1584 Family 16h (Models 30h-3fh) Processor Function 4
1585 Family 16h (Models 30h-3fh) Processor Function 5
1590 Amur/Nolan HT Configuration
1591 Amur/Nolan Address Maps
1592 Amur/Nolan DRAM Configuration
1593 Amur/Nolan Miscellaneous Configuration
1594 Amur/Nolan PM Configuration
1595 Amur/Nolan NB Performance Monitor
1596 Amur/Nolan Root Complex
1597 Amur/Nolan IOMMU
1598 Amur/Nolan Platform Security Processor
1599 Amur/Nolan PCIe Dummy Host Bridge
159d Amur Function 6: Gasket
15b0 Stoney HT Configuration
15b1 Stoney Address Maps
15b2 Stoney DRAM Configuration
15b3
Stoney Miscellaneous Configuration
15b4 Stoney PM Configuration
15b5 Stoney NB Performance Monitor
15bc Stoney PCIe [GFX,GPP] Bridge [4:0]
15be Stoney Audio Processor
15d0 Raven/Raven2 Root Complex
103c 8615 Pavilion Laptop 15-cw1xxx
15d1 Raven/Raven2 IOMMU
103c 8615 Pavilion Laptop 15-cw1xxx

15d2 Raven/Raven2 PCIe Dummy Host Bridge
15d3 Raven/Raven2 PCIe GPP Bridge [6:0]
15d4 FireFlight USB 3.1
15d5 FireFlight USB 3.1
15da Raven/Raven2 PCIe Dummy Host Bridge
15db Raven/Raven2 Internal PCIe GPP Bridge 0 to Bus A
15dc Raven/Raven2 Internal PCIe GPP Bridge 0 to Bus B
15de Raven/Raven2/FireFlight HD Audio Controller
15df Family 17h (Models 10h-1fh) Platform Security Processor
17aa 5124 ThinkPad E595
15e0 Raven USB 3.1
103c 8615 Pavilion Laptop 15-cw1xxx
17aa 5124 ThinkPad E595
15e1 Raven USB 3.1
103c 8615 Pavilion Laptop 15-cw1xxx
17aa 5124 ThinkPad E595
15e2 Raven/Raven2/FireFlight/Renoir Audio Processor
17aa 5124 ThinkPad E595
15e3
Family 17h (Models 10h-1fh) HD Audio Controller
103c 8615 Pavilion Laptop 15-cw1xxx
17aa 5124 ThinkPad E595
15e4 Raven/Raven2/Renoir Sensor Fusion Hub
15e5 Raven2 USB 3.1
15e6 Raven/Raven2/Renoir Non-Sensor Fusion Hub KMDF driver
1022 15e4 Raven/Raven2/Renoir Sensor Fusion Hub
15e8 Raven/Raven2 Device 24: Function 0
15e9 Raven/Raven2 Device 24: Function 1
15ea Raven/Raven2 Device 24: Function 2
15eb Raven/Raven2 Device 24: Function 3
15ec Raven/Raven2 Device 24: Function 4
15ed Raven/Raven2 Device 24: Function 5
15ee Raven/Raven2 Device 24: Function 6
15ef Raven/Raven2 Device 24: Function 7
15f0 FireFlight Device 24: Function 0
15f1 FireFlight Device 24: Function 1
15f2 FireFlight Device 24: Function 2
15f3 FireFlight Device 24: Function 3
15f4 FireFlight Device 24: Function 4
15f5 FireFlight Device 24: Function 5
15f6 FireFlight Device 24: Function 6
15f7 FireFlight Device 24: Function 7
15f8 FireFlight Root Complex
15f9 FireFlight
IOMMU
15fa FireFlight PCIe Dummy Host Bridge
15fb FireFlight PCIe GPP Bride 3:0
15fc FireFlight PCIe Dummy Host Bridge

15fd FireFlight Internal PCIe GPP Bridge 0 to Bus A
15fe FireFlight Internal PCIe GPP Bridge 0 to Bus B
15ff FireFlight Bus A; Device 0: Function 0: Internal GPU
1600 Family 15h Processor Function 0
1601 Family 15h Processor Function 1
1602 Family 15h Processor Function 2
1603 Family 15h Processor Function 3
1604 Family 15h Processor Function 4
1605 Family 15h Processor Function 5
1606 Arden Security Processor
1608 Arden Device 18h: Function 0
1609 Arden Device 18h: Function 1
160a Arden Device 18h: Function 2
160b Arden Device 18h: Function 3
160c Arden Device 18h: Function 4
160d Arden Device 18h: Function 5
160e Arden Device 18h: Function 6
160f Arden Device 18h: Function 7
1620 Anubis HT Configuration
1621 Anubis Address Maps
1622 Anubis DRAM Configuration
1623 Anubis Miscellaneous Configuration
1624 Anubis
PM Configuration
1625 Anubis NB Performance Monitor
1626 Arden Root Complex
1627 Arden IOMMU
1628 Arden PCIe Dummy Host Bridge
1629 Arden PCIe GPP Bridge
162a Arden Internal PCIe GPP Bridge 0 to bus X
162b Arden PCIe Non-Transparent Bridge
1630 Renoir Root Complex
1631 Renoir IOMMU
1632 Renoir PCIe Dummy Host Bridge
1633 Renoir PCIe GPP Bridge
1634 Renoir PCIe GPP Bridge
1635 Renoir Internal PCIe GPP Bridge to Bus
1637 Renoir HD Audio Controller
1639 Renoir USB 3.1
1641 Renoir 10GbE Controller Port 0 (XGBE0/1)
1642 Renoir WLAN
1643 Renoir BT
1644 Renoir I2S
1700 Family 12h/14h Processor Function 0
1701 Family 12h/14h Processor Function 1
1702 Family 12h/14h Processor Function 2
1703 Family 12h/14h Processor Function 3
1704 Family 12h/14h Processor Function 4

1705 Family 12h Processor Root Complex
1706 Llano P2P Bridge to external GPU
1707 Family 12h Processor Root Port
1708 Family 12h Processor Root Port
1709 Family 12h Processor
Root Port
170a Family 12h Processor Root Port
170b Family 12h Processor Root Port
170c Family 12h Processor Root Port
170d Family 12h Processor Root Port
1716 Family 12h/14h Processor Function 5
1718 Family 12h/14h Processor Function 6
1719 Family 12h/14h Processor Function 7
2000 79c970 [PCnet32 LANCE]
1014 2000 NetFinity 10/100 Fast Ethernet
1022 2000 PCnet - Fast 79C971
103c 104c Ethernet with LAN remote power Adapter
103c 1064 Ethernet with LAN remote power Adapter
103c 1065 Ethernet with LAN remote power Adapter
103c 106c Ethernet with LAN remote power Adapter
103c 106e Ethernet with LAN remote power Adapter
103c 10ea Ethernet with LAN remote power Adapter
1113 1220 EN1220 10/100 Fast Ethernet
1259 2450 AT-2450 10/100 Fast Ethernet
1259 2454 AT-2450v4 10Mb Ethernet Adapter
1259 2700 AT-2700TX 10/100 Fast Ethernet
1259 2701 AT-2700FX 100Mb Ethernet
1259 2702 AT-2700FTX 10/100 Mb Fiber/Copper Fast Ethernet
1259 2703 AT-2701FX
1259
2704 AT-2701FTX 10/100 Mb Fiber/Copper Fast Ethernet
4c53 1000 CC7/CR7/CP7/VC7/VP7/VR7 mainboard
4c53 1010 CP5/CR6 mainboard
4c53 1020 VR6 mainboard
4c53 1030 PC5 mainboard
4c53 1040 CL7 mainboard
4c53 1060 PC7 mainboard
2001 79c978 [HomePNA]
1092 0a78 Multimedia Home Network Adapter
1668 0299 ActionLink Home Network Adapter
2003 Am 1771 MBW [Alchemy]
2020 53c974 [PCscsi]
1af4 1100 QEMU Virtual Machine
2040 79c974
2080 CS5536 [Geode companion] Host Bridge
2081 Geode LX Video
2082 Geode LX AES Security Block
208f CS5536 GeodeLink PCI South Bridge

2090 CS5536 [Geode companion] ISA
2091 CS5536 [Geode companion] FLASH
2093 CS5536 [Geode companion] Audio
2094 CS5536 [Geode companion] OHC
2095 CS5536 [Geode companion] EHC
2096 CS5536 [Geode companion] UDC
2097 CS5536 [Geode companion] UOC
209a CS5536 [Geode companion] IDE
3000 ELanSC520 Microcontroller
43a0 Hudson PCI to PCI bridge (PCIE port 0)
43a1 Hudson PCI to
PCI bridge (PCIE port 1)
43a2 Hudson PCI to PCI bridge (PCIE port 2)
43a3 Hudson PCI to PCI bridge (PCIE port 3)
43b0 X370 Series Chipset PCIe Upstream Port
1849 43c6 Fatal1ty X370 Professional Gaming
43b1 X399 Series Chipset PCIe Bridge
43b4 300 Series Chipset PCIe Port
43b5 X370 Series Chipset SATA Controller
1849 43c8 Fatal1ty X370 Professional Gaming
43b6 X399 Series Chipset SATA Controller
43b7 300 Series Chipset SATA Controller
43b9 X370 Series Chipset USB 3.1 xHCI Controller
1849 43d0 Fatal1ty X370 Professional Gaming
43ba X399 Series Chipset USB 3.1 xHCI Controller
43bb 300 Series Chipset USB 3.1 xHCI Controller
43c6 400 Series Chipset PCIe Bridge
43c7 400 Series Chipset PCIe Port
43c8 400 Series Chipset SATA Controller
43d5 400 Series Chipset USB 3.1 XHCI Controller
57a3 Matisse PCIe GPP Bridge
57a4 Matisse PCIe GPP Bridge
57ad Matisse Switch Upstream
7006 AMD-751 [Irongate] System Controller
7007 AMD-751 [Irongate] AGP Bridge
700a
AMD-IGR4 AGP Host to PCI Bridge
700b AMD-IGR4 PCI to PCI Bridge
700c AMD-760 MP [IGD4-2P] System Controller
700d AMD-760 MP [IGD4-2P] AGP Bridge
700e AMD-760 [IGD4-1P] System Controller
700f AMD-760 [IGD4-1P] AGP Bridge
7400 AMD-755 [Cobra] ISA
7401 AMD-755 [Cobra] IDE
7403 AMD-755 [Cobra] ACPI
7404 AMD-755 [Cobra] USB
7408 AMD-756 [Viper] ISA
7409 AMD-756 [Viper] IDE

740b AMD-756 [Viper] ACPI
740c AMD-756 [Viper] USB
7410 AMD-766 [ViperPlus] ISA
7411 AMD-766 [ViperPlus] IDE
7413 AMD-766 [ViperPlus] ACPI
7414 AMD-766 [ViperPlus] USB
7440 AMD-768 [Opus] ISA
1043 8044 A7M-D Mainboard
7441 AMD-768 [Opus] IDE
7443 AMD-768 [Opus] ACPI
1043 8044 A7M-D Mainboard
7445 AMD-768 [Opus] Audio
7446 AMD-768 [Opus] MC97 Modem
7448 AMD-768 [Opus] PCI
7449 AMD-768 [Opus] USB
7450 AMD-8131 PCI-X Bridge
7451 AMD-8131 PCI-X IOAPIC
7454 AMD-8151 System Controller
7455 AMD-8151 AGP Bridge
7458 AMD-8132 PCI-X Bridge
7459 AMD-8132 PCI-X
IOAPIC
7460 AMD-8111 PCI
161f 3017 HDAMB
7461 AMD-8111 USB
7462 AMD-8111 Ethernet
7463 AMD-8111 USB EHCI
7464 AMD-8111 USB OHCI
161f 3017 HDAMB
7468 AMD-8111 LPC
161f 3017 HDAMB
7469 AMD-8111 IDE
1022 2b80 AMD-8111 IDE [Quartet]
161f 3017 HDAMB
746a AMD-8111 SMBus 2.0
746b AMD-8111 ACPI
161f 3017 HDAMB
746d AMD-8111 AC97 Audio
161f 3017 HDAMB
746e AMD-8111 MC97 Modem
756b AMD-8111 ACPI
7800 FCH SATA Controller [IDE mode]
7801 FCH SATA Controller [AHCI mode]
103c 168b ProBook 4535s Notebook
103c 194e ProBook 455 G1 Notebook
17aa 3988 Z50-75
1849 7801 QC5000-ITX/PH
7802 FCH SATA Controller [RAID mode]

7803 FCH SATA Controller [RAID mode]
7804 FCH SATA Controller [AHCI mode]
103c 1985 Pavilion 17-e163sg Notebook PC
7805 FCH SATA Controller [RAID mode]
7806 FCH SD Flash Controller
7807 FCH USB OHCI Controller
103c 194e ProBook 455 G1 Notebook
103c 1985 Pavilion 17-e163sg Notebook PC
17aa 3988 Z50-75
1849
7807 QC5000-ITX/PH
7808 FCH USB EHCI Controller
103c 194e ProBook 455 G1 Notebook
103c 1985 Pavilion 17-e163sg Notebook PC
17aa 3988 Z50-75
1849 7808 QC5000-ITX/PH
7809 FCH USB OHCI Controller
103c 194e ProBook 455 G1 Notebook
17aa 3988 Z50-75
780a Kabini/Mullins SATA Raid/AHCI Mode (DotHill driver)
780b FCH SMBus Controller
103c 194e ProBook 455 G1 Notebook
103c 1985 Pavilion 17-e163sg Notebook PC
17aa 3988 Z50-75
1849 780b QC5000-ITX/PH
780c FCH IDE Controller
780d FCH Azalia Controller
103c 194e ProBook 455 G1 Notebook
103c 1985 Pavilion 17-e163sg Notebook PC
1043 8444 F2A85-M Series
17aa 3988 Z50-75
1849 8892 QC5000-ITX/PH
780e FCH LPC Bridge
103c 194e ProBook 455 G1 Notebook
103c 1985 Pavilion 17-e163sg Notebook PC
17aa 3988 Z50-75
1849 780e QC5000-ITX/PH
780f FCH PCI Bridge
7812 FCH USB XHCI Controller
7813 FCH SD Flash Controller
7814 FCH USB XHCI Controller
103c 194e ProBook 455 G1 Notebook
103c
1985 Pavilion 17-e163sg Notebook PC
17aa 3988 Z50-75
1849 7814 QC5000-ITX/PH
7900 FCH SATA Controller [IDE mode]
7901 FCH SATA Controller [AHCI mode]

103c 8615 Pavilion Laptop 15-cw1xxx
1462 7c37 X570-A PRO motherboard
7902 FCH SATA Controller [RAID mode]
7903 FCH SATA Controller [RAID mode]
7904 FCH SATA Controller [AHCI mode]
7906 FCH SD Flash Controller
7908 FCH USB EHCI Controller
790b FCH SMBus Controller
103c 8615 Pavilion Laptop 15-cw1xxx
1462 7c37 X570-A PRO motherboard
17aa 5124 ThinkPad E595
790e FCH LPC Bridge
103c 8615 Pavilion Laptop 15-cw1xxx
1462 7c37 X570-A PRO motherboard
17aa 5124 ThinkPad E595
790f FCH PCI Bridge
7914 FCH USB XHCI Controller
9600 RS780 Host Bridge
1043 82ee M378A-CM Motherboard
1043 82f1 M3A78-EH Motherboard
9601 RS880 Host Bridge
1019 2120 A785GM-M
103c 1609 ProLiant MicroServer N36L
1043 83a2 M4A785-M Mainboard
1043 843e M5A88-V EVO
9602 RS780/RS880 PCI to PCI bridge (int
gfx)
9603 RS780 PCI to PCI bridge (ext gfx port 0)
103c 1609 ProLiant MicroServer N36L
9604 RS780/RS880 PCI to PCI bridge (PCIE port 0)
9605 RS780/RS880 PCI to PCI bridge (PCIE port 1)
9606 RS780 PCI to PCI bridge (PCIE port 2)
103c 1609 ProLiant MicroServer N36L
9607 RS780/RS880 PCI to PCI bridge (PCIE port 3)
9608 RS780/RS880 PCI to PCI bridge (PCIE port 4)
9609 RS780/RS880 PCI to PCI bridge (PCIE port 5)
960a RS780 PCI to PCI bridge (NB-SB link)
960b RS780 PCI to PCI bridge (ext gfx port 1)
1023 Trident Microsystems
0194 82C194
2000 4DWave DX
2001 4DWave NX
122d 1400 Trident PCI288-Q3DII (NX)
2100 CyberBlade XP4m32
2200 XGI Volari XP5
8400 CyberBlade/i7
1023 8400 CyberBlade i7 AGP
8420 CyberBlade/i7d

0e11 b15a CyberBlade i7 AGP
8500 CyberBlade/i1
8520 CyberBlade i1
0e11 b16e CyberBlade i1 AGP
1023 8520 CyberBlade i1 AGP
8620 CyberBlade/i1
1014 0502 ThinkPad R30/T30
1014 1025 Travelmate 352TE
8820 CyberBlade XPAi1
9320
TGUI 9320
9350 GUI Accelerator
9360 Flat panel GUI Accelerator
9382 Cyber 9382 [Reference design]
9383 Cyber 9383 [Reference design]
9385 Cyber 9385 [Reference design]
9386 Cyber 9386
9388 Cyber 9388
9397 Cyber 9397
939a Cyber 9397DVD
9420 TGUI 9420
9430 TGUI 9430
9440 TGUI 9440
9460 TGUI 9460
9470 TGUI 9470
9520 Cyber 9520
9525 Cyber 9525
9540 Cyber 9540
9660 TGUI 9660/938x/968x
9680 TGUI 9680
9682 TGUI 9682
9683 TGUI 9683
9685 ProVIDIA 9685
9750 3DImage 9750
1014 9750 3DImage 9750
1023 9750 3DImage 9750
9753 TGUI 9753
9754 TGUI 9754
9759 TGUI 975
9783 TGUI 9783
9785 TGUI 9785
9850 3DImage 9850
9880 Blade 3D PCI/AGP
1023 9880 Blade 3D
9910 CyberBlade/XP
9930 CyberBlade/XPm
9960 CyberBlade XP2
1024 Zenith Data Systems

1025 Acer Incorporated [ALI]
1435 M1435
1445 M1445
1449 M1449
1451 M1451
1461 M1461
1489 M1489
1511 M1511
1512 ALI M1512 Aladdin
1513 M1513
1521 ALI M1521 Aladdin III
CPU Bridge
10b9 1521 ALI M1521 Aladdin III CPU Bridge
1523 ALI M1523 ISA Bridge
10b9 1523 ALI M1523 ISA Bridge
1531 M1531 Northbridge [Aladdin IV/IV+]
1533 M1533 PCI-to-ISA Bridge
10b9 1533 ALI M1533 Aladdin IV/V ISA South Bridge
1535 M1535 PCI Bridge + Super I/O + FIR
1541 M1541 Northbridge [Aladdin V]
10b9 1541 ALI M1541 Aladdin V/V+ AGP+PCI North Bridge
1542 M1542 Northbridge [Aladdin V]
1543 M1543 PCI-to-ISA Bridge + Super I/O + FIR
1561 M1561 Northbridge [Aladdin 7]
1621 M1621 Northbridge [Aladdin-Pro II]
1631 M1631 Northbridge+3D Graphics [Aladdin TNT2]
1641 M1641 Northbridge [Aladdin-Pro IV]
1647 M1647 [MaGiK1] PCI North Bridge
1671 M1671 Northbridge [ALADDiN-P4]
1672 Northbridge [CyberALADDiN-P4]
3141 M3141
3143 M3143
3145 M3145
3147 M3147
3149 M3149
3151 M3151
3307 M3307 MPEG-I Video Controller
3309 M3309 MPEG-II Video w/ Software Audio Decoder
3321 M3321 MPEG-II Audio/Video Decoder
5212 M4803
5215 ALI PCI EIDE Controller
5217
M5217H
5219 M5219
5225 M5225
5229 M5229
5235 M5235
5237 M5237 PCI USB Host Controller

5240 EIDE Controller
5241 PCMCIA Bridge
5242 General Purpose Controller
5243 PCI to PCI Bridge Controller
5244 Floppy Disk Controller
5247 M1541 PCI to PCI Bridge
5251 M5251 P1394 Controller
5427 PCI to AGP Bridge
5451 M5451 PCI AC-Link Controller Audio Device
5453 M5453 PCI AC-Link Controller Modem Device
7101 M7101 PCI PMU Power Management Controller
10b9 7101 M7101 PCI PMU Power Management Controller
should be 1022:9602
9602 AMD RS780/RS880 PCI to PCI bridge (int gfx)
1028 Dell
0001 PowerEdge Expandable RAID Controller 2/Si
1028 0001 PowerEdge 2400
0002 PowerEdge Expandable RAID Controller 3/Di
1028 0002 PowerEdge 4400
1028 00d1 PERC 3/DiV [Viper]
1028 00d9 PERC 3/DiL [Lexus]
0003 PowerEdge Expandable RAID Controller 3/Si
1028 0003 PowerEdge 2450
PowerEdge Codename Iguana
0004 PowerEdge Expandable RAID Controller 3/Di [Iguana]
1028
0004 PERC 3/DiF [Iguana]
0006 PowerEdge Expandable RAID Controller 3/Di
0007 Remote Access Card III
0008 Remote Access Card III
0009 Remote Access Card III: BMC/SMIC device not present
000a PowerEdge Expandable RAID Controller 3/Di
1028 0106 PERC 3/DiJ [Jaguar]
1028 011b PERC 3/DiD [Dagger]
1028 0121 PERC 3/DiB [Boxster]
000c Embedded Remote Access or ERA/O
000d Embedded Remote Access: BMC/SMIC device
000e PowerEdge Expandable RAID controller 4/Di
000f PowerEdge Expandable RAID controller 4/Di
1028 014a PowerEdge 1750
0010 Remote Access Card 4
0011 Remote Access Card 4 Daughter Card
0012 Remote Access Card 4 Daughter Card Virtual UART
0013 PowerEdge Expandable RAID controller 4
1028 016c PowerEdge Expandable RAID Controller 4e/Si
1028 016d PowerEdge Expandable RAID Controller 4e/Di
1028 016e PowerEdge Expandable RAID Controller 4e/Di
1028 016f PowerEdge Expandable RAID Controller 4e/Di

1028 0170 PowerEdge Expandable RAID
Controller 4e/Di
0014 Remote Access Card 4 Daughter Card SMIC interface
0015 PowerEdge Expandable RAID controller 5
1028 1f01 PERC 5/E Adapter RAID Controller
1028 1f02 PERC 5/i Adapter RAID Controller
1028 1f03 PERC 5/i Integrated RAID Controller
0016 PowerEdge Expandable RAID controller S300
1028 1f24 PERC S300 Controller
NV-RAM Adapter used in Dell DR appliances
0073 NV-RAM Adapter
1029 Siemens Nixdorf IS
102a LSI Logic
0000 HYDRA
0010 ASPEN
001f AHA-2940U2/U2W /7890/7891 SCSI Controllers
9005 00f 2940U2W SCSI Controller
9005 0106 2940U2W SCSI Controller
9005 a180 2940U2W SCSI Controller
00c5 AIC-7899 U160/m SCSI Controller
1028 00c5 PowerEdge 2550/2650/4600
00cf AIC-7899P U160/m
1028 0106 PowerEdge 4600
1028 0121 PowerEdge 2650
102b Matrox Electronics Systems Ltd.
DJ: I've a suspicion that 0010 is a duplicate of 0d10.
0010 MGA-I [Impression?]
0100 MGA 1064SG [Mystique]
0518 MGA-II [Athena]
0519 MGA 2064W [Millennium]
051a
MGA 1064SG [Mystique]
102b 0100 MGA-1064SG Mystique
102b 1100 MGA-1084SG Mystique
102b 1200 MGA-1084SG Mystique
1100 102b MGA-1084SG Mystique
110a 0018 Scenic Pro C5 (D1025)
051b MGA 2164W [Millennium II]
102b 051b MGA-2164W Millennium II
102b 1100 MGA-2164W Millennium II
102b 1200 MGA-2164W Millennium II
102b 2100 MGA-2164W Millennium II
051e MGA 1064SG [Mystique] AGP
051f MGA 2164W [Millennium II] AGP
102b 2100 MGA-2164WA [Millennium II A]
0520 MGA G200
102b dbc2 G200 Multi-Monitor
102b dbc8 G200 Multi-Monitor

102b dbe2 G200 Multi-Monitor
102b dbe8 G200 Multi-Monitor
102b ff03 Millennium G200 SD
102b ff04 Marvel G200
0521 MGA G200 AGP
1014 ff03 Millennium G200 AGP
102b 48e9 Mystique G200 AGP
102b 48f8 Millennium G200 SD AGP
102b 4a60 Millennium G200 LE AGP
102b 4a64 Millennium G200 AGP
102b c93c Millennium G200 AGP
102b c9b0 Millennium G200 AGP
102b c9bc Millennium G200 AGP
102b ca60 Millennium
G250 LE AGP
102b ca6c Millennium G250 AGP
102b dbbc Millennium G200 AGP
102b dbc2 Millennium G200 MMS (Dual G200)
102b dbc3 G200 Multi-Monitor
102b dbc8 Millennium G200 MMS (Dual G200)
102b dbd2 G200 Multi-Monitor
102b dbd3 G200 Multi-Monitor
102b dbd4 G200 Multi-Monitor
102b dbd5 G200 Multi-Monitor
102b dbd8 G200 Multi-Monitor
102b dbd9 G200 Multi-Monitor
102b dbe2 Millennium G200 MMS (Quad G200)
102b dbe3 G200 Multi-Monitor
102b dbe8 Millennium G200 MMS (Quad G200)
102b dbf2 G200 Multi-Monitor
102b dbf3 G200 Multi-Monitor
102b dbf4 G200 Multi-Monitor
102b dbf5 G200 Multi-Monitor
102b dbf8 G200 Multi-Monitor
102b dbf9 G200 Multi-Monitor
102b f806 Mystique G200 Video AGP
102b ff00 MGA-G200 AGP
102b ff02 Mystique G200 AGP
102b ff03 Millennium G200A AGP
102b ff04 Marvel G200 AGP
110a 0032 MGA-G200 AGP
0522 MGA G200e [Pilot] ServerEngines (SEP1)
103c 31fa ProLiant DL140 G3
0525 MGA G400/G450
0e11 b16f
MGA-G400 AGP
102b 0328 Millennium G400 16Mb SDRAM
102b 0338 Millennium G400 16Mb SDRAM

102b 0378 Millennium G400 32Mb SDRAM
102b 0541 Millennium G450 Dual Head
102b 0542 Millennium G450 Dual Head LX
102b 0543 Millennium G450 Single Head LX
102b 0641 Millennium G450 32Mb SDRAM Dual Head
102b 0642 Millennium G450 32Mb SDRAM Dual Head LX
102b 0643 Millennium G450 32Mb SDRAM Single Head LX
102b 07c0 Millennium G450 Dual Head LE
102b 07c1 Millennium G450 SDR Dual Head LE
102b 0d41 Millennium G450 Dual Head PCI
102b 0d42 Millennium G450 Dual Head LX PCI
102b 0d43 Millennium G450 32Mb Dual Head PCI
102b 0e00 Marvel G450 eTV
102b 0e01 Marvel G450 eTV
102b 0e02 Marvel G450 eTV
102b 0e03 Marvel G450 eTV
102b 0f80 Millennium G450 Low Profile
102b 0f81 Millennium G450 Low Profile
102b 0f82 Millennium G450 Low Profile DVI
102b 0f83 Millennium G450 Low Profile DVI
102b 19d8 Millennium G400 16Mb SGRAM
102b 19f8 Millennium G400
32Mb SGRAM
102b 2159 Millennium G400 Dual Head 16Mb
102b 2179 Millennium G400 MAX/Dual Head 32Mb
102b 217d Millennium G400 Dual Head Max
102b 23c0 Millennium G450
102b 23c1 Millennium G450
102b 23c2 Millennium G450 DVI
102b 23c3 Millennium G450 DVI
102b 2f58 Millennium G400
102b 2f78 Millennium G400
102b 3693 Marvel G400 AGP
102b 5dd0 4Sight II
102b 5f50 4Sight II
102b 5f51 4Sight II
102b 5f52 4Sight II
102b 9010 Millennium G400 Dual Head
1458 0400 GA-G400
1705 0001 Millennium G450 32MB SGRAM
1705 0002 Millennium G450 16MB SGRAM
1705 0003 Millennium G450 32MB
1705 0004 Millennium G450 16MB
0527 Parhelia
102b 0840 Parhelia 128Mb
102b 0850 Parhelia 256MB
102b 0870 MED2mp-DVI
102b 0880 P-256 Edge Overlap Controller

0528 Parhelia
102b 1020 Parhelia 128MB
102b 1030 Parhelia 256 MB Dual DVI
102b 1040 MED2mp-DVI
102b 1050 Sono S20
102b 1060 PJ-30L
102b 1070 PJ-40L
102b 1421 MED5mp
102b 1431 MED3mp-DVI
102b
1451 MED5mp-DVI
102b 1491 MED2mp-DVI
102b 14b1 MED3mp-DVI
102b 14c1 MED5mp-DVI
102b 14e1 Parhelia PCI 256MB
102b 14f1 Parhelia Precision SGT
102b 1501 ATC-4MP
102b 1511 ATC-4MP
102b 1521 TheatreVUE T30
102b 1531 TheatreVUE T20
102b 1541 MED2mp-DVI
102b 1551 MED3mp-DVI
102b 1561 MED5mp-DVI
102b 1571 Parhelia DL256 PCI
102b 1591 Parhelia Precision SDT
102b 15a1 MED4mp-DVI
102b 2011 Parhelia HR256
102b 2021 QID Pro
102b 2061 PJ-40LP
102b 2081 EWS Quad
102b 2411 PPX-OUT8
102b 2421 VPX-OUT8
102b 2441 PPX-OUT4
102b 2451 VPX-OUT4
102b 2491 LPX-OUT4
0530 MGA G200EV
0532 MGA G200eW WPCM450
1028 0235 PowerEdge R710 MGA G200eW WPCM450
1028 0236 PowerEdge R610 MGA G200eW WPCM450
1028 0237 PowerEdge T610 MGA G200eW WPCM450
1028 0287 PowerEdge M610 MGA G200eW WPCM450
1028 028c PowerEdge R410 MGA G200eW WPCM450
1028 028d PowerEdge T410 MGA G200eW WPCM450
1028 029c PowerEdge M710 MGA G200eW
WPCM450
1028 02a4 PowerEdge T310 MGA G200eW WPCM450
15d9 0605 X8SIL
15d9 0624 X9SCM-F Motherboard

15d9 066b X9SRL-F
15d9 a811 H8DGU
0533 MGA G200EH
103c 3381 iLO4
0534 G200eR2
1028 04f7 PowerEdge R320 server
0536 Integrated Matrox G200eW3 Graphics Controller
0538 MGA G200eH3
1590 00e4 iLO5 VGA
0540 M91XX
102b 2080 M9140 LP PCIe x16
102b 20c0 Xenia
102b 20c1 Xenia Pro
102b 2100 M9120 PCIe x16
102b 2140 M9125 PCIe x16
102b 2180 M9120 Plus LP PCIe x16
102b 21c0 M9120 Plus LP PCIe x1
102b 2200 VDA1164 Output Board
102b 2240 M9148 LP PCIe x16
102b 2241 M9138 LP PCIe x16
102b 2280 M9188 ATX PCIe x16
102b 22c0 M9128 LP PCIe x16
0550 SV2
102b 00c0 MURA-IPX-I4EF
102b 00c1 MURA-IPX-I4DF
102b 00c3 MURA-IPX-I4DHF
102b 00c5 MURA-IPX-I4EHF
0d10 MGA Ultima/Impression
1000 MGA G100 [Productiva]
102b ff01 Productiva G100
102b ff05 Productiva G100 Multi-Monitor
1001 MGA G100 [Productiva] AGP
102b 1001 MGA-G100
AGP
102b ff00 MGA-G100 AGP
102b ff01 MGA-G100 Productiva AGP
102b ff03 Millennium G100 AGP
102b ff04 MGA-G100 AGP
102b ff05 MGA-G100 Productiva AGP Multi-Monitor
110a 001e MGA-G100 AGP
2007 MGA Mistral
2527 Millennium G550
PCI\VEN_102B&DEV_2527&SUBSYS_0F42102B&REV_01
102b 0f42 Matrox G550 Low Profile PCI
102b 0f83 Millennium G550
102b 0f84 Millennium G550 Dual Head DDR 32Mb
102b 1e41 Millennium G550
102b 22c0 G550 PCIe

102b 2300 Millennium G550 LP PCIE
2537 Millennium P650/P750
102b 1820 Millennium P750 64MB
102b 1830 Millennium P650 64MB
102b 1850 RAD2mp
102b 1860 RAD3mp
102b 1880 Sono S10
102b 1c10 QID 128MB
102b 2811 Millennium P650 Low-profile PCI 64MB
102b 2821 Millennium P650 Low-profile PCI
102b 2841 RAD PCI
102b 2851 Spectrum PCI
102b 2871 EpicA TC2
102b 2c11 QID Low-profile PCI
102b 2c21 QID LP PCI LW
102b 2c31 QID LP PCI
102b 2c41 EpicA TC4
102b 3001 Extio F1400
102b 3011 Extio
F1220
102b 3041 RG-200DL
102b 3051 RG-400SL
102b 3061 Extio F1420
102b 3081 Extio F1240
2538 Millennium P650 PCIE
102b 0847 RAD PCIE
102b 08c7 Millennium P650 PCIE 128MB
102b 0907 Millennium P650 PCIE 64MB
102b 0947 Parhelia APVe
102b 0987 ATC PCIE 4MP
102b 1047 Millennium P650 LP PCIE 128MB
102b 1087 Millennium P650 LP PCIE 64MB
102b 1801 Millennium P650 PCIE x1
102b 2538 Parhelia APVe
102b 3007 QID Low-profile PCIE
102b 3087 Aurora VX3mp
102b 30c7 QID LP PCIE
2539 Millennium P690
102b 0040 Millennium P690 PCIE x16
102b 0042 ONYX
102b 0043 SPECTRA
102b 0080 Millennium P690 Plus LP PCIE x16
102b 0081 Millennium P690 LP PCIE x16
102b 0082 RAD LPX PCIE x16
102b 00c0 Millennium P690 Plus LP PCI
102b 00c2 Millennium P690 LP PCI
102b 00c3 RAD LPX PCI
102b 0101 Millennium P690 PCI

102b 0140 Millennium P690 LP PCIe x1
102b 0180 Display Wall IP Decode 128 MB
4164 Morphis QxT frame grabber
43b4 Morphis
Qxt encoding engine
4510 Morphis COM port
4536 VIA Framegrabber
4686 Concord GX (customized Intel 82541)
475b Solios eCL/XCL-B frame grabber
475d Vio frame grabber family
102b 4b90 Vio Duo frame grabber (single channel)
102b 4b91 Vio Duo frame grabber
102b 4b92 Vio Analog frame grabber
102b 4b93 Vio SDI Frame Grabber
102b 4b94 Vio DVI-A frame grabber
475f Solios (single-Full) CL frame grabber
102b 475f Solios eCL/XCL-F frame grabber
102b 4d5f Solios eV-CL (single-Full) frame grabber
102b 4e5f Solios eM-CL (single-Full) frame grabber
47a1 Solios eA/XA frame grabber
102b 4be0 Solios eA/XA (single) frame grabber
102b 4be1 Solios eA/XA (dual) frame grabber
102b 4be2 Solios eA/XA (quad) frame grabber
47a2 Solios COM port
47c1 Solios (dual-Base/single-Medium) CL frame grabber
102b 0000 Solios frame grabber
102b 4b80 Solios eCL/XCL (single-Medium) frame grabber
102b 4b81 Solios eCL/XCL (dual-Base) frame grabber
102b 4d80 Solios
eV-CL (single-Medium) frame grabber
102b 4d81 Solios eV-CL (dual-Base) frame grabber
102b 4e80 Solios eM-CL (single-Medium) frame grabber
102b 4e81 Solios eM-CL (dual-Base) frame grabber
47c2 Solios COM port
4949 Radient frame grabber family
102b 0010 Radient eCL (Single-full) frame grabber
102b 0011 Radient eCLV (Single-full) frame grabber
102b 0020 Radient eCL (Dual-base) frame grabber
102b 0030 Radient eCL (Dual-full) frame grabber
102b 0040 Radient eCL (Quad-base) frame grabber
102b 0050 Radient eCL (Golden) frame grabber
102b 1010 Radient eV-CXP (quad CXP-6) frame grabber
102b 1015 Radient eV-CXP (dual CXP-6) frame grabber
102b 1020 Radient eV-CXP (quad CXP-3) frame grabber
102b 1050 Radient eV-CXP (Golden) frame grabber
4cdc Morphis JPEG2000 accelerator
4f54 Morphis (e)Quad frame grabber
4fc5 Morphis (e)Dual frame grabber

5e10 Morphis aux I/O
6573 Shark 10/100 Multiport SwitchNIC
102c Chips and Technologies
00b8 F64310
00c0
F69000 HiQVideo
102c 00c0 F69000 HiQVideo
4c53 1000 CC7/CR7/CP7/VC7/VP7/VR7 mainboard
4c53 1010 CP5/CR6 mainboard
4c53 1020 VR6 mainboard
4c53 1030 PC5 mainboard
4c53 1050 CT7 mainboard
4c53 1051 CE7 mainboard
00d0 F65545
00d8 F65545
00dc F65548
00e0 F65550
00e4 F65554
00e5 F65555 HiQVPro
0e11 b049 Armada 1700 Laptop Display Controller
1179 0001 Satellite Pro/Satellite
00f0 F68554
00f4 F68554 HiQVision
00f5 F68555
0c30 F69030
4c53 1000 CC7/CR7/CP7/VC7/VP7/VR7 mainboard
4c53 1050 CT7 mainboard
4c53 1051 CE7 mainboard
4c53 1080 CT8 mainboard
102d Wyse Technology Inc.
50dc 3328 Audio
102e Olivetti Advanced Technology
102f Toshiba America
0009 r4x00
000a TX3927 MIPS RISC PCI Controller
0020 ATM Meteor 155
102f 00f8 ATM Meteor 155
0030 TC35815CF PCI 10/100 Mbit Ethernet Controller
0031 TC35815CF PCI 10/100 Mbit Ethernet Controller with WOL
0032 TC35815CF PCI 10/100 Mbit Ethernet Controller on TX4939
0105 TC86C001
[goku-s] IDE
0106 TC86C001 [goku-s] USB 1.1 Host
0107 TC86C001 [goku-s] USB Device Controller
0108 TC86C001 [goku-s] I2C/SIO/GPIO Controller
0180 TX4927/38 MIPS RISC PCI Controller
0181 TX4925 MIPS RISC PCI Controller
0182 TX4937 MIPS RISC PCI Controller

01b4 Celleb platform IDE interface
01b5 SCC USB 2.0 EHCI controller
01b6 SCC USB 1.1 OHCI controller
1030 TMC Research
1031 Miro Computer Products AG
5601 DC20 ASIC
5607 Video I/O & motion JPEG compressor
5631 Media 3D
6057 MiroVideo DC10/DC30+
1032 Compaq
1033 NEC Corporation
0000 Vr4181A USB Host or Function Control Unit
0001 PCI to 486-like bus Bridge
0002 PCI to VL98 Bridge
0003 ATM Controller
0004 R4000 PCI Bridge
0005 PCI to 486-like bus Bridge
0006 PC-9800 Graphic Accelerator
0007 PCI to UX-Bus Bridge
0008 PC-9800 Graphic Accelerator
0009 PCI to PC9800 Core-Graph Bridge
0016 PCI to VL Bridge
001a [Nile II]
0021 Vrc4373 [Nile I]
0029 PowerVR PCX1
002a PowerVR 3D
002c
Star Alpha 2
002d PCI to C-bus Bridge
0035 OHCI USB Controller
1033 0035 USB Controller
103c 1293 USB add-in card
103c 1294 USB 2.0 add-in card
1179 0001 USB
1186 0035 DUB-C2 USB 2.0 2-port 32-bit cardbus controller
12ee 7000 Root Hub
14c2 0105 PTI-205N USB 2.0 Host Controller
1799 0001 Root Hub
1931 000a GlobeTrotter Fusion Quad Lite (PPP data)
1931 000b GlobeTrotter Fusion Quad Lite (GSM data)
807d 0035 PCI-USB2 (OHCI subsystem)
003b PCI to C-bus Bridge
003e NAPCCARD Cardbus Controller
0046 PowerVR PCX2 [midas]
005a Vrc5074 [Nile 4]
0063 uPD72862 [Firewarden] IEEE1394 OHCI 1.0 Link Controller
0067 PowerVR Neon 250 Chipset
1010 0020 PowerVR Neon 250 AGP 32Mb

1010 0080 PowerVR Neon 250 AGP 16Mb
1010 0088 PowerVR Neon 250 16Mb
1010 0090 PowerVR Neon 250 AGP 16Mb
1010 0098 PowerVR Neon 250 16Mb
1010 00a0 PowerVR Neon 250 AGP 32Mb
1010 00a8 PowerVR Neon 250 32Mb
1010 0120 PowerVR Neon 250 AGP 32Mb
0072 uPD72874
IEEE1394 OHCI 1.1 3-port PHY-Link Ctrlr
0074 56k Voice Modem
1033 8014 RCV56ACF 56k Voice Modem
009b Vrc5476
00a5 VRC4173
00a6 VRC5477 AC97
00cd uPD72870 [Firewarden] IEEE1394a OHCI 1.0 Link/3-port PHY Controller
12ee 8011 Root hub
00ce uPD72871 [Firewarden] IEEE1394a OHCI 1.0 Link/1-port PHY Controller
00df Vr4131
00e0 uPD72010x USB 2.0 Controller
1186 f100 DUB-C2 USB 2.0 2-port 32-bit cardbus controller
12ee 7001 Root hub
14c2 0205 PTI-205N USB 2.0 Host Controller
1799 0002 Root Hub
807d 1043 PCI-USB2 (EHCI subsystem)
00e7 uPD72873 [Firewarden] IEEE1394a OHCI 1.1 Link/2-port PHY Controller
00f2 uPD72874 [Firewarden] IEEE1394a OHCI 1.1 Link/3-port PHY Controller
00f3 uPD6113x Multimedia Decoder/Processor [EMMA2]
010c VR7701
0125 uPD720400 PCI Express - PCI/PCI-X Bridge
013a Dual Tuner/MPEG Encoder
0194 uPD720200 USB 3.0 Host Controller
1028 04a3 Precision M4600
1028 04b2 Vostro 3350
1028 04da Vostro 3750
1043 8413 P8P67
Deluxe Motherboard
104d 907a Vaio VPCF1
1af4 1100 QEMU Virtual Machine
1b96 0001 USB 3.0 PCIe Card
01e7 uPD72873 [Firewarden] IEEE1394a OHCI 1.1 Link/2-port PHY Controller
01f2 uPD72874 [Firewarden] IEEE1394a OHCI 1.1 Link/3-port PHY Controller
1034 Framatome Connectors USA Inc.
1035 Comp. & Comm. Research Lab
1036 Future Domain Corp.
0000 TMC-18C30 [36C70]
1037 Hitachi Micro Systems
1038 AMP, Inc
1039 Silicon Integrated Systems [SiS]

0001 AGP Port (virtual PCI-to-PCI bridge)
0002 AGP Port (virtual PCI-to-PCI bridge)
0003 AGP Port (virtual PCI-to-PCI bridge)
0004 PCI-to-PCI bridge
1039 0000 PCIe x16 port
0006 85C501/2/3
0008 SiS85C503/5513 (LPC Bridge)
0009 5595 Power Management Controller
000a PCI-to-PCI bridge
1039 0000 PCIe x1 port
0016 SiS961/2/3 SMBus controller
0018 SiS85C503/5513 (LPC Bridge)
0163 163 802.11b/g Wireless LAN Adapter
0180 RAID bus controller 180 SATA/PATA [SiS]
0181 SATA
0182 182 SATA/RAID Controller
1734 1095
D2030-A1
0186 AHCI Controller (0106)
0190 190 Ethernet Adapter
0191 191 Gigabit Ethernet Adapter
1043 8139 P5SD2-FM/S mainboard
0200 5597/5598/6326 VGA
1039 0000 SiS5597 SVGA (Shared RAM)
0204 82C204
0205 SG86C205
0300 300/305 PCI/AGP VGA Display Adapter
107d 2720 Leadtek WinFast VR300
0310 315H PCI/AGP VGA Display Adapter
0315 315 PCI/AGP VGA Display Adapter
0325 315PRO PCI/AGP VGA Display Adapter
0330 330 [Xabre] PCI/AGP VGA Display Adapter
0406 85C501/2
0496 85C496
0530 530 Host
0540 540 Host
0550 550 Host
0597 5513C
0601 85C601
0620 620 Host
0630 630 Host
0633 633 Host
0635 635 Host
0645 SiS645 Host & Memory & AGP Controller
0646 SiS645DX Host & Memory & AGP Controller
0648 645xx
0649 SiS649 Host
0650 650/M650 Host

0651 651 Host
0655 655 Host
0660 660 Host
0661 661FX/M661FX/M661MX Host
0662 662 Host
0671 671MX
0730 730 Host
0733 733 Host
0735 735 Host
0740 740 Host
0741 741/741GX/M741 Host
1849
0741 K7S41/K7S41GX motherboard
0745 745 Host
0746 746 Host
0755 755 Host
0760 760/M760 Host
0761 761/M761 Host
1734 1099 D2030-A1 Motherboard
0900 SiS900 PCI Fast Ethernet
1019 0a14 K7S5A motherboard
1039 0900 SiS900 10/100 Ethernet Adapter onboard
1043 8035 CUSI-FX motherboard
1043 80a7 Motherboard P4S800D-X
1462 0900 MS-6701 motherboard
0961 SiS961 [MuTIOL Media IO]
0962 SiS962 [MuTIOL Media IO] LPC Controller
0963 SiS963 [MuTIOL Media IO] LPC Controller
0964 SiS964 [MuTIOL Media IO] LPC Controller
0965 SiS965 [MuTIOL Media IO]
0966 SiS966 [MuTIOL Media IO]
0968 SiS968 [MuTIOL Media IO]
1180 SATA Controller / IDE mode
1182 SATA Controller / RAID mode
1039 0180 SiS 966 4-port SATA controller
1183 SATA Controller / IDE mode
1039 0180 SiS 966 4-port SATA controller
1184 AHCI Controller / RAID mode
1185 AHCI IDE Controller (0106)
3602 83C602
5107 5107
5300 SiS540 PCI Display Adapter
5315 550 PCI/AGP VGA Display Adapter
5401
486 PCI Chipset
5511 5511/5512
5513 5513 IDE Controller
1019 0970 P6STP-FL motherboard

1039 5513 SiS5513 EIDE Controller (A,B step)
1043 8035 CUSI-FX motherboard
1462 7010 MS-6701 motherboard
1631 5513 GA-8SIML Rev1.0 Motherboard
1734 1095 D2030-A1 Motherboard
5517 5517
5571 5571
5581 5581 Pentium Chipset
5582 5582
5591 5591/5592 Host
5596 5596 Pentium Chipset
5597 5597 [SiS5582]
5600 5600 Host
6204 Video decoder & MPEG interface
6205 VGA Controller
6236 6236 3D-AGP
6300 630/730 PCI/AGP VGA Display Adapter
1019 0970 P6STP-FL motherboard
1043 8035 CUSI-FX motherboard
104d 80e2 VAIO PCV-J200
6306 530/620 PCI/AGP VGA Display Adapter
6325 65x/M650/740 PCI/AGP VGA Display Adapter
1039 6325 SiS 651 onboard [Asus P4SC-EA]
1631 1004 SiS 651C onboard [Gigabyte GA-8SIML Rev1.0]
6326 86C326 5598/6326
1039 6326 SiS6326 GUI Accelerator
1092 0a50 SpeedStar A50
1092 0a70 SpeedStar A70
1092 4910 SpeedStar A70
1092
4920 SpeedStar A70
10b0 6326 S6110-B (AGP)
1569 6326 SiS6326 GUI Accelerator
6330 661/741/760 PCI/AGP or 662/761Gx PCIE VGA Display Adapter
1039 6330 [M]661xX/[M]741[GX]/[M]760 PCI/AGP VGA Adapter
1043 8113 SiS Real 256E (ASUS P5S800-VM motherboard)
1458 d000 SiS661FX GUI 2D/3D Accelerator
1734 1099 D2030-A1
6350 770/670 PCIE VGA Display Adapter
6351 771/671 PCIE VGA Display Adapter
7001 USB 1.1 Controller
1019 0a14 K7S5A motherboard
1039 7000 Onboard USB Controller
1462 5470 ECS K7SOM+ motherboard
1462 7010 MS-6701 motherboard
1734 1095 D2030-A1 Motherboard
7002 USB 2.0 Controller
1462 5470 K7SOM+ 5.2C Motherboard

1462 7010 MS-6701 motherboard
1509 7002 Onboard USB Controller
1734 1095 D2030-A1
7007 FireWire Controller
1462 701d MS-6701
7012 SiS7012 AC'97 Sound Controller
1019 0f05 A928 (i-Buddie)
1039 7012 SiS 7012 onboard [Asus P4SC-EA] AC'97 Sound Controller
1043 818f A8S-X Motherboard
13f6 0300 CMI9739(A)
on ECS K7S series motherboard
1462 5850 MSI 648 Max (MS-6585)
1462 7010 MS-6701 motherboard
15bd 1001 DFI 661FX motherboard
1734 109f D2030-A1 Motherboard
1849 7012 K7S41GX motherboard
There are may be different modem codecs here (Intel537 compatible and incompatible)
7013 AC'97 Modem Controller
7016 SiS7016 PCI Fast Ethernet Adapter
1039 7016 SiS7016 10/100 Ethernet Adapter
7018 SiS PCI Audio Accelerator
1014 01b6 SiS PCI Audio Accelerator
1014 01b7 SiS PCI Audio Accelerator
1019 7018 SiS PCI Audio Accelerator
1025 000e SiS PCI Audio Accelerator
1025 0018 SiS PCI Audio Accelerator
1039 7018 SiS PCI Audio Accelerator
1043 1453 SiS PCI Audio Accelerator
1043 800b SiS PCI Audio Accelerator
104d 80e2 VAIO PCV-J200
1054 7018 SiS PCI Audio Accelerator
107d 5330 SiS PCI Audio Accelerator
107d 5350 SiS PCI Audio Accelerator
1170 3209 SiS PCI Audio Accelerator
1462 400a SiS PCI Audio Accelerator
14a4 2089 SiS PCI Audio Accelerator
14cd
2194 SiS PCI Audio Accelerator
14ff 1100 SiS PCI Audio Accelerator
152d 8808 SiS PCI Audio Accelerator
1558 1103 SiS PCI Audio Accelerator
1558 2200 SiS PCI Audio Accelerator
1563 7018 SiS PCI Audio Accelerator
15c5 0111 SiS PCI Audio Accelerator
270f a171 SiS PCI Audio Accelerator
a0a0 0022 SiS PCI Audio Accelerator
7019 SiS7019 Audio Accelerator
7502 Azalia Audio Controller

1043 81a1 P5SD2-FM/S mainboard
103a Seiko Epson Corporation
103b Tatung Corp. Of America
103c Hewlett-Packard Company
1005 A4977A Visualize EG
1008 Visualize FX
1028 Tach TL Fibre Channel Host Adapter
1029 Tach XL2 Fibre Channel Host Adapter
107e 000f Interphase 5560 Fibre Channel Adapter
9004 9210 1Gb/2Gb Family Fibre Channel Controller
9004 9211 1Gb/2Gb Family Fibre Channel Controller
102a Tach TS Fibre Channel Host Adapter
107e 000e Interphase 5540/5541 Fibre Channel Adapter
9004 9110 1Gb/2Gb Family Fibre Channel Controller
9004 9111
1Gb/2Gb Family Fibre Channel Controller
1030 J2585A DeskDirect 10/100VG NIC
1031 J2585B HP 10/100VG PCI LAN Adapter
103c 1040 J2973A DeskDirect 10BaseT NIC
103c 1041 J2585B DeskDirect 10/100VG NIC
103c 1042 J2970A DeskDirect 10BaseT/2 NIC
1040 J2973A DeskDirect 10BaseT NIC
1041 J2585B DeskDirect 10/100 NIC
1042 J2970A DeskDirect 10BaseT/2 NIC
1048 Diva Serial [GSP] Multiport UART
103c 1049 Tosca Console
103c 104a Tosca Secondary
103c 104b Maestro SP2
103c 1223 Superdome Console
103c 1226 Keystone SP2
103c 1227 Powerbar SP2
103c 1282 Everest SP2
103c 1301 Diva RMP3
1054 PCI Local Bus Adapter
1064 79C970 PCnet Ethernet Controller
108b Visualize FXe
10c1 NetServer Smart IRQ Router
10ed TopTools Remote Control
10f0 rio System Bus Adapter
10f1 rio I/O Controller
1219 NetServer PCI Hot-Plug Controller
121a NetServer SMIC Controller
121b NetServer Legacy COM Port Decoder
121c NetServer PCI COM Port Decoder
1229 zx1 System
Bus Adapter
122a zx1 I/O Controller
122e PCI-X Local Bus Adapter

127b sx1000 System Bus Adapter
127c sx1000 I/O Controller
128d Diva [GSP] Management Board
1290 Auxiliary Diva Serial Port
103c 1291 Diva SP2
1291 Auxiliary Diva Serial Port
12b4 zx1 QuickSilver AGP8x Local Bus Adapter
12eb sx2000 System Bus Adapter
12ec sx2000 I/O Controller
12ee PCI-X 2.0 Local Bus Adapter
1302 RMP-3 Shared Memory Driver
1303 RMP-3 (Remote Management Processor)
22f6 iLO5 Virtual USB Controller
1590 00e4 iLO5 Standard Virtual USB Controller
2910 E2910A PCIBus Exerciser
2925 E2925A 32 Bit, 33 MHz PCI Exerciser & Analyzer
3206 Adaptec Embedded Serial ATA HostRAID
3220 Smart Array P600
103c 3225 3 Gb/s SAS RAID
3230 Smart Array Controller
103c 3223 Smart Array P800
103c 3234 P400 SAS Controller
103c 3235 P400i SAS Controller
103c 3237 E500 SAS Controller
103c 323d P700m SAS Controller
3238 Smart Array E200i (SAS Controller)
103c 3211 Smart Array
E200i
103c 3212 Smart Array E200
3239 Smart Array Gen9 Controllers
103c 21bd P244br
103c 21be P741m
103c 21bf H240ar
103c 21c0 P440ar
103c 21c1 P840ar
103c 21c2 P440
103c 21c3 P441
103c 21c4 Smart Array
103c 21c5 P841
103c 21c6 H244br
103c 21c7 H240
103c 21c8 H241
103c 21c9 Smart Array
103c 21ca P246br
103c 21cb P840
103c 21cc Smart Array
103c 21cd P240nr
103c 21ce H240nr

323a Smart Array G6 controllers
103c 3241 Smart Array P212
103c 3243 Smart Array P410
103c 3245 Smart Array P410i
103c 3247 Smart Array P411
103c 3249 Smart Array P812
103c 324a Smart Array 712m (Mezzanine RAID controller)
103c 324b Smart Array P711m (Mezzanine RAID controller)
323b Smart Array Gen8 Controllers
103c 3350 P222
103c 3351 P420
103c 3352 P421
103c 3354 P420i
103c 3355 P220i
323c Smart Array Gen8+ Controllers
103c 1920 P430i
103c 1921 P830i
103c 1922 P430
103c 1923 P431
103c 1924 P830
103c
1925 Smart Array
103c 1926 P731m
103c 1928 P230i
3300 Integrated Lights-Out Standard Virtual USB Controller
103c 3304 iLO2
103c 3305 iLO2
103c 3309 iLO2 GXL/iLO3 GXE
103c 330e iLO3
103c 3381 iLO4
3301 Integrated Lights-Out Standard Serial Port
103c 3304 iLO2
103c 3305 iLO2
103c 330e iLO3
103c 3381 iLO4
Virtual serial port which is presented on a Java applet
3302 Integrated Lights-Out Standard KCS Interface
103c 3304 iLO2
103c 3305 iLO2
103c 330e iLO3
103c 3381 iLO4
3305 Integrated Lights-Out (iLO2) Controller
3306 Integrated Lights-Out Standard Slave Instrumentation & System Support
103c 330e iLO3
103c 3381 iLO4
1590 00e4 iLO5
3307 Integrated Lights-Out Standard Management Processor Support and Messaging
HP DL380 G6

103c 3309 iLO 2
103c 330e iLO3
103c 3381 iLO4
3308 Integrated Lights-Out Standard MS Watchdog Timer
103c 330e iLO3
103c 3381 iLO4
4030 zx2 System Bus Adapter
4031 zx2 I/O Controller
4037
PCIe Local Bus Adapter
9602 AMD RS780/RS880 PCI to PCI bridge (int gfx)
103c 1609 ProLiant MicroServer N36L
103e Solliday Engineering
103f Synopsys/Logic Modeling Group
1040 Accelgraphics Inc.
1041 Computrend
1042 Micron
1000 PC Tech RZ1000
1001 PC Tech RZ1001
3000 Samurai_0
3010 Samurai_1
3020 Samurai_IDE
1043 ASUSTeK Computer Inc.
0464 Radeon R9 270x GPU
0521 RX580 [RX 580 Dual O8G]
0675 ISDNLink P-IN100-ST-D
0675 1704 ISDN Adapter (PCI Bus, D, C)
0675 1707 ISDN Adapter (PCI Bus, DV, W)
10cf 105e ISDN Adapter (PCI Bus, DV, W)
Should be 1022:9602
9602 AMD RS780/RS880 PCI to PCI bridge (int gfx)
1043 83a2 M4A785TD Motherboard
1044 Adaptec (formerly DPT)
1012 Domino RAID Engine
a400 SmartCache/Raid I-IV Controller
a500 PCI Bridge
a501 SmartRAID V Controller
1044 c001 PM1554U2 Ultra2 Single Channel
1044 c002 PM1654U2 Ultra2 Single Channel
1044 c003 PM1564U3 Ultra3 Single Channel
1044 c004 PM1564U3 Ultra3 Dual Channel
1044
c005 PM1554U2 Ultra2 Single Channel (NON ACPI)
1044 c00a PM2554U2 Ultra2 Single Channel
1044 c00b PM2654U2 Ultra2 Single Channel
1044 c00c PM2664U3 Ultra3 Single Channel
1044 c00d PM2664U3 Ultra3 Dual Channel
1044 c00e PM2554U2 Ultra2 Single Channel (NON ACPI)

1044 c00f PM2654U2 Ultra2 Single Channel (NON ACPI)
1044 c014 PM3754U2 Ultra2 Single Channel (NON ACPI)
1044 c015 PM3755U2B Ultra2 Single Channel (NON ACPI)
1044 c016 PM3755F Fibre Channel (NON ACPI)
1044 c01e PM3757U2 Ultra2 Single Channel
1044 c01f PM3757U2 Ultra2 Dual Channel
1044 c020 PM3767U3 Ultra3 Dual Channel
1044 c021 PM3767U3 Ultra3 Quad Channel
1044 c028 PM2865U3 Ultra3 Single Channel
1044 c029 PM2865U3 Ultra3 Dual Channel
1044 c02a PM2865F Fibre Channel
1044 c03c 2000S Ultra3 Single Channel
1044 c03d 2000S Ultra3 Dual Channel
1044 c03e 2000F Fibre Channel
1044 c046 3000S Ultra3 Single Channel
1044 c047 3000S Ultra3 Dual Channel
1044 c048 3000F

Fibre Channel

1044 c050 5000S Ultra3 Single Channel
1044 c051 5000S Ultra3 Dual Channel
1044 c052 5000F Fibre Channel
1044 c05a 2400A UDMA Four Channel
1044 c05b 2400A UDMA Four Channel DAC
1044 c064 3010S Ultra3 Dual Channel
1044 c065 3410S Ultra160 Four Channel
1044 c066 3010S Fibre Channel

a511 SmartRAID V Controller

1044 c032 ASR-2005S I2O Zero Channel
1044 c035 ASR-2010S I2O Zero Channel
c066 3010S Ultra3 Dual Channel

1045 OPTi Inc.

a0f8 82C750 [Vendetta] USB Controller
c101 92C264
c178 92C178
c556 82X556 [Viper]
c557 82C557 [Viper-M]
c558 82C558 [Viper-M ISA+IDE]
c567 82C750 [Vendetta], device 0
c568 82C750 [Vendetta], device 1
c569 82C579 [Viper XPress+ Chipset]
c621 82C621 [Viper-M/N+]
c700 82C700 [FireStar]
c701 82C701 [FireStar Plus]
c814 82C814 [Firebridge 1]
c822 82C822
c824 82C824
c825 82C825 [Firebridge 2]
c832 82C832

c861 82C861 OHCI USB Host
c881 82C881 [FireLink] 1394 OHCI Link Controller
c895
82C895
c935 EV1935 ECTIVA MachOne PCIAudio
d568 82C825 [Firebridge 2]
d721 IDE [FireStar]
1046 IPC Corporation, Ltd.
1047 Genoa Systems Corp
1048 Elsa AG
0c60 Gladiac MX
0d22 Quadro4 900XGL [ELSA GLoria4 900XGL]
1000 QuickStep 1000
3000 QuickStep 3000
8901 Gloria XL
1048 0935 GLoria XL (Virge)
1049 Fountain Technologies, Inc.
nee SGS Thomson Microelectronics
104a STMicroelectronics
0000 STLS2F Host Bridge
0008 STG 2000X
0009 STG 1764X
0010 STG4000 [3D Prophet Kyro Series]
104a 4018 ST PowerVR Kyro (64MB AGP TVO)
64MB AGP
1681 0010 PowerVR Kyro II [3D Prophet 4500]
1681 0028 3D Prophet 4000XT
1681 c010 3D Prophet 4500 TV-Out
1681 c069 3D Prophet 4000XT
0201 STPC Vega Northbridge
0209 STPC Consumer/Industrial North- and Southbridge
020a STPC Atlas/ConsumerS/Consumer IIA Northbridge
020b STPC Consumer II ISA Bridge
0210 STPC Atlas ISA Bridge
021a STPC Consumer S Southbridge
021b STPC Consumer IIA Southbridge
0220 STPC Industrial
PCI to PCCard bridge
0228 STPC Atlas IDE
0229 STPC Vega IDE
0230 STPC Atlas/Vega OHCI USB Controller
0238 STPC Vega LAN
0500 ST70137 [Unicorn] ADSL DMT Transceiver
104a 0500 BeWAN ADSL PCI st
0564 STPC Client Northbridge
0981 21x4x DEC-Tulip compatible 10/100 Ethernet
1746 STG 1764X
2774 21x4x DEC-Tulip compatible 10/100 Ethernet

3520 MPEG-II decoder card
55cc STPC Client Southbridge
104b BusLogic
0140 BT-946C (old) [multimaster 01]
1040 BT-946C (BA80C30) [MultiMaster 10]
8130 Flashpoint LT
104c Texas Instruments
0500 100 MBit LAN Controller
0508 TMS380C2X Compressor Interface
1000 Eagle i/f AS
104c PCI1510 PC card Cardbus Controller
3d04 TVP4010 [Permedia]
3d07 TVP4020 [Permedia 2]
1011 4d10 Comet
1040 000f AccelStar II
1040 0011 AccelStar II
1048 0a31 WINNER 2000
1048 0a32 GLoria Synergy
1048 0a34 GLoria Synergy
1048 0a35 GLoria Synergy
1048 0a36 GLoria Synergy
1048 0a43 GLoria Synergy
1048 0a44 GLoria
Synergy
107d 2633 WinFast 3D L2300
1092 0126 FIRE GL 1000 PRO
1092 0127 FIRE GL 1000 PRO
1092 0136 FIRE GL 1000 PRO
1092 0141 FIRE GL 1000 PRO
1092 0146 FIRE GL 1000 PRO
1092 0148 FIRE GL 1000 PRO
1092 0149 FIRE GL 1000 PRO
1092 0152 FIRE GL 1000 PRO
1092 0154 FIRE GL 1000 PRO
1092 0155 FIRE GL 1000 PRO
1092 0156 FIRE GL 1000 PRO
1092 0157 FIRE GL 1000 PRO
1097 3d01 Jeronimo Pro
1102 100f Graphics Blaster Extreme
3d3d 0100 Reference Permedia 2 3D
8000 PCILynx/PCILynx2 IEEE 1394 Link Layer Controller
105e 8003 FireBoard200
1443 8003 FireBoard200
1443 8005 FireBoard400
1443 8006 FireBoard400
e4bf 1010 CF1-1-SNARE
e4bf 1020 CF1-2-SNARE
e4bf 1040 FireCompact400

8009 TSB12LV22 IEEE-1394 Controller
104d 8032 8032 OHCI i.LINK (IEEE 1394) Controller
1443 8010 FireBoard400-OHCI
8017 PCI4410 FireWire Controller
8019 TSB12LV23 IEEE-1394 Controller
11bd 000a Studio DV500-1394
11bd 000e Studio DV
1443 8010
FireBoard400-OHCI
e4bf 1010 CF2-1-CYMBAL
8020 TSB12LV26 IEEE-1394 Controller (Link)
1028 00d8 Precision 530
104d 80e2 VAIO PCV-J200
11bd 000f Studio DV500-1394
11bd 001c Excalibur 4.1
1443 8010 FireBoard400-OHCI
8021 TSB43AA22 IEEE-1394 Controller (PHY/Link Integrated)
104d 80df Vaio PCG-FX403
104d 80e7 VAIO PCG-GR214EP/GR214MP/GR215MP/GR314MP/GR315MP
8022 TSB43AB22 IEEE-1394a-2000 Controller (PHY/Link) [iOHCI-Lynx]
104c 8023 TSB43AB22/A IEEE-1394a-2000 Controller (PHY/Link)
8023 TSB43AB22A IEEE-1394a-2000 Controller (PHY/Link) [iOHCI-Lynx]
1028 0168 Precision Workstation 670 Mainboard
103c 088c NC8000 laptop
1043 808b K8N4/A8N Series Mainboard
1043 815b P5W DH Deluxe Motherboard
1443 8023 FireCard400
8086 5044 Desktop Board DP35DP
8024 TSB43AB23 IEEE-1394a-2000 Controller (PHY/Link)
107d 6620 Winfast DV2000 FireWire Controller
1443 8024 FireBoard Blue
1458 1000 Motherboard
8025 TSB82AA2 IEEE-1394b Link Layer Controller
1043
813c P5P series mainboard
1443 8025 FireBoard800
1458 1000 GA-K8N Ultra-9 Mainboard
1546 8025 FWB-PCI01
17fc 8025 GIC3800
8026 TSB43AB21 IEEE-1394a-2000 Controller (PHY/Link)
1025 0035 TravelMate 660
1025 003c Aspire 2001WLCi (Compaq CL50 motherboard)
103c 0025 XE4500 Notebook
103c 006a NX9500
1043 808d A7V333 mainboard.
8027 PCI4451 IEEE-1394 Controller
1028 00e5 Latitude C810
1028 00e6 PCI4451 IEEE-1394 Controller (Dell Inspiron 8100)

8029 PCI4510 IEEE-1394 Controller
1028 0163 Latitude D505
1028 0196 Inspiron 5160
1071 8160 MIM2900
802b PCI7410,7510,7610 OHCI-Lynx Controller
1028 0139 Latitude D400
1028 014e PCI7410,7510,7610 OHCI-Lynx Controller (Latitude D800)
802e PCI7x20 1394a-2000 OHCI Two-Port PHY/Link-Layer Controller
1028 018d Inspiron 700m/710m
8031 PCIxx21/PCIxx11/PCIx515 PC Card Controller
1025 0064 Extensa 3000 series laptop
1025 0080 Aspire 5024WLMi
103c 0934 Compaq nw8240/nx8220
103c 0944
Compaq nc6220 Notebook PC
103c 099c NX6110/NC6120
103c 308b MX6125
8032 OHCI Compliant IEEE 1394 Host Controller
1025 0064 Extensa 3000 series laptop
1025 0080 Aspire 5024WLMi
103c 0934 Compaq nw8240/nx8220
103c 099c NX6110/NC6120
103c 308b MX6125
8033 PCIxx21/PCIxx11 Flash Media Controller
1025 0064 Extensa 3000 series laptop
1025 0080 Aspire 5024WLMi
103c 0934 Compaq nw8240/nx8220
103c 0944 Compaq nc6220 Notebook PC
103c 099c NX6110/NC6120
103c 308b MX6125
8034 PCIxx21/PCIxx11 SD Host Controller
1025 0080 Aspire 5024WLMi
103c 0934 Compaq nw8240/nx8220
103c 0944 Compaq nc6220 Notebook PC
103c 099c NX6110/NC6120
103c 308b MX6125
8035 PCIxx21/PCIxx11 Smart Card Controller
103c 0934 Compaq nw8240/nx8220
103c 0944 Compaq nc6220 Notebook PC
103c 099c NX6110/NC6120
8036 PCI6515 Cardbus Controller
8038 PCI6515 SmartCard Controller
8039 PCIxx12 Cardbus Controller
103c 309f Compaq nx9420 Notebook
103c 30a1
NC2400
103c 30a3 Compaq nw8440
104d 902d VAIO VGN-NR120E

803a PCIxx12 OHCI Compliant IEEE 1394 Host Controller
103c 309f nx9420
103c 30a1 NC2400
103c 30a3 Compaq nw8440
104d 902d VAIO VGN-NR120E
803b PCIxx12 Flash Media Controller
103c 309f nx9420
103c 30a3 Compaq nw8440
104d 8212 VAIO VGN-N21E
104d 902d VAIO VGN-NR120E
803c PCIxx12 SDA Standard Compliant SD Host Controller
103c 309f nx9420
103c 30a3 Compaq nw8440
803d PCIxx12 GemCore based SmartCard controller
103c 309f Compaq nx9420 Notebook
103c 30a1 NC2400
103c 30a3 nc8430
103c 30aa nc6310
8101 TSB43DB42 IEEE-1394a-2000 Controller (PHY/Link)
8201 PCI1620 Firmware Loading Function
8204 PCI7410/7510/7610 PCI Firmware Loading Function
1028 0139 Latitude D400
1028 014e Latitude D800
8231 XIO2000(A)/XIO2200A PCI Express-to-PCI Bridge
5678 1234 DC-1394 PCIe
8232 XIO3130 PCI Express Switch (Upstream)
8233 XIO3130 PCI Express Switch (Downstream)
8235 XIO2200A IEEE-1394a-2000
Controller (PHY/Link)
5678 1234 DC-1394 PCIe
823e XIO2213A/B/XIO2221 PCI Express to PCI Bridge [Cheetah Express]
823f XIO2213A/B/XIO2221 IEEE-1394b OHCI Controller [Cheetah Express]
1546 803c FWB-PCIE1X11B
8240 XIO2001 PCI Express-to-PCI Bridge
8241 TUSB73x0 SuperSpeed USB 3.0 xHCI Host Controller
1014 04b2 S824 (8286-42A)
8400 ACX 100 22Mbps Wireless Interface
1186 3b00 DWL-650+ PC Card cardbus 22Mbs Wireless Adapter [AirPlus]
1186 3b01 DWL-520+ 22Mbps PCI Wireless Adapter
1395 2201 WL22-PC
16ab 8501 WL-8305 IEEE802.11b+ Wireless LAN PCI Adapter
8401 ACX 100 22Mbps Wireless Interface
8888 Multicore DSP+ARM KeyStone II SOC
9000 Wireless Interface (of unknown type)
9065 TMS320DM642
9066 ACX 111 54Mbps Wireless Interface
0308 3404 G-102 v1 802.11g Wireless Cardbus Adapter
0308 3406 G-162 v2 802.11g Wireless Cardbus Adapter

104c 9066 WL212 Sitecom Wireless Network PCI-Card 100M (Version 1)
Found in Philips ADSL ANNEX A WLAN
Router SNA6500/18 sold by Belgacom
104c 9067 TNETW1130GVF
104c 9096 Trendnet TEW-412PC Wireless PCI Adapter (Version A)
1186 3b04 DWL-G520+ Wireless PCI Adapter
1186 3b05 DWL-G650+ AirPlusG+ CardBus Wireless LAN
1186 3b08 AirPlus G DWL-G630 Wireless Cardbus Adapter (rev.B1)
1385 4c00 WG311v2 802.11g Wireless PCI Adapter
13d1 aba0 SWLMP-54108 108Mbps Wireless mini PCI card 802.11g+
14ea ab07 GW-NS54GM Wireless Cardbus Adapter
16ec 010d USR5416 802.11g Wireless Turbo PCI Adapter
16ec 010e USR5410 802.11g Wireless Cardbus Adapter
1737 0033 WPC54G v2 802.11g Wireless-G Notebook Adapter
17cf 0032 G-162 v1 802.11g Wireless Cardbus Adapter
17cf 0033 Z-Com XG650 Wireless miniPCI 802.11b/g
187e 340b G-302 v2 802.11g Wireless PCI Adapter
187e 340c G-360 v2 802.11g Wireless PCI Adapter
a001 TDC1570
a100 TDC1561
a102 TNETA1575 HyperSAR Plus w/PCI Host i/f & UTOPIA i/f
a106 TMS320C6414 TMS320C6415 TMS320C6416
175c 5000 ASI50xx Audio Adapter
175c
6400 ASI6400 Cobranet series
175c 8700 ASI87xx Radio Tuner card
ac10 PCI1050
ac11 PCI1053
ac12 PCI1130
ac13 PCI1031
ac15 PCI1131
ac16 PCI1250
1014 0092 ThinkPad 600
ac17 PCI1220
ac18 PCI1260
ac19 PCI1221
ac1a PCI1210
ac1b PCI1450
0e11 b113 Armada M700
1014 0130 ThinkPad 600X/A21m/T20/T22
ac1c PCI1225
0e11 b121 Armada E500
1028 0088 Latitude CPi A400XT
ac1d PCI1251A
ac1e PCI1211
ac1f PCI1251B
ac20 TI 2030
ac21 PCI2031

ac22 PCI2032 PCI Docking Bridge
ac23 PCI2250 PCI-to-PCI Bridge
ac28 PCI2050 PCI-to-PCI Bridge
ac2c PCI2060 PCI-to-PCI Bridge
ac30 PCI1260 PC card Cardbus Controller
ac40 PCI4450 PC card Cardbus Controller
ac41 PCI4410 PC card Cardbus Controller
ac42 PCI4451 PC card Cardbus Controller
1028 00e6 PCI4451 PC card CardBus Controller (Inspiron 8100)
ac44 PCI4510 PC card Cardbus Controller
1028 0149 Inspiron 5100
1028 0163 Latitude D505
1028 0196 Inspiron 5160
1071 8160 MIM2000
ac46 PCI4520
PC card Cardbus Controller
1014 0552 ThinkPad
ac47 PCI7510 PC card Cardbus Controller
1028 0139 Latitude D400
1028 013f Precision M60
1028 014e Latitude D800
ac48 PCI7610 PC Card Cardbus Controller
ac49 PCI7410 PC Card Cardbus Controller
ac4a PCI7510/7610 CardBus Bridge
1028 0139 Latitude D400
1028 014e Latitude D800
ac4b PCI7610 SD/MMC controller
ac4c PCI7610 Memory Stick controller
ac50 PCI1410 PC card Cardbus Controller
ac51 PCI1420 PC card Cardbus Controller
0e11 004e Evo N600c
1014 0148 ThinkPad A20m
1014 023b ThinkPad T23
1028 00b1 Latitude C600
1028 012a Latitude C640
1033 80cd Versa Note VXi
10cf 1095 Lifebook S-4510/C6155
e4bf 1000 CP2-2-HIPHOP
ac52 PCI1451 PC card Cardbus Controller
ac53 PCI1421 PC card Cardbus Controller
ac54 PCI1620 PC Card Controller
103c 08b0 tc1100 tablet
ac55 PCI1520 PC card Cardbus Controller
1014 0512 ThinkPad T30/T40
103c 0025 XE4500 Notebook
ac56 PCI1510 PC card Cardbus
Controller
1014 0512 ThinkPad R50e

1014 0528 ThinkPad R40e
17aa 2012 ThinkPad T60/R60 series
ac60 PCI2040 PCI to DSP Bridge Controller
175c 5100 ASI51xx Audio Adapter
175c 6100 ASI61xx Audio Adapter
175c 6200 ASI62xx Audio Adapter
175c 8800 ASI88xx Audio Adapter
186f 3001 WR-G303 PCI radio receiver
186f 3005 WR-G305 PCI radio receiver
186f 3101 WR-G313 PCI radio receiver
186f 3105 WR-G315 PCI radio receiver
ac8d PCI 7620
ac8e PCI7420 CardBus Controller
1028 018d Inspiron 700m/710m
ac8f PCI7420/7620 SD/MS-Pro Controller
1028 018d Inspiron 700m/710m
b001 TMS320C6424
fe00 FireWire Host Controller
fe03 12C01A FireWire Host Controller
104d Sony Corporation
8004 DTL-H2500 [Playstation development board]
8009 CXD1947Q i.LINK Controller
800c DTL-H800 [PS1 sound development board]
8039 CXD3222 i.LINK Controller
8047 PS2 TOOL MRP
8056 Rockwell HCF 56K modem
808a Memory Stick Controller
80ff PS2 Performance Analyzer
814a PS2
Performance Analyzer
8183 ATHENS [PS3 prototype developer interface card]
81b0 BM-1 [PSP TOOL Board Management Device]
81c3 VO-4 [PSP TOOL Video Output Device]
81ce SxS Pro memory card
81ff PS3 TOOL MRP
8200 PS3 TOOL RSX Tracing FPGA
820e CXD9208GP [PS3 PS2 emulation subsystem adapter]
2nd ID
905c SxS Pro memory card
2nd ID
907f SxS Pro+ memory card
908f Aeolia ACPI
909e Aeolia Ethernet Controller (Marvell Yukon 2 Family)
909f Aeolia SATA AHCI Controller
90a0 Aeolia SD/MMC Host Controller
90a1 Aeolia PCI Express Glue and Miscellaneous Devices
90a2 Aeolia DMA Controller
90a3 Aeolia Memory (DDR3/SPM)

90a4 Aeolia USB 3.0 xHCI Host Controller
90bc SxS Pro+ memory card
90c8 Belize ACPI
90c9 Belize Ethernet Controller
90ca Belize SATA AHCI Controller
90cb Belize SD/MMC Host Controller
90cc Belize PCI Express Glue and Miscellaneous Devices
90cd Belize DMA Controller
90ce Belize Memory (DDR3/SPM)
90cf Belize USB 3.0 xHCI Host Controller
90d7
Baikal ACPI
90d8 Baikal Ethernet Controller
90d9 Baikal SATA AHCI Controller
90da Baikal SD/MMC Host Controller
90db Baikal PCI Express Glue and Miscellaneous Devices
90dc Baikal DMA Controller
90dd Baikal Memory (DDR3/SPM)
90de Baikal USB 3.0 xHCI Host Controller
104e Oak Technology, Inc
0017 OTI-64017
0107 OTI-107 [Spitfire]
0109 Video Adapter
0111 OTI-64111 [Spitfire]
0217 OTI-64217
0317 OTI-64317
104f Co-time Computer Ltd
1050 Winbond Electronics Corp
0000 NE2000
0001 W83769F
0033 W89C33D 802.11 a/b/g BB/MAC
0105 W82C105
0840 W89C840
1050 0001 W89C840 Ethernet Adapter
1050 0840 W89C840 Ethernet Adapter
0940 W89C940
5a5a W89C940F
6692 W6692
1043 1702 ISDN Adapter (PCI Bus, D, W)
1043 1703 ISDN Adapter (PCI Bus, DV, W)
1043 1707 ISDN Adapter (PCI Bus, DV, W)
144f 1702 ISDN Adapter (PCI Bus, D, W)
144f 1703 ISDN Adapter (PCI Bus, DV, W)
144f 1707 ISDN Adapter (PCI Bus, DV, W)
9921 W99200F MPEG-1 Video Encoder
9922
W99200F/W9922PF MPEG-1/2 Video Encoder
9970 W9970CF

1051 Anigma, Inc.
1052 ?Young Micro Systems
1053 Young Micro Systems
1054 Hitachi, Ltd
3009 2Gbps Fibre Channel to PCI HBA 3009
300a 4Gbps Fibre Channel to PCI-X HBA 300a
300b 4Gbps Fibre Channel to PCI-X HBA 300b
300f ColdFusion 3 Chipset Processor to I/O Controller
3010 ColdFusion 3 Chipset Memory Controller Hub
3011 ColdFusion 3e Chipset Processor to I/O Controller
3012 ColdFusion 3e Chipset Memory Controller Hub
3017 Unassigned Hitachi Shared FC Device 3017
301b Virtual VGA Device
301d PCIe-to-PCIe Bridge with Virtualization IO Assist Feature
3020 FIVE-EX based Fibre Channel to PCIe HBA
302c M001 PCI Express Switch Upstream Port
302d M001 PCI Express Switch Downstream Port
3070 Hitachi FIVE-FX Fibre Channel to PCIe HBA
3505 SH7751 PCI Controller (PCIC)
350e SH7751R PCI Controller (PCIC)
1055 Microchip Technology / SMSC
9130 SLC90E66 [Victory66] IDE
9460 SLC90E66 [Victory66] ISA
9462
SLC90E66 [Victory66] USB
9463 SLC90E66 [Victory66] ACPI
e420 LAN9420/LAN9420i
1056 ICL
Motorola made a mistake and used 1507 instead of 1057 in some chips. Please look at the 1507 entry as well when updating this.
1057 Motorola
0001 MPC105 [Eagle]
0002 MPC106 [Grackle]
0003 MPC8240 [Kahlua]
0004 MPC107
0006 MPC8245 [Unity]
0008 MPC8540
0009 MPC8560
0012 MPC8548 [PowerQUICC III]
0100 MC145575 [HFC-PCI]
0431 KTI829c 100VG
1073 Nokia N770
1219 Nokia N800
1801 DSP56301 Digital Signal Processor
14fb 0101 Transas Radar Imitator Board [RIM]
14fb 0102 Transas Radar Imitator Board [RIM-2]
14fb 0202 Transas Radar Integrator Board [RIB-2]
14fb 0611 1 channel CAN bus Controller [CanPci-1]

14fb 0612 2 channels CAN bus Controller [CanPci-2]
14fb 0613 3 channels CAN bus Controller [CanPci-3]
14fb 0614 4 channels CAN bus Controller [CanPci-4]
14fb 0621 1 channel CAN bus Controller [CanPci2-1]
14fb 0622 2 channels CAN bus Controller [CanPci2-2]
14fb
0810 Transas VTS Radar Integrator Board [RIB-4]
175c 4200 ASI4215 Audio Adapter
175c 4300 ASI43xx Audio Adapter
175c 4400 ASI4401 Audio Adapter
ecc0 0010 Darla
ecc0 0020 Gina
ecc0 0030 Layla rev.0
ecc0 0031 Layla rev.1
ecc0 0040 Darla24 rev.0
ecc0 0041 Darla24 rev.1
ecc0 0050 Gina24 rev.0
ecc0 0051 Gina24 rev.1
ecc0 0070 Mona rev.0
ecc0 0071 Mona rev.1
ecc0 0072 Mona rev.2
18c0 MPC8265A/8266/8272
18c1 MPC8271/MPC8272
3052 SM56 Data Fax Modem
3410 DSP56361 Digital Signal Processor
ecc0 0050 Gina24 rev.0
ecc0 0051 Gina24 rev.1
ecc0 0060 Layla24
ecc0 0070 Mona rev.0
ecc0 0071 Mona rev.1
ecc0 0072 Mona rev.2
ecc0 0080 Mia rev.0
ecc0 0081 Mia rev.1
ecc0 0090 Indigo
ecc0 00a0 Indigo IO
ecc0 00b0 Indigo DJ
ecc0 0100 3G
4801 Raven
4802 Falcon
4803 Hawk
4806 CPX8216
MPC7410 PowerPC microprocessor and PCI host bridge
480b MPC7410
4d68 20268
5600 SM56 PCI Modem
1057 0300 SM56
PCI Speakerphone Modem
1057 0301 SM56 PCI Voice Modem

1057 0302 SM56 PCI Fax Modem
1057 5600 SM56 PCI Voice modem
13d2 0300 SM56 PCI Speakerphone Modem
13d2 0301 SM56 PCI Voice modem
13d2 0302 SM56 PCI Fax Modem
1436 0300 SM56 PCI Speakerphone Modem
1436 0301 SM56 PCI Voice modem
1436 0302 SM56 PCI Fax Modem
144f 100c SM56 PCI Fax Modem
1494 0300 SM56 PCI Speakerphone Modem
1494 0301 SM56 PCI Voice modem
14c8 0300 SM56 PCI Speakerphone Modem
14c8 0302 SM56 PCI Fax Modem
1668 0300 SM56 PCI Speakerphone Modem
1668 0302 SM56 PCI Fax Modem
5608 Wildcard X100P
5803 MPC5200
5806 MCF54 Coldfire
5808 MPC8220
5809 MPC5200B
6400 MPC190 Security Processor (S1 family, encryption)
6405 MPC184 Security Processor (S1 family)
1058 Electronics & Telecommunications RSH
1059 Kontron
105a Promise Technology, Inc.
0d30 PDC20265 (FastTrak100 Lite/Ultra100)
1043 8042 AV7266-E South Bridge Promise RAID
105a 4d33 Ultra100
0d38 20263
105a
4d39 Fasttrak66
1275 20275
3318 PDC20318 (SATA150 TX4)
3319 PDC20319 (FastTrak S150 TX4)
105a 3319 FastTrak S150 TX4 4 port SATA PCI board
8086 3427 S875WP1-E mainboard
3371 PDC20371 (FastTrak S150 TX2plus)
3373 PDC20378 (FastTrak 378/SATA 378)
1043 80f5 K8V Deluxe/PC-DL Deluxe motherboard
1462 590d KT6 Delta-FIS2R (MS-6590)
1462 702e K8T NEO FIS2R motherboard
3375 PDC20375 (SATA150 TX2plus)
3376 PDC20376 (FastTrak 376)
1043 809e A7V8X motherboard
3515 PDC40719 [FastTrak TX4300/TX4310]
3519 PDC40519 (FastTrak TX4200)
3570 PDC20771 [FastTrak TX2300]
3571 PDC20571 (FastTrak TX2200)

3574 PDC20579 SATAII 150 IDE Controller
3577 PDC40779 (SATA 300 779)
3d17 PDC40718 (SATA 300 TX4)
3d18 PDC20518/PDC40518 (SATAII 150 TX4)
3d73 PDC40775 (SATA 300 TX2plus)
3d75 PDC20575 (SATAII150 TX2plus)
3f20 PDC42819 [FastTrak TX2650/TX4650]
4302 80333 [SuperTrak EX4350]
4d30 PDC20267 (FastTrak100/Ultra100)
105a 4d33 Ultra100
105a 4d39 FastTrak100
8086
5744 S845WD1-E mainboard
4d33 20246
105a 4d33 20246 IDE Controller
4d38 PDC20262 (FastTrak66/Ultra66)
105a 4d30 Ultra Device on SuperTrak
105a 4d33 Ultra66
105a 4d39 FastTrak66
4d68 PDC20268 [Ultra100 TX2]
105a 4d68 Ultra100 TX2
4d69 20269
105a 4d68 Ultra133TX2
5275 PDC20276 (MBFastTrak133 Lite)
1043 807e A7V333 motherboard.
105a 0275 SuperTrak SX6000 IDE
105a 1275 MBFastTrak133 Lite (tm) Controller (RAID mode)
1458 b001 MBUltra 133
5300 DC5300
6268 PDC20270 (FastTrak100 LP/TX2/TX4)
105a 4d68 FastTrak100 TX2
6269 PDC20271 (FastTrak TX2000)
105a 6269 FastTrak TX2/TX2000
6300 PDC81731 [FastTrak SX8300]
6621 PDC20621 (FastTrak S150 SX4/FastTrak SX4000 lite)
6622 PDC20621 [SATA150 SX4] 4 Channel IDE RAID Controller
6624 PDC20621 [FastTrak SX4100]
6626 PDC20618 (Ultra 618)
6629 PDC20619 (FastTrak TX4000)
7275 PDC20277 (SBFastTrak133 Lite)
8002 SATAII150 SX8
8350 80333 [SuperTrak EX8350/EX16350], 80331 [SuperTrak
EX8300/EX16300]
8650 81384 [SuperTrak EX SAS and SATA RAID Controller]
105a 4600 SuperTrak EX4650A
105a 4601 SuperTrak EX4650
105a 4610 SuperTrak EX4650EL
105a 8600 SuperTrak EX8650EL

105a 8601 SuperTrak EX8650A
105a 8602 SuperTrak EX8654
105a 8603 SuperTrak EX8658
105a 8604 SuperTrak EX8650
105a 8610 SuperTrak EX8650M
105a a600 SuperTrak EX12650
105a b600 SuperTrak EX16650
105a b601 SuperTrak EX16654
105a b602 SuperTrak EX16658
8760 PM8010 [SuperTrak EX SAS and SATA 6G RAID Controller]
c350 80333 [SuperTrak EX12350]
e350 80333 [SuperTrak EX24350]
105b Foxconn International, Inc.
105c Wipro Infotech Limited
105d Number 9 Computer Company
2309 Imagine 128
2339 Imagine 128-II
105d 0000 Imagine 128 series 2 4Mb VRAM
105d 0001 Imagine 128 series 2 4Mb VRAM
105d 0002 Imagine 128 series 2 4Mb VRAM
105d 0003 Imagine 128 series 2 4Mb VRAM
105d 0004 Imagine 128 series 2 4Mb VRAM
105d 0005 Imagine 128 series 2 4Mb VRAM
105d
0006 Imagine 128 series 2 4Mb VRAM
105d 0007 Imagine 128 series 2 4Mb VRAM
105d 0008 Imagine 128 series 2e 4Mb DRAM
105d 0009 Imagine 128 series 2e 4Mb DRAM
105d 000a Imagine 128 series 2 8Mb VRAM
105d 000b Imagine 128 series 2 8Mb H-VRAM
11a4 000a Barco Metheus 5 Megapixel
13cc 0000 Barco Metheus 5 Megapixel
13cc 0004 Barco Metheus 5 Megapixel
13cc 0005 Barco Metheus 5 Megapixel
13cc 0006 Barco Metheus 5 Megapixel
13cc 0008 Barco Metheus 5 Megapixel
13cc 0009 Barco Metheus 5 Megapixel
13cc 000a Barco Metheus 5 Megapixel
13cc 000c Barco Metheus 5 Megapixel
493d Imagine 128 T2R [Ticket to Ride]
11a4 000a Barco Metheus 5 Megapixel, Dual Head
11a4 000b Barco Metheus 5 Megapixel, Dual Head
13cc 0002 Barco Metheus 4 Megapixel, Dual Head
13cc 0003 Barco Metheus 5 Megapixel, Dual Head
13cc 0007 Barco Metheus 5 Megapixel, Dual Head
13cc 0008 Barco Metheus 5 Megapixel, Dual Head
13cc 0009 Barco Metheus 5 Megapixel, Dual

Head
13cc 000a Barco Metheus 5 Megapixel, Dual Head
5348 Revolution 4
105d 0037 Revolution IV-FP AGP (For SGI 1600SW)
11a4 0028 PVS5600M
11a4 0038 PVS5600D
105e Vtech Computers Ltd
105f Infotronic America Inc
1060 United Microelectronics [UMC]
0001 UM82C881
0002 UM82C886
0101 UM8673F
0881 UM8881
0886 UM8886F
0891 UM8891A
1001 UM886A
673a UM8886BF
673b EIDE Master/DMA
8710 UM8710
886a UM8886A
8881 UM8881F
8886 UM8886F
888a UM8886A
8891 UM8891A
9017 UM9017F
9018 UM9018
9026 UM9026
e881 UM8881N
e886 UM8886N
e88a UM8886N
e891 UM8891N
1061 I.I.T.
0001 AGX016
0002 IIT3204/3501
1062 Maspar Computer Corp
1063 Ocean Office Automation
1064 Alcatel
1102 Dynamite 2840 (ADSL PCI modem)
1065 Texas Microsystems
1066 PicoPower Technology
0000 PT80C826
0001 PT86C521 [Vesuvius v1] Host Bridge
0002 PT86C523 [Vesuvius v3] PCI-ISA Bridge Master
0003 PT86C524 [Nile] PCI-to-PCI Bridge
0004 PT86C525 [Nile-II] PCI-to-PCI Bridge
0005
National PC87550 System Controller
8002 PT86C523 [Vesuvius v3] PCI-ISA Bridge Slave

1067 Mitsubishi Electric
0301 AccelGraphics AcceECLIPSE
0304 AccelGALAXY A2100 [OEM Evans & Sutherland]
0308 Tornado 3000 [OEM Evans & Sutherland]
1002 VG500 [VolumePro Volume Rendering Accelerator]
1068 Diversified Technology
1069 Mylex Corporation
0001 DAC960P
0002 DAC960PD
0010 DAC960PG
0020 DAC960LA
0050 AcceleRAID 352/170/160 support Device
1069 0050 AcceleRAID 352 support Device
1069 0052 AcceleRAID 170 support Device
1069 0054 AcceleRAID 160 support Device
b166 AcceleRAID 600/500/400/Sapphire support Device
1014 0242 iSeries 2872 DASD IOA
1014 0266 Dual Channel PCI-X U320 SCSI Adapter
1014 0278 Dual Channel PCI-X U320 SCSI RAID Adapter
1014 02d3 Dual Channel PCI-X U320 SCSI Adapter
1014 02d4 Dual Channel PCI-X U320 SCSI RAID Adapter
1069 0200 AcceleRAID 400, Single Channel, PCI-X, U320, SCSI RAID
1069 0202 AcceleRAID Sapphire, Dual Channel,
PCI-X, U320, SCSI RAID
1069 0204 AcceleRAID 500, Dual Channel, Low-Profile, PCI-X, U320, SCSI RAID
1069 0206 AcceleRAID 600, Dual Channel, PCI-X, U320, SCSI RAID
ba55 eXtremeRAID 1100 support Device
ba56 eXtremeRAID 2000/3000 support Device
1069 0030 eXtremeRAID 3000 support Device
1069 0040 eXtremeRAID 2000 support Device
ba57 eXtremeRAID 4000/5000 support Device
1069 0072 eXtremeRAID 5000 support Device
106a Aten Research Inc
106b Apple Inc.
0001 Bandit PowerPC host bridge
0002 Grand Central I/O
0003 Control Video
0004 PlanB Video-In
0007 O'Hare I/O
000c DOS on Mac
000e Hydra Mac I/O
0010 Heathrow Mac I/O
0017 Paddington Mac I/O
0018 UniNorth FireWire
0019 KeyLargo USB
001e UniNorth Internal PCI
001f UniNorth PCI
0020 UniNorth AGP

0021 UniNorth GMAC (Sun GEM)
0022 KeyLargo Mac I/O
0024 UniNorth/Pangea GMAC (Sun GEM)
0025 KeyLargo/Pangea Mac I/O
0026 KeyLargo/Pangea USB
0027 UniNorth/Pangea AGP
0028 UniNorth/Pangea
PCI
0029 UniNorth/Pangea Internal PCI
002d UniNorth 1.5 AGP
002e UniNorth 1.5 PCI
002f UniNorth 1.5 Internal PCI
0030 UniNorth/Pangea FireWire
0031 UniNorth 2 FireWire
106b 5811 iBook G4 2004
0032 UniNorth 2 GMAC (Sun GEM)
0033 UniNorth 2 ATA/100
0034 UniNorth 2 AGP
0035 UniNorth 2 PCI
0036 UniNorth 2 Internal PCI
003b UniNorth/Intrepid ATA/100
003e KeyLargo/Intrepid Mac I/O
003f KeyLargo/Intrepid USB
1af4 1100 QEMU Virtual Machine
0040 K2 KeyLargo USB
0041 K2 KeyLargo Mac/IO
0042 K2 FireWire
0043 K2 ATA/100
0045 K2 HT-PCI Bridge
0046 K2 HT-PCI Bridge
0047 K2 HT-PCI Bridge
0048 K2 HT-PCI Bridge
0049 K2 HT-PCI Bridge
004a CPC945 HT Bridge
004b U3 AGP
004c K2 GMAC (Sun GEM)
004f Shasta Mac I/O
0050 Shasta IDE
0051 Shasta (Sun GEM)
0052 Shasta Firewire
0053 Shasta PCI Bridge
0054 Shasta PCI Bridge
0055 Shasta PCI Bridge
0056 U4 PCIe
0057 U3 HT Bridge
0058 U3L AGP Bridge
0059 U3H AGP Bridge
005b CPC945 PCIe

Bridge
0066 Intrepid2 AGP Bridge
0067 Intrepid2 PCI Bridge
0068 Intrepid2 PCI Bridge
0069 Intrepid2 ATA/100
006a Intrepid2 Firewire
006b Intrepid2 GMAC (Sun GEM)
0074 U4 HT Bridge
should be 14e4:1645
1645 Broadcom NetXtreme BCM5701 Gigabit Ethernet
1801 T2 Bridge Controller
1802 T2 Secure Enclave Processor
1803 Apple Audio Device
2001 S1X NVMe Controller
2002 S3ELab NVMe Controller
2003 S3X NVMe Controller
2005 ANS2 NVMe Controller
106c Hynix Semiconductor
8139 8139c 100BaseTX Ethernet Controller
8801 Dual Pentium ISA/PCI Motherboard
8802 PowerPC ISA/PCI Motherboard
8803 Dual Window Graphics Accelerator
8804 LAN Controller
8805 100-BaseT LAN
106d Sequent Computer Systems
106e DFI, Inc
106f City Gate Development Ltd
1070 Daewoo Telecom Ltd
1071 Mitac
8160 Mitac 8060B Mobile Platform
1072 GIT Co Ltd
1073 Yamaha Corporation
0001 3D GUI Accelerator
0002 YGV615 [RPA3 3D-Graphics Controller]
0003 YMF-740
0004 YMF-724
1073 0004
YMF724-Based PCI Audio Adapter
0005 DS1 Audio
1073 0005 DS-XG PCI Audio CODEC
0006 DS1 Audio
0008 DS1 Audio
1073 0008 DS-XG PCI Audio CODEC
000a DS1L Audio
1073 0004 DS-XG PCI Audio CODEC
1073 000a DS-XG PCI Audio CODEC
8086 4d55 DS-XG PCI Audio CODEC [Intel MU440EX]
000c YMF-740C [DS-1L Audio Controller]

107a 000c DS-XG PCI Audio CODEC
 000d YMF-724F [DS-1 Audio Controller]
 1073 000d DS-XG PCI Audio CODEC
 0010 YMF-744B [DS-1S Audio Controller]
 1073 0006 DS-XG PCI Audio CODEC
 1073 0010 DS-XG PCI Audio CODEC
 0012 YMF-754 [DS-1E Audio Controller]
 1073 0012 DS-XG PCI Audio Codec
 0020 DS-1 Audio
 1000 SW1000XG [XG Factory]
 2000 DS2416 Digital Mixing Card
 1073 2000 DS2416 Digital Mixing Card
 1074 NexGen Microsystems
 4e78 82c500/1
 1075 Advanced Integrations Research
 1076 Chaintech Computer Co. Ltd
 1077 QLogic Corp.
 1016 ISP10160 Single Channel Ultra3 SCSI Processor
 1020 ISP1020 Fast-wide SCSI
 1022 ISP1022 Fast-wide SCSI
 1080
 ISP1080 SCSI Host Adapter
 1216 ISP12160 Dual Channel Ultra3 SCSI Processor
 101e 8471 QLA12160 on AMI MegaRAID
 101e 8493 QLA12160 on AMI MegaRAID
 1240 ISP1240 SCSI Host Adapter
 1280 ISP1280 SCSI Host Adapter
 1634 FastLinQ QL45000 Series 40GbE Controller
 1077 e4f1 FastLinQ QL45212H 40GbE Adapter
 1077 e4f2 FastLinQ QL45211H 40GbE Adapter
 1077 e4f3 FastLinQ QL45412H 40GbE Adapter
 1077 e4f4 FastLinQ QL45411H 40GbE Adapter
 1644 FastLinQ QL45000 Series 100GbE Controller
 1077 e4f8 FastLinQ QL45611H 100GbE Adapter
 1654 FastLinQ QL45000 Series 50GbE Controller
 1077 0032 QL45212 Flex 50Gb 2-port Ethernet Adapter
 1590 0223 Synergy 6810C 25/50Gb Ethernet Adapter
 1590 0287 Synergy 6820C 25/50Gb CNA
 1656 FastLinQ QL45000 Series 25GbE Controller
 1077 0033 QL45214 Flex 25Gb 4-port Ethernet Adapter
 1077 02a7 QL45212-DE 25GbE Adapter
 1077 e4f6 FastLinQ QL45211H 25GbE Adapter
 1077 e4f7 FastLinQ QL45212H 25GbE Adapter
 1590 0245 10/20/25GbE 2P 4820c
 CNA
 165c FastLinQ QL45000 Series 10/25/40/50GbE Controller (FCoE)
 1077 0034 QL45262 Flex 50Gb 2-port Ethernet Adapter w/ iSCSI/FCoE
 1077 e4f1 FastLinQ QL45462H 40GbE FCoE Adapter

1077 e4f2 FastLinQ QL45461H 40GbE FCoE Adapter
1590 0245 10/20/25GbE 2P 4820c CNA FCoE
165e FastLinQ QL45000 Series 10/25/40/50GbE Controller (iSCSI)
1077 0034 QL45262 Flex 50Gb 2-port Ethernet Adapter w/ iSCSI/FCoE
1077 e4f1 FastLinQ QL45462H 40GbE iSCSI Adapter
1077 e4f2 FastLinQ QL45461H 40GbE iSCSI Adapter
1590 0245 10/20/25GbE 2P 4820c CNA iSCSI
1664 FastLinQ QL45000 Series Gigabit Ethernet Controller (SR-IOV VF)
1077 e4f1 FastLinQ QL45462H 40GbE Adapter (SR-IOV VF)
1077 e4f2 FastLinQ QL45461H 40GbE Adapter (SR-IOV VF)
1077 e4f3 FastLinQ QL45412H 40GbE Adapter (SR-IOV VF)
1077 e4f4 FastLinQ QL45411H 40GbE Adapter (SR-IOV VF)
1077 e4f6 FastLinQ QL45211H 25GbE Adapter (SR-IOV VF)
1077 e4f7 FastLinQ QL45212H 25GbE Adapter (SR-IOV VF)
1077 e4f8 FastLinQ QL45611H
100GbE Adapter (SR-IOV VF)
1590 0245 10/20/25GbE 2P 4820c CNA SRIOV
2020 ISP2020A Fast!SCSI Basic Adapter
2031 ISP8324-based 16Gb Fibre Channel to PCI Express Adapter
103c 17e7 SN1000Q 16Gb Single Port Fibre Channel Adapter
103c 17e8 SN1000Q 16Gb Dual Port Fibre Channel Adapter
103c 1939 QMH2672 16Gb Dual Port Fibre Channel Adapter
103c 8002 3830C 16G Fibre Channel Host Bus Adapter
2071 ISP2714-based 16/32Gb Fibre Channel to PCIe Adapter
1077 0283 QLE2764 Quad Port 32Gb Fibre Channel to PCIe Adapter
1077 029e QLE2694 Quad Port 16Gb Fibre Channel to PCIe Adapter
1077 02a2 QLE2694L Quad Port 16Gb Fibre Channel to PCIe Adapter
1077 02ad QLE2694U Quad Port 16/32Gb Fibre Channel to PCIe Adapter
2081 ISP2814-based 64/32G Fibre Channel to PCIe Controller
1077 02e1 QLE2874 Quad Port 64GFC PCIe Gen4 x16 Adapter
1077 02e3 QLE2774 Quad Port 32GFC PCIe Gen4 x16 Adapter
2100 QLA2100 64-bit Fibre Channel Adapter
1077 0001 QLA2100 64-bit Fibre Channel
Adapter
2200 QLA2200 64-bit Fibre Channel Adapter
1077 0002 QLA2200
2261 ISP2722-based 16/32Gb Fibre Channel to PCIe Adapter
1077 0299 QLE2740 Single Port 32Gb Fibre Channel to PCIe Adapter
1077 029a QLE2742 Dual Port 32Gb Fibre Channel to PCIe Adapter
1077 029b QLE2690 Single Port 16Gb Fibre Channel to PCIe Adapter
1077 029c QLE2692 Dual Port 16Gb Fibre Channel to PCIe Adapter
1077 02a7 QLE2690 Single Port 16Gb FC to PCIe Gen3 x8 Adapter
1077 02a8 QLE2692 Dual Port 16Gb FC to PCIe Gen3 x8 Adapter
1077 02ab QLE2740 Single Port 32Gb FC to PCIe Gen3 x8 Adapter
1077 02ac QLE2742 Dual Port 32Gb FC to PCIe Gen3 x8 Adapter
1077 02b8 2x16Gb QME2692 FC HBA
1077 02b9 2x32Gb QME2742 FC HBA
1590 00f9 StoreFabric SN1100Q 16Gb Single Port Fibre Channel Host Bus Adapter

1590 00fa StoreFabric SN1100Q 16Gb Dual Port Fibre Channel Host Bus Adapter
1590 0203 StoreFabric SN1600Q 32Gb Single Port Fibre Channel Host Bus Adapter
1590 0204 StoreFabric SN1600Q
32Gb Dual Port Fibre Channel Host Bus Adapter
1590 022d 5830C 32Gb Dual Port Fibre Channel Adapter
2281 ISP2812-based 64/32G Fibre Channel to PCIe Controller
1077 02e2 QLE2872 Dual Port 64GFC PCIe Gen4 x8 Adapter
1077 02e4 QLE2772 Dual Port 32GFC PCIe Gen4 x8 Adapter
1077 02ee QLE2870 Single Port 64GFC PCIe Gen4 x8 Adapter
1077 02f0 QLE2770 Single Port 32GFC PCIe Gen4 x8 Adapter
1077 02f2 QLogic 1x32Gb QLE2770 FC HBA
1077 02f3 QLogic 2x32Gb QLE2772 FC HBA
1590 02d3 SN1610Q - 1P Enhanced 32GFC Single Port Fibre Channel Host Bus Adapter
1590 02d4 SN1610Q – 2P Enhanced 32GFC Dual Port Fibre Channel Host Bus Adapter
2300 QLA2300 64-bit Fibre Channel Adapter
2312 ISP2312-based 2Gb Fibre Channel to PCI-X HBA
103c 0131 2Gb Fibre Channel - Single port [A7538A]
103c 12ba 2Gb Fibre Channel - Dual port [A6826A]
2322 ISP2322-based 2Gb Fibre Channel to PCI-X HBA
2422 ISP2422-based 4Gb Fibre Channel to PCI-X HBA
103c 12d7 4Gb Fibre Channel [AB379A]
103c
12dd 4Gb Fibre Channel [AB429A]
2432 ISP2432-based 4Gb Fibre Channel to PCI Express HBA
103c 7040 FC1142SR 4Gb 1-port PCIe Fibre Channel Host Bus Adapter [HPAE311A]
1077 0137 QLE2460 4 GB PCI-X Host-Bus-Adapter
2532 ISP2532-based 8Gb Fibre Channel to PCI Express HBA
1014 041e FC EN0Y/EN12 PCIe2 LP 8 Gb 4-port Fibre Channel Adapter for POWER
103c 3262 StorageWorks 81Q
103c 3263 StorageWorks 82Q
1077 015c QLE2560 PCI Express to 8Gb FC Single Channel
1077 015d QLE2562 PCI Express to 8Gb FC Dual Channel
1077 015e QLE2564 PCI Express to 8Gb FC Quad Channel
1077 0167 QME2572 Dual Port FC8 HBA Mezzanine
1590 00fc StoreFabric 84Q 8Gb Quad Port Fibre Channel Host Bus Adapter
2971 ISP2684
3022 ISP4022-based Ethernet NIC
3032 ISP4032-based Ethernet IPv6 NIC
4010 ISP4010-based iSCSI TOE HBA
4022 ISP4022-based iSCSI TOE HBA
4032 ISP4032-based iSCSI TOE IPv6 HBA
5432 SP232-based 4Gb Fibre Channel to PCI Express HBA
6312 SP202-based 2Gb Fibre Channel
to PCI-X HBA
6322 SP212-based 2Gb Fibre Channel to PCI-X HBA
7220 IBA7220 InfiniBand HCA
7322 IBA7322 QDR InfiniBand HCA
8000 10GbE Converged Network Adapter (TCP/IP Networking)

8001 10GbE Converged Network Adapter (FCoE)
 1014 03af FC 5708/5270 10 Gb FCoE PCIe Dual Port Adapter for POWER

8020 cLOM8214 1/10GbE Controller
 1028 1f64 QMD8262-k 10G DP bNDC KR

103c 3346 CN1000Q Dual Port Converged Network Adapter
 103c 3733 NC523SFP 10Gb 2-port Server Adapter

1077 0203 8200 Series Single Port 10GbE Converged Network Adapter (TCP/IP Networking)
 1077 0207 8200 Series Dual Port 10GbE Converged Network Adapter (TCP/IP Networking)
 1077 020b 3200 Series Dual Port 10Gb Intelligent Ethernet Adapter
 1077 020c 3200 Series Quad Port 1Gb Intelligent Ethernet Adapter
 1077 020f 3200 Series Single Port 10Gb Intelligent Ethernet Adapter
 1077 0210 QME8242-k 10GbE Dual Port Mezzanine Card
 1077 0233 QME8262-k 10GbE Dual Port Mezzanine Card

8021 8200 Series 10GbE
 Converged Network Adapter (FCoE)
 103c 3348 CN1000Q Dual Port Converged Network Adapter
 1077 0211 QME8242-k 10GbE Dual Port Mezzanine Card, FCoE

8022 8200 Series 10GbE Converged Network Adapter (iSCSI)
 103c 3347 CN1000Q Dual Port Converged Network Adapter
 1077 0212 QME8242-k 10GbE Dual Port Mezzanine Card, iSCSI

8030 ISP8324 1/10GbE Converged Network Controller
 1077 0243 8300 Series Single Port 10GbE Converged Network Adapter (TCP/IP Networking)
 1077 0246 8300 Series Dual Port 10GbE Converged Network Adapter (TCP/IP Networking)

8031 8300 Series 10GbE Converged Network Adapter (FCoE)
 8032 8300 Series 10GbE Converged Network Adapter (iSCSI)

8070 FastLinQ QL41000 Series 10/25/40/50GbE Controller
 1077 0001 10GE 2P QL41162HxRJ-DE Adapter
 1077 0002 10GE 2P QL41112HxCU-DE Adapter
 1077 0004 4x10GE QL41164HFCU CNA
 1077 0005 QLogic 4x10GE QL41164HMRJ CNA
 1077 0006 QLogic 4x10GE QL41164HMCU CNA
 1077 0007 QLogic 2x1GE+2x10GE QL41264HMCU CNA
 1077 0009
 QLogic 2x1GE+2x10GE QL41162HMRJ CNA
 1077 000b 25GE 2P QL41262HxCU-DE Adapter
 1077 000f 2x25GE QL41262HMKR CNA
 1077 0010 2x25GE QL41232HMKR NIC
 1077 0011 FastLinQ QL41212HLCU 25GbE Adapter
 1077 0012 FastLinQ QL41112H 10GbE Adapter
 1077 0019 QL41232HOCU - Dual Port 25/10GbE SFP28 OCP Adapter
 1077 0039 QLogic QL41262 PCIe 25Gb 2-Port SFP28 Ethernet Adapter
 1077 0053 QLogic 2x25GE QL41232HQCU NIC
 1077 0054 2x10GE QL41132HQRJ NIC
 1077 0055 QLogic 2x10GE QL41132HQCU NIC
 1077 0056 2x10GE QL41132HxRJ NIC
 1077 0057 2x25GE QL41232HxCU NIC
 1077 0065 QLogic 4x10GE QL41154HQRJ CNA
 1077 0066 QLogic 4x10GE QL41154HQCU CNA

1077 0068 10GbE 2p SFP+ QL41132HLCU-HC Adapter
1077 0069 10GbE 2p BASE-T QL41132HQRJ-HC OCP3 Adapter
1077 0070 10GbE 2p BASE-T QL41132HLRJ-HC Adapter
1077 0071 10GbE 2p SFP+ QL41132HQCUCU-HC OCP3 Adapter
1077 0072 10GbE 4p SFP+ QL41134HLCU-HC Adapter
1077 0073 10/25GbE 2p SFP28 QL41232HQCUCU-HC OCP3 Adapter
1077 0074 10/25GbE
2p SFP28 QL41232HLCU-HC Adapter
1590 021a 10GbE 2P QL41162HLRJ-HP Adapter
1590 021b 10GbE 2P QL41162HLRJ-HP Adapter
1590 021d 10/25GbE 2P QL41222HLCU-HP Adapter
1590 021e 10/25GbE 2P QL41162HMRJ-HP Adapter
1590 021f 10/25GbE 2P QL41262HMCU-HP Adapter
1590 0220 10/25GbE 2P QL41122HLRJ-HP Adapter
1590 02bd 10Gb 2P 524SFP+ NIC
8080 FastLinQ QL41000 Series 10/25/40/50GbE Controller (FCoE)
1077 0001 10GE 2P QL41162HxRJ-DE Adapter
1077 0002 10GE 2P QL41112HxCUCU-DE Adapter
1077 0004 4x10GE QL41164HFUCU CNA
1077 0005 QLogic 4x10GE QL41164HMRJ CNA
1077 0006 QLogic 4x10GE QL41164HMCU CNA
1077 0007 QLogic 2x1GE+2x10GE QL41264HMCU CNA
1077 0009 QLogic 2x1GE+2x10GE QL41162HMRJ CNA
1077 000b 25GE 2P QL41262HxCUCU-DE Adapter
1077 000c QLogic 2x25GE QL41262HMCU CNA
1077 000d FastLinQ QL41262H 25GbE FCoE Adapter
1077 000e FastLinQ QL41162H 10GbE FCoE Adapter
1077 000f 2x25GE QL41262HMKR CNA
1590 021a 10GbE 2P QL41162HLRJ-HP Adapter
1590
021b 10GbE 2P QL41162HLRJ-HP Adapter
8084 FastLinQ QL41000 Series 10/25/40/50GbE Controller (iSCSI)
1077 0001 10GE 2P QL41162HxRJ-DE Adapter
1077 0002 10GE 2P QL41112HxCUCU-DE Adapter
1077 0003 4x10GE QL41164HxRJ CNA
1077 0004 4x10GE QL41164HFUCU CNA
1077 0005 QLogic 4x10GE QL41164HMRJ CNA
1077 0006 QLogic 4x10GE QL41164HMCU CNA
1077 0007 QLogic 2x25GE QL41262HMCU CNA
1077 0009 QLogic 2x1GE+2x10GE QL41162HMRJ CNA
1077 000b 25GE 2P QL41262HxCUCU-DE Adapter
1077 000c QLogic 2x25GE QL41262HMCU CNA
1077 000d FastLinQ QL41262H 25GbE iSCSI Adapter
1077 000e FastLinQ QL41162H 10GbE iSCSI Adapter
1077 000f 2x25GE QL41262HMKR CNA
1077 0065 QLogic 4x10GE QL41154HQRJ CNA
1077 0066 QLogic 4x10GE QL41154HQCUCU CNA
1590 021a 10GbE 2P QL41162HLRJ-HP Adapter

1590 021b 10GbE 2P QL41162HLRJ-HP Adapter
8090 FastLinQ QL41000 Series Gigabit Ethernet Controller (SR-IOV VF)
1077 0001 25GE 2P QL41262HxCU-DE Adapter
1077 0002 10GE 2P QL41112HxCU-DE Adapter
1077
0003 4x10GE QL41164HxRJ CNA
1077 0004 4x10GE QL41164HFCU CNA
1077 0005 QLogic 4x10GE QL41164HMRJ CNA
1077 0006 QLogic 4x10GE QL41164HMCU CNA
1077 0007 QLogic 2x1GE+2x10GE QL41264HMCU CNA
1077 0009 QLogic 2x1GE+2x10GE QL41162HMRJ CNA
1077 000b 25GE 2P QL41262HxCU-DE Adapter
1077 000c QLogic 2x25GE QL41262HMCU CNA
1077 000d FastLinQ QL41262H 25GbE FCoE Adapter (SR-IOV VF)
1077 000e FastLinQ QL41162H 10GbE iSCSI Adapter (SR-IOV VF)
1077 000f 2x25GE QL41262HMKR CNA
1077 0010 2x25GE QL41232HMKR NIC
1077 0011 FastLinQ QL41212H 25GbE Adapter (SR-IOV VF)
1077 0012 FastLinQ QL41112H 10GbE Adapter (SR-IOV VF)
1077 0053 QLogic 2x25GE QL41232HQCU NIC
1077 0054 QLogic 2x10GE QL41132HQRJ NIC
1077 0055 QLogic 2x10GE QL41132HQCU NIC
1077 0056 2x10GE QL41132HxRJ NIC
1077 0057 2x25GE QL41232HxCU NIC
1077 0065 QLogic 4x10GE QL41154HQRJ CNA
1077 0066 QLogic 4x10GE QL41154HQCU CNA
1590 021a 10GbE 2P QL41162HLRJ-HP Adapter
1590 021b
10GbE 2P QL41162HLRJ-HP Adapter
1590 021e 10/25GbE 2P QL41162HMRJ-HP Adapter
1590 021f 10/25GbE 2P QL41262HMCU-HP Adapter
1590 02bd 10Gb 2P 524SFP+ NIC
8430 ISP8324 1/10GbE Converged Network Controller (NIC VF)
8431 8300 Series 10GbE Converged Network Adapter (FCoE VF)
8432 ISP2432M-based 10GbE Converged Network Adapter (CNA)
1078 Cyrix Corporation
0000 5510 [Grappa]
0001 PCI Master
0002 5520 [Cognac]
0100 5530 Legacy [Kahlua]
0101 5530 SMI [Kahlua]
0102 5530 IDE [Kahlua]
0103 5530 Audio [Kahlua]
0104 5530 Video [Kahlua]
0400 ZFMicro PCI Bridge
0401 ZFMicro Chipset SMI
0402 ZFMicro Chipset IDE
0403 ZFMicro Expansion Bus

1079 I-Bus
107a NetWorth
formerly Gateway 2000 / acquired by Acer Inc.
107b Gateway, Inc.
107c LG Electronics [Lucky Goldstar Co. Ltd]
107d LeadTek Research Inc.
0000 P86C850
107e Interphase Corporation
0001 5515 ATM Adapter [Flipper]
0002 100 VG AnyLan Controller
0004 5526 Fibre Channel Host Adapter
0005 x526 Fibre
Channel Host Adapter
0008 5525/5575 ATM Adapter (155 Mbit) [Atlantic]
9003 5535-4P-BRI-ST
9007 5535-4P-BRI-U
9008 5535-1P-SR
900c 5535-1P-SR-ST
900e 5535-1P-SR-U
9011 5535-1P-PRI
9013 5535-2P-PRI
9023 5536-4P-BRI-ST
9027 5536-4P-BRI-U
9031 5536-1P-PRI
9033 5536-2P-PRI
107f Data Technology Corporation
0802 SL82C105
1080 Contaq Microsystems
0600 82C599
c691 Cypress CY82C691
c693 82c693
1081 Supermac Technology
0d47 Radius PCI to NuBUS Bridge
1082 EFA Corporation of America
1083 Forex Computer Corporation
0001 FR710
1084 Parador
1086 J. Bond Computer Systems
1087 Cache Computer
1088 Microcomputer Systems (M) Son
1089 Data General Corporation
Formerly Bit3 Computer Corp.
108a SBS Technologies
0001 VME Bridge Model 617
0010 VME Bridge Model 618
0040 dataBLIZZARD
3000 VME Bridge Model 2706
108c Oakleigh Systems Inc.

108d Olicom
0001 Token-Ring 16/4 PCI Adapter (3136/3137)
0002 16/4 Token Ring
0004 RapidFire OC-3139/3140 Token-Ring
16/4 PCI Adapter
108d 0004 OC-3139/3140 RapidFire Token-Ring 16/4 Adapter
0005 GoCard 3250 Token-Ring 16/4 CardBus PC Card
0006 OC-3530 RapidFire Token-Ring 100
0007 RapidFire 3141 Token-Ring 16/4 PCI Fiber Adapter
108d 0007 OC-3141 RapidFire Token-Ring 16/4 Adapter
0008 RapidFire 3540 HSTR 100/16/4 PCI Adapter
108d 0008 OC-3540 RapidFire HSTR 100/16/4 Adapter
0011 OC-2315
0012 OC-2325
0013 OC-2183/2185
0014 OC-2326
0019 OC-2327/2250 10/100 Ethernet Adapter
108d 0016 OC-2327 Rapidfire 10/100 Ethernet Adapter
108d 0017 OC-2250 GoCard 10/100 Ethernet Adapter
0021 OC-6151/6152 [RapidFire ATM 155]
0022 ATM Adapter
108e Oracle/SUN
0001 EBUS
1000 EBUS
1001 Happy Meal 10/100 Ethernet [hme]
1100 RIO EBUS
108e 1100 RIO EBUS on Blade 100 motherboard
1101 RIO 10/100 Ethernet [eri]
108e 1101 RIO GEM on Blade 100 motherboard
1102 RIO 1394
108e 1102 RIO 1394 on Blade 100 motherboard
1103 RIO USB
108e 1103 RIO USB on Blade 100 motherboard
1647
Broadcom 570x 10/100/1000 Ethernet [bge]
1648 Broadcom 570x 10/100/1000 Ethernet [bge]
16a7 Broadcom 570x 10/100/1000 Ethernet [bge]
16a8 Broadcom 570x 10/100/1000 Ethernet [bge]
2bad GEM 10/100/1000 Ethernet [ge]
5000 Simba Advanced PCI Bridge
108e 5000 Netra AX1105-500
5043 SunPCI Co-processor
5ca0 Crypto Accelerator 6000 [mca]
6300 Intel 21554 PCI-PCI bus bridge [db21554]
6301 Intel 21554 PCI-PCI bus bridge [db21554]
6302 Intel 21554 PCI-PCI bus bridge [db21554]
6303 Intel 21554 PCI-PCI bus bridge [db21554]
6310 Intel 21554 PCI-PCI bus bridge [db21554]

6311 Intel 21554 PCI-PCI bus bridge [db21554]
6312 Intel 21554 PCI-PCI bus bridge [db21554]
6313 Intel 21554 PCI-PCI bus bridge [db21554]
6320 Intel 21554 PCI-PCI bus bridge [db21554]
6323 Intel 21554 PCI-PCI bus bridge [db21554]
6330 Intel 21554 PCI-PCI bus bridge [db21554]
6331 Intel 21554 PCI-PCI bus bridge [db21554]
6332 Intel 21554 PCI-PCI bus bridge [db21554]
6333 Intel
21554 PCI-PCI bus bridge [db21554]
6340 Intel 21554 PCI-PCI bus bridge [db21554]
6343 Intel 21554 PCI-PCI bus bridge [db21554]
6350 Intel 21554 PCI-PCI bus bridge [db21554]
6353 Intel 21554 PCI-PCI bus bridge [db21554]
6722 Intel 21554 PCI-PCI bus bridge [db21554]
676e SunPCiIII
7063 SunPCiII / SunPCiIIpro
8000 Psycho PCI Bus Module
8001 Schizo PCI Bus Module
8002 Schizo+ PCI Bus Module
80f0 PCIe switch [px]
80f8 PCIe switch [px]
9010 PCIe/PCI bridge switch [pxb_plx]
9020 PCIe/PCI bridge switch [pxb_plx]
9102 Davicom Fast Ethernet driver for Davicom DM9102A [dmfe]
a000 Psycho UPA-PCI Bus Module [pcipsy]
a001 Psycho UPA-PCI Bus Module [pcipsy]
108e a001 Ultra IIe on Blade 100 motherboard
a801 Schizo Fireplane-PCI bus bridge module [pcisch]
aaaa Multithreaded Shared 10GbE Ethernet Network Controller
abba Cassini 10/100/1000
abcd Multithreaded 10-Gigabit Ethernet Network Controller
c416 Sun Fire System/System Controller Interface chip [sbbc]
108f
Systemsoft
1090 Compro Computer Services, Inc.
4610 PCI RTOM
4620 GPIO HSD
1091 Intergraph Corporation
0020 3D graphics processor
0021 3D graphics processor w/Texturing
0040 3D graphics frame buffer
0041 3D graphics frame buffer
0060 Proprietary bus bridge
00e4 Powerstorm 4D50T
0720 Motion JPEG codec
0780 Intense3D Wildcat 3410 (MSMT496)
07a0 Sun Expert3D-Lite Graphics Accelerator

1091 Sun Expert3D Graphics Accelerator
1092 Diamond Multimedia Systems
0028 Viper V770
1092 4a00 Viper V770 32MB
00a0 Speedstar Pro SE
00a8 Speedstar 64
0550 Viper V550
08d4 Supra 2260 Modem
094c SupraExpress 56i Pro
1001 Video Crunch It 1001 capture card
1092 Viper V330
6120 Maximum DVD
8810 Stealth SE
8811 Stealth 64/SE
8880 Stealth
8881 Stealth
88b0 Stealth 64
88b1 Stealth 64
88c0 Stealth 64
88c1 Stealth 64
88d0 Stealth 64
88d1 Stealth 64
88f0 Stealth 64
88f1 Stealth 64
9999 DMD-I0928-1 "Monster sound" sound chip
1093 National
Instruments
0160 PCI-DIO-96
0162 PCI-MIO-16XE-50
0fe1 PXI-8320
1150 PCI-6533 (PCI-DIO-32HS)
1170 PCI-MIO-16XE-10
1180 PCI-MIO-16E-1
1190 PCI-MIO-16E-4
11b0 PXI-6070E
11c0 PXI-6040E
11d0 PXI-6030E
1270 PCI-6032E
1290 PCI-6704
12b0 PCI-6534
1310 PCI-6602
1320 PXI-6533
1330 PCI-6031E
1340 PCI-6033E
1350 PCI-6071E
1360 PXI-6602
13c0 PXI-6508
1490 PXI-6534

14e0 PCI-6110
14f0 PCI-6111
1580 PXI-6031E
15b0 PXI-6071E
1710 PXI-6509
17c0 PXI-5690
17d0 PCI-6503
1870 PCI-6713
1880 PCI-6711
18b0 PCI-6052E
18c0 PXI-6052E
1920 PXI-6704
1930 PCI-6040E
19c0 PCI-4472
1aa0 PXI-4110
1ad0 PCI-6133
1ae0 PXI-6133
1e30 PCI-6624
1e40 PXI-6624
1e50 PXI-5404
2410 PCI-6733
2420 PXI-6733
2430 PCI-6731
2470 PCI-4474
24a0 PCI-4065
24b0 PXI-4200
24f0 PXI-4472
2510 PCI-4472
2520 PCI-4474
27a0 PCI-6123
27b0 PXI-6123
2880 DAQCard-6601
2890 PCI-6036E
28a0 PXI-4461
28b0 PCI-6013
28c0 PCI-6014
28d0 PCI-5122
28e0
PXI-5122
29f0 PXI-7334
2a00 PXI-7344
2a60 PCI-6023E
2a70 PCI-6024E
2a80 PCI-6025E
2ab0 PXI-6025E
2b10 PXI-6527
2b20 PCI-6527
2b80 PXI-6713

2b90 PXI-6711
2c60 PCI-6601
2c70 PXI-6601
2c80 PCI-6035E
2c90 PCI-6703
2ca0 PCI-6034E
2cb0 PCI-7344
2cc0 PXI-6608
2d20 PXI-5600
2db0 PCI-6608
2dc0 PCI-4070
2dd0 PXI-4070
2eb0 PXI-4472
2ec0 PXI-6115
2ed0 PCI-6115
2ee0 PXI-6120
2ef0 PCI-6120
2fd1 PCI-7334
2fd2 PCI-7350
2fd3 PCI-7342
2fd5 PXI-7350
2fd6 PXI-7342
7003 PCI-6551
7004 PXI-6551
700b PXI-5421
700c PCI-5421
701a VXIpc-87xB
701b VXIpc-770
7023 PXI-2593
7027 PCI-MXI-2 Universal
702c PXI-7831R
702d PCI-7831R
702e PXI-7811R
702f PCI-7811R
7030 PCI-CAN (Series 2)
7031 PCI-CAN/2 (Series 2)
7032 PCI-CAN/LS (Series 2)
7033 PCI-CAN/LS2 (Series 2)
7034 PCI-CAN/DS (Series 2)
7035 PXI-8460 (Series 2, 1 port)
7036 PXI-8460 (Series 2, 2 ports)
7037 PXI-8461 (Series 2, 1 port)
7038 PXI-8461 (Series
2, 2 ports)
7039 PXI-8462 (Series 2)
703f PXI-2566
7040 PXI-2567
7044 MXI-4 Connection Monitor

7047 PXI-6653
704c PXI-2530
704f PXI-4220
7050 PXI-4204
7055 PXI-7830R
7056 PCI-7830R
705a PCI-CAN/XS (Series 2)
705b PCI-CAN/XS2 (Series 2)
705c PXI-8464 (Series 2, 1 port)
705d PXI-8464 (Series 2, 2 ports)
705e cRIO-9102
7060 PXI-5610
7064 PXI-1045 Trigger Routing Module
7065 PXI-6652
7066 PXI-6651
7067 PXI-2529
7068 PCI-CAN/SW (Series 2)
7069 PCI-CAN/SW2 (Series 2)
706a PXI-8463 (Series 2, 1 port)
706b PXI-8463 (Series 2, 2 ports)
7073 PCI-6723
7074 PXI-7833R
7075 PXI-6552
7076 PCI-6552
707c PXI-1428
707e PXI-4462
7080 PXI-8430/2 (RS-232) Interface
7081 PXI-8431/2 (RS-485) Interface
7083 PCI-7833R
7085 PCI-6509
7086 PXI-6528
7087 PCI-6515
7088 PCI-6514
708c PXI-2568
708d PXI-2569
70a9 PCI-6528
70aa PCI-6229
70ab PCI-6259
70ac PCI-6289
70ad PXI-6251
70ae PXI-6220
70af PCI-6221
70b0 PCI-6220
70b1
PXI-6229
70b2 PXI-6259
70b3 PXI-6289
70b4 PCI-6250

70b5 PXI-6221
70b6 PCI-6280
70b7 PCI-6254
70b8 PCI-6251
70b9 PXI-6250
70ba PXI-6254
70bb PXI-6280
70bc PCI-6284
70bd PCI-6281
70be PXI-6284
70bf PXI-6281
70c0 PCI-6143
70c3 PCI-6511
70c4 PXI-7330
70c5 PXI-7340
70c6 PCI-7330
70c7 PCI-7340
70c8 PCI-6513
70c9 PXI-6515
70ca PCI-1405
70cc PCI-6512
70cd PXI-6514
70ce PXI-1405
70cf PCIe-GPIB
70d0 PXI-2570
70d1 PXI-6513
70d2 PXI-6512
70d3 PXI-6511
70d4 PCI-6722
70d6 PXI-4072
70d7 PXI-6541
70d8 PXI-6542
70d9 PCI-6541
70da PCI-6542
70db PCI-8430/2 (RS-232) Interface
70dc PCI-8431/2 (RS-485) Interface
70dd PXI-8430/4 (RS-232) Interface
70de PXI-8431/4 (RS-485) Interface
70df PCI-8430/4 (RS-232) Interface
70e0 PCI-8431/4 (RS-485) Interface
70e1 PXI-2532
70e2 PXI-8430/8 (RS-232) Interface
70e3 PXI-8431/8 (RS-485) Interface
70e4 PCI-8430/8 (RS-232) Interface
70e5 PCI-8431/8 (RS-485) Interface
70e6 PXI-8430/16
(RS-232) Interface
70e7 PCI-8430/16 (RS-232) Interface

70e8 PXI-8432/2 (Isolated RS-232) Interface
70e9 PXI-8433/2 (Isolated RS-485) Interface
70ea PCI-8432/2 (Isolated RS-232) Interface
70eb PCI-8433/2 (Isolated RS-485) Interface
70ec PXI-8432/4 (Isolated RS-232) Interface
70ed PXI-8433/4 (Isolated RS-485) Interface
70ee PCI-8432/4 (Isolated RS-232) Interface
70ef PCI-8433/4 (Isolated RS-485) Interface
70f0 PXI-5922
70f1 PCI-5922
70f2 PCI-6224
70f3 PXI-6224
70f6 cRIO-9101
70f7 cRIO-9103
70f8 cRIO-9104
70ff PXI-6723
7100 PXI-6722
7104 PCIx-1429
7105 PCIe-1429
710a PXI-4071
710d PXI-6143
710e PCIe-GPIB
710f PXI-5422
7110 PCI-5422
7111 PXI-5441
7119 PXI-6561
711a PXI-6562
711b PCI-6561
711c PCI-6562
7120 PCI-7390
7121 PXI-5122EX
7122 PCI-5122EX
7123 PXIe-5653
7124 PCI-6510
7125 PCI-6516
7126 PCI-6517
7127 PCI-6518
7128 PCI-6519
7137 PXI-2575
713c PXI-2585
713d PXI-2586
7142 PXI-4224
7144 PXI-5124
7145
PCI-5124
7146 PCI-6132
7147 PXI-6132
7148 PCI-6122

7149 PXI-6122
714c PXI-5114
714d PCI-5114
7150 PXI-2564
7152 PCI-5640R
7156 PXI-1044 Trigger Routing Module
715d PCI-1426
7167 PXI-5412
7168 PCI-5412
716b PCI-6230
716c PCI-6225
716d PXI-6225
716f PCI-4461
7170 PCI-4462
7171 PCI-6010
7174 PXI-8360
7177 PXI-6230
717d PCIe-6251
717f PCIe-6259
7187 PCI-1410
718b PCI-6521
718c PXI-6521
7191 PCI-6154
7193 PXI-7813R
7194 PCI-7813R
7195 PCI-8254R
7197 PXI-5402
7198 PCI-5402
719f PCIe-6535
71a0 PCIe-6536
71a3 PXI-5650
71a4 PXI-5652
71a5 PXI-2594
71a7 PXI-2595
71a9 PXI-2596
71aa PXI-2597
71ab PXI-2598
71ac PXI-2599
71ad PCI-GPIB+
71ae PCIe-1430
71b7 PXI-1056 Trigger Routing Module
71b8 PXI-1045 Trigger Routing Module
71b9 PXI-1044 Trigger Routing Module
71bb PXI-2584
71bc PCI-6221 (37-pin)
71bf PCIe-1427
71c5 PCI-6520
71c6 PXI-2576

71c7 cRIO-9072
71dc PCI-1588
71e0 PCI-6255
71e1
PXI-6255
71e2 PXI-5406
71e3 PCI-5406
71fc PXI-4022
7209 PCI-6233
720a PXI-6233
720b PCI-6238
720c PXI-6238
7260 PXI-5142
7261 PCI-5142
726d PXI-5651
7273 PXI-4461
7274 PXI-4462
7279 PCI-6232
727a PXI-6232
727b PCI-6239
727c PXI-6239
727e SMBus Controller
1093 75ac PXIe-8388
1093 75ad PXIe-8389
1093 7650 PXIe-8381
1093 8360 PXIe-8360
1093 8370 PXIe-8370
1093 8375 PXIe-8375
7281 PCI-6236
7282 PXI-6236
7283 PXI-2554
7288 PXIe-5611
7293 PCIe-8255R
729d cRIO-9074
72a4 PCIe-4065
72a7 PCIe-6537
72a8 PXI-5152
72a9 PCI-5152
72aa PXI-5105
72ab PCI-5105
72b8 PXI-6682
72d0 PXI-2545
72d1 PXI-2546
72d2 PXI-2547
72d3 PXI-2548
72d4 PXI-2549
72d5 PXI-2555
72d6 PXI-2556

72d7 PXI-2557
72d8 PXI-2558
72d9 PXI-2559
72e8 PXIe-6251
72e9 PXIe-6259
72ef PXI-4498
72f0 PXI-4496
72fb PXIe-6672
730e PXI-4130
730f PXI-5922EX
7310 PCI-5922EX
731c PXI-2535
731d PXI-2536
7322 PXIe-6124
7327 PXI-6529
732c
VXI-8360T
7331 PXIe-5602
7332 PXIe-5601
7333 PXI-5900
7335 PXI-2533
7336 PXI-2534
7342 PXI-4461
7349 PXI-5154
734a PCI-5154
7357 PXI-4065
7359 PXI-4495
7370 PXI-4461
7373 sbRIO-9601
7374 IOtech-9601
7375 sbRIO-9602
7378 sbRIO-9641
737d PXI-5124EX
7384 PXI-7851R
7385 PXI-7852R
7386 PCIe-7851R
7387 PCIe-7852R
7390 PXI-7841R
7391 PXI-7842R
7392 PXI-7853R
7393 PCIe-7841R
7394 PCIe-7842R
7397 sbRIO-9611
7398 sbRIO-9612
7399 sbRIO-9631
739a sbRIO-9632
739b sbRIO-9642
73a1 PXIe-4498

73a2 PXIe-4496
73a5 PXIe-5641R
73a7 PXI-8250 Chassis Monitor Module
73a8 PXI-8511 CAN/LS
73a9 PXI-8511 CAN/LS
73aa PXI-8512 CAN/HS
73ab PXI-8512 CAN/HS
73ac PXI-8513 CAN/XS
73ad PXI-8513 CAN/XS
73af PXI-8516 LIN
73b1 PXI-8517 FlexRay
73b2 PXI-8531 CANopen
73b3 PXI-8531 CANopen
73b4 PXI-8532 DeviceNet
73b5 PXI-8532 DeviceNet
73b6 PCI-8511 CAN/LS
73b7 PCI-8511 CAN/LS
73b8 PCI-8512 CAN/HS
73b9 PCI-8512 CAN/HS
73ba
PCI-8513 CAN/XS
73bb PCI-8513 CAN/XS
73bd PCI-8516 LIN
73bf PCI-8517 FlexRay
73c0 PCI-8531 CANopen
73c1 PCI-8531 CANopen
73c2 PCI-8532 DeviceNet
73c3 PCI-8532 DeviceNet
73c5 PXIe-2527
73c6 PXIe-2529
73c8 PXIe-2530
73c9 PXIe-2532
73ca PXIe-2569
73cb PXIe-2575
73cc PXIe-2593
73d5 PXI-7951R
73d6 PXI-7952R
73d7 PXI-7953R
73e1 PXI-7854R
73ec PXI-7954R
73ed cRIO-9073
73f0 PXI-5153
73f1 PCI-5153
73f4 PXI-2515
73f6 cRIO-9111
73f7 cRIO-9112
73f8 cRIO-9113
73f9 cRIO-9114

73fa cRIO-9116
73fb cRIO-9118
7404 PXI-4132
7405 PXIe-6674T
7406 PXIe-6674
740e PCIe-8430/16 (RS-232) Interface
740f PCIe-8430/8 (RS-232) Interface
7410 PCIe-8431/16 (RS-485) Interface
7411 PCIe-8431/8 (RS-485) Interface
7414 PCIe-GPIB+
741c PXI-5691
741d PXI-5695
743c CSC-3059
7448 PXI-2510
7454 PXI-2512
7455 PXI-2514
7456 PXIe-2512
7457 PXIe-2514
745a PXI-6682H
745e PXI-5153EX
745f PCI-5153EX
7460 PXI-5154EX
7461 PCI-5154EX
746d
PXIe-5650
746e PXIe-5651
746f PXIe-5652
7472 PXI-2800
7495 PXIe-5603
7497 PXIe-5605
74ae PXIe-2515
74b4 PXI-2531
74b5 PXIe-2531
74c1 PXIe-8430/16 (RS-232) Interface
74c2 PXIe-8430/8 (RS-232) Interface
74c3 PXIe-8431/16 (RS-485) Interface
74c4 PXIe-8431/8 (RS-485) Interface
74d5 PXIe-5630
74d9 PCIe-8432/2 (Isolated RS-232) Interface
74da PCIe-8433/2 (Isolated RS-485) Interface
74db PCIe-8432/4 (Isolated RS-232) Interface
74dc PCIe-8433/4 (Isolated RS-485) Interface
74e8 NI 9148
7515 PCIe-8430/2 (RS-232) Interface
7516 PCIe-8430/4 (RS-232) Interface
7517 PCIe-8431/2 (RS-485) Interface
7518 PCIe-8431/4 (RS-485) Interface
751b cRIO-9081

751c cRIO-9082
7528 PXIe-4497
7529 PXIe-4499
752a PXIe-4492
7539 NI 9157
753a NI 9159
7598 PXI-2571
75a4 PXI-4131A
75b1 PCIe-7854R
75ba PXI-2543
75bb PXIe-2543
75e5 PXI-6683
75e6 PXI-6683H
75ef PXIe-5632
761c VXI-8360LT
761f PXI-2540
7620 PXIe-2540
7621 PXI-2541
7622
PXIe-2541
7626 NI 9154
7627 NI 9155
7638 PXI-2720
7639 PXI-2722
763a PXIe-2725
763b PXIe-2727
763c PXI-4465
764b PXIe-2790
764c PXI-2520
764d PXI-2521
764e PXI-2522
764f PXI-2523
7654 PXI-2796
7655 PXI-2797
7656 PXI-2798
7657 PXI-2799
765d PXI-2542
765e PXIe-2542
765f PXI-2544
7660 PXIe-2544
766d PCIe-6535B
766e PCIe-6536B
766f PCIe-6537B
76a3 PXIe-6535B
76a4 PXIe-6536B
76a5 PXIe-6537B
783e PXI-8368
9020 PXI-2501

9030 PXI-2503
9040 PXI-2527
9050 PXI-2565
9060 PXI-2590
9070 PXI-2591
9080 PXI-2580
9090 PCI-4021
90a0 PXI-4021
a001 PCI-MXI-2
b001 PCI-1408
b011 PXI-1408
b021 PCI-1424
b022 PXI-1424
b031 PCI-1413
b041 PCI-1407
b051 PXI-1407
b061 PCI-1411
b071 PCI-1422
b081 PXI-1422
b091 PXI-1411
b0b1 PCI-1409
b0c1 PXI-1409
b0e1 PCI-1428
c4c4 PXIe/PCIe Device
1093 728a PXIe-5421
1093 728b PXIe-5442
1093 728d PXIe-5451
1093 72a2 PXIe-5122
1093 72da PXIe-5422
1093 72f7
PXIe-6535
1093 72f8 PXIe-6536
1093 72f9 PXIe-6537
1093 7326 PCIe-6509
1093 736c PXIe-4140
1093 738b PXIe-5622
1093 73c4 PXIe-5450
1093 73c7 PXIe-6545
1093 73d4 PXIe-6544
1093 7425 PCIe-6320
1093 7427 PCIe-6321
1093 7428 PXIe-6323
1093 7429 PCIe-6323
1093 742a PXIe-6341
1093 742b PCIe-6341
1093 742c PXIe-6343
1093 742d PCIe-6343
1093 742f PCIe-6351

1093 7431 PCIe-6353
1093 7432 PXIe-6361
1093 7433 PCIe-6361
1093 7434 PXIe-6363
1093 7435 PCIe-6363
1093 7436 PXIe-6356
1093 7437 PXIe-6358
1093 7438 PXIe-6366
1093 7439 PXIe-6368
1093 7468 PXIe-5185
1093 7469 PXIe-5186
1093 7492 PXIe-4300
1093 7498 PXIe-6548
1093 7499 PXIe-6547
1093 74a8 PXIe-4330
1093 74a9 PXIe-4331
1093 74b1 PXIe-4154
1093 74b2 PXIe-4353
1093 74b6 PCIe-1433
1093 74cd PXIe-5643R
1093 74d0 PXIe-7961R
1093 74dd PXIe-6376
1093 74de PXIe-6378
1093 74e2 PXIe-7962R
1093 74e3 PXIe-7965R
1093 74e5 PXIe-4844
1093
74f3 PCIe-5140
1093 753c PXIe-1435
1093 7548 PXIe-5622 (25MHz DDC)
1093 754d PCIe-5155
1093 7551 PXIe-6556
1093 7553 PCIe-1473R
1093 7570 PCIe-1474R
1093 7571 PXIe-1475R
1093 7572 PXIe-1476R
1093 75a2 PXIe-5693
1093 75a3 PXIe-5694
1093 75a5 PXIe-4141
1093 75ce PXIe-7966R
1093 75cf PXIe-4357
1093 75d2 PXIe-RevB-5643R
1093 75d3 PXIe-5644R
1093 75ee PXIe-5645R
1093 7613 PXIe-6555
1093 7619 PXIe-5185
1093 761a PXIe-5186
1093 7629 PXIe-4142

1093 762a PXIe-4143
1093 762b PXIe-4138
1093 762c PXIe-4144
1093 762d PXIe-4145
1093 762e PXIe-5606
1093 7644 PXIe-4841
1093 764a PCIe-8237R-S
1093 7658 PXIe-5162 (4CH)
1093 76ab PXIe-4322
1093 76ad PXIe-4112
1093 76ae PXIe-4113
1093 76b5 PXIe-7971R
1093 76b6 PXIe-7972R
1093 76b7 PXIe-7975R
1093 76b8 PXIe-5696
1093 76b9 PXIe-5654
1093 76c8 PXIe-6614
1093 76c9 PXIe-6612
1093 76cb PXIe-5646R
1093 76cc PXIe-5162 (2CH)
1093 76ce
CVS-1459
1093 76d0 PXIe-5160 (2CH)
1093 76d1 PXIe-5160 (4CH)
1093 76dc PXIe-4610
1093 76ec PXIe-2524
1093 76ed PXIe-2525
1093 76ee PXIe-2526
1093 76ef PXIe-2737
1093 76f0 PXIe-2738
1093 76f1 PXIe-2739
1093 76fb PCIe-1473R-LX110
1093 76fc PXIe-5105
1093 76fd PXIe-5114
1093 76fe PXIe-5644R
1093 76ff PXIe-5644R
1093 7700 PXIe-5644R
1093 7701 PXIe-5645R
1093 7702 PXIe-5645R
1093 7703 PXIe-5645R
1093 770c PXIe-4139
1093 7711 PXIe-4464
1093 7712 PXIe-4463
1093 7716 PCIe-6612
1093 771d Unconfigured CA4 Switch
1093 771e PXIe-4339
1093 7735 cRIO-9033
1093 773e PXIe-5624R

1093 774b cRIO-9031
1093 774d cRIO-9034
1093 7755 cRIO-9030
1093 7768 PXIe-2747
1093 7769 PXIe-2748
1093 776a PXIe-2746
1093 7777 PXIe-7976R
1093 7782 PXIe-5646R
1093 7783 PXIe-5646R
1093 7784 PXIe-5646R
1093 7790 PXIe-5170R (4CH)
1093 7791 PXIe-5170R (8CH)
1093 7793 PXIe-5171R (8CH)
1093 77a5 PXIe-6345
1093
77a6 PXIe-6355
1093 77a7 PXIe-6365
1093 77a8 PXIe-6375
1093 77aa CVS-1458
1093 77ad IC-3173
1093 77b4 PXIe-7820R
1093 77b5 PXIe-7821R
1093 77b6 PXIe-7822R
1093 77b9 cRIO-9038
1093 77ba PXIe-4136
1093 77bb PXIe-4137
1093 77c0 PXIe-5624R
1093 77c1 PXIe-5624R
1093 77c2 PXIe-5624R
1093 77ca PXIe-6738
1093 77cb PXIe-6739
1093 77db cRIO-9035
1093 77dc cRIO-9036
1093 77dd cRIO-9039
1093 7802 PXIe-4302
1093 7803 PXIe-4303
1093 7805 PXIe-4305
1093 786f PXIe-4163
1093 788e PXIe-4304
1093 78f8 NI FlexRIO Module (KU035)
1093 78f9 NI FlexRIO Module (KU040)
1093 78fa NI FlexRIO Module (KU060)
1093 78ff PXIe-4162
1093 7995 PXIe-7911R
1093 7996 PXIe-7912R
1093 7997 PXIe-7915R
1093 79d3 NI FlexRIO PCIe Module (KU035)
1093 79d4 NI FlexRIO PCIe Module (KU040)

1093 79d5 NI FlexRIO PCIe Module (KU060)

c801 PCI-GPIB

c811 PCI-GPIB+

c821 PXI-GPIB

c831 PMC-GPIB

c840 PCI-GPIB

d130 PCI-232/2 Interface

d140

PCI-232/4 Interface

d150 PCI-232/8 Interface

d160 PCI-485/2 Interface

d170 PCI-485/4 Interface

d190 PXI-8422/2 (Isolated RS-232) Interface

d1a0 PXI-8422/4 (Isolated RS-232) Interface

d1b0 PXI-8423/2 (Isolated RS-485) Interface

d1c0 PXI-8423/4 (Isolated RS-485) Interface

d1d0 PXI-8420/2 (RS-232) Interface

d1e0 PXI-8420/4 (RS-232) Interface

d1f0 PXI-8420/8 (RS-232) Interface

d1f1 PXI-8420/16 (RS-232) Interface

d230 PXI-8421/2 (RS-485) Interface

d240 PXI-8421/4 (RS-485) Interface

d250 PCI-232/2 (Isolated) Interface

d260 PCI-485/2 (Isolated) Interface

d270 PCI-232/4 (Isolated) Interface

d280 PCI-485/4 (Isolated) Interface

d290 PCI-485/8 Interface

d2a0 PXI-8421/8 (RS-485) Interface

d2b0 PCI-232/16 Interface

e111 PCI-CAN

e131 PXI-8461 (1 port)

e141 PCI-CAN/LS

e151 PXI-8460 (1 port)

e211 PCI-CAN/2

e231 PXI-8461 (2 ports)

e241 PCI-CAN/LS2

e251 PXI-8460 (2 ports)

e261 PCI-CAN/DS

e271 PXI-8462

f110 VMEpc-650

f120 VXIpc-650

fe00

VXIpc-87x

fe41 VXIpc-860

fe51 VXIpc-74x

fe61 VXIpc-850

fe70 VXIpc-880

1094 First International Computers [FIC]

nec CMD Technology Inc
1095 Silicon Image, Inc.
0240 Adaptec AAR-1210SA SATA HostRAID Controller
0640 PCI0640
0643 PCI0643
0646 PCI0646
0647 PCI0647
0648 PCI0648
1043 8025 CUBX motherboard
0649 SiI 0649 Ultra ATA/100 PCI to ATA Host Controller
0e11 005d Integrated Ultra ATA-100 Dual Channel Controller
0e11 007e Integrated Ultra ATA-100 IDE RAID Controller
101e 0649 AMI MegaRAID IDE 100 Controller
0650 PBC0650A
0670 USB0670
1095 0670 USB0670
0673 USB0673
0680 PCI0680 Ultra ATA-133 Host Controller
1095 0680 SiI 0680 ATA/133 Controller
1095 3680 Winic W-680 (Silicon Image 680 based)
3112 SiI 3112 [SATALink/SATARaid] Serial ATA Controller
1095 3112 SiI 3112 SATALink Controller
1095 6112 SiI 3112 SATARaid Controller
9005 0250 SATAConnect 1205SA Host Controller
3114 SiI 3114 [SATALink/SATARaid] Serial ATA
Controller
1043 8167 A8N-SLI Deluxe/Premium Mainboard
1095 3114 SiI 3114 SATALink Controller
1095 6114 SiI 3114 SATARaid Controller
3124 SiI 3124 PCI-X Serial ATA Controller
1095 3124 SiI 3124 PCI-X Serial ATA Controller
3132 SiI 3132 Serial ATA Raid II Controller
3512 SiI 3512 [SATALink/SATARaid] Serial ATA Controller
1095 3512 SiI 3512 SATALink Controller
1095 6512 SiI 3512 SATARaid Controller
3531 SiI 3531 [SATALink/SATARaid] Serial ATA Controller
17c0 4083 Medion WIM 2210 Notebook PC [MD96850]
1096 Alacron
1097 Appian Technology
1098 Quantum Designs (H.K.) Ltd
0001 QD-8500
0002 QD-8580
1099 Samsung Electronics Co., Ltd
109a Packard Bell
109b Gemlight Computer Ltd.
109c Megachips Corporation
109d Zida Technologies Ltd.
109e Brooktree Corporation

0310 Bt848 Video Capture
032e Bt878 Video Capture
0350 Bt848 Video Capture
0351 Bt849A Video capture
0369 Bt878 Video Capture
1002 0001 TV-Wonder
1002 0003 TV-Wonder/VE
036c Bt879(??)
Video Capture
13e9 0070 Win/TV (Video Section)
036e Bt878 Video Capture
0000 0001 Euresys Picolo PCIe
0070 13eb WinTV Series
0070 ff01 Viewcast Osprey 200
0071 0101 DigiTV PCI
107d 6606 WinFast TV 2000
11bd 0012 PCTV pro (TV + FM stereo receiver)
11bd 001c PCTV Sat (DBC receiver)
127a 0001 Bt878 Mediastream Controller NTSC
127a 0002 Bt878 Mediastream Controller PAL BG
127a 0003 Bt878a Mediastream Controller PAL BG
127a 0048 Bt878/832 Mediastream Controller
144f 3000 MagicTView CPH060 - Video
1461 0002 TV98 Series (TV/No FM/Remote)
1461 0003 AverMedia UltraTV PCI 350
1461 0004 AVerTV WDM Video Capture
1461 0761 AVerTV DVB-T
1461 0771 AverMedia AVerTV DVB-T 771
14f1 0001 Bt878 Mediastream Controller NTSC
14f1 0002 Bt878 Mediastream Controller PAL BG
14f1 0003 Bt878a Mediastream Controller PAL BG
14f1 0048 Bt878/832 Mediastream Controller
1822 0001 VisionPlus DVB card
1851 1850 FlyVideo'98 - Video
1851 1851 FlyVideo

II

1852 1852 FlyVideo'98 - Video (with FM Tuner)
18ac d500 DViCO FusionHDTV5 Lite
270f fc00 Digitop DTT-1000

Vendor/ID appear to be randomly chosen

aa00 1460 Spectra8 CardA Input0

Vendor/ID appear to be randomly chosen

aa01 1461 Spectra8 CardA Input1

Vendor/ID appear to be randomly chosen

aa02 1462 Spectra8 CardA Input2

Vendor/ID appear to be randomly chosen

aa03 1463 Spectra8 CardA Input3

Vendor/ID appear to be randomly chosen

aa04 1464 Spectra8 CardB Input0
Vendor/ID appear to be randomly chosen
aa05 1465 Spectra8 CardB Input1
Vendor/ID appear to be randomly chosen
aa06 1466 Spectra8 CardB Input2
Vendor/ID appear to be randomly chosen
aa07 1467 Spectra8 CardB Input3
Vendor/ID appear to be randomly chosen
aa08 1468 Spectra8 CardC Input0
Vendor/ID appear to be randomly chosen
aa09 1469 Spectra8 CardC Input1
Vendor/ID appear to be randomly chosen
aa0a 146a Spectra8 CardC Input2
Vendor/ID appear to be randomly chosen
aa0b
146b Spectra8 CardC Input3
Vendor/ID appear to be randomly chosen
aa0c 146c Spectra8 CardD Input0
Vendor/ID appear to be randomly chosen
aa0d 146d Spectra8 CardD Input1
Vendor/ID appear to be randomly chosen
aa0e 146e Spectra8 CardD Input2
Vendor/ID appear to be randomly chosen
aa0f 146f Spectra8 CardD Input3
bd11 1200 PCTV pro (TV + FM stereo receiver)
036f Bt879 Video Capture
127a 0044 Bt879 Video Capture NTSC
127a 0122 Bt879 Video Capture PAL I
127a 0144 Bt879 Video Capture NTSC
127a 0222 Bt879 Video Capture PAL BG
127a 0244 Bt879a Video Capture NTSC
127a 0322 Bt879 Video Capture NTSC
127a 0422 Bt879 Video Capture NTSC
127a 1122 Bt879 Video Capture PAL I
127a 1222 Bt879 Video Capture PAL BG
127a 1322 Bt879 Video Capture NTSC
127a 1522 Bt879a Video Capture PAL I
127a 1622 Bt879a Video Capture PAL BG
127a 1722 Bt879a Video Capture NTSC
14f1 0044 Bt879 Video Capture NTSC
14f1 0122 Bt879 Video Capture PAL I
14f1
0144 Bt879 Video Capture NTSC
14f1 0222 Bt879 Video Capture PAL BG
14f1 0244 Bt879a Video Capture NTSC
14f1 0322 Bt879 Video Capture NTSC
14f1 0422 Bt879 Video Capture NTSC
14f1 1122 Bt879 Video Capture PAL I

14f1 1222 Bt879 Video Capture PAL BG
14f1 1322 Bt879 Video Capture NTSC
14f1 1522 Bt879a Video Capture PAL I
14f1 1622 Bt879a Video Capture PAL BG
14f1 1722 Bt879a Video Capture NTSC
1851 1850 FlyVideo'98 - Video
1851 1851 FlyVideo II
1852 1852 FlyVideo'98 - Video (with FM Tuner)
0370 Bt880 Video Capture
1851 1850 FlyVideo'98
1851 1851 FlyVideo'98 EZ - video
1852 1852 FlyVideo'98 (with FM Tuner)
0878 Bt878 Audio Capture
0000 0001 Euresys Picolo PCIe
0070 13eb WinTV Series
0070 ff01 Viewcast Osprey 200
0071 0101 DigiTV PCI
1002 0001 TV-Wonder
1002 0003 TV-Wonder/VE
11bd 0012 PCTV pro (TV + FM stereo receiver, audio section)
11bd 001c PCTV Sat (DBC receiver)
127a 0001 Bt878 Video Capture (Audio Section)
127a
0002 Bt878 Video Capture (Audio Section)
127a 0003 Bt878 Video Capture (Audio Section)
127a 0048 Bt878 Video Capture (Audio Section)
13e9 0070 Win/TV (Audio Section)
144f 3000 MagicTView CPH060 - Audio
1461 0002 Avermedia PCTV98 Audio Capture
1461 0003 UltraTV PCI 350
1461 0004 AVerTV WDM Audio Capture
1461 0761 AVerTV DVB-T
1461 0771 AverMedia AVerTV DVB-T 771
14f1 0001 Bt878 Video Capture (Audio Section)
14f1 0002 Bt878 Video Capture (Audio Section)
14f1 0003 Bt878 Video Capture (Audio Section)
14f1 0048 Bt878 Video Capture (Audio Section)
1822 0001 VisionPlus DVB Card
18ac d500 DVICO FusionHDTV5 Lite
270f fc00 Digitop DTT-1000
bd11 1200 PCTV pro (TV + FM stereo receiver, audio section)
0879 Bt879 Audio Capture
127a 0044 Bt879 Video Capture (Audio Section)
127a 0122 Bt879 Video Capture (Audio Section)
127a 0144 Bt879 Video Capture (Audio Section)
127a 0222 Bt879 Video Capture (Audio Section)
127a 0244

Bt879 Video Capture (Audio Section)
127a 0322 Bt879 Video Capture (Audio Section)
127a 0422 Bt879 Video Capture (Audio Section)
127a 1122 Bt879 Video Capture (Audio Section)
127a 1222 Bt879 Video Capture (Audio Section)
127a 1322 Bt879 Video Capture (Audio Section)
127a 1522 Bt879 Video Capture (Audio Section)
127a 1622 Bt879 Video Capture (Audio Section)
127a 1722 Bt879 Video Capture (Audio Section)
14f1 0044 Bt879 Video Capture (Audio Section)
14f1 0122 Bt879 Video Capture (Audio Section)
14f1 0144 Bt879 Video Capture (Audio Section)
14f1 0222 Bt879 Video Capture (Audio Section)
14f1 0244 Bt879 Video Capture (Audio Section)
14f1 0322 Bt879 Video Capture (Audio Section)
14f1 0422 Bt879 Video Capture (Audio Section)
14f1 1122 Bt879 Video Capture (Audio Section)
14f1 1222 Bt879 Video Capture (Audio Section)
14f1 1322 Bt879 Video Capture (Audio Section)
14f1 1522 Bt879 Video Capture (Audio Section)
14f1 1622 Bt879 Video Capture
(Audio Section)
14f1 1722 Bt879 Video Capture (Audio Section)
0880 Bt880 Audio Capture
2115 BtV 2115 Mediastream controller
2125 BtV 2125 Mediastream controller
2164 BtV 2164
2165 BtV 2165
8230 Bt8230 ATM Segment/Reassembly Ctrlr (SRC)
8472 Bt8472
8474 Bt8474
109f Trigem Computer Inc.
10a0 Meidensha Corporation
10a1 Juko Electronics Ind. Co. Ltd
10a2 Quantum Corporation
10a3 Everex Systems Inc
10a4 Globe Manufacturing Sales
10a5 Smart Link Ltd.
3052 SmartPCI562 56K Modem
5449 SmartPCI561 modem
10a6 Informtech Industrial Ltd.
10a7 Benchmarq Microelectronics
10a8 Sierra Semiconductor
0000 STB Horizon 64
10a9 Silicon Graphics Intl. Corp.
0001 Crosstalk to PCI Bridge
0002 Linc I/O controller
0003 IOC3 I/O controller

0004 O2 MACE
0005 RAD Audio
0006 HPCEX
0007 RPCEX
0008 DiVO VIP
0009 AceNIC Gigabit Ethernet
10a9 8002 AceNIC Gigabit Ethernet
0010 AMP Video I/O
0011 GRIP
0012 SGH PSHAC GSN
0208 SSIM1 SAS Adapter
1001 Magic Carpet
1002
Lithium
1003 Dual JPEG 1
1004 Dual JPEG 2
1005 Dual JPEG 3
1006 Dual JPEG 4
1007 Dual JPEG 5
1008 Cesium
100a IOC4 I/O controller
1504 SSIM1 Fibre Channel Adapter
2001 Fibre Channel
2002 ASDE
4001 TIO-CE PCI Express Bridge
4002 TIO-CE PCI Express Port
8001 O2 1394
8002 G-net NT
PCIe x1 Low Profile
802b REACT external interrupt controller
10aa ACC Microelectronics
0000 ACCM 2188
2051 2051 CPU bridge
5842 2051 ISA bridge
10ab Digicom
10ac Honeywell IAC
10ad Symphony Labs
0001 W83769F
0003 SL82C103
0005 SL82C105
0103 SL82c103
0105 SL82c105
0565 W83C553F/W83C554F
10ae Cornerstone Technology
10af Micro Computer Systems Inc
10b0 CardExpert Technology
10b1 Cabletron Systems Inc
10b2 Raytheon Company

10b3 Databook Inc
3106 DB87144
b106 DB87144
10b4 STB Systems Inc
1b1d Velocity 128 3D
10b4 237e Velocity 4400
10b5 PLX Technology, Inc.
0001 i960 PCI bus interface
0557 PCI9030 32-bit 33MHz PCI <-> IOBus Bridge
10b5
9030 Digium Tormenta 2 T400P-SS7 or E400P-SS7 Quad T1 or E1 PCI card
1000 PCI9030 32-bit 33MHz PCI <-> IOBus Bridge
10b5 9030 ATCOM AT400P Quad T1 PCI card
1024 Acromag, Inc. IndustryPack Carrier Card
1042 Brandywine / jxi2, Inc. - PMC-SyncClock32, IRIG A & B, Nasa 36
106a Dual OX16C952 4 port serial adapter [Megawolf Romulus/4]
1076 VScom 800 8 port serial adaptor
1077 VScom 400 4 port serial adaptor
1078 VScom 210 2 port serial and 1 port parallel adaptor
1103 VScom 200 2 port serial adaptor
1146 VScom 010 1 port parallel adaptor
1147 VScom 020 2 port parallel adaptor
2000 PCI9030 32-bit 33MHz PCI <-> IOBus Bridge
10b5 9030 ATCOM AE400P Quad E1 PCI card
2540 IXXAT CAN-Interface PC-I 04/PCI
2724 Thales PCSM Security Card
3376 Cosateq 4 Port CAN Card
4000 PCI9030 32-bit 33MHz PCI <-> IOBus Bridge
10b5 9030 Tormenta 3 Varion V400P/ATCOM TE400P Quad E1/T1/J1 PCI card
4001 PCI9030 32-bit 33MHz PCI <-> IOBus Bridge
10b5 9030 ATCOM A400PE
Quad E1 PCI card
4002 PCI9030 32-bit 33MHz PCI <-> IOBus Bridge
10b5 9030 ATCOM A400PT Quad T1 PCI card
6140 PCI6140 32-bit 33MHz PCI-to-PCI Bridge
6150 PCI6150 32-bit 33MHz PCI-to-PCI Bridge
6152 PCI6152 32-bit 66MHz PCI-to-PCI Bridge
6154 PCI6154 64-bit 66MHz PCI-to-PCI Bridge
6254 PCI6254 64-bit 66MHz PCI-to-PCI Bridge
6466 PCI6466 64-bit 66MHz PCI-to-PCI Bridge
6520 PCI6520 64-bit 133MHz PCI-X-to-PCI-X Bridge
6540 PCI6540 64-bit 133MHz PCI-X-to-PCI-X Bridge
1775 1100 CR11 Single Board Computer
4c53 10e0 PSL09 PrPMC
6541 PCI6540/6466 PCI-PCI bridge (non-transparent mode, primary side)
1775 1100 CR11 Single Board Computer
4c53 10e0 PSL09 PrPMC
6542 PCI6540/6466 PCI-PCI bridge (non-transparent mode, secondary side)

1775 1100 CR11 Single Board Computer
4c53 10e0 PSL09 PrPMC
8111 PEX 8111 PCI Express-to-PCI Bridge
8112 PEX8112 x1 Lane PCI Express-to-PCI Bridge
8114 PEX 8114 PCI Express-to-PCI/PCI-X Bridge
8311 PEX8311 x1 Lane PCI Express-to-Generic
Local Bus Bridge
8505 PEX 8505 5-lane, 5-port PCI Express Switch
8508 PEX 8508 8-lane, 5-port PCI Express Switch
8509 PEX 8509 8-lane, 8-port PCI Express Switch
8512 PEX 8512 12-lane, 5-port PCI Express Switch
8516 PEX 8516 Versatile PCI Express Switch
8517 PEX 8517 16-lane, 5-port PCI Express Switch
8518 PEX 8518 16-lane, 5-port PCI Express Switch
8524 PEX 8524 24-lane, 6-port PCI Express Switch
8525 PEX 8525 24-lane, 5-port PCI Express Switch
8532 PEX 8532 Versatile PCI Express Switch
8533 PEX 8533 32-lane, 6-port PCI Express Switch
8547 PEX 8547 48-lane, 3-port PCI Express Switch
8548 PEX 8548 48-lane, 9-port PCI Express Switch
8603 PEX 8603 3-lane, 3-Port PCI Express Gen 2 (5.0 GT/s) Switch
8604 PEX 8604 4-lane, 4-Port PCI Express Gen 2 (5.0 GT/s) Switch
8605 PEX 8605 PCI Express 4-port Gen2 Switch
8606 PEX 8606 6 Lane, 6 Port PCI Express Gen 2 (5.0 GT/s) Switch
8608 PEX 8608 8-lane, 8-Port PCI Express Gen 2 (5.0 GT/s) Switch
8609
PEX 8609 8-lane, 8-Port PCI Express Gen 2 (5.0 GT/s) Switch with DMA
8612 PEX 8612 12-lane, 4-Port PCI Express Gen 2 (5.0 GT/s) Switch
8613 PEX 8613 12-lane, 3-Port PCI Express Gen 2 (5.0 GT/s) Switch
8614 PEX 8614 12-lane, 12-Port PCI Express Gen 2 (5.0 GT/s) Switch
8615 PEX 8615 12-lane, 12-Port PCI Express Gen 2 (5.0 GT/s) Switch with DMA
8616 PEX 8616 16-lane, 4-Port PCI Express Gen 2 (5.0 GT/s) Switch
8617 PEX 8617 16-lane, 4-Port PCI Express Gen 2 (5.0 GT/s) Switch with P2P
8618 PEX 8618 16-lane, 16-Port PCI Express Gen 2 (5.0 GT/s) Switch
8619 PEX 8619 16-lane, 16-Port PCI Express Gen 2 (5.0 GT/s) Switch with DMA
8624 PEX 8624 24-lane, 6-Port PCI Express Gen 2 (5.0 GT/s) Switch [ExpressLane]
13a3 1845 DX1845 Acceleration Card
8625 PEX 8625 24-lane, 24-Port PCI Express Gen 2 (5.0 GT/s) Switch
8632 PEX 8632 32-lane, 12-Port PCI Express Gen 2 (5.0 GT/s) Switch
8636 PEX 8636 36-lane, 24-Port PCI Express Gen 2 (5.0 GT/s) Switch
8647 PEX 8647 48-Lane, 3-Port
PCI Express Gen 2 (5.0 GT/s) Switch
8648 PEX 8648 48-lane, 12-Port PCI Express Gen 2 (5.0 GT/s) Switch
8649 PEX 8649 48-lane, 12-Port PCI Express Gen 2 (5.0 GT/s) Switch
8664 PEX 8664 64-lane, 16-Port PCI Express Gen 2 (5.0 GT/s) Switch
8680 PEX 8680 80-lane, 20-Port PCI Express Gen 2 (5.0 GT/s) Multi-Root Switch
8696 PEX 8696 96-lane, 24-Port PCI Express Gen 2 (5.0 GT/s) Multi-Root Switch
8717 PEX 8717 16-lane, 8-Port PCI Express Gen 3 (8.0 GT/s) Switch with DMA

8718 PEX 8718 16-Lane, 5-Port PCI Express Gen 3 (8.0 GT/s) Switch
 8724 PEX 8724 24-Lane, 6-Port PCI Express Gen 3 (8 GT/s) Switch, 19 x 19mm FCBGA
 8732 PEX 8732 32-lane, 8-Port PCI Express Gen 3 (8.0 GT/s) Switch
 8734 PEX 8734 32-lane, 8-Port PCI Express Gen 3 (8.0GT/s) Switch
 8747 PEX 8747 48-Lane, 5-Port PCI Express Gen 3 (8.0 GT/s) Switch
 8748 PEX 8748 48-Lane, 12-Port PCI Express Gen 3 (8 GT/s) Switch, 27 x 27mm FCBGA
 # This is the Non-Transparent-Bridge Virtualized Port as presented by the PLX
 PEX 8732 chip, the physical bridges show up at 10b5:8732
 87b0 PEX 8732 32-lane, 8-Port PCI Express Gen 3 (8.0 GT/s) Switch
 1093 7761 PXIe-8830mc
 9016 PLX 9016 8-port serial controller
 9030 PCI9030 32-bit 33MHz PCI <-> IOBus Bridge
 10b5 2695 Hilscher CIF50-PB/DPS Profibus
 10b5 2862 Alpermann+Velte PCL PCI LV (3V/5V): Timecode Reader Board
 10b5 2906 Alpermann+Velte PCI TS (3V/5V): Time Synchronisation Board
 10b5 2940 Alpermann+Velte PCL PCI D (3V/5V): Timecode Reader Board
 10b5 2977 IXXAT iPC-I XC16/PCI CAN Board
 10b5 2978 SH ARC-PCIu/SH ARC-PCI104/SH ARC-PCIe SOHARD ARCNET card
 10b5 3025 Alpermann+Velte PCL PCI L (3V/5V): Timecode Reader Board
 10b5 3068 Alpermann+Velte PCL PCI HD (3V/5V): Timecode Reader Board
 10b5 3463 Alpermann+Velte PCL PCI D (v2) (3V/5V): Timecode Reader Board
 10b5 3591 PLURA PCL PCI L (v2) (3.3V/5V): Time Code Reader Board
 12fe 0111 CPCI-ASIO4 (ESD 4-port Serial Interface Board)
 1369 9c01 VX222v2
 1369 9d01 VX222-Mic
 1369
 9d02 VX222-Mic
 1369 9e01 PCX924v2
 1369 9f01 PCX924-Mic
 1369 9f02 PCX924-Mic
 1369 a001 PCX22v2
 1369 a701 LCM220v2
 1369 a801 LCM200
 1397 3136 4xS0-ISDN PCI Adapter
 1397 3137 S2M-E1-ISDN PCI Adapter
 1518 0200 ThinkIO-C
 15ed 1002 MCCA 8-port Serial Hot Swap
 15ed 1003 MCCA 16-port Serial Hot Swap
 # MIL-STD-1553B Board
 e1c5 0001 TE1-PCI
 e1c5 0005 TA1-PCI
 e1c5 0006 TA1-PCI4
 9036 9036
 9050 PCI <-> IOBus Bridge
 10b5 1067 IXXAT CAN i165
 10b5 114e Wasco WITIO PCI168extended
 10b5 1169 Wasco OPTOIO32standard 32 digital in, 32 digital out
 10b5 1172 IK220 (Heidenhain)

10b5 2036 SatPak GPS
10b5 2221 Alpermann+Velte PCL PCI LV: Timecode Reader Board
10b5 2273 SH ARC-PCI SOHARD ARCNET card
10b5 2431 Alpermann+Velte PCL PCI D: Timecode Reader Board
10b5 2905 Alpermann+Velte PCI TS: Time Synchronisation Board
10b5 3196 Goramo PLX200SYN sync serial card
10b5 9050 PCI-I04 PCI Passive PC/CAN Interface
1369 8901 PCX11+

PCI

1369 8f01 VX222
1369 9401 PCX924
1369 9501 PCX22
1498 0362 TPMC866 8 Channel Serial Card
1522 0001 RockForce 4 Port V.90 Data/Fax/Voice Modem
1522 0002 RockForce 2 Port V.90 Data/Fax/Voice Modem
1522 0003 RockForce 6 Port V.90 Data/Fax/Voice Modem
1522 0004 RockForce 8 Port V.90 Data/Fax/Voice Modem
1522 0010 RockForce2000 4 Port V.90 Data/Fax/Voice Modem
1522 0020 RockForce2000 2 Port V.90 Data/Fax/Voice Modem
15ed 1000 Macrolink M CCS 8-port Serial
15ed 1001 Macrolink M CCS 16-port Serial
15ed 1002 Macrolink M CCS 8-port Serial Hot Swap
15ed 1003 Macrolink M CCS 16-port Serial Hot Swap
5654 2036 OpenSwitch 6 Telephony card
5654 3132 OpenSwitch 12 Telephony card
5654 5634 OpenLine4 Telephony Card
d531 c002 PCIIntelliCAN 2xSJA1000 CAN bus
d84d 4006 EX-4006 1P
d84d 4008 EX-4008 1P EPP/ECP
d84d 4014 EX-4014 2P
d84d 4018 EX-4018 3P EPP/ECP
d84d 4025 EX-4025 1S(16C550) RS-232
d84d 4027 EX-4027 1S(16C650) RS-232
d84d 4028
EX-4028 1S(16C850) RS-232
d84d 4036 EX-4036 2S(16C650) RS-232
d84d 4037 EX-4037 2S(16C650) RS-232
d84d 4038 EX-4038 2S(16C850) RS-232
d84d 4052 EX-4052 1S(16C550) RS-422/485
d84d 4053 EX-4053 2S(16C550) RS-422/485
d84d 4055 EX-4055 4S(16C550) RS-232
d84d 4058 EX-4055 4S(16C650) RS-232
d84d 4065 EX-4065 8S(16C550) RS-232
d84d 4068 EX-4068 8S(16C650) RS-232
d84d 4078 EX-4078 2S(16C552) RS-232+1P
9052 PCI9052 PCI <-> IOBus Bridge
9054 PCI9054 32-bit 33MHz PCI <-> IOBus Bridge
10b5 2455 Wessex Techology PHIL-PCI

10b5 2696 Innes Corp AM Radcap card
10b5 2717 Innes Corp Auricon card
10b5 2844 Innes Corp TVS Encoder card
12c7 4001 Intel Dialogic DM/V960-4T1 PCI
12d9 0002 PCI Prosody Card rev 1.5
14b4 d100 Dektec DTA-100
14b4 d114 Dektec DTA-120
16df 0011 PIKA PrimeNet MM PCI
16df 0012 PIKA PrimeNet MM cPCI 8
16df 0013 PIKA PrimeNet MM cPCI 8 (without CAS Signaling)
16df 0014 PIKA PrimeNet MM cPCI 4
16df 0015 PIKA Daytona
MM
16df 0016 PIKA InLine MM
9056 PCI9056 32-bit 66MHz PCI <-> IOBus Bridge
10b5 2979 CellinkBlade 11 - CPCI board VoATM AAL1
10b5 3268 IXXAT iPC-I XC16/PCIe CAN Board
10b5 3334 Cambridge Pixel HPx Radar Input Card
10b5 3352 Alpermann+Velte PCL PCIe HD: Timecode Reader Board
10b5 3353 Alpermann+Velte PCL PCIe D: Timecode Reader Board
10b5 3354 Alpermann+Velte PCL PCIe LV: Timecode Reader Board
10b5 3355 Alpermann+Velte PCL PCIe L: Timecode Reader Board
10b5 3415 Alpermann+Velte PCIe TS: Time Synchronisation Board
10b5 3493 Alpermann+Velte PCL PCIe 3G: Timecode Reader Board
10b5 3565 Cambridge Pixel HPx Radar Output Card
1369 c001 LX6464ES
1369 c201 LX1616ES
14b4 d10a DekTec DTA-110T
14b4 d128 Dektec DTA-140
14b4 d140 Dektec DTA-140
1a0e 006f Dektec DTA-111
9060 PCI9060 32-bit 33MHz PCI <-> IOBus Bridge
906d 9060SD
125c 0640 Aries 16000P
906e 9060ES
9080 PCI9080 32-bit; 33MHz PCI <-> IOBus Bridge
103c 10eb (Agilent)
E2777B 83K Series Optical Communication Interface
103c 10ec (Agilent) E6978-66442 PCI CIC
10b5 1123 Sectra KK631 encryption board
10b5 9080 9080 [real subsystem ID not set]
12d9 0002 PCI Prosody Card
12df 4422 4422PCI ["Do-All" Telemetry Data Acquisition System]
1369 9601 PCX822np
1369 a102 PCX822v2
1369 a201 PCX442
1369 a301 LCM440v2
1369 a401 VX822

1369 a402 VX822v2
1369 a901 LCM420
1369 aa01 VX820v2
1517 000b ECSG-1R3ADC-PMC Clock synthesizer
9656 PCI9656 PCI <-> IOBus Bridge
1517 000f ECDR-GC314-PMC Receiver
1885 0700 Tsunami FPGA PMC with Altera Stratix S40
1885 0701 Tsunami FPGA PMC with Altera Stratix S30
9733 PEX 9733 33-lane, 9-port PCI Express Gen 3 (8.0 GT/s) Switch
1d49 0001 ThinkSystem 1610-4P NVMe Switch Adapter
1d49 0002 ThinkSystem 810-4P NVMe Switch Adapter
9749 PEX 9749 49-lane, 13-port PCI Express Gen 3 (8.0 GT/s) Switch
1d49 0004 ThinkSystem 1610-8P NVMe Switch Adapter
a100 Blackmagic Design DeckLink
bb04
B&B 3PCIOSD1A Isolated PCI Serial
c001 CronyxOmega-PCI (8-port RS232)
d00d PCI9030 32-bit 33MHz PCI <-> IOBus Bridge
10b5 9030 Digium Tormenta 2 T400P or E400P Quad T1 or E1 PCI card
d33d PCI9030 32-bit 33MHz PCI <-> IOBus Bridge
10b5 9030 Tormenta 3 Varion V401PT Quad T1/J1 PCI card
d44d PCI9030 32-bit 33MHz PCI <-> IOBus Bridge
10b5 17f6 Allo CP100P/E 1-port E1/T1/J1 PCI/PCIe card
10b5 17f7 Allo CP400P/E 4-port E1/T1/J1 PCI/PCIe card
10b5 17f8 Allo CP200P/E 2-port E1/T1/J1 PCI/PCIe card
10b5 9030 Tormenta 3 Varion V401PE Quad E1 PCI card
10b6 Madge Networks
0001 Smart 16/4 PCI Ringnode
0002 Smart 16/4 PCI Ringnode Mk2
10b6 0002 Smart 16/4 PCI Ringnode Mk2
10b6 0006 16/4 CardBus Adapter
0003 Smart 16/4 PCI Ringnode Mk3
0e11 b0fd Compaq NC4621 PCI, 4/16, WOL
10b6 0003 Smart 16/4 PCI Ringnode Mk3
10b6 0007 Presto PCI Plus Adapter
0004 Smart 16/4 PCI Ringnode Mk1
0006 16/4 Cardbus Adapter
10b6 0006 16/4 CardBus Adapter
0007
Presto PCI Adapter
10b6 0007 Presto PCI
0009 Smart 100/16/4 PCI-HS Ringnode
10b6 0009 Smart 100/16/4 PCI-HS Ringnode
000a Token Ring 100/16/4 Ringnode/Ringrunner
10b6 000a Token Ring 100/16/4 Ringnode/Ringrunner
000b 16/4 CardBus Adapter Mk2
10b6 0008 16/4 CardBus Adapter Mk2
10b6 000b 16/4 Cardbus Adapter Mk2

000c RapidFire 3140V2 16/4 TR Adapter
10b6 000c RapidFire 3140V2 16/4 TR Adapter
1000 Collage 25/155 ATM Client Adapter
1001 Collage 155 ATM Server Adapter
10b7 3Com Corporation
0001 3c985 1000BaseSX (SX/TX)
wrong ID?
9850 0001 3c985B-SX
0013 AR5212 802.11abg NIC (3CRDAG675)
10b7 2031 3CRDAG675 11a/b/g Wireless PCI Adapter
0910 3C910-A01
1006 MINI PCI type 3B Data Fax Modem
1007 Mini PCI 56k Winmodem
10b7 615b Mini PCI 56K Modem
10b7 615c Mini PCI 56K Modem
1201 3c982-TXM 10/100baseTX Dual Port A [Hydra]
1202 3c982-TXM 10/100baseTX Dual Port B [Hydra]
1700 3c940 10/100/1000Base-T [Marvell]
1043 80eb A7V600/P4P800/K8V
motherboard
10b7 0010 3C940 Gigabit LOM Ethernet Adapter
10b7 0020 3C941 Gigabit LOM Ethernet Adapter
147b 1407 KV8-MAX3 motherboard
3390 3c339 TokenLink Velocity
3590 3c359 TokenLink Velocity XL
10b7 3590 TokenLink Velocity XL Adapter (3C359/359B)
4500 3c450 HomePNA [Tornado]
5055 3c555 Laptop Hurricane
5057 3c575 Megahertz 10/100 LAN CardBus [Boomerang]
10b7 5a57 3C575 Megahertz 10/100 LAN Cardbus PC Card
5157 3cCFE575BT Megahertz 10/100 LAN CardBus [Cyclone]
10b7 5b57 3C575 Megahertz 10/100 LAN Cardbus PC Card
5257 3cCFE575CT CardBus [Cyclone]
10b7 5c57 FE575C-3Com 10/100 LAN CardBus-Fast Ethernet
5900 3c590 10BaseT [Vortex]
5920 3c592 EISA 10mbps Demon/Vortex
5950 3c595 100BaseTX [Vortex]
5951 3c595 100BaseT4 [Vortex]
5952 3c595 100Base-MII [Vortex]
5970 3c597 EISA Fast Demon/Vortex
5b57 3c595 Megahertz 10/100 LAN CardBus [Boomerang]
10b7 5b57 3C575 Megahertz 10/100 LAN Cardbus PC Card
6000 3CRSHPW796 [OfficeConnect Wireless
CardBus]
6001 3com 3CRWE154G72 [Office Connect Wireless LAN Adapter]
6055 3c556 Hurricane CardBus [Cyclone]
6056 3c556B CardBus [Tornado]
10b7 6556 10/100 Mini PCI Ethernet Adapter

6560 3cCFE656 CardBus [Cyclone]
10b7 656a 3CCFEM656 10/100 LAN+56K Modem CardBus
6561 3cCFEM656 10/100 LAN+56K Modem CardBus
10b7 656b 3CCFEM656 10/100 LAN+56K Modem CardBus
6562 3cCFEM656B 10/100 LAN+Winmodem CardBus [Cyclone]
10b7 656b 3CCFEM656B 10/100 LAN+56K Modem CardBus
6563 3cCFEM656B 10/100 LAN+56K Modem CardBus
10b7 656b 3CCFEM656 10/100 LAN+56K Modem CardBus
6564 3cXFEM656C 10/100 LAN+Winmodem CardBus [Tornado]
7646 3cSOHO100-TX Hurricane
7770 3CRWE777 PCI Wireless Adapter [Airconnect]
7940 3c803 FDDILink UTP Controller
7980 3c804 FDDILink SAS Controller
7990 3c805 FDDILink DAS Controller
80eb 3c940B 10/100/1000Base-T
8811 Token ring
9000 3c900 10BaseT [Boomerang]
9001 3c900 10Mbps Combo [Boomerang]
9004 3c900B-TPO Etherlink XL [Cyclone]
10b7 9004
3C900B-TPO Etherlink XL TPO 10Mb
9005 3c900B-Combo Etherlink XL [Cyclone]
10b7 9005 3C900B-Combo Etherlink XL Combo
9006 3c900B-TPC Etherlink XL [Cyclone]
900a 3c900B-FL 10base-FL [Cyclone]
9050 3c905 100BaseTX [Boomerang]
9051 3c905 100BaseT4 [Boomerang]
9054 3C905B-TX Fast Etherlink XL PCI
10b7 9054 3C905B-TX Fast Etherlink XL PCI
9055 3c905B 100BaseTX [Cyclone]
1028 0080 3C905B Fast Etherlink XL 10/100
1028 0081 3C905B Fast Etherlink XL 10/100
1028 0082 3C905B Fast Etherlink XL 10/100
1028 0083 3C905B Fast Etherlink XL 10/100
1028 0084 3C905B Fast Etherlink XL 10/100
1028 0085 3C905B Fast Etherlink XL 10/100
1028 0086 3C905B Fast Etherlink XL 10/100
1028 0087 3C905B Fast Etherlink XL 10/100
1028 0088 3C905B Fast Etherlink XL 10/100
1028 0089 3C905B Fast Etherlink XL 10/100
1028 0090 3C905B Fast Etherlink XL 10/100
1028 0091 3C905B Fast Etherlink XL 10/100
1028 0092 3C905B Fast Etherlink XL 10/100
1028 0093 3C905B Fast
Etherlink XL 10/100
1028 0094 3C905B Fast Etherlink XL 10/100
1028 0095 3C905B Fast Etherlink XL 10/100
1028 0096 3C905B Fast Etherlink XL 10/100

1028 0097 3C905B Fast Etherlink XL 10/100
1028 0098 3C905B Fast Etherlink XL 10/100
1028 0099 3C905B Fast Etherlink XL 10/100
10b7 9055 3C905B Fast Etherlink XL 10/100
9056 3c905B-T4 Fast EtherLink XL [Cyclone]
9058 3c905B Deluxe Etherlink 10/100/BNC [Cyclone]
905a 3c905B-FX Fast Etherlink XL FX 100baseFx [Cyclone]
9200 3c905C-TX/TX-M [Tornado]
1028 0095 3C920 Integrated Fast Ethernet Controller
1028 0097 3C920 Integrated Fast Ethernet Controller
1028 00b4 OptiPlex GX110
1028 00d8 Precision 530
1028 00fe Optiplex GX240
1028 012a 3C920 Integrated Fast Ethernet Controller [Latitude C640]
10b7 1000 3C905CX-TX/TX-M Fast Etherlink for PC Management NIC
10b7 7000 10/100 Mini PCI Ethernet Adapter
10f1 2466 Tiger MPX S2466 (3C920 Integrated Fast Ethernet Controller)
144d c005 X10 Laptop
9201
3C920B-EMB Integrated Fast Ethernet Controller [Tornado]
1043 80ab A7N8X Deluxe onboard 3C920B-EMB Integrated Fast Ethernet Controller
9202 3Com 3C920B-EMB-WNM Integrated Fast Ethernet Controller
9210 3C920B-EMB-WNM Integrated Fast Ethernet Controller
9300 3CSOHO100B-TX 910-A01 [tulip]
9800 3c980-TX Fast Etherlink XL Server Adapter [Cyclone]
10b7 9800 3c980-TX Fast Etherlink XL Server Adapter
9805 3c980-C 10/100baseTX NIC [Python-T]
10b7 1201 EtherLink Server 10/100 Dual Port A
10b7 1202 EtherLink Server 10/100 Dual Port B
10b7 9805 3c980 10/100baseTX NIC [Python-T]
10f1 2462 Thunder K7 S2462
9900 3C990-TX [Typhoon]
9902 3CR990-TX-95 [Typhoon 56-bit]
9903 3CR990-TX-97 [Typhoon 168-bit]
9904 3C990B-TX-M/3C990BSVR [Typhoon2]
10b7 1000 3CR990B-TX-M [Typhoon2]
10b7 2000 3CR990BSVR [Typhoon2 Server]
9905 3CR990-FX-95/97/95 [Typhon Fiber]
10b7 1101 3CR990-FX-95 [Typhoon Fiber 56-bit]
10b7 1102 3CR990-FX-97 [Typhoon Fiber 168-bit]
10b7 2101
3CR990-FX-95 Server [Typhoon Fiber 56-bit]
10b7 2102 3CR990-FX-97 Server [Typhoon Fiber 168-bit]
9908 3CR990SVR95 [Typhoon Server 56-bit]
9909 3CR990SVR97 [Typhoon Server 168-bit]
990a 3C990SVR [Typhoon Server]
990b 3C990SVR [Typhoon Server]
10b8 Standard Microsystems Corp [SMC]

0005 83c170 EPIC/100 Fast Ethernet Adapter
1055 e000 LANEPIC 10/100 [EVB171Q-PCI]
1055 e002 LANEPIC 10/100 [EVB171G-PCI]
10b8 a011 EtherPower II 10/100
10b8 a014 EtherPower II 10/100
10b8 a015 EtherPower II 10/100
10b8 a016 EtherPower II 10/100
10b8 a017 EtherPower II 10/100
0006 83c175 EPIC/100 Fast Ethernet Adapter
1055 e100 LANEPIC Cardbus Fast Ethernet Adapter
1055 e102 LANEPIC Cardbus Fast Ethernet Adapter
1055 e300 LANEPIC Cardbus Fast Ethernet Adapter
1055 e302 LANEPIC Cardbus Fast Ethernet Adapter
10b8 a012 LANEPIC Cardbus Fast Ethernet Adapter
13a2 8002 LANEPIC Cardbus Fast Ethernet Adapter
13a2 8006 LANEPIC Cardbus Fast Ethernet Adapter
1000
FDC 37c665
1001 FDC 37C922
a011 83C170QF
b106 SMC34C90
Split off ALi Corporation in 2003
10b9 ULi Electronics Inc.
0101 CMI8338/C3DX PCI Audio Device
0111 C-Media CMI8738/C3DX Audio Device (OEM)
10b9 0111 C-Media CMI8738/C3DX Audio Device (OEM)
0780 Multi-IO Card
0782 Multi-IO Card
1435 M1435
1445 M1445
1449 M1449
1451 M1451
1461 M1461
1489 M1489
1511 M1511 [Aladdin]
1512 M1512 [Aladdin]
1513 M1513 [Aladdin]
1521 M1521 [Aladdin III]
10b9 1521 ALI M1521 Aladdin III CPU Bridge
1523 M1523
10b9 1523 ALI M1523 ISA Bridge
1531 M1531 [Aladdin IV]
1533 M1533/M1535/M1543 PCI to ISA Bridge [Aladdin IV/V/V+]
1014 053b ThinkPad R40e
10b9 1533 ALi M1533 Aladdin IV/V ISA Bridge
1541 M1541
10b9 1541 ALI M1541 Aladdin V/V+ AGP System Controller
1543 M1543

1563 M1563 HyperTransport South Bridge
10b9 1563 ASRock 939Dual-SATA2 Motherboard
1849 1563 ASRock 939Dual-SATA2 Motherboard
1573 PCI to LPC Controller
1575 M1575 South
Bridge
1621 M1621
1631 ALI M1631 PCI North Bridge Aladdin Pro III
1632 M1632M Northbridge+Trident
1641 ALI M1641 PCI North Bridge Aladdin Pro IV
1644 M1644/M1644T Northbridge+Trident
1646 M1646 Northbridge+Trident
1647 M1647 Northbridge [MAGiK 1 / MobileMAGiK 1]
1651 M1651/M1651T Northbridge [Aladdin-Pro 5/5M,Aladdin-Pro 5T/5TM]
1671 M1671 Super P4 Northbridge [AGP4X,PCI and SDR/DDR]
1672 M1672 Northbridge [CyberALADDiN-P4]
1681 M1681 P4 Northbridge [AGP8X,HyperTransport and SDR/DDR]
1687 M1687 K8 Northbridge [AGP8X and HyperTransport]
1689 M1689 K8 Northbridge [Super K8 Single Chip]
1695 M1695 Host Bridge
1697 M1697 HTT Host Bridge
3141 M3141
3143 M3143
3145 M3145
3147 M3147
3149 M3149
3151 M3151
3307 M3307
3309 M3309
3323 M3325 Video/Audio Decoder
5212 M4803
5215 MS4803
5217 M5217H
5219 M5219
5225 M5225
5228 M5228 ALi ATA/RAID Controller
5229 M5229 IDE
1014 050f ThinkPad R30
1014 053d ThinkPad R40e
103c 0024 Pavilion
ze4400 builtin IDE
103c 0025 XE4500 Notebook
1043 8053 A7A266 Motherboard IDE
1849 5229 ASRock 939Dual-SATA2 Motherboard IDE (PATA)
5235 M5225
5237 USB 1.1 Controller
1014 0540 ThinkPad R40e
103c 0024 Pavilion ze4400 builtin USB

103c 0025 XE4500 Notebook
104d 810f VAIO PCG-U1 USB/OHCI Revision 1.0
10b9 5237 ASRock 939Dual-SATA2 Motherboard
1849 5237 ASRock 939Dual-SATA2 Motherboard
5239 USB 2.0 Controller
10b9 5239 ASRock 939Dual-SATA2 Motherboard
1849 5239 ASRock 939Dual-SATA2 Motherboard
5243 M1541 PCI to AGP Controller
5246 AGP8X Controller
5247 PCI to AGP Controller
5249 M5249 HTT to PCI Bridge
524b PCI Express Root Port
524c PCI Express Root Port
524d PCI Express Root Port
524e PCI Express Root Port
5251 M5251 P1394 OHCI 1.0 Controller
5253 M5253 P1394 OHCI 1.1 Controller
5261 M5261 Ethernet Controller
5263 ULi 1689,1573 integrated ethernet.
5281 ALi M5281 Serial ATA / RAID Host Controller
5287 ULi 5287 SATA
5288
ULi M5288 SATA
1043 8056 A8R-MVP Mainboard
5289 ULi 5289 SATA
5450 Lucent Technologies Soft Modem AMR
5451 M5451 PCI AC-Link Controller Audio Device
1014 0506 ThinkPad R30
1014 053e ThinkPad R40e
103c 0024 Pavilion ze4400 builtin Audio
103c 0025 XE4500 Notebook
5453 M5453 PCI AC-Link Controller Modem Device
5455 M5455 PCI AC-Link Controller Audio Device
10b9 5455 ASRock 939Dual-SATA2 Motherboard
1849 0850 ASRock 939Dual-SATA2 Motherboard
5457 M5457 AC'97 Modem Controller
1014 0535 ThinkPad R40e
103c 0024 Pavilion ze4400 builtin Modem Device
103c 0025 XE4500 Notebook
5459 SmartLink SmartPCI561 56K Modem
545a SmartLink SmartPCI563 56K Modem
5461 HD Audio Controller
5471 M5471 Memory Stick Controller
5473 M5473 SD-MMC Controller
7101 M7101 Power Management Controller [PMU]
1014 0510 ThinkPad R30
1014 053c ThinkPad R40e
103c 0024 Pavilion ze4400

103c 0025 XE4500 Notebook
1849 7101 ASRock 939Dual-SATA2 Motherboard
10ba
Mitsubishi Electric Corp.
0301 AccelGraphics AccelECLIPSE
0304 AccelGALAXY A2100 [OEM Evans & Sutherland]
0308 Tornado 3000 [OEM Evans & Sutherland]
10dd 0024 Tornado 3000
1002 VG500 [VolumePro Volume Rendering Accelerator]
10bb Dapha Electronics Corporation
10bc Advanced Logic Research
10bd Surecom Technology
0e34 NE-34
10be Tseng Labs International Co.
10bf Most Inc
10c0 Boca Research Inc.
10c1 ICM Co., Ltd.
10c2 Auspex Systems Inc.
10c3 Samsung Semiconductors, Inc.
10c4 Award Software International Inc.
10c5 Xerox Corporation
10c6 Rambus Inc.
10c7 Media Vision
10c8 Neomagic Corporation
0001 NM2070 [MagicGraph 128]
0002 NM2090 [MagicGraph 128V]
0003 NM2093 [MagicGraph 128ZV]
0004 NM2160 [MagicGraph 128XD]
1014 00ba MagicGraph 128XD
1025 1007 MagicGraph 128XD
1028 0074 MagicGraph 128XD
1028 0075 MagicGraph 128XD
1028 007d MagicGraph 128XD
1028 007e MagicGraph 128XD
1033 802f MagicGraph 128XD
104d 801b MagicGraph 128XD
104d
802f MagicGraph 128XD
104d 830b MagicGraph 128XD
10ba 0e00 MagicGraph 128XD
10c8 0004 MagicGraph 128XD
10cf 1029 MagicGraph 128XD
10f7 8308 MagicGraph 128XD
10f7 8309 MagicGraph 128XD
10f7 830b MagicGraph 128XD
10f7 830d MagicGraph 128XD
10f7 8312 MagicGraph 128XD
0005 NM2200 [MagicGraph 256AV]

1014 00dd ThinkPad 570
1028 0088 Latitude CPi A
0006 NM2360 [MagicMedia 256ZX]
1014 0152 ThinkPad 600X
0016 NM2380 [MagicMedia 256XL+]
10c8 0016 MagicMedia 256XL+
0025 NM2230 [MagicGraph 256AV+]
0083 NM2093 [MagicGraph 128ZV+]
8005 NM2200 [MagicMedia 256AV Audio]
0e11 b0d1 MagicMedia 256AV Audio Device on Discovery
0e11 b126 MagicMedia 256AV Audio Device on Durango
1014 00dd ThinkPad 390/i1720/i1721
1025 1003 MagicMedia 256AV Audio Device on TravelMate 720
1028 0088 Latitude CPi A
1028 008f MagicMedia 256AV Audio Device on Colorado Inspiron
103c 0007 MagicMedia 256AV Audio Device on Voyager II
103c 0008 MagicMedia 256AV
Audio Device on Voyager III
103c 000d MagicMedia 256AV Audio Device on Omnibook 900
10c8 8005 MagicMedia 256AV Audio Device on FireAnt
110a 8005 MagicMedia 256AV Audio Device
14c0 0004 MagicMedia 256AV Audio Device
8006 NM2360 [MagicMedia 256ZX Audio]
8016 NM2380 [MagicMedia 256XL+ Audio]
10c9 Dataexpert Corporation
10ca Fujitsu Microelectr., Inc.
10cb Omron Corporation
nee Mentor ARC Inc
10cc Mai Logic Incorporated
0660 Articia S Host Bridge
0661 Articia S PCI Bridge
10cd Advanced System Products, Inc
1100 ASC1100
1200 ASC1200 [(abp940) Fast SCSI-II]
1300 ASC1300 / ASC3030 [ABP940-U / ABP960-U / ABP3925]
10cd 1310 ASC1300/3030 SCSI adapter
1195 1320 Ultra-SCSI CardBus PC Card REX CB31
2300 ABP940-UW
2500 ABP940-U2W
2700 ABP3950-U3W
10ce Radius
nee Citicorp TTI
10cf Fujitsu Limited.
01ef PCEA4 PCI-Express Dual Port ESCON Adapter
1414 On-board USB 1.1 companion controller
1415 On-board USB 2.0 EHCI controller
1422 E8410 nVidia

graphics adapter
142d HD audio (Realtek ALC262)
1430 82566MM Intel 1Gb copper LAN interface
1623 PCEA4 PCI-Express Dual Port ESCON Adapter
2001 mb86605
200c MB86613L IEEE1394 OHCI 1.0 Controller
2010 MB86613S IEEE1394 OHCI 1.1 Controller
2019 MB86295S [CORAL P]
201e MB86296S [CORAL PA]
202b MB86297A [Carmine Graphics Controller]
10d1 FuturePlus Systems Corp.
10d2 Molex Incorporated
10d3 Jabil Circuit Inc
10d4 Hualon Microelectronics
10d5 Autologic Inc.
10d6 Cetia
10d7 BCM Advanced Research
10d8 Advanced Peripherals Labs
10d9 Macronix, Inc. [MXIC]
0431 MX98715
0512 MX98713
0531 MX987x5
1186 1200 DFE-540TX ProFAST 10/100 Adapter
8625 MX86250
8626 Macronix MX86251 + 3Dfx Voodoo Rush
8888 MX86200
10da Compaq IPG-Austin
0508 TC4048 Token Ring 4/16
3390 Tl3c3x9
10db Rohm LSI Systems, Inc.
10dc CERN/ECP/EDU
0001 STAR/RD24 SCI-PCI (PMC)
0002 TAR/RD24 SCI-PCI (PMC)
0021 HIPPI destination
0022 HIPPI source
10dc ATT2C15-3 FPGA
10dd Evans
& Sutherland
0100 Lightning 1200
10dd 0023 Lightning 1200 15+16M
10de NVIDIA Corporation
0008 NV1 [STG2000X-B Series]
0009 NV1 [NV1 Series]
0018 NV3 [Riva 128]
0019 NV3 [Riva 128ZX]
0020 NV4 [Riva TNT]
1043 0200 V3400 TNT
1048 0c18 Erazor II SGRAM

1048 0c19 Erazor II
1048 0c1b Erazor II
1048 0c1c Erazor II
1092 0550 Viper V550
1092 0552 Viper V550
1092 4804 Viper V550
1092 4808 Viper V550
1092 4810 Viper V550
1092 4812 Viper V550
1092 4815 Viper V550
1092 4820 Viper V550 with TV out
1092 4822 Viper V550
1092 4904 Viper V550
1092 4914 Viper V550
1092 8225 Viper V550
10b4 273d Velocity 4400
10b4 273e Velocity 4400
10b4 2740 Velocity 4400
10de 0020 Riva TNT
1102 1015 Graphics Blaster CT6710
1102 1016 Graphics Blaster RIVA TNT
0028 NV5 [Riva TNT2 / TNT2 Pro]
1043 0200 AGP-V3800 SGRAM
1043 0201 AGP-V3800 SDRAM
1043 0205 PCI-V3800
1043 4000 AGP-V3800PRO
1048 0c21 Synergy II
1048 0c28 Erazor

III

1048 0c29 Erazor III
1048 0c2a Erazor III
1048 0c2b Erazor III
1048 0c31 Erazor III Pro
1048 0c32 Erazor III Pro
1048 0c33 Erazor III Pro
1048 0c34 Erazor III Pro
107d 2134 WinFast 3D S320 II + TV-Out
1092 4804 Viper V770
1092 4a00 Viper V770
1092 4a02 Viper V770 Ultra
1092 5a00 RIVA TNT2/TNT2 Pro
1092 5a40 Viper V770D AGP
1092 6a02 Viper V770 Ultra
1092 7a02 Viper V770 Ultra
10de 0005 RIVA TNT2 Pro
10de 000f Compaq NVIDIA TNT2 Pro
1102 1020 3D Blaster RIVA TNT2
1102 1026 3D Blaster RIVA TNT2 Digital

1462 8806 MS-8806 AGPhantom Graphics Card
14af 5810 Maxi Gamer Xentor
0029 NV5 [Riva TNT2 Ultra]
1043 0200 AGP-V3800 Deluxe
1043 0201 AGP-V3800 Ultra SDRAM
1043 0205 PCI-V3800 Ultra
1048 0c2e Erazor III Ultra
1048 0c2f Erazor III Ultra
1048 0c30 Erazor III Ultra
1102 1021 3D Blaster RIVA TNT2 Ultra
1102 1029 3D Blaster RIVA TNT2 Ultra
1102 102f 3D Blaster RIVA TNT2 Ultra
14af 5820 Maxi Gamer
Xentor 32
4843 4f34 Dynamite
002a NV5 [Riva TNT2]
002b NV5 [Riva TNT2]
002c NV5 [Vanta / Vanta LT]
1043 0200 AGP-V3800 Combat SDRAM
1043 0201 AGP-V3800 Combat
1048 0c20 TNT2 Vanta
1048 0c21 TNT2 Vanta
1048 0c25 TNT2 Vanta 16MB
1092 6820 Viper V730
1102 1031 CT6938 VANTA 8MB
1102 1034 CT6894 VANTA 16MB
14af 5008 Maxi Gamer Phoenix 2
002d NV5 [Riva TNT2 Model 64 / Model 64 Pro]
1043 0200 AGP-V3800M
1043 0201 AGP-V3800M
1048 0c3a Erazor III LT
1048 0c3b Erazor III LT
107d 2137 WinFast 3D S325
10de 0006 RIVA TNT2 Model 64/Model 64 Pro
10de 001e M64 AGP4x
1102 1023 CT6892 RIVA TNT2 Value
1102 1024 CT6932 RIVA TNT2 Value 32Mb
1102 102c CT6931 RIVA TNT2 Value [Jumper]
1102 1030 CT6931 RIVA TNT2 Value
S26361-D1243-V116
110a 006f GM1000-16
S26361-D1243-V216
110a 0081 GM1000-16
1462 8808 MSI-8808
14af 5620 Gamer Cougar Video Edition
1554 1041 Pixelview RIVA TNT2 M64
1569 002d Palit Microsystems Daytona

TNT2 M64
0034 MCP04 SMBus
0035 MCP04 IDE
0036 MCP04 Serial ATA Controller
0037 MCP04 Ethernet Controller
0038 MCP04 Ethernet Controller
003a MCP04 AC'97 Audio Controller
003b MCP04 USB Controller
003c MCP04 USB Controller
003d MCP04 PCI Bridge
003e MCP04 Serial ATA Controller
0040 NV40 [GeForce 6800 Ultra]
0041 NV40 [GeForce 6800]
1043 817b V9999 Gamer Edition
107d 2992 WinFast A400
1458 310f Geforce 6800 GV-N6812
0042 NV40 [GeForce 6800 LE]
107d 299b WinFast A400 LE
0043 NV40 [GeForce 6800 XE]
0044 NV40 [GeForce 6800 XT]
0045 NV40 [GeForce 6800 GT]
1043 817d V9999GT
1458 3140 GV-N68T256D
0047 NV40 [GeForce 6800 GS]
1682 2109 GeForce 6800 GS
0048 NV40 [GeForce 6800 XT]
004e NV40GL [Quadro FX 4000]
0050 CK804 ISA Bridge
1043 815a K8N4/A8N Series Mainboard
10f1 2865 Tomcat K8E (S2865)
1458 0c11 GA-K8N Ultra-9 Mainboard
1462 7100 MSI K8N Diamond
1462 7125 K8N Neo4-F mainboard
147b 1c1a KN8-Ultra Mainboard
1565
3402 NF4 AM2L Mainboard
0051 CK804 ISA Bridge
1028 0225 PowerEdge T105 ISA Bridge
0052 CK804 SMBus
1028 0225 PowerEdge T105 SMBus
1043 815a K8N4/A8N Series Mainboard
10f1 2865 Tomcat K8E (S2865)
1458 0c11 GA-K8N Ultra-9 Mainboard
1462 7100 MSI K8N Diamond
1462 7125 K8N Neo4-F mainboard
147b 1c1a KN8-Ultra Mainboard
1565 3402 NF4 AM2L Mainboard
0053 CK804 IDE

1043 815a K8N4/A8N Series Mainboard
10f1 2865 Tomcat K8E (S2865)
1458 5002 GA-K8N Ultra-9 Mainboard
1462 7100 MSI K8N Diamond
1462 7125 K8N Neo4-F mainboard
147b 1c1a KN8-Ultra Mainboard
1565 3402 NF4 AM2L Mainboard
0054 CK804 Serial ATA Controller
1028 0225 PowerEdge T105 Serial ATA
1043 815a A8N Series Mainboard
10f1 2865 Tomcat K8E (S2865)
1458 b003 GA-K8N Ultra-9 Mainboard
1462 7100 MSI K8N Diamond
1462 7125 K8N Neo4-F mainboard
147b 1c1a KN8-Ultra Mainboard
1565 5401 NF4 AM2L Mainboard
0055 CK804 Serial ATA Controller
1028 0225 PowerEdge
T105 Serial ATA
1043 815a K8N4/A8N Series Mainboard
10f1 2865 Tomcat K8E (S2865)
1458 b003 GA-K8N Ultra-9 Mainboard
1462 7125 K8N Neo4-F mainboard
147b 1c1a KN8-Ultra Mainboard
1565 5401 NF4 AM2L Mainboard
0056 CK804 Ethernet Controller
0057 CK804 Ethernet Controller
1043 8141 K8N4/A8N Series Mainboard
10de cb84 NF4 Lanparty
10f1 2865 Tomcat K8E (S2865)
1458 e000 GA-K8N Ultra-9 Mainboard
1462 7100 MSI K8N Diamond
1462 7125 K8N Neo4-F mainboard
147b 1c1a KN8-Ultra Mainboard
1565 2501 NF4 AM2L Mainboard
0058 CK804 AC'97 Modem
0059 CK804 AC'97 Audio Controller
1043 812a K8N4/A8N Series Mainboard
10f1 2865 Tomcat K8E (S2865)
1462 7585 K8N Neo4-F mainboard
147b 1c1a KN8-Ultra Mainboard
1565 8211 NF4 AM2L Mainboard
005a CK804 USB Controller
1028 0225 PowerEdge T105 onboard USB
1043 815a K8N4/A8N Series Mainboard
10f1 2865 Tomcat K8E (S2865)
1458 5004 GA-K8N Ultra-9 Mainboard
1462 7100 MSI K8N Diamond

1462 7125
K8N Neo4-F mainboard
147b 1c1a KN8-Ultra Mainboard
1565 3402 NF4 AM2L Mainboard
005b CK804 USB Controller
1028 0225 PowerEdge T105 onboard USB
1043 815a K8N4/A8N Series Mainboard
10f1 2865 Tomcat K8E (S2865)
1458 5004 GA-K8N Ultra-9 Mainboard
1462 7100 MSI K8N Diamond
1462 7125 K8N Neo4-F mainboard
147b 1c1a KN8-Ultra Mainboard
1565 3402 NF4 AM2L Mainboard
005c CK804 PCI Bridge
005d CK804 PCIE Bridge
005e CK804 Memory Controller
1028 0225 PowerEdge T105 Memory Controller
1043 815a A8N Series Mainboard
10de 005e ECS Elitegroup NFORCE3-A939 motherboard.
10f1 2865 Tomcat K8E (S2865)
10f1 2891 Thunder K8SRE Mainboard
1458 5000 GA-K8N Ultra-9 Mainboard
1462 7100 K8N Diamond Mainboard
1462 7125 K8N Neo4-F Mainboard
147b 1c1a KN8-Ultra Mainboard
1565 3402 NF4 AM2L Mainboard
005f CK804 Memory Controller
0060 nForce2 ISA Bridge
1043 80ad A7N8X Mainboard
147b 1c02 NF7-S/NF7 (nVidia-nForce2) 2.X
a0a0 03ba UK79G-1394
motherboard
0064 nForce2 SMBus (MCP)
147b 1c02 NF7-S/NF7 (nVidia-nForce2) 2.X
a0a0 03bb UK79G-1394 motherboard
0065 nForce2 IDE
10de 0c11 nForce 2 EIDE Controller
a0a0 03b2 UK79G-1394 motherboard
0066 nForce2 Ethernet Controller
1043 80a7 A7N8X Mainboard onboard nForce2 Ethernet
10de 0c11 nForce MCP-T Networking Adapter
a0a0 03b3 UK79G-1394 motherboard
0067 nForce2 USB Controller
1043 0c11 A7N8X Mainboard
a0a0 03b4 UK79G-1394 motherboard
0068 nForce2 USB Controller
1043 0c11 A7N8X Mainboard
a0a0 03b4 UK79G-1394 motherboard

006a nForce2 AC97 Audio Controller (MCP)
1043 8095 nForce2 AC97 Audio Controller (MCP)
a0a0 0304 UK79G-1394 motherboard
006b nForce Audio Processing Unit
10de 006b nForce2 MCP Audio Processing Unit
a0a0 0304 UK79G-1394 motherboard
006c nForce2 External PCI Bridge
006d nForce2 PCI Bridge
006e nForce2 FireWire (IEEE 1394) Controller
a0a0 0306 UK79G-1394 motherboard
0080 MCP2A ISA bridge
147b 1c09
NV7 Motherboard
0084 MCP2A SMBus
147b 1c09 NV7 Motherboard
0085 MCP2A IDE
147b 1c09 NV7 Motherboard
0086 MCP2A Ethernet Controller
0087 MCP2A USB Controller
147b 1c09 NV7 Motherboard
0088 MCP2A USB Controller
147b 1c09 NV7 Motherboard
008a MCP2S AC'97 Audio Controller
147b 1c09 NV7 Motherboard
008b MCP2A PCI Bridge
008c MCP2A Ethernet Controller
008e nForce2 Serial ATA Controller
0090 G70 [GeForce 7800 GTX]
0091 G70 [GeForce 7800 GTX]
0092 G70 [GeForce 7800 GT]
0093 G70 [GeForce 7800 GS]
0095 G70 [GeForce 7800 SLI]
0097 G70 [GeForce GTS 250]
0098 G70M [GeForce Go 7800]
0099 G70M [GeForce Go 7800 GTX]
009d G70GL [Quadro FX 4500]
00a0 NV0A [Aladdin TNT2 IGP]
14af 5810 Maxi Gamer Xentor
00c0 NV41 [GeForce 6800 GS]
00c1 NV41 [GeForce 6800]
00c2 NV41 [GeForce 6800 LE]
00c3 NV41 [GeForce 6800 XT]
00c5 NV41
00c6 NV41
00c7 NV41
00c8 NV41M [GeForce Go 6800]
00c9 NV41M [GeForce Go 6800 Ultra]
00cc NV41GLM [Quadro FX Go1400]

00cd
NV42GL [Quadro FX 3450/4000 SDI]
10de 029b Quadro FX 3450
00ce NV41GL [Quadro FX 1400]
00cf NV41
00d0 nForce3 LPC Bridge
00d1 nForce3 Host Bridge
00d2 nForce3 AGP Bridge
00d3 CK804 Memory Controller
00d4 nForce3 SMBus
00d5 nForce3 IDE
00d6 nForce3 Ethernet
00d7 nForce3 USB 1.1
00d8 nForce3 USB 2.0
00d9 nForce3 Audio
00da nForce3 Audio
00dd nForce3 PCI Bridge
00df CK8S Ethernet Controller
1043 80a7 K8N-E
105b 0c43 Winfast NF3250K8AA
147b 1c0b NF8 Mainboard
00e0 nForce3 250Gb LPC Bridge
1043 813f K8N-E
10de 0c11 Winfast NF3250K8AA
1462 7030 K8N Neo-FSR v2.0
147b 1c0b NF8 Mainboard
1849 00e0 Motherboard (one of many)
00e1 nForce3 250Gb Host Bridge
1043 813f K8N-E
1462 7030 K8N Neo-FSR v2.0
147b 1c0b NF8 Mainboard
1849 00e1 Motherboard (one of many)
00e2 nForce3 250Gb AGP Host to PCI Bridge
00e3 nForce3 Serial ATA Controller
1043 813f K8N-E
105b 0c43 Winfast NF3250K8AA
147b 1c0b NF8 Mainboard
1849
00e3 Motherboard (one of many)
00e4 nForce 250Gb PCI System Management
1043 813f K8N-E
105b 0c43 Winfast NF3250K8AA
1462 7030 K8N Neo-FSR v2.0
147b 1c0b NF8 Mainboard
1849 00e4 Motherboard (one of many)
00e5 CK8S Parallel ATA Controller (v2.5)
1043 813f K8N-E
105b 0c43 Winfast NF3250K8AA

1462 7030 K8N Neo-FSR v2.0
147b 1c0b NF8 Mainboard
1849 00e5 Motherboard (one of many)
f849 00e5 Motherboard (one of many)
00e6 CK8S Ethernet Controller
00e7 CK8S USB Controller
1043 813f K8N-E
105b 0c43 Winfast NF3250K8AA
1462 7030 K8N Neo-FSR v2.0
147b 1c0b NF8 Mainboard
1849 00e7 Motherboard (one of many)
00e8 nForce3 EHCI USB 2.0 Controller
1043 813f K8N-E
105b 0c43 Winfast NF3250K8AA
1462 7030 K8N Neo-FSR v2.0
147b 1c0b NF8 Mainboard
1849 00e8 Motherboard (one of many)
00ea nForce3 250Gb AC'97 Audio Controller
1043 819d K8N-E
105b 0c43 Winfast NF3250K8AA
1462 b010 K8N Neo-FSR v2.0
147b 1c0b NF8 Mainboard
00ed
nForce3 250Gb PCI-to-PCI Bridge
00ee nForce3 Serial ATA Controller 2
00f1 NV43 [GeForce 6600 GT]
1043 81a6 N6600GT TD 128M AGP
1043 81c6 N6600GT TD 128M AGP
1458 3150 GV-N66T128VP
1554 1191 PixelView PV-N43UA (128KD)
1682 2119 GeForce 6600 GT AGP
00f2 NV43 [GeForce 6600]
1554 1194 PixelView PV-N43AT (256KD)
1682 211c GeForce 6600 256MB DDR DUAL DVI TV
00f3 NV43 [GeForce 6200]
00f4 NV43 [GeForce 6600 LE]
00f5 G71 [GeForce 7800 GS]
00f6 NV43 [GeForce 6800 GS/XT]
1682 217e XFX GeForce 6800 XTreme 256MB DDR3 AGP
00f8 NV45GL [Quadro FX 3400/4400]
00f9 NV40 [GeForce 6800 GT/GTO/Ultra]
10de 00f9 NV40 [GeForce 6800 GT]
1682 2120 GEFORCE 6800 GT PCI-E
00fa NV39 [GeForce PCX 5750]
00fb NV35 [GeForce PCX 5900]
00fc NV37GL [Quadro FX 330/GeForce PCX 5300]
00fd NV37GL [Quadro PCI-E Series]
00fe NV38GL [Quadro FX 1300]

00ff NV19 [GeForce PCX 4300]
0100 NV10 [GeForce 256 SDR]
1043 0200 AGP-V6600 SGRAM
1043 0201 AGP-V6600 SDRAM
1043
4008 AGP-V6600 SGRAM
1043 4009 AGP-V6600 SDRAM
1048 0c41 Erazor X
1048 0c43 ERAZOR X PCI
1048 0c48 Synergy Force
1102 102d CT6941 GeForce 256
14af 5022 3D Prophet SE
0101 NV10 [GeForce 256 DDR]
1043 0202 AGP-V6800 DDR
1043 400a AGP-V6800 DDR SGRAM
1043 400b AGP-V6800 DDR SDRAM
1048 0c42 Erazor X
107d 2822 WinFast GeForce 256
1102 102e CT6970/CT6971
14af 5021 3D Prophet DDR-DVI
0103 NV10GL [Quadro]
1048 0c40 GLoria II-64
1048 0c44 GLoria II
1048 0c45 GLoria II
1048 0c4a GLoria II-64 Pro
1048 0c4b GLoria II-64 Pro DVII
10a9 9002 VPro VR3
0110 NV11 [GeForce2 MX/MX 400]
1043 4015 AGP-V7100 Pro
1043 4021 V7100 Deluxe Combo
1043 4031 V7100 Pro with TV output
1048 0c60 Gladiac MX
1048 0c61 Gladiac 511PCI
1048 0c63 Gladiac 511TV-OUT 32MB
1048 0c64 Gladiac 511TV-OUT 64MB
1048 0c65 Gladiac 511TWIN
1048 0c66 Gladiac 311
10b0 0001 GeForce2 MX Jumbo TV
10de 0091 Dell OEM GeForce 2 MX 400
10de
00a1 Apple OEM GeForce2 MX
1462 8523 MS-8852
1462 8817 MSI GeForce2 MX400 Pro32S [MS-8817]
14af 7102 3D Prophet II MX
14af 7103 3D Prophet II MX Dual-Display
1545 0023 Xtasy Rev. B2
1554 1081 MVGA-NVG11AM(400)
0111 NV11 [GeForce2 MX200]

0112 NV11M [GeForce2 Go]
0113 NV11GL [Quadro2 MXR/EX/Go]
1028 00e5 Quadro2 Go
0140 NV43 [GeForce 6600 GT]
1458 3125 GV-NX66T128D
1458 3126 GV-NX66T256DE
1462 8939 MS-8983
0141 NV43 [GeForce 6600]
1043 81b0 EN6600 Silencer
107d 593a LR2A22 128MB TV OUT
107d 597b WINFAST PX6600
1458 3124 GV-NX66128DP Turbo Force Edition
0142 NV43 [GeForce 6600 LE]
0143 NV43 [GeForce 6600 VE]
0144 NV43M [GeForce Go 6600]
0145 NV43 [GeForce 6610 XL]
0146 NV43M [GeForce Go6200 TE / 6600 TE]
0147 NV43 [GeForce 6700 XL]
0148 NV43M [GeForce Go 6600]
0149 NV43M [GeForce Go 6600 GT]
014a NV43 [Quadro NVS 440]
014b NV43
014d NV43GL [Quadro FX 550]
014e NV43GL [Quadro FX 540]
014f NV43 [GeForce 6200]
0150
NV15 [GeForce2 GTS/Pro]
1043 4016 V7700 AGP Video Card
1043 402a AGP-V7700
1048 0c50 Gladiac
1048 0c52 Gladiac-64
107d 2840 WinFast GeForce2 GTS with TV output
107d 2842 WinFast GeForce 2 Pro
10de 002e GeForce2 GTS
1462 815a MS-8815
1462 8831 Creative GeForce2 Pro
0151 NV15 [GeForce2 Ti]
1043 405f V7700Ti
1462 5506 Creative 3D Blaster GeForce2 Titanium
1462 8364 MS-8836
0152 NV15 [GeForce2 Ultra]
1048 0c56 GLADIAC Ultra
0153 NV15GL [Quadro2 Pro]
0160 NV44 [GeForce 6500]
0161 NV44 [GeForce 6200 TurboCache]
0162 NV44 [GeForce 6200 SE TurboCache]
0163 NV44 [GeForce 6200 LE]
0164 NV44M [GeForce Go 6200]

0165 NV44 [Quadro NVS 285]
0166 NV44M [GeForce Go 6400]
0167 NV44M [GeForce Go 6200]
0168 NV44M [GeForce Go 6400]
0169 NV44 [GeForce 6250]
016a NV44 [GeForce 7100 GS]
016d NV44
016e NV44
016f NV44
0170 NV17 [GeForce4 MX 460]
1462 8630 MS-8863
0171 NV17 [GeForce4 MX 440]
10b0 0002 Gainward Pro/600 TV
10de
0008 Apple OEM GeForce4 MX 440
1462 8661 G4MX440-VTP
1462 8730 MX440SES-T (MS-8873)
1462 8743 MS-8874
1462 8852 GeForce4 MX440 PCI
147b 8f00 Abit Siluro GeForce4MX440
0172 NV17 [GeForce4 MX 420]
1462 8730 MS-8873
1462 8784 MS-8878
0173 NV17 [GeForce4 MX 440-SE]
0174 NV17M [GeForce4 440 Go]
0175 NV17M [GeForce4 420 Go]
0176 NV17M [GeForce4 420 Go 32M]
103c 08b0 tc1100 tablet
144d c005 X10 Laptop
4c53 1090 Cx9 / Vx9 mainboard
0177 NV17M [GeForce4 460 Go]
0178 NV17GL [Quadro4 550 XGL]
0179 NV17M [GeForce4 440 Go 64M]
10de 0179 GeForce4 MX (Mac)
017a NV17GL [Quadro NVS]
017b NV17GL [Quadro4 550 XGL]
017c NV17GL [Quadro4 500 GoGL]
017f NV17
0181 NV18 [GeForce4 MX 440 AGP 8x]
1043 8063 GeForce4 MX 440 AGP 8X
1043 806f V9180 Magic
1462 8880 MS-StarForce GeForce4 MX 440 with AGP8X
1462 8900 MS-8890 GeForce 4 MX440 AGP8X
1462 9350 MSI GeForce4 MX T8X with AGP8X
147b 8f0d Siluro GF4 MX-8X
1554 1111 PixelView MVGA-NVG18A
0182

NV18 [GeForce4 MX 440SE AGP 8x]
0183 NV18 [GeForce4 MX 420 AGP 8x]
0184 NV18 [GeForce4 MX]
0185 NV18 [GeForce4 MX 4000]
0186 NV18M [GeForce4 448 Go]
0187 NV18M [GeForce4 488 Go]
0188 NV18GL [Quadro4 580 XGL]
0189 NV18 [GeForce4 MX with AGP8X (Mac)]
018a NV18GL [Quadro NVS 280 SD]
018b NV18GL [Quadro4 380 XGL]
018c NV18GL [Quadro NVS 50 PCI]
018d NV18M [GeForce4 448 Go]
0190 G80 [GeForce 8800 GTS / 8800 GTX]
0191 G80 [GeForce 8800 GTX]
0192 G80 [GeForce 8800 GTS]
0193 G80 [GeForce 8800 GTS]
107d 20bd WinFast PX 8800 GTS TDH
0194 G80 [GeForce 8800 Ultra]
0197 G80GL [Tesla C870]
019d G80GL [Quadro FX 5600]
019e G80GL [Quadro FX 4600]
01a0 nForce 220/420 NV1A [GeForce2 MX]
01a4 nForce CPU bridge
01ab nForce 420 Memory Controller (DDR)
01ac nForce 220/420 Memory Controller
01ad nForce 220/420 Memory Controller
01b0 nForce Audio Processing Unit
01b1 nForce AC'97 Audio Controller
01b2 nForce ISA Bridge
01b4 nForce PCI
System Management
01b7 nForce AGP to PCI Bridge
01b8 nForce PCI-to-PCI bridge
01bc nForce IDE
01c1 nForce AC'97 Modem Controller
01c2 nForce USB Controller
01c3 nForce Ethernet Controller
01d0 G72 [GeForce 7350 LE]
01d1 G72 [GeForce 7300 LE]
107d 5efa WinFast PX7300LE-TD128
107d 5efb WinFast PX7300LE-TD256
1462 0345 7300LE PCI Express Graphics Adapter
01d2 G72 [GeForce 7550 LE]
01d3 G72 [GeForce 7200 GS / 7300 SE]
1043 8203 EN7300SE
1043 8250 EN7200GS
01d5 G72
01d6 G72M [GeForce Go 7200]

01d7 G72M [Quadro NVS 110M/GeForce Go 7300]
01d8 G72M [GeForce Go 7400]
1028 01d7 XPS M1210
01d9 G72M [GeForce Go 7450]
01da G72M [Quadro NVS 110M]
01db G72M [Quadro NVS 120M]
01dc G72GLM [Quadro FX 350M]
01dd G72 [GeForce 7500 LE]
01de G72GL [Quadro FX 350]
10de 01dc Quadro FX Go350M
01df G72 [GeForce 7300 GS]
01e0 nForce2 IGP2
147b 1c09 NV7 Motherboard
01e8 nForce2 AGP
01ea nForce2 Memory Controller 0
a0a0 03b9 UK79G-1394 motherboard
01eb
nForce2 Memory Controller 1
a0a0 03b9 UK79G-1394 motherboard
01ec nForce2 Memory Controller 2
a0a0 03b9 UK79G-1394 motherboard
01ed nForce2 Memory Controller 3
a0a0 03b9 UK79G-1394 motherboard
01ee nForce2 Memory Controller 4
10de 01ee MSI Delta-L nForce2 memory controller
a0a0 03b9 UK79G-1394 motherboard
01ef nForce2 Memory Controller 5
a0a0 03b9 UK79G-1394 motherboard
01f0 NV1F C17 [GeForce4 MX IGP]
a0a0 03b5 UK79G-1394 motherboard
0200 NV20 [GeForce3]
1043 402f AGP-V8200 DDR
1048 0c70 GLADIAC 920
0201 NV20 [GeForce3 Ti 200]
0202 NV20 [GeForce3 Ti 500]
1043 405b V8200 T5
1545 002f Xtasy 6964
0203 NV20GL [Quadro DCC]
0211 NV48 [GeForce 6800]
0212 NV48 [GeForce 6800 LE]
0215 NV48 [GeForce 6800 GT]
0218 NV48 [GeForce 6800 XT]
0221 NV44A [GeForce 6200]
1043 81e1 N6200/TD/256M/A
3842 a341 256A8N341DX
0222 NV44 [GeForce 6200 A-LE]
0224 NV44
0240 C51PV [GeForce 6150]

1043 81cd A8N-VM CSM
1462 7207
K8NGM2 series
0241 C51 [GeForce 6150 LE]
0242 C51G [GeForce 6100]
105b 0cad Winfast 6100K8MB
0243 C51 PCI Express Bridge
0244 C51 [GeForce Go 6150]
103c 30b5 Presario V3242AU
103c 30b7 Presario V6133CL
10de 0244 GeForce Go 6150
0245 C51 [Quadro NVS 210S/GeForce 6150LE]
0246 C51 PCI Express Bridge
0247 C51 [GeForce Go 6100]
1043 1382 MCP51 PCI-X GeForce Go 6100
0248 C51 PCI Express Bridge
0249 C51 PCI Express Bridge
024a C51 PCI Express Bridge
024b C51 PCI Express Bridge
024c C51 PCI Express Bridge
024d C51 PCI Express Bridge
024e C51 PCI Express Bridge
024f C51 PCI Express Bridge
0250 NV25 [GeForce4 Ti 4600]
0251 NV25 [GeForce4 Ti 4400]
1043 8023 v8440 GeForce 4 Ti4400
10de 0251 PNY GeForce4 Ti 4400
1462 8710 PNY GeForce4 Ti 4400
0252 NV25 [GeForce4 Ti]
0253 NV25 [GeForce4 Ti 4200]
107d 2896 WinFast A250 LE TD (Dual VGA/TV-out/DVI)
147b 8f09 Siluro (Dual VGA/TV-out/DVI)
0258 NV25GL [Quadro4 900 XGL]
0259 NV25GL [Quadro4
750 XGL]
025b NV25GL [Quadro4 700 XGL]
0260 MCP51 LPC Bridge
103c 2a34 Pavilion a1677c
103c 30b7 Presario V6133CL
1043 81bc A8N-VM CSM Mainboard
1458 5001 GA-M55plus-S3G
1462 7207 K8NGM2 series
0261 MCP51 LPC Bridge
105b 0cad Winfast 6100K8MB
0262 MCP51 LPC Bridge
0263 MCP51 LPC Bridge
0264 MCP51 SMBus
103c 2a34 Pavilion a1677c

103c 30b7 Presario V6133CL
1043 81bc A8N-VM CSM Mainboard
105b 0cad Winfast 6100K8MB
1462 7207 K8NGM2 series
0265 MCP51 IDE
103c 2a34 Pavilion a1677c
103c 30b7 Presario V6133CL
1043 81bc A8N-VM CSM Mainboard
1462 7207 K8NGM2 series
Foxconn has used a wrong vendor ID for this one
f05b 0cad Winfast 6100K8MB
0266 MCP51 Serial ATA Controller
103c 2a34 Pavilion a1677c
103c 30b7 Presario V6133CL
1043 81bc A8N-VM CSM Mainboard
1462 7207 K8NGM2 series
0267 MCP51 Serial ATA Controller
103c 2a34 Pavilion a1677c
1043 81bc A8N-VM CSM Mainboard
1462 7207 K8NGM2 series
0268 MCP51
Ethernet Controller
0269 MCP51 Ethernet Controller
103c 2a34 Pavilion a1677c
103c 30b7 Presario V6133CL
1043 8141 A8N-VM CSM Mainboard
1462 7207 K8NGM2 series
026a MCP51 MCI
026b MCP51 AC97 Audio Controller
105b 0cad Winfast 6100K8MB
026c MCP51 High Definition Audio
103c 2a34 Pavilion a1677c
103c 30b5 Presario V3242AU
103c 30b7 Presario V6133CL
10de cb84 ASUSTeK Computer Inc. A8N-VM CSM Mainboard
1462 7207 K8NGM2 series
026d MCP51 USB Controller
103c 2a34 Pavilion a1677c
103c 30b7 Presario V6133CL
1043 81bc A8N-VM CSM Mainboard
105b 0cad Winfast 6100K8MB
1462 7207 K8NGM2 series
026e MCP51 USB Controller
103c 2a34 Pavilion a1677c
103c 30b7 Presario V6133CL
1043 81bc A8N-VM CSM Mainboard
105b 0cad Winfast 6100K8MB
1462 7207 K8NGM2 series

026f MCP51 PCI Bridge
103c 30b7 Presario V6133CL
0270 MCP51 Host Bridge
103c 2a34 Pavilion a1677c
103c 30b7 Presario V6133CL
1043 81bc A8N-VM CSM Mainboard
105b 0cad
Winfast 6100K8MB
1458 5001 GA-M55plus-S3G
1462 7207 K8NGM2 series
0271 MCP51 PMU
103c 30b5 Presario V3242AU
103c 30b7 Presario V6133CL
0272 MCP51 Memory Controller 0
103c 2a34 Pavilion a1677c
105b 0cad Winfast 6100K8MB
027e C51 Memory Controller 2
103c 2a34 Pavilion a1677c
103c 30b7 Presario V6133CL
1043 81cd A8N-VM CSM Mainboard
1458 5000 GA-M55plus-S3G
1462 7207 K8NGM2 series
027f C51 Memory Controller 3
103c 2a34 Pavilion a1677c
103c 30b7 Presario V6133CL
1043 81cd A8N-VM CSM Mainboard
1458 5000 GA-M55plus-S3G
1462 7207 K8NGM2 series
0280 NV28 [GeForce4 Ti 4800]
0281 NV28 [GeForce4 Ti 4200 AGP 8x]
0282 NV28 [GeForce4 Ti 4800 SE]
0286 NV28M [GeForce4 Ti 4200 Go AGP 8x]
0288 NV28GL [Quadro4 980 XGL]
0289 NV28GL [Quadro4 780 XGL]
028c NV28GLM [Quadro4 Go700]
0290 G71 [GeForce 7900 GTX]
0291 G71 [GeForce 7900 GT/GTO]
10de 042b NX7900GTO-T2D512E [7900 GTO]
0292 G71 [GeForce 7900 GS]
0293 G71 [GeForce 7900
GX2]
0294 G71 [GeForce 7950 GX2]
0295 G71 [GeForce 7950 GT]
1043 8225 GeForce 7950 GT
107d 2a68 WinFast PX7950GT TDH
1462 0663 NX7950GT-VT2D512EZ-HD
0297 G71M [GeForce Go 7950 GTX]
0298 G71M [GeForce Go 7900 GS]

0299 G71M [GeForce Go 7900 GTX]
029a G71GLM [Quadro FX 2500M]
029b G71GLM [Quadro FX 1500M]
029c G71GL [Quadro FX 5500]
029d G71GL [Quadro FX 3500]
1028 019b G71GLM [Quadro FX 3500M]
029e G71GL [Quadro FX 1500]
029f G71GL [Quadro FX 4500 X2]
Xbox Graphics Processing Unit (Integrated). GeForce3 derivative (NV20 < NV2A < NV25).
02a0 NV2A [XGPU]
02a5 MCPX CPU Bridge
02a6 MCPX Memory Controller
02e0 G73 [GeForce 7600 GT]
02e0 2249 GF 7600GT 560M 256MB DDR3 DUAL DVI TV
02e1 G73 [GeForce 7600 GS]
1682 222b PV-T73K-UAL3 (256MB)
1682 2247 GF 7600GS 512MB DDR2
02e2 G73 [GeForce 7300 GT]
02e3 G71 [GeForce 7900 GS]
02e4 G71 [GeForce 7950 GT]
1682 2271 PV-T71A-YDF7 (512MB)
02f0 C51 Host Bridge
103c 2a34 Pavilion a1677c
103c
30b7 Presario V6133CL
1043 81cd A8N-VM CSM Mainboard
1462 7207 K8NGM2 series
02f1 C51 Host Bridge
1458 5000 GA-M55plus-S3G
02f2 C51 Host Bridge
02f3 C51 Host Bridge
02f4 C51 Host Bridge
02f5 C51 Host Bridge
02f6 C51 Host Bridge
02f7 C51 Host Bridge
02f8 C51 Memory Controller 5
103c 2a34 Pavilion a1677c
103c 30b7 Presario V6133CL
1043 81cd A8N-VM CSM Mainboard
1458 5000 GA-M55plus-S3G
1462 7207 K8NGM2 series
02f9 C51 Memory Controller 4
103c 2a34 Pavilion a1677c
103c 30b7 Presario V6133CL
1043 81cd A8N-VM CSM Mainboard
1458 5000 GA-M55plus-S3G
1462 7207 K8NGM2 series
02fa C51 Memory Controller 0

103c 2a34 Pavilion a1677c
103c 30b7 Presario V6133CL
1043 81cd A8N-VM CSM Mainboard
1458 5000 GA-M55plus-S3G
1462 7207 K8NGM2 series
02fb C51 PCI Express Bridge
02fc C51 PCI Express Bridge
103c 30b7 Presario V6133CL
02fd C51 PCI Express Bridge
103c 30b7 Presario V6133CL
02fe C51 Memory Controller 1
103c
2a34 Pavilion a1677c
103c 30b7 Presario V6133CL
1043 81cd A8N-VM CSM Mainboard
1458 5000 GA-M55plus-S3G
1462 7207 K8NGM2 series
02ff C51 Host Bridge
103c 2a34 Pavilion a1677c
103c 30b7 Presario V6133CL
1043 81cd A8N-VM CSM Mainboard
1458 5000 GA-M55plus-S3G
1462 7207 K8NGM2 series
0300 NV30 [GeForce FX]
0301 NV30 [GeForce FX 5800 Ultra]
0302 NV30 [GeForce FX 5800]
0308 NV30GL [Quadro FX 2000]
0309 NV30GL [Quadro FX 1000]
0311 NV31 [GeForce FX 5600 Ultra]
0312 NV31 [GeForce FX 5600]
0314 NV31 [GeForce FX 5600XT]
1043 814a V9560XT/TD
0316 NV31M
0318 NV31GL
031a NV31M [GeForce FX Go5600]
031b NV31M [GeForce FX Go5650]
031c NV31GLM [Quadro FX Go700]
0320 NV34 [GeForce FX 5200]
0321 NV34 [GeForce FX 5200 Ultra]
0322 NV34 [GeForce FX 5200]
1043 02fb V9250 Magic
1043 8180 V9520-X/TD/128M
107d 2967 WinFast A340T 128MB
1462 9110 MS-8911 (FX5200-TD128)
1462 9171 MS-8917 (FX5200-T128)
1462 9360 MS-8936 (FX5200-T128)
1682

1351 GeForce FX 5200
0323 NV34 [GeForce FX 5200LE]
0324 NV34M [GeForce FX Go5200 64M]
1028 0196 Inspiron 5160
103c 006a Pavilion ZD7000 laptop
1071 8160 MIM2000
0325 NV34M [GeForce FX Go5250]
0326 NV34 [GeForce FX 5500]
1458 310d GeForce FX 5500 128 MB
1682 2034 GeForce 5500 256 MB
0327 NV34 [GeForce FX 5100]
0328 NV34M [GeForce FX Go5200 32M/64M]
0329 NV34M [GeForce FX Go5200]
10de 0010 Powerbook G4
032a NV34GL [Quadro NVS 280 PCI]
032b NV34GL [Quadro FX 500/600 PCI]
032c NV34M [GeForce FX Go5300 / Go5350]
032d NV34M [GeForce FX Go5100]
032e NV34
032f NV34 [GeForce FX 5200]
0330 NV35 [GeForce FX 5900 Ultra]
1043 8137 V9950 Ultra / 256 MB
0331 NV35 [GeForce FX 5900]
1043 8145 V9950GE
0332 NV35 [GeForce FX 5900XT]
0333 NV38 [GeForce FX 5950 Ultra]
0334 NV35 [GeForce FX 5900ZT]
1462 9373 FX5900ZT-VTD128 (MS-8937)
0338 NV35GL [Quadro FX 3000]
033f NV35GL [Quadro FX 700]
0341 NV36 [GeForce FX 5700 Ultra]
1462
9380 MS-8938 (FX5700U-TD128)
0342 NV36 [GeForce FX 5700]
0343 NV36 [GeForce FX 5700LE]
0344 NV36 [GeForce FX 5700VE]
0347 NV36M [GeForce FX Go5700]
103c 006a NX9500
0348 NV36M [GeForce FX Go5700]
034c NV36 [Quadro FX Go1000]
034d NV36
034e NV36GL [Quadro FX 1100]
0360 MCP55 LPC Bridge
0361 MCP55 LPC Bridge
1028 0221 PowerEdge R805 MCP55 LPC Bridge
0362 MCP55 LPC Bridge
147b 1c24 KN9 series mainboard
0363 MCP55 LPC Bridge

0364 MCP55 LPC Bridge
1028 0221 PowerEdge R805 MCP55 LPC Bridge
0365 MCP55 LPC Bridge
0366 MCP55 LPC Bridge
0367 MCP55 LPC Bridge
0368 MCP55 SMBus Controller
1028 020c PowerEdge M605 MCP55 SMBus
1028 0221 PowerEdge R805 MCP55 SMBus
147b 1c24 KN9 series mainboard
0369 MCP55 Memory Controller
147b 1c24 KN9 series mainboard
036a MCP55 Memory Controller
036b MCP55 SMU
036c MCP55 USB Controller
1028 020c PowerEdge M605 MCP55 USB Controller
1028 0221 PowerEdge R805 MCP55 USB Controller
147b 1c24
KN9 series mainboard
036d MCP55 USB Controller
1028 020c PowerEdge M605 MCP55 USB Controller
1028 0221 PowerEdge R805 MCP55 USB Controller
147b 1c24 KN9 series mainboard
036e MCP55 IDE
147b 1c24 KN9 series mainboard
0370 MCP55 PCI bridge
0371 MCP55 High Definition Audio
147b 1c24 KN9 series mainboard
0372 MCP55 Ethernet
0373 MCP55 Ethernet
147b 1c24 KN9 series mainboard
0374 MCP55 PCI Express bridge
0375 MCP55 PCI Express bridge
0376 MCP55 PCI Express bridge
0377 MCP55 PCI Express bridge
0378 MCP55 PCI Express bridge
037a MCP55 Memory Controller
037e MCP55 SATA Controller
037f MCP55 SATA Controller
1028 0221 PowerEdge R805 MCP55 SATA Controller
147b 1c24 KN9 series mainboard
038b G73 [GeForce 7650 GS]
0390 G73 [GeForce 7650 GS]
0391 G73 [GeForce 7600 GT]
1458 3427 GV-NX76T128D-RH
1462 0452 NX7600GT-VT2D256E
0392 G73 [GeForce 7600 GS]
1462 0622 NX7600GS-T2D256EH
0393 G73 [GeForce 7300 GT]

10de 0412 NX7300GT-TD256EH
1462
0412 NX7300GT-TD256EH
0394 G73 [GeForce 7600 LE]
0395 G73 [GeForce 7300 GT]
0396 G73
0397 G73M [GeForce Go 7700]
0398 G73M [GeForce Go 7600]
1025 006c Aspire 9814WKMi
0399 G73M [GeForce Go 7600 GT]
039a G73M [Quadro NVS 300M]
039b G73M [GeForce Go 7900 SE]
039c G73GLM [Quadro FX 550M]
10de 039c Quadro FX 560M
039d G73
039e G73GL [Quadro FX 560]
039f G73
03a0 C55 Host Bridge
03a1 C55 Host Bridge
03a2 C55 Host Bridge
03a3 C55 Host Bridge
03a4 C55 Host Bridge
03a5 C55 Host Bridge
03a6 C55 Host Bridge
03a7 C55 Host Bridge
03a8 C55 Memory Controller
03a9 C55 Memory Controller
03aa C55 Memory Controller
03ab C55 Memory Controller
03ac C55 Memory Controller
03ad C55 Memory Controller
03ae C55 Memory Controller
03af C55 Memory Controller
03b0 C55 Memory Controller
03b1 C55 Memory Controller
03b2 C55 Memory Controller
03b3 C55 Memory Controller
03b4 C55 Memory Controller
03b5 C55 Memory Controller
03b6 C55 Memory
Controller
03b7 C55 PCI Express bridge
03b8 C55 PCI Express bridge
03b9 C55 PCI Express bridge
03ba C55 Memory Controller
03bb C55 PCI Express bridge
03bc C55 Memory Controller
03d0 C61 [GeForce 6150SE nForce 430]

1028 020e Inspiron 531
03d1 C61 [GeForce 6100 nForce 405]
03d2 C61 [GeForce 6100 nForce 400]
03d5 C61 [GeForce 6100 nForce 420]
03d6 C61 [GeForce 7025 / nForce 630a]
03e0 MCP61 LPC Bridge
1028 020e Inspiron 531
1849 03e0 939NF6G-VSTA Board
03e1 MCP61 LPC Bridge
1043 83a4 M4N68T series motherboard
03e2 MCP61 Host Bridge
1043 83a4 M4N68T series motherboard
03e3 MCP61 LPC Bridge
03e4 MCP61 High Definition Audio
03e5 MCP61 Ethernet
03e6 MCP61 Ethernet
03e7 MCP61 SATA Controller
03e8 MCP61 PCI Express bridge
1028 020e Inspiron 531
1849 03e8 939NF6G-VSTA Board
03e9 MCP61 PCI Express bridge
1028 020e Inspiron 531
1849 03e9 939NF6G-VSTA Board
03ea MCP61 Memory Controller
1028 020e Inspiron 531
1849 03ea
939NF6G-VSTA Board
03eb MCP61 SMBus
1028 020e Inspiron 531
1043 83a4 M4N68T series motherboard
1849 03eb 939NF6G-VSTA Board
03ec MCP61 IDE
1025 0392 ET1350
1028 020e Inspiron 531
1043 83a4 M4N68T series motherboard
1849 03ec 939NF6G-VSTA Board
03ee MCP61 Ethernet
03ef MCP61 Ethernet
1025 8000 ET1350
1028 020e Inspiron 531
1043 83a4 M4N68T series motherboard
1849 03ef 939NF6G-VSTA Board
03f0 MCP61 High Definition Audio
1028 020e Inspiron 531
1043 8415 M4N68T series motherboard
1849 0888 939NF6G-VSTA Board
03f1 MCP61 USB 1.1 Controller
1028 020e Inspiron 531

1043 83a4 M4N68T series motherboard
1849 03f1 939NF6G-VSTA Board
03f2 MCP61 USB 2.0 Controller
1028 020e Inspiron 531
1043 83a4 M4N68T series motherboard
1849 03f2 939NF6G-VSTA Board
03f3 MCP61 PCI bridge
1028 020e Inspiron 531
1849 03f3 939NF6G-VSTA Board
03f4 MCP61 SMU
03f5 MCP61 Memory Controller
1028 020e Inspiron 531
1043 83a4 M4N68T series
motherboard
1849 03eb 939NF6G-VSTA Board
03f6 MCP61 SATA Controller
1028 020e Inspiron 531
1043 83a4 M4N68T series motherboard
1849 03f6 939NF6G-VSTA Board
03f7 MCP61 SATA Controller
0400 G84 [GeForce 8600 GTS]
1043 8241 EN8600GTS
0401 G84 [GeForce 8600 GT]
0402 G84 [GeForce 8600 GT]
1458 3455 GV-NX86T512H
1462 0910 NX8600GT-T2D256EZ
0403 G84 [GeForce 8600 GS]
0404 G84 [GeForce 8400 GS]
1462 1230 NX8400GS-TD256E
0405 G84M [GeForce 9500M GS]
0406 G84 [GeForce 8300 GS]
0407 G84M [GeForce 8600M GT]
0408 G84M [GeForce 9650M GS]
0409 G84M [GeForce 8700M GT]
040a G84GL [Quadro FX 370]
040b G84GLM [Quadro NVS 320M]
040c G84GLM [Quadro FX 570M]
17aa 20d9 ThinkPad T61p
040d G84GLM [Quadro FX 1600M]
040e G84GL [Quadro FX 570]
040f G84GL [Quadro FX 1700]
0410 G92 [GeForce GT 330]
0414 G92 [GeForce 9800 GT]
0418 G92 [GeForce GT 330 OEM]
0420 G86 [GeForce 8400 SE]
0421 G86 [GeForce 8500 GT]
1462 0960 NX8500GT-TD512EH/M2
0422

G86 [GeForce 8400 GS]
0423 G86 [GeForce 8300 GS]
0424 G86 [GeForce 8400 GS]
0425 G86M [GeForce 8600M GS]
1025 0121 Aspire 5920G
1043 1514 F3SV
0426 G86M [GeForce 8400M GT]
0427 G86M [GeForce 8400M GS]
103c 30cc Pavilion dv6700
103c 30cf Pavilion dv9668eg Laptop
0428 G86M [GeForce 8400M G]
0429 G86M [Quadro NVS 140M]
17aa 20d8 ThinkPad T61
042a G86M [Quadro NVS 130M]
042b G86M [Quadro NVS 135M]
042c G86 [GeForce 9400 GT]
042d G86GLM [Quadro FX 360M]
042e G86M [GeForce 9300M G]
042f G86 [Quadro NVS 290]
0440 MCP65 LPC Bridge
0441 MCP65 LPC Bridge
0442 MCP65 LPC Bridge
103c 30cf Pavilion dv9668eg Laptop
0443 MCP65 LPC Bridge
0444 MCP65 Memory Controller
103c 30cf Pavilion dv9668eg Laptop
0445 MCP65 Memory Controller
0446 MCP65 SMBus
103c 30cf Pavilion dv9668eg Laptop
0447 MCP65 SMU
103c 30cf Pavilion dv9500/9600/9700 series
0448 MCP65 IDE
103c 30cf Pavilion dv9668eg Laptop
0449 MCP65 PCI bridge
10de cb84
HP Pavilion dv9668eg Laptop
044a MCP65 High Definition Audio
103c 30cf Pavilion dv9668eg Laptop
044b MCP65 High Definition Audio
044c MCP65 AHCI Controller
044d MCP65 AHCI Controller
044e MCP65 AHCI Controller
044f MCP65 AHCI Controller
0450 MCP65 Ethernet
103c 30cf Pavilion dv9668eg Laptop
0451 MCP65 Ethernet
0452 MCP65 Ethernet
0453 MCP65 Ethernet

0454 MCP65 USB 1.1 OHCI Controller
103c 30cf Pavilion dv9668eg Laptop
0455 MCP65 USB 2.0 EHCI Controller
103c 30cf Pavilion dv9668eg Laptop
0456 MCP65 USB Controller
0457 MCP65 USB Controller
0458 MCP65 PCI Express bridge
10de 0000 MCP65 PCI Express bridge
0459 MCP65 PCI Express bridge
10de 0000 MCP65 PCI Express bridge
045a MCP65 PCI Express bridge
10de 0000 MCP65 PCI Express bridge
045b MCP65 PCI Express bridge
10de 0000 MCP65 PCI Express bridge
045c MCP65 SATA Controller
045d MCP65 SATA Controller
103c 30cf Pavilion dv9668eg Laptop
045e MCP65 SATA Controller
045f MCP65
SATA Controller
0531 C67 [GeForce 7150M / nForce 630M]
0533 C67 [GeForce 7000M / nForce 610M]
053a C68 [GeForce 7050 PV / nForce 630a]
053b C68 [GeForce 7050 PV / nForce 630a]
1043 8308 M2N68-AM Motherboard
053e C68 [GeForce 7025 / nForce 630a]
0541 MCP67 Memory Controller
0542 MCP67 SMBus
1043 8308 M2N68-AM Motherboard
0543 MCP67 Co-processor
0547 MCP67 Memory Controller
1043 8308 M2N68-AM Motherboard
1849 0547 ALiveNF7G-HDready
0548 MCP67 ISA Bridge
1043 8308 M2N68-AM Motherboard
054c MCP67 Ethernet
1043 8308 M2N68-AM Motherboard
1849 054c ALiveNF7G-HDready, MCP67 Gigabit Ethernet
054d MCP67 Ethernet
054e MCP67 Ethernet
054f MCP67 Ethernet
0550 MCP67 AHCI Controller
1043 8308 M2N68-AM Motherboard
0554 MCP67 AHCI Controller
1043 8308 M2N68-AM Motherboard
0555 MCP67 SATA Controller
1043 8308 M2N68-AM Motherboard
055c MCP67 High Definition Audio

1043 8290 M2N68-AM Motherboard
055d MCP67 High Definition Audio
055e
MCP67 OHCI USB 1.1 Controller
1043 8308 M2N68-AM Motherboard
055f MCP67 EHCI USB 2.0 Controller
1043 8308 M2N68-AM Motherboard
0560 MCP67 IDE Controller
f043 8308 M2N68-AM Motherboard
0561 MCP67 PCI Bridge
0562 MCP67 PCI Express Bridge
1849 0562 ALiveNF7G-HDready
0563 MCP67 PCI Express Bridge
0568 MCP78S [GeForce 8200] Memory Controller
103c 2a9e Pavilion p6310f
1043 82e8 M3N72-D
1462 7508 K9N2GM-FIH
1849 0568 K10N78FullHD-hSLI R3.0 Memory Controller
0569 MCP78S [GeForce 8200] PCI Express Bridge
103c 2a9e Pavilion p6310f
1043 82e8 M3N72-D
1462 7508 K9N2GM-FIH
1849 0569 K10N78FullHD-hSLI R3.0 PCI Express Bridge
056a MCP73 [nForce 630i] USB 2.0 Controller (EHCI)
1019 297a MCP73PVT-SM
147b 1c3e I-N73V motherboard
056c MCP73 IDE Controller
1019 297a MCP73PVT-SM
147b 1c3e I-N73V motherboard
1afa 7150 JW-IN7150-HD
056d MCP73 PCI Express bridge
1019 297a MCP73PVT-SM
10de cb73 MCP73 PCI Bridge
056e MCP73 PCI Express
bridge
1019 297a MCP73PVT-SM
10de 0000 MCP73 PCIe x16 port
056f MCP73 PCI Express bridge
1019 297a MCP73PVT-SM
10de 0000 MCP73 PCIe x1 port
05b1 NF200 PCIe 2.0 switch
05b8 NF200 PCIe 2.0 switch for GTX 295
05be NF200 PCIe 2.0 switch for Quadro Plex S4 / Tesla S870 / Tesla S1070 / Tesla S2050
05e0 GT200b [GeForce GTX 295]
05e1 GT200 [GeForce GTX 280]
05e2 GT200 [GeForce GTX 260]
05e3 GT200b [GeForce GTX 285]
1682 2490 GX-285N-ZDF

05e6 GT200b [GeForce GTX 275]
05e7 GT200GL [Tesla C1060 / M1060]
10de 0595 Tesla T10 Processor
10de 068f Tesla T10 Processor
10de 0697 Tesla M1060
10de 0714 Tesla M1060
10de 0743 Tesla M1060
05ea GT200 [GeForce GTX 260]
05eb GT200 [GeForce GTX 295]
05ed GT200GL [Quadro Plex 2200 D2]
05f1 GT200 [GeForce GTX 280]
05f2 GT200 [GeForce GTX 260]
05f8 GT200GL [Quadro Plex 2200 S4]
05f9 GT200GL [Quadro CX]
05fd GT200GL [Quadro FX 5800]
05fe GT200GL [Quadro FX 4800]
05ff GT200GL [Quadro FX 3800]
0600
G92 [GeForce 8800 GTS 512]
0601 G92 [GeForce 9800 GT]
0602 G92 [GeForce 8800 GT]
0603 G92 [GeForce GT 230 OEM]
0604 G92 [GeForce 9800 GX2]
0605 G92 [GeForce 9800 GT]
0606 G92 [GeForce 8800 GS]
0607 G92 [GeForce GTS 240]
0608 G92M [GeForce 9800M GTX]
0609 G92M [GeForce 8800M GTS]
106b 00a7 GeForce 8800 GS
060a G92M [GeForce GTX 280M]
060b G92M [GeForce 9800M GT]
060c G92M [GeForce 8800M GTX]
060d G92 [GeForce 8800 GS]
060f G92M [GeForce GTX 285M]
0610 G92 [GeForce 9600 GSO]
1682 2385 GeForce 9600 GSO 768mb
0611 G92 [GeForce 8800 GT]
107d 2ab0 Winfast PX8800 GT PCI-E
1462 1170 NX8800GT series model V117 2xDVI+TV
19da 1040 ZT-88TES2P-FSP
0612 G92 [GeForce 9800 GTX / 9800 GTX+]
0613 G92 [GeForce 9800 GTX+]
0614 G92 [GeForce 9800 GT]
107d 2ab3 WinFast PX9800 GT (S-Fanpipe)
0615 G92 [GeForce GTS 250]
3842 1150 GeForce GTS 250 P/N 512-P3-1150-TR
Overclocked
3842 1151 GeForce GTS 250 P/N 512-P3-1151-TR

3842 1155 GeForce
GTS 250 P/N 01G-P3-1155-TR
Overclocked
3842 1156 GeForce GTS 250 P/N 01G-P3-1156-TR
0617 G92M [GeForce 9800M GTX]
0618 G92M [GeForce GTX 260M]
0619 G92GL [Quadro FX 4700 X2]
061a G92GL [Quadro FX 3700]
061b G92GL [Quadro VX 200]
061c G92GLM [Quadro FX 3600M]
061d G92GLM [Quadro FX 2800M]
061e G92GLM [Quadro FX 3700M]
061f G92GLM [Quadro FX 3800M]
0620 G94 [GeForce 9800 GT]
0621 G94 [GeForce GT 230]
0622 G94 [GeForce 9600 GT]
107d 2ac1 WinFast PX9600GT 1024MB
1458 3481 GV-NX96T512HP
0623 G94 [GeForce 9600 GS]
0624 G94 [GeForce 9600 GT Green Edition]
0625 G94 [GeForce 9600 GSO 512]
0626 G94 [GeForce GT 130]
0627 G94 [GeForce GT 140]
0628 G94M [GeForce 9800M GTS]
062a G94M [GeForce 9700M GTS]
062b G94M [GeForce 9800M GS]
062c G94M [GeForce 9800M GTS]
062d G94 [GeForce 9600 GT]
062e G94 [GeForce 9600 GT]
106b 0605 GeForce GT 130
062f G94 [GeForce 9800 S]
0630 G94 [GeForce 9600 GT]
0631 G94M [GeForce GTS 160M]
0632 G94M [GeForce
GTS 150M]
0633 G94 [GeForce GT 220]
0635 G94 [GeForce 9600 GSO]
0637 G94 [GeForce 9600 GT]
0638 G94GL [Quadro FX 1800]
063a G94GLM [Quadro FX 2700M]
063f G94 [GeForce 9600 GE]
0640 G96C [GeForce 9500 GT]
0641 G96C [GeForce 9400 GT]
1682 4009 PV-T94G-ZAFG
0642 G96 [D9M-10]
0643 G96 [GeForce 9500 GT]
0644 G96 [GeForce 9500 GS]
174b 9600 Geforce 9500GS 512M DDR2 V/D/HDMI

0645 G96C [GeForce 9500 GS]
0646 G96C [GeForce GT 120]
0647 G96CM [GeForce 9600M GT]
0648 G96CM [GeForce 9600M GS]
0649 G96CM [GeForce 9600M GT]
1043 202d GeForce GT 220M
064a G96M [GeForce 9700M GT]
064b G96M [GeForce 9500M G]
064c G96CM [GeForce 9650M GT]
064e G96C [GeForce 9600 GSO / 9800 GT]
0651 G96CM [GeForce G 110M]
0652 G96CM [GeForce GT 130M]
152d 0850 GeForce GT 240M LE
0653 G96CM [GeForce GT 120M]
0654 G96CM [GeForce GT 220M]
1043 14a2 GeForce GT 320M
1043 14d2 GeForce GT 320M
0655 G96 [GeForce GT 120 Mac Edition]
0656 G96 [GeForce GT
120 Mac Edition]
0658 G96GL [Quadro FX 380]
0659 G96CGL [Quadro FX 580]
065a G96GLM [Quadro FX 1700M]
065b G96C [GeForce 9400 GT]
065c G96GLM [Quadro FX 770M]
065d G96 [GeForce 9500 GA / 9600 GT / GTS 250]
065f G96C [GeForce G210]
06c0 GF100 [GeForce GTX 480]
06c4 GF100 [GeForce GTX 465]
06ca GF100M [GeForce GTX 480M]
06cb GF100 [GeForce GTX 480]
06cd GF100 [GeForce GTX 470]
06d0 GF100GL
06d1 GF100GL [Tesla C2050 / C2070]
10de 0771 Tesla C2050
10de 0772 Tesla C2070
06d2 GF100GL [Tesla M2070]
10de 0774 Tesla M2070
10de 0830 Tesla M2070
10de 0842 Tesla M2070
10de 088f Tesla X2070
10de 0908 Tesla M2070
06d8 GF100GL [Quadro 6000]
06d9 GF100GL [Quadro 5000]
06da GF100GLM [Quadro 5000M]
06dc GF100GL [Quadro 6000]
06dd GF100GL [Quadro 4000]
06de GF100GL [Tesla T20 Processor]

10de 0773 Tesla S2050
10de 082f Tesla M2050
10de 0840 Tesla X2070
10de 0842 Tesla M2050
10de 0846 Tesla M2050
10de 0866 Tesla M2050
10de
0907 Tesla M2050
10de 091e Tesla M2050
06df GF100GL [Tesla M2070-Q]
10de 084d Tesla M2070-Q
10de 087f Tesla M2070-Q
06e0 G98 [GeForce 9300 GE]
107d 5a96 Geforce 9300GE
06e1 G98 [GeForce 9300 GS]
06e2 G98 [GeForce 8400]
06e3 G98 [GeForce 8300 GS]
06e4 G98 [GeForce 8400 GS Rev. 2]
1458 3475 GV-NX84S256HE [GeForce 8400 GS]
06e5 G98M [GeForce 9300M GS]
06e6 G98 [GeForce G 100]
06e7 G98 [GeForce 9300 SE]
06e8 G98M [GeForce 9200M GS]
103c 360b GeForce 9200M GE
06e9 G98M [GeForce 9300M GS]
1043 19b2 U6V laptop
06ea G98M [Quadro NVS 150M]
06eb G98M [Quadro NVS 160M]
06ec G98M [GeForce G 105M]
06ed G98 [GeForce 9600 GT / 9800 GT]
06ee G98 [GeForce 9600 GT / 9800 GT]
06ef G98M [GeForce G 103M]
06f1 G98M [GeForce G 105M]
06f8 G98 [Quadro NVS 420]
06f9 G98GL [Quadro FX 370 LP]
06fa G98 [Quadro NVS 450]
06fb G98GLM [Quadro FX 370M]
06fd G98 [Quadro NVS 295]
06ff G98 [HICx16 + Graphics]
10de 0711 HICx8 + Graphics
0751 MCP78S
[GeForce 8200] Memory Controller
103c 2a9e Pavilion p6310f
1043 82e8 M3N72-D
1462 7508 K9N2GM-FIH
1849 0751 K10N78FullHD-hSLI R3.0 Memory Controller
0752 MCP78S [GeForce 8200] SMBus
103c 2a9e Pavilion p6310f

1043 82e8 M3N72-D
1462 7508 K9N2GM-FIH
1849 0752 K10N78FullHD-hSLI R3.0 SMBus
0753 MCP78S [GeForce 8200] Co-Processor
103c 2a9e Pavilion p6310f
1043 82e8 M3N72-D
1462 7508 K9N2GM-FIH
1849 0753 K10N78FullHD-hSLI R3.0 Co-Processor
0754 MCP78S [GeForce 8200] Memory Controller
103c 2a9e Pavilion p6310f
1043 82e8 M3N72-D
1462 7508 K9N2GM-FIH
1849 0754 K10N78FullHD-hSLI R3.0 Memory Controller
0759 MCP78S [GeForce 8200] IDE
1043 82e8 M3N72-D
1462 7508 K9N2GM-FIH
1849 0759 K10N78FullHD-hSLI R3.0 IDE
075a MCP78S [GeForce 8200] PCI Bridge
103c 2a9e Pavilion p6310f
1043 82e8 M3N72-D
1849 075a K10N78FullHD-hSLI R3.0 PCI Bridge
075b MCP78S [GeForce 8200] PCI Express Bridge
103c 2a9e Pavilion p6310f
1043 82e8 M3N72-D
1462
7508 K9N2GM-FIH
1849 075b K10N78FullHD-hSLI R3.0 PCI Express Bridge
075c MCP78S [GeForce 8200] LPC Bridge
103c 2a9e Pavilion p6310f
1462 7508 K9N2GM-FIH
1849 075c K10N78FullHD-hSLI R3.0 LPC Bridge
075d MCP78S [GeForce 8200] LPC Bridge
1043 82e8 M3N72-D
0760 MCP77 Ethernet
103c 2a9e Pavilion p6310f
1043 82e8 M3N72-D
1462 7508 K9N2GM-FIH
1849 0760 K10N78FullHD-hSLI R3.0 Ethernet
0761 MCP77 Ethernet
0762 MCP77 Ethernet
0763 MCP77 Ethernet
0774 MCP72XE/MCP72P/MCP78U/MCP78S High Definition Audio
103c 2a9e Pavilion p6310f
has a Realtek ALC1200 HDAudio Codec
1043 82fe M3N72-D
1462 7508 K9N2GM-FIH
1849 3662 K10N78FullHD-hSLI R3.0 High Definition Audio
0778 MCP78S [GeForce 8200] PCI Express Bridge

103c 2a9e Pavilion p6310f
1043 82e8 M3N72-D
1462 7508 K9N2GM-FIH
1849 0778 K10N78FullHD-hSLI R3.0 PCI Express Bridge
077a MCP78S [GeForce 8200] PCI Bridge
103c 2a9e Pavilion p6310f
1043 82e8 M3N72-D
1462 7508
K9N2GM-FIH
1849 077a K10N78FullHD-hSLI R3.0 PCI Bridge
077b MCP78S [GeForce 8200] OHCI USB 1.1 Controller
103c 2a9e Pavilion p6310f
1043 82e8 M3N72-D
1462 7508 K9N2GM-FIH
1849 077b K10N78FullHD-hSLI R3.0 OHCI USB 1.1 Controller
077c MCP78S [GeForce 8200] EHCI USB 2.0 Controller
103c 2a9e Pavilion p6310f
1043 82e8 M3N72-D
1462 7508 K9N2GM-FIH
1849 077c K10N78FullHD-hSLI R3.0 EHCI USB 2.0 Controller
077d MCP78S [GeForce 8200] OHCI USB 1.1 Controller
103c 2a9e Pavilion p6310f
1043 82e8 M3N72-D
1462 7508 K9N2GM-FIH
1849 077d K10N78FullHD-hSLI R3.0 OHCI USB 1.1 Controller
077e MCP78S [GeForce 8200] EHCI USB 2.0 Controller
103c 2a9e Pavilion p6310f
1043 82e8 M3N72-D
1462 7508 K9N2GM-FIH
1849 077e K10N78FullHD-hSLI R3.0 EHCI USB 2.0 Controller
07c0 MCP73 Host Bridge
1afa 7150 JW-IN7150-HD
07c1 MCP73 Host Bridge
1019 297a MCP73PVT-SM
07c2 MCP73 Host Bridge
07c3 MCP73 Host Bridge
147b 1c3e I-N73V motherboard
07c5 MCP73
Host Bridge
07c8 MCP73 Memory Controller
1019 297a MCP73PVT-SM
147b 1c3e I-N73V motherboard
1afa 7150 JW-IN7150-HD
07cb nForce 610i/630i memory controller
1019 297a MCP73PVT-SM
147b 1c3e I-N73V motherboard
1afa 7150 JW-IN7150-HD
07cd nForce 610i/630i memory controller

1019 297a MCP73PVT-SM
147b 1c3e I-N73V motherboard
1afa 7150 JW-IN7150-HD
07ce nForce 610i/630i memory controller
1019 297a MCP73PVT-SM
147b 1c3e I-N73V motherboard
1afa 7150 JW-IN7150-HD
07cf nForce 610i/630i memory controller
1019 297a MCP73PVT-SM
147b 1c3e I-N73V motherboard
1afa 7150 JW-IN7150-HD
07d0 nForce 610i/630i memory controller
1019 297a MCP73PVT-SM
147b 1c3e I-N73V motherboard
1afa 7150 JW-IN7150-HD
07d1 nForce 610i/630i memory controller
1019 297a MCP73PVT-SM
147b 1c3e I-N73V motherboard
1afa 7150 JW-IN7150-HD
07d2 nForce 610i/630i memory controller
1019 297a MCP73PVT-SM
147b 1c3e I-N73V motherboard
1afa 7150 JW-IN7150-HD
07d3
nForce 610i/630i memory controller
1019 297a MCP73PVT-SM
147b 1c3e I-N73V motherboard
1afa 7150 JW-IN7150-HD
07d6 nForce 610i/630i memory controller
1019 297a MCP73PVT-SM
147b 1c3e I-N73V motherboard
1afa 7150 JW-IN7150-HD
07d7 MCP73 LPC Bridge
1019 297a MCP73PVT-SM
147b 1c3e I-N73V motherboard
1afa 7150 JW-IN7150-HD
07d8 MCP73 SMBus
1019 297a MCP73PVT-SM
147b 1c3e I-N73V motherboard
1afa 7150 JW-IN7150-HD
07d9 MCP73 Memory Controller
1019 297a MCP73PVT-SM
147b 1c3e I-N73V motherboard
1afa 7150 JW-IN7150-HD
07da MCP73 Co-processor
1afa 7150 JW-IN7150-HD
07dc MCP73 Ethernet
147b 1c3e I-N73V motherboard

07dd MCP73 Ethernet
07de MCP73 Ethernet
07df MCP73 Ethernet
07e0 C73 [GeForce 7150 / nForce 630i]
1afa 7150 JW-IN7150-HD
07e1 C73 [GeForce 7100 / nForce 630i]
1019 297a MCP73PVT-SM
07e2 C73 [GeForce 7050 / nForce 630i]
07e3 C73 [GeForce 7050 / nForce 610i]
147b 1c3e I-N73V motherboard
07e5 C73
[GeForce 7100 / nForce 620i]
07f0 MCP73 SATA Controller (IDE mode)
147b 1c3e I-N73V motherboard
07f4 GeForce 7100/nForce 630i SATA
1019 297a MCP73PVT-SM
147b 1c3e I-N73V motherboard
07f8 MCP73 SATA RAID Controller
147b 1c3e I-N73V motherboard
07fc MCP73 High Definition Audio
1019 297a MCP73PVT-SM
10de 07fc MCP73 High Definition Audio
147b 1c3e I-N73V motherboard
07fe MCP73 OHCI USB 1.1 Controller
1019 297a MCP73PVT-SM
147b 1c3e I-N73V motherboard
1afa 7150 JW-IN7150-HD
0840 C77 [GeForce 8200M]
0844 C77 [GeForce 9100M G]
0845 C77 [GeForce 8200M G]
0846 C77 [GeForce 9200]
0847 C78 [GeForce 9100]
103c 2a9e Pavilion p6310f
0848 C77 [GeForce 8300]
0849 C77 [GeForce 8200]
1462 7508 K9N2GM-FIH
1849 0849 K10N78FullHD-hSLI R3.0 GeForce 8200
084a C77 [nForce 730a]
084b C77 [GeForce 8200]
084c C77 [nForce 780a/980a SLI]
084d C77 [nForce 750a SLI]
1043 82e8 M3N72-D mGPU
084f C77 [GeForce 8100 / nForce 720a]
0860 C79 [GeForce
9300]
0861 C79 [GeForce 9400]
0862 C79 [GeForce 9400M G]
0863 C79 [GeForce 9400M]

106b 00aa MacBook5,1
0864 C79 [GeForce 9300]
0865 C79 [GeForce 9300 / ION]
0866 C79 [GeForce 9400M G]
106b 00b1 GeForce 9400M
0867 C79 [GeForce 9400]
106b 00ad iMac 9,1
0868 C79 [nForce 760i SLI]
0869 MCP7A [GeForce 9400]
086a C79 [GeForce 9400]
086c C79 [GeForce 9300 / nForce 730i]
086d C79 [GeForce 9200]
086e C79 [GeForce 9100M G]
086f MCP79 [GeForce 8200M G]
0870 C79 [GeForce 9400M]
0871 C79 [GeForce 9200]
0872 C79 [GeForce G102M]
1043 19b4 GeForce G102M
1043 1aa2 GeForce G102M
1043 1c02 GeForce G102M
1043 1c42 GeForce G205M
0873 C79 [GeForce G102M]
1043 19b4 GeForce G102M
1043 1c12 GeForce G102M
1043 1c52 GeForce G205M
0874 C79 [ION]
0876 C79 [GeForce 9400M / ION]
087a C79 [GeForce 9400]
087d C79 [ION]
19da a123 IONITX-F-E
087e C79 [ION LE]
087f C79 [ION LE]
08a0 MCP89 [GeForce 320M]
08a2 MCP89 [GeForce 320M]
08a3
MCP89 [GeForce 320M]
08a4 MCP89 [GeForce 320M]
08a5 MCP89 [GeForce 320M]
0a20 GT216 [GeForce GT 220]
1043 8311 ENGT220/DI/1GD3(LP)/V2
0a21 GT216M [GeForce GT 330M]
0a22 GT216 [GeForce 315]
0a23 GT216 [GeForce 210]
0a26 GT216 [GeForce 405]
0a27 GT216 [GeForce 405]
0a28 GT216M [GeForce GT 230M]
0a29 GT216M [GeForce GT 330M]
0a2a GT216M [GeForce GT 230M]

0a2b GT216M [GeForce GT 330M]
0a2c GT216M [NVS 5100M]
0a2d GT216M [GeForce GT 320M]
0a30 GT216 [GeForce 505]
0a32 GT216 [GeForce GT 415]
0a34 GT216M [GeForce GT 240M]
0a35 GT216M [GeForce GT 325M]
0a38 GT216GL [Quadro 400]
0a3c GT216GLM [Quadro FX 880M]
0a60 GT218 [GeForce G210]
0a62 GT218 [GeForce 205]
0a63 GT218 [GeForce 310]
0a64 GT218 [ION]
0a65 GT218 [GeForce 210]
1043 8334 EN210 SILENT
1458 36a9 GV-N210D3-1GI (rev. 6.0/6.1)
1462 8094 N210 [Geforce 210] PCIe graphics adapter
0a66 GT218 [GeForce 310]
0a67 GT218 [GeForce 315]
0a68 GT218M [GeForce G 105M]
0a69 GT218M
[GeForce G 105M]
0a6a GT218M [NVS 2100M]
0a6c GT218M [NVS 3100M]
1028 040b Latitude E6510
17aa 2142 ThinkPad T410
0a6e GT218M [GeForce 305M]
0a6f GT218M [ION]
0a70 GT218M [GeForce 310M]
0a71 GT218M [GeForce 305M]
0a72 GT218M [GeForce 310M]
0a73 GT218M [GeForce 305M]
0a74 GT218M [GeForce G210M]
1b0a 903a GeForce G210
0a75 GT218M [GeForce 310M]
0a76 GT218M [ION 2]
0a78 GT218GL [Quadro FX 380 LP]
0a7a GT218M [GeForce 315M]
104d 907e GeForce 315M
1179 fc50 GeForce 315M
1179 fc61 GeForce 315M
1179 fc71 GeForce 315M
1179 fc90 GeForce 315M
1179 fcc0 GeForce 315M
1179 fcd0 GeForce 315M
1179 fce2 GeForce 315M
1179 fcf2 GeForce 315M
1179 fd16 GeForce 315M

1179 fd40 GeForce 315M
1179 fd50 GeForce 315M
1179 fd52 GeForce 315M
1179 fd61 GeForce 315M
1179 fd71 GeForce 315M
1179 fd92 GeForce 315M
1179 fd96 GeForce 315M
1179 fdd0 GeForce 315M
1179 fdd2 GeForce 315M
1179 fdfe GeForce 315M
144d c0a2 GeForce
315M
144d c0b2 GeForce 315M
144d c581 GeForce 315M
144d c587 GeForce 315M
144d c588 GeForce 315M
144d c597 GeForce 315M
144d c606 GeForce 315M
1462 aa51 GeForce 405
1462 aa58 GeForce 405
1462 ac71 GeForce 405
1462 ac81 GeForce 315M
1462 ac82 GeForce 405
1462 ae33 GeForce 405
1642 3980 GeForce 405
17aa 3950 GeForce 405M
17aa 397d GeForce 405M
1b0a 2091 GeForce 315M
1b0a 90b4 GeForce 405
1bfd 0003 GeForce 405
1bfd 8006 GeForce 405
1bfd 8007 GeForce 315M
0a7b GT218 [GeForce 505]
0a7c GT218GLM [Quadro FX 380M]
0a80 MCP79 Host Bridge
0a81 MCP79 Host Bridge
0a82 MCP79 Host Bridge
0a83 MCP79 Host Bridge
0a84 MCP79 Host Bridge
0a85 MCP79 Host Bridge
0a86 MCP79 Host Bridge
0a87 MCP79 Host Bridge
0a88 MCP79 Memory Controller
0a89 MCP79 Memory Controller
0a98 MCP79 Memory Controller
10de cb79 iMac 9,1
0aa0 MCP79 PCI Express Bridge
10de cb79 Apple iMac 9,1

0aa2 MCP79 SMBus
10de cb79 Apple iMac
9,1
19da a123 IONITX-F-E

0aa3 MCP79 Co-processor
10de cb79 Apple iMac 9,1
19da a123 IONITX-F-E

0aa4 MCP79 Memory Controller
19da a123 IONITX-F-E

0aa5 MCP79 OHCI USB 1.1 Controller
10de cb79 Apple iMac 9,1
19da a123 IONITX-F-E

0aa6 MCP79 EHCI USB 2.0 Controller
10de cb79 Apple iMac 9,1
19da a123 IONITX-F-E

0aa7 MCP79 OHCI USB 1.1 Controller
10de cb79 Apple iMac 9,1
19da a123 IONITX-F-E

0aa8 MCP79 OHCI USB 1.1 Controller

0aa9 MCP79 EHCI USB 2.0 Controller
10de cb79 Apple iMac 9,1
19da a123 IONITX-F-E

0aaa MCP79 EHCI USB 2.0 Controller

0aab MCP79 PCI Bridge
10de cb79 Apple iMac 9,1

0aac MCP79 LPC Bridge

0aad MCP79 LPC Bridge
19da a123 IONITX-F-E

0aae MCP79 LPC Bridge
10de cb79 Apple iMac 9,1

0aaf MCP79 LPC Bridge

0ab0 MCP79 Ethernet
10de cb79 Apple iMac 9,1
19da a123 IONITX-F-E

0ab1 MCP79 Ethernet

0ab2 MCP79 Ethernet

0ab3 MCP79 Ethernet

0ab4 MCP79 SATA Controller
19da a123 IONITX-F-E

0ab5 MCP79 SATA
Controller

0ab6 MCP79 SATA Controller

0ab7 MCP79 SATA Controller

0ab8 MCP79 AHCI Controller

0ab9 MCP79 AHCI Controller
10de cb79 Apple iMac 9,1

0aba MCP79 AHCI Controller

0abb MCP79 AHCI Controller

0abc MCP79 RAID Controller
0abd MCP79 RAID Controller
0abe MCP79 RAID Controller
0abf MCP79 RAID Controller
0ac0 MCP79 High Definition Audio
10de cb79 Apple iMac 9,1
0ac1 MCP79 High Definition Audio
0ac2 MCP79 High Definition Audio
0ac3 MCP79 High Definition Audio
0ac4 MCP79 PCI Express Bridge
10de cb79 Apple iMac 9,1
0ac5 MCP79 PCI Express Bridge
0ac6 MCP79 PCI Express Bridge
10de cb79 Apple iMac 9,1
0ac7 MCP79 PCI Express Bridge
10de cb79 Apple iMac 9,1
0ac8 MCP79 PCI Express Bridge
0ad0 MCP78S [GeForce 8200] SATA Controller (non-AHCI mode)
1462 7508 K9N2GM-FIH
1849 0ad0 K10N78FullHD-hSLI R3.0 IDE
0ad4 MCP78S [GeForce 8200] AHCI Controller
103c 2a9e Pavilion p6310f
1043 82e8 M3N72-D
1849 0ad4 K10N78FullHD-hSLI R3.0 AHCI
Controller
0ad8 MCP78S [GeForce 8200] SATA Controller (RAID mode)
0be2 GT216 HDMI Audio Controller
1043 8311 ENGT220/DI/1GD3(LP)/V2
0be3 High Definition Audio Controller
1028 040b Latitude E6510
10de 066d G98 [GeForce 8400GS]
1462 8094 N210 [Geforce 210] PCIe graphics adapter
0be4 High Definition Audio Controller
0be5 GF100 High Definition Audio Controller
0be9 GF106 High Definition Audio Controller
1558 8687 CLEVO/KAPOK W860CU
3842 1452 GeForce GTS 450
0bea GF108 High Definition Audio Controller
3842 1430 GeForce GT 430
0beb GF104 High Definition Audio Controller
1462 2322 N460GTX Cyclone 1GD5/OC
0bee GF116 High Definition Audio Controller
0bf0 Tegra2 PCIe x4 Bridge
0bf1 Tegra2 PCIe x2 Bridge
0ca0 GT215 [GeForce GT 330]
0ca2 GT215 [GeForce GT 320]
0ca3 GT215 [GeForce GT 240]
0ca4 GT215 [GeForce GT 340]

0ca5 GT215 [GeForce GT 220]
0ca7 GT215 [GeForce GT 330]
0ca8 GT215M [GeForce GTS 260M]
0ca9 GT215M [GeForce GTS 250M]
0cac
GT215 [GeForce GT 220/315]
0caf GT215M [GeForce GT 335M]
0cb0 GT215M [GeForce GTS 350M]
0cb1 GT215M [GeForce GTS 360M]
0cbc GT215GLM [Quadro FX 1800M]
0d60 MCP89 HOST Bridge
0d68 MCP89 Memory Controller
0d69 MCP89 Memory Controller
0d76 MCP89 PCI Express Bridge
0d79 MCP89 SMBus
0d7a MCP89 Co-Processor
0d7b MCP89 Memory Controller
0d7d MCP89 Ethernet
0d80 MCP89 LPC Bridge
0d85 MCP89 SATA Controller
0d88 MCP89 SATA Controller (AHCI mode)
0d89 MCP89 SATA Controller (AHCI mode)
0d8d MCP89 SATA Controller (RAID mode)
0d94 MCP89 High Definition Audio
0d9c MCP89 OHCI USB 1.1 Controller
0d9d MCP89 EHCI USB 2.0 Controller
0dc0 GF106 [GeForce GT 440]
0dc4 GF106 [GeForce GTS 450]
0dc5 GF106 [GeForce GTS 450 OEM]
0dc6 GF106 [GeForce GTS 450 OEM]
0dcd GF106M [GeForce GT 555M]
0dce GF106M [GeForce GT 555M]
0dd1 GF106M [GeForce GTX 460M]
1558 8687 CLEVO/KAPOK W860CU
0dd2 GF106M [GeForce GT 445M]
0dd3 GF106M [GeForce GT 435M]
0dd6 GF106M
[GeForce GT 550M]
0dd8 GF106GL [Quadro 2000]
10de 0914 Quadro 2000D
0dda GF106GLM [Quadro 2000M]
0de0 GF108 [GeForce GT 440]
0de1 GF108 [GeForce GT 430]
3842 1430 GeForce GT 430
0de2 GF108 [GeForce GT 420]
0de3 GF108M [GeForce GT 635M]
0de4 GF108 [GeForce GT 520]
0de5 GF108 [GeForce GT 530]

0de7 GF108 [GeForce GT 610]
0de8 GF108M [GeForce GT 620M]
0de9 GF108M [GeForce GT 620M/630M/635M/640M LE]
1025 0692 GeForce GT 620M
1025 0725 GeForce GT 620M
1025 0728 GeForce GT 620M
1025 072b GeForce GT 620M
1025 072e GeForce GT 620M
1025 0753 GeForce GT 620M
1025 0754 GeForce GT 620M
17aa 3977 GeForce GT 640M LE
1b0a 2210 GeForce GT 635M
0dea GF108M [GeForce 610M]
17aa 365a GeForce 615
17aa 365b GeForce 615
17aa 365e GeForce 615
17aa 3660 GeForce 615
17aa 366c GeForce 615
0deb GF108M [GeForce GT 555M]
0dec GF108M [GeForce GT 525M]
0ded GF108M [GeForce GT 520M]
0dee GF108M [GeForce GT 415M]
0def GF108M [NVS 5400M]
0df0
GF108M [GeForce GT 425M]
0df1 GF108M [GeForce GT 420M]
0df2 GF108M [GeForce GT 435M]
0df3 GF108M [GeForce GT 420M]
0df4 GF108M [GeForce GT 540M]
152d 0952 GeForce GT 630M
152d 0953 GeForce GT 630M
0df5 GF108M [GeForce GT 525M]
0df6 GF108M [GeForce GT 550M]
0df7 GF108M [GeForce GT 520M]
0df8 GF108GL [Quadro 600]
0df9 GF108GLM [Quadro 500M]
0dfa GF108GLM [Quadro 1000M]
0dfc GF108GLM [NVS 5200M]
0e08 GF119 HDMI Audio Controller
1043 83a0 ENGT520 SILENT
1024MB with passive cooling (heatsink)
10b0 104a Gainward GeForce GT 610
0e09 GF110 High Definition Audio Controller
0e0a GK104 HDMI Audio Controller
0e0b GK106 HDMI Audio Controller
0e0c GF114 HDMI Audio Controller
0e0f GK208 HDMI/DP Audio Controller
0e12 TegraK1 PCIe x4 Bridge

0e13 TegraK1 PCIe x1 Bridge
0e1a GK110 High Definition Audio Controller
0e1b GK107 HDMI Audio Controller
103c 197b ZBook 15
1043 8428 GTX650-DC-1GD5
0e1c Tegra3+ PCIe x4 Bridge
0e1d Tegra3+
PCIe x2 Bridge
0e22 GF104 [GeForce GTX 460]
1462 2322 N460GTX Cyclone 1GD5/OC
0e23 GF104 [GeForce GTX 460 SE]
0e24 GF104 [GeForce GTX 460 OEM]
0e30 GF104M [GeForce GTX 470M]
0e31 GF104M [GeForce GTX 485M]
0e3a GF104GLM [Quadro 3000M]
0e3b GF104GLM [Quadro 4000M]
0f00 GF108 [GeForce GT 630]
0f01 GF108 [GeForce GT 620]
0f02 GF108 [GeForce GT 730]
0f03 GF108 [GeForce GT 610]
0f06 GF108 [GeForce GT 730]
0fb0 GM200 High Definition Audio
0fb8 GP108 High Definition Audio Controller
0fb9 GP107GL High Definition Audio Controller
0fba GM206 High Definition Audio Controller
0fbb GM204 High Definition Audio Controller
0fbc GM107 High Definition Audio Controller [GeForce 940MX]
0fc0 GK107 [GeForce GT 640 OEM]
0fc1 GK107 [GeForce GT 640]
0fc2 GK107 [GeForce GT 630 OEM]
0fc5 GK107 [GeForce GT 1030]
0fc6 GK107 [GeForce GTX 650]
1043 8428 GTX650-DC-1GD5
0fc8 GK107 [GeForce GT 740]
0fc9 GK107 [GeForce GT 730]
0fcd GK107M [GeForce GT 755M]
0fce
GK107M [GeForce GT 640M LE]
0fd1 GK107M [GeForce GT 650M]
1043 1597 GeForce GT 650M
1043 15a7 GeForce GT 650M
1043 2103 N56VZ
1043 2105 GeForce GT 650M
1043 2141 GeForce GT 650M
0fd2 GK107M [GeForce GT 640M]
1028 054f GeForce GT 640M
1028 055f GeForce GT 640M
1028 0595 GeForce GT 640M LE

1028 05b2 GeForce GT 640M LE
0fd3 GK107M [GeForce GT 640M LE]
0fd4 GK107M [GeForce GTX 660M]
0fd5 GK107M [GeForce GT 650M Mac Edition]
0fd8 GK107M [GeForce GT 640M Mac Edition]
0fd9 GK107M [GeForce GT 645M]
0fdb GK107M
0fdf GK107M [GeForce GT 740M]
0fe0 GK107M [GeForce GTX 660M Mac Edition]
0fe1 GK107M [GeForce GT 730M]
0fe2 GK107M [GeForce GT 745M]
0fe3 GK107M [GeForce GT 745M]
103c 2b16 GeForce GT 745A
17aa 3675 GeForce GT 745A
0fe4 GK107M [GeForce GT 750M]
0fe5 GK107 [GeForce K340 USM]
0fe6 GK107 [GRID K1 NVS USM]
GRID K1 USM
0fe7 GK107GL [GRID K100 vGPU]
10de 101e GRID K100
0fe9 GK107M [GeForce GT 750M Mac Edition]
0fea GK107M
[GeForce GT 755M Mac Edition]
0fec GK107M [GeForce 710A]
0fed GK107M [GeForce 820M]
0fee GK107M [GeForce 810M]
0fef GK107GL [GRID K340]
0ff1 GK107 [NVS 1000]
0ff2 GK107GL [GRID K1]
0ff3 GK107GL [Quadro K420]
0ff5 GK107GL [GRID K1 Tesla USM]
0ff6 GK107GLM [Quadro K1100M]
103c 197b ZBook 15
GRID K1 Quadro USM
0ff7 GK107GL [GRID K140Q vGPU]
10de 1037 GRID K140Q
0ff8 GK107GLM [Quadro K500M]
0ff9 GK107GL [Quadro K2000D]
0ffa GK107GL [Quadro K600]
0ffb GK107GLM [Quadro K2000M]
0ffc GK107GLM [Quadro K1000M]
0ffd GK107 [NVS 510]
0ffe GK107GL [Quadro K2000]
0fff GK107GL [Quadro 410]
1001 GK110B [GeForce GTX TITAN Z]
1003 GK110 [GeForce GTX Titan LE]
1004 GK110 [GeForce GTX 780]
3842 0784 GK110B [GeForce GTX 780 SC w/ ACX Cooler]

3842 1784 GK110B [GeForce GTX 780 Dual FTW w/ ACX Cooler]
3842 1788 GK110B [GeForce GTX 780 Dual Classified w/ ACX Cooler]
1005 GK110 [GeForce GTX TITAN]
1043 8451 GTX TITAN-6GD5
Reference Model
10de
1035 GeForce GTX Titan
06G-P4-2790-KR
3842 2790 GeForce GTX Titan
06G-P4-2791-KR
3842 2791 GeForce GTX Titan SC
06G-P4-2793-KR
3842 2793 GeForce GTX Titan SC Signature
06G-P4-2794-KR
3842 2794 GeForce GTX Titan SC Hydro Copper
06G-P4-2795-KR
3842 2795 GeForce GTX Titan SC Hydro Copper Signature
1007 GK110 [GeForce GTX 780 Rev. 2]
1008 GK110 [GeForce GTX 780 Ti 6GB]
100a GK110B [GeForce GTX 780 Ti]
100c GK110B [GeForce GTX TITAN Black]
101e GK110GL [Tesla K20X]
101f GK110GL [Tesla K20]
1020 GK110GL [Tesla K20X]
1021 GK110GL [Tesla K20Xm]
1022 GK110GL [Tesla K20c]
1023 GK110BGL [Tesla K40m]
10de 097e 12GB Computational Accelerator
1024 GK180GL [Tesla K40c]
1026 GK110GL [Tesla K20s]
1027 GK110BGL [Tesla K40st]
1028 GK110GL [Tesla K20m]
1029 GK110BGL [Tesla K40s]
102a GK110BGL [Tesla K40t]
102d GK210GL [Tesla K80]
102e GK110BGL [Tesla K40d]
102f GK110BGL [Tesla Stella Solo]
103a GK110GL [Quadro K6000]
103c GK110GL [Quadro
K5200]
103f GK110BGL [Tesla Stella SXM]
1040 GF119 [GeForce GT 520]
1043 83a0 ENGT520 SILENT
1042 GF119 [GeForce 510]
1045 GF119
1048 GF119 [GeForce 605]
1049 GF119 [GeForce GT 620 OEM]
104a GF119 [GeForce GT 610]

1024MB with passive cooling (heatsink)
10b0 104a Gainward GeForce GT 610
104b GF119 [GeForce GT 625 OEM]
104c GF119 [GeForce GT 705]
104d GF119 [GeForce GT 710]
1050 GF119M [GeForce GT 520M]
1051 GF119M [GeForce GT 520MX]
1052 GF119M [GeForce GT 520M]
1054 GF119M [GeForce 410M]
1055 GF119M [GeForce 410M]
1056 GF119M [NVS 4200M]
1057 GF119M [Quadro NVS 4200M]
1058 GF119M [GeForce 610M]
103c 2aed GeForce 610
103c 2af1 GeForce 610
1043 10ac GeForce GT 610M
1043 10bc GeForce GT 610M
1043 1652 GeForce GT 610M
17aa 367a GeForce 610M
17aa 3682 GeForce 800A
17aa 3687 GeForce 800A
17aa 3692 GeForce 705A
17aa 3695 GeForce 800A
17aa a117 GeForce 610M
1059 GF119M [GeForce 610M]
105a GF119M [GeForce 610M]
1043
2111 GeForce GT 610M
1043 2112 GeForce GT 610M
105b GF119M [GeForce 705M]
103c 2afb GeForce 705A
17aa 309d GeForce 705A
17aa 30b1 GeForce 800A
17aa 30f3 GeForce 705A
17aa 36a1 GeForce 800A
107c GF119 [NVS 315]
107d GF119 [NVS 310]
1080 GF110 [GeForce GTX 580]
1081 GF110 [GeForce GTX 570]
10de 087e Leadtek WinFast GTX 570
1082 GF110 [GeForce GTX 560 Ti OEM]
1084 GF110 [GeForce GTX 560 OEM]
1086 GF110 [GeForce GTX 570 Rev. 2]
1087 GF110 [GeForce GTX 560 Ti 448 Cores]
1088 GF110 [GeForce GTX 590]
1089 GF110 [GeForce GTX 580 Rev. 2]
108b GF110 [GeForce GTX 580]
108e GF110GL [Tesla C2090]

1091 GF110GL [Tesla M2090]
10de 088e Tesla X2090
10de 0891 Tesla X2090
10de 0974 Tesla X2090
10de 098d Tesla X2090
1094 GF110GL [Tesla M2075]
10de 0888 Tesla M2075
1096 GF110GL [Tesla C2050 / C2075]
10de 0910 Tesla C2075
10de 0911 Tesla C2050
109a GF100GLM [Quadro 5010M]
109b GF100GL [Quadro 7000]
10de 0918 Quadro 7000
10c0
GT218 [GeForce 9300 GS Rev. 2]
10c3 GT218 [GeForce 8400 GS Rev. 3]
10c5 GT218 [GeForce 405]
10d8 GT218 [NVS 300]
10ef GP102 HDMI Audio Controller
10f0 GP104 High Definition Audio Controller
10f1 GP106 High Definition Audio Controller
10f7 TU102 High Definition Audio Controller
10f8 TU104 HD Audio Controller
10f9 TU106 High Definition Audio Controller
1043 8673 TURBO-RTX2070-8G
1140 GF117M [GeForce 610M/710M/810M/820M / GT 620M/625M/630M/720M]
1019 0799 GeForce 820M
1019 999f GeForce GT 720M
1025 0600 GeForce GT 620M
1025 0606 GeForce GT 620M
1025 064a GeForce GT 620M
1025 064c GeForce GT 620M
1025 067a GeForce GT 620M
1025 0680 GeForce GT 620M
1025 0686 GeForce 710M
1025 0689 GeForce 710M
1025 068b GeForce 710M
1025 068d GeForce 710M
1025 068e GeForce 710M
1025 0691 GeForce 710M
1025 0692 GeForce GT 620M
1025 0694 GeForce GT 620M
1025 0702 GeForce GT 620M
1025 0719 GeForce GT 620M
1025 0725 GeForce
GT 620M
1025 0728 GeForce GT 620M
1025 072b GeForce GT 620M

1025 072e GeForce GT 620M
1025 0732 GeForce GT 620M
1025 0763 GeForce GT 720M
1025 0773 GeForce 710M
1025 0774 GeForce 710M
1025 0776 GeForce GT 720M
1025 077a GeForce 710M
1025 077b GeForce 710M
1025 077c GeForce 710M
1025 077d GeForce 710M
1025 077e GeForce 710M
1025 077f GeForce 710M
1025 0781 GeForce GT 720M
1025 0798 GeForce GT 720M
1025 0799 GeForce GT 720M
1025 079b GeForce GT 720M
1025 079c GeForce GT 720M
1025 0807 GeForce GT 720M
1025 0821 GeForce GT 720M
1025 0823 GeForce GT 720M
1025 0830 GeForce GT 720M
1025 0833 GeForce GT 720M
1025 0837 GeForce GT 720M
1025 083e GeForce 820M
1025 0841 GeForce 710M
1025 0854 GeForce 820M
1025 0855 GeForce 820M
1025 0856 GeForce 820M
1025 0857 GeForce 820M
1025 0858 GeForce 820M
1025 0863 GeForce 820M
1025 0868 GeForce 820M
1025 0869 GeForce 810M
1025 0873 GeForce 820M
1025
0878 GeForce 820M
1025 087b GeForce 820M
1025 087c GeForce 810M
1025 0881 GeForce 820M
1025 088a GeForce 820M
1025 089b GeForce 820M
1025 090f GeForce 820M
1025 0921 GeForce 820M
1025 092e GeForce 810M
1025 092f GeForce 820M
1025 0932 GeForce 820M
1025 093a GeForce 820M
1025 093c GeForce 820M

1025 093f GeForce 820M
1025 0941 GeForce 820M
1025 0945 GeForce 820M
1025 0954 GeForce 820M
1025 0965 GeForce 820M
1028 054d GeForce GT 630M
1028 054e GeForce GT 630M
1028 0554 GeForce GT 620M
1028 0557 GeForce GT 620M
1028 0562 GeForce GT 625M
1028 0565 GeForce GT 630M
1028 0568 GeForce GT 630M
1028 0590 GeForce GT 630M
1028 0592 GeForce GT 625M
1028 0594 GeForce GT 625M
1028 0595 GeForce GT 625M
1028 05a2 GeForce GT 625M
1028 05b1 GeForce GT 625M
1028 05b3 GeForce GT 625M
1028 05da GeForce GT 630M
1028 05de GeForce GT 720M
1028 05e0 GeForce GT 720M
1028 05e8 GeForce GT 630M
1028 05f4 GeForce
GT 720M
1028 060f GeForce GT 720M
1028 064e GeForce 820M
1028 0652 GeForce 820M
1028 0653 GeForce 820M
1028 0655 GeForce 820M
1028 065e GeForce 820M
1028 0662 GeForce 820M
1028 068d GeForce 820M
1028 06ad GeForce 820M
1028 06ae GeForce 820M
1028 06af GeForce 820M
1028 06b0 GeForce 820M
1028 06c0 GeForce 820M
1028 06c1 GeForce 820M
103c 18ef GeForce GT 630M
103c 18f9 GeForce GT 630M
103c 18fb GeForce GT 630M
103c 18fd GeForce GT 630M
103c 18ff GeForce GT 630M
103c 218a GeForce 820M
103c 21bb GeForce 820M
103c 21bc GeForce 820M
103c 220e GeForce 820M

103c 2210 GeForce 820M
103c 2212 GeForce 820M
103c 2214 GeForce 820M
103c 2218 GeForce 820M
103c 225b GeForce 820M
103c 225d GeForce 820M
103c 226d GeForce 820M
103c 226f GeForce 820M
103c 22d2 GeForce 820M
103c 22d9 GeForce 820M
103c 2335 GeForce 820M
103c 2337 GeForce 820M
103c 2aef GeForce GT 720A
103c 2af9 GeForce 710A
1043
10dd NVS 5200M
1043 10ed NVS 5200M
1043 11fd GeForce GT 720M
1043 124d GeForce GT 720M
1043 126d GeForce GT 720M
1043 131d GeForce GT 720M
1043 13fd GeForce GT 720M
1043 14c7 GeForce GT 720M
1043 1507 GeForce GT 620M
1043 15ad GeForce 820M
1043 15ed GeForce 820M
1043 160d GeForce 820M
1043 163d GeForce 820M
1043 166d GeForce 820M
1043 16cd GeForce 820M
1043 16dd GeForce 820M
1043 170d GeForce 820M
1043 176d GeForce 820M
1043 178d GeForce 820M
1043 179d GeForce 820M
1043 17dd GeForce 820M
1043 2132 GeForce GT 620M
1043 2136 NVS 5200M
1043 21ba GeForce GT 720M
1043 21fa GeForce GT 720M
1043 220a GeForce GT 720M
1043 221a GeForce GT 720M
1043 223a GeForce GT 710M
1043 224a GeForce GT 710M
1043 227a GeForce 820M
1043 228a GeForce 820M
1043 232a GeForce 820M
1043 233a GeForce 820M

1043 235a GeForce 820M
1043 236a GeForce 820M
1043 238a GeForce 820M
1043 8595 GeForce GT 720M
1043
85ea GeForce GT 720M
1043 85eb GeForce 820M
1043 85ec GeForce 820M
1043 85ee GeForce GT 720M
1043 85f3 GeForce 820M
1043 860e GeForce 820M
1043 861a GeForce 820M
1043 861b GeForce 820M
1043 8628 GeForce 820M
1043 8643 GeForce 820M
1043 864c GeForce 820M
1043 8652 GeForce 820M
1043 8660 GeForce 820M
1043 8661 GeForce 820M
105b 0dac GeForce GT 720M
105b 0dad GeForce GT 720M
105b 0ef3 GeForce GT 720M
1072 152d GeForce GT 720M
10cf 17f5 GeForce GT 720M
1179 fa01 GeForce 710M
1179 fa02 GeForce 710M
1179 fa03 GeForce 710M
1179 fa05 GeForce 710M
1179 fa11 GeForce 710M
1179 fa13 GeForce 710M
1179 fa18 GeForce 710M
1179 fa19 GeForce 710M
1179 fa21 GeForce 710M
1179 fa23 GeForce 710M
1179 fa2a GeForce 710M
1179 fa32 GeForce 710M
1179 fa33 GeForce 710M
1179 fa36 GeForce 710M
1179 fa38 GeForce 710M
1179 fa42 GeForce 710M
1179 fa43 GeForce 710M
1179 fa45 GeForce 710M
1179 fa47 GeForce
710M
1179 fa49 GeForce 710M
1179 fa58 GeForce 710M
1179 fa59 GeForce 710M
1179 fa88 GeForce 710M

1179 fa89 GeForce 710M
144d b092 GeForce GT 620M
144d c0d5 GeForce GT 630M
144d c0d7 GeForce GT 620M
144d c0e2 NVS 5200M
144d c0e3 NVS 5200M
144d c0e4 NVS 5200M
144d c10d GeForce 820M
144d c652 GeForce GT 620M on NP300E5C series laptop
144d c709 GeForce 710M
144d c711 GeForce 710M
144d c736 GeForce 710M
144d c737 GeForce 710M
144d c745 GeForce 820M
144d c750 GeForce 820M
1462 10b8 GeForce GT 710M
1462 10e9 GeForce GT 720M
1462 1116 GeForce 820M
1462 aa33 GeForce 720M
1462 aaa2 GeForce GT 720M
1462 aaa3 GeForce 820M
1462 acb2 GeForce GT 720M
1462 acc1 GeForce GT 720M
1462 ae61 GeForce 720M
1462 ae65 GeForce GT 720M
1462 ae6a GeForce 820M
1462 ae71 GeForce GT 720M
14c0 0083 GeForce 820M
152d 0926 GeForce 620M
152d 0982 GeForce GT 630M
152d 0983 GeForce GT 630M
152d 1005 GeForce GT 820M
152d
1012 GeForce 710M
152d 1019 GeForce 820M
152d 1030 GeForce GT 630M
152d 1055 GeForce 710M
152d 1067 GeForce GT 720M
152d 1072 GeForce GT 720M
152d 1086 GeForce 820M
152d 1092 GeForce 820M
17aa 2200 NVS 5200M
17aa 2213 GeForce GT 720M
17aa 2220 GeForce GT 720M
17aa 309c GeForce GT 720A
17aa 30b4 GeForce 820A
17aa 30b7 GeForce 720A
17aa 30e4 GeForce 820A

17aa 361b GeForce 820A
17aa 361c GeForce 820A
17aa 361d GeForce 820A
17aa 3656 GeForce GT 620M
17aa 365a GeForce 705M
17aa 365e GeForce 800M
17aa 3661 GeForce 820A
17aa 366c GeForce 800M
17aa 3685 GeForce 800M
17aa 3686 GeForce 800M
17aa 3687 GeForce 705A
17aa 3696 GeForce 820A
17aa 369b GeForce 820A
17aa 369c GeForce 820A
17aa 369d GeForce 820A
17aa 369e GeForce 820A
17aa 36a9 GeForce 820A
17aa 36af GeForce 820A
17aa 36b0 GeForce 820A
17aa 36b6 GeForce 820A
17aa 3800 GeForce GT 720M
17aa 3801 GeForce GT 720M
17aa 3802 GeForce
GT 720M
17aa 3803 GeForce GT 720M
17aa 3804 GeForce GT 720M
17aa 3806 GeForce GT 720M
17aa 3808 GeForce GT 720M
17aa 380d GeForce 820M
17aa 380e GeForce 820M
17aa 380f GeForce 820M
17aa 3811 GeForce 820M
17aa 3812 GeForce 820M
17aa 3813 GeForce 820M
17aa 3816 GeForce 820M
17aa 3818 GeForce 820M
17aa 381a GeForce 820M
17aa 381c GeForce 820M
17aa 3901 GeForce 610M / GT 620M
17aa 3902 GeForce 710M
17aa 3903 GeForce 610M/710M
17aa 3904 GeForce GT 620M/625M
17aa 3905 GeForce GT 720M
17aa 3907 GeForce 820M
17aa 3910 GeForce 720M
17aa 3912 GeForce 720M
17aa 3913 GeForce 820M
17aa 3915 GeForce 820M

17aa 3977 GeForce GT 720M
17aa 3983 GeForce 610M
17aa 5001 GeForce 610M
17aa 5003 GeForce GT 720M
17aa 5005 GeForce 705M
17aa 500d GeForce GT 620M
17aa 5014 GeForce 710M
17aa 5017 GeForce 710M
17aa 5019 GeForce 710M
17aa 501a GeForce 710M
17aa 501f GeForce GT 720M
17aa 5025 GeForce 710M
17aa
5027 GeForce 710M
17aa 502a GeForce 710M
17aa 502b GeForce GT 720M
17aa 502d GeForce 710M
17aa 502e GeForce GT 720M
17aa 502f GeForce GT 720M
17aa 5030 GeForce 705M
17aa 5031 GeForce 705M
17aa 5032 GeForce 820M
17aa 5033 GeForce 820M
17aa 503e GeForce 710M
17aa 503f GeForce 820M
17aa 5040 GeForce 820M
1854 0177 GeForce 710M
1854 0180 GeForce 710M
1854 0190 GeForce GT 720M
1854 0192 GeForce GT 720M
1854 0224 GeForce 820M
1b0a 01c0 GeForce 820M
1b0a 20dd GeForce GT 620M
1b0a 20df GeForce GT 620M
1b0a 210e GeForce 820M
1b0a 2202 GeForce GT 720M
1b0a 90d7 GeForce 820M
1b0a 90dd GeForce 820M
1b50 5530 GeForce 820M
1b6c 5531 GeForce GT 720M
1bab 0106 GeForce 820M
1d05 1013 GeForce 810M
1180 GK104 [GeForce GTX 680]
1043 83f1 GTX680-DC2-2GD5
3842 3682 GeForce GTX 680 Mac Edition
1182 GK104 [GeForce GTX 760 Ti]
1183 GK104 [GeForce GTX 660 Ti]
1184 GK104 [GeForce GTX 770]

1185 GK104 [GeForce
GTX 660 OEM]
10de 106f GK104 [GeForce GTX 760 OEM]
1187 GK104 [GeForce GTX 760]
1188 GK104 [GeForce GTX 690]
1189 GK104 [GeForce GTX 670]
10de 1074 GK104 [GeForce GTX 760 Ti OEM]
118a GK104GL [GRID K520]
118b GK104GL [GRID K2 GeForce USM]
118c GK104 [GRID K2 NVS USM]
GRID K2 USM
118d GK104GL [GRID K200 vGPU]
10de 101d GRID K200
118e GK104 [GeForce GTX 760 OEM]
118f GK104GL [Tesla K10]
1191 GK104 [GeForce GTX 760 Rev. 2]
1193 GK104 [GeForce GTX 760 Ti OEM]
1194 GK104GL [Tesla K8]
1195 GK104 [GeForce GTX 660 Rev. 2]
1198 GK104M [GeForce GTX 880M]
1199 GK104M [GeForce GTX 870M]
119a GK104M [GeForce GTX 860M]
119d GK104M [GeForce GTX 775M Mac Edition]
119e GK104M [GeForce GTX 780M Mac Edition]
119f GK104M [GeForce GTX 780M]
11a0 GK104M [GeForce GTX 680M]
11a1 GK104M [GeForce GTX 670MX]
11a2 GK104M [GeForce GTX 675MX Mac Edition]
11a3 GK104M [GeForce GTX 680MX]
106b 010d iMac 13,2
11a7 GK104M [GeForce GTX 675MX]
11af GK104GLM
[GRID IceCube]
11b0 GK104GL [GRID K240Q / K260Q vGPU]
10de 101a GRID K240Q
10de 101b GRID K260Q
11b1 GK104GL [GRID K2 Tesla USM]
11b4 GK104GL [Quadro K4200]
11b6 GK104GLM [Quadro K3100M]
11b7 GK104GLM [Quadro K4100M]
11b8 GK104GLM [Quadro K5100M]
11b9 GK104GLM
11ba GK104GL [Quadro K5000]
11bb GK104GL [Quadro 4100]
11bc GK104GLM [Quadro K5000M]
11bd GK104GLM [Quadro K4000M]
11be GK104GLM [Quadro K3000M]
11bf GK104GL [GRID K2]

11c0 GK106 [GeForce GTX 660]
11c2 GK106 [GeForce GTX 650 Ti Boost]
1043 845b GeForce GTX 650 Ti Boost DirectCU II OC
1462 2874 GeForce GTX 650 Ti Boost TwinFroze II OC
1569 11c2 GeForce GTX 650 Ti Boost OC
19da 1281 GeForce GTX 650 Ti Boost OC
3842 3657 GeForce GTX 650 Ti Boost
3842 3658 GeForce GTX 650 Ti Boost Superclocked
11c3 GK106 [GeForce GTX 650 Ti OEM]
10de 1030 GeForce GTX 650 Ti OEM
11c4 GK106 [GeForce GTX 645 OEM]
11c5 GK106 [GeForce GT 740]
11c6 GK106 [GeForce GTX 650 Ti]
11c7 GK106 [GeForce
GTX 750 Ti]
11c8 GK106 [GeForce GTX 650 OEM]
11cb GK106 [GeForce GT 740]
11e0 GK106M [GeForce GTX 770M]
11e1 GK106M [GeForce GTX 765M]
11e2 GK106M [GeForce GTX 765M]
11e3 GK106M [GeForce GTX 760M]
17aa 3683 GeForce GTX 760A
11e7 GK106M
11fa GK106GL [Quadro K4000]
11fc GK106GLM [Quadro K2100M]
1200 GF114 [GeForce GTX 560 Ti]
1201 GF114 [GeForce GTX 560]
1202 GF114 [GeForce GTX 560 Ti OEM]
1203 GF114 [GeForce GTX 460 SE v2]
1205 GF114 [GeForce GTX 460 v2]
1206 GF114 [GeForce GTX 555]
1207 GF114 [GeForce GT 645 OEM]
1208 GF114 [GeForce GTX 560 SE]
1210 GF114M [GeForce GTX 570M]
1211 GF114M [GeForce GTX 580M]
1212 GF114M [GeForce GTX 675M]
1213 GF114M [GeForce GTX 670M]
1241 GF116 [GeForce GT 545 OEM]
1243 GF116 [GeForce GT 545]
1244 GF116 [GeForce GTX 550 Ti]
1245 GF116 [GeForce GTS 450 Rev. 2]
1246 GF116M [GeForce GT 550M]
1247 GF116M [GeForce GT 555M/635M]
1043 1752 GeForce GT 555M
1043 2050 GeForce GT 555M
1043 2051
GeForce GT 555M
1043 212a GeForce GT 635M

1043 212b GeForce GT 635M
1043 212c GeForce GT 635M
152d 0930 GeForce GT 635M
1248 GF116M [GeForce GT 555M/635M]
152d 0930 GeForce GT 635M
17c0 10e7 GeForce GT 555M
17c0 10e8 GeForce GT 555M
17c0 10ea GeForce GT 555M
1854 0890 GeForce GT 555M
1854 0891 GeForce GT 555M
1854 1795 GeForce GT 555M
1854 1796 GeForce GT 555M
1854 3005 GeForce GT 555M
1249 GF116 [GeForce GTS 450 Rev. 3]
124b GF116 [GeForce GT 640 OEM]
124d GF116M [GeForce GT 555M/635M]
1028 0491 GeForce GT 555M
1028 0570 GeForce GT 555M
1028 0571 GeForce GT 555M
1462 108d GeForce GT 555M
1462 10cc GeForce GT 635M
1251 GF116M [GeForce GT 560M]
1280 GK208 [GeForce GT 635]
1281 GK208 [GeForce GT 710]
1282 GK208 [GeForce GT 640 Rev. 2]
1284 GK208 [GeForce GT 630 Rev. 2]
1286 GK208 [GeForce GT 720]
1287 GK208B [GeForce GT 730]
1288 GK208B [GeForce GT 720]
1289 GK208 [GeForce GT 710]
128b GK208B [GeForce GT
710]
1043 85f7 GT710-SL-1GD5
1290 GK208M [GeForce GT 730M]
103c 2afa GeForce GT 730A
103c 2b04 GeForce GT 730A
1043 13ad GeForce GT 730M
1043 13cd GeForce GT 730M
1291 GK208M [GeForce GT 735M]
1292 GK208M [GeForce GT 740M]
17aa 3675 GeForce GT 740A
17aa 367c GeForce GT 740A
17aa 3684 GeForce GT 740A
1293 GK208M [GeForce GT 730M]
1294 GK208M [GeForce GT 740M]
1295 GK208M [GeForce 710M]
103c 2b0d GeForce 710A
103c 2b0f GeForce 710A

103c 2b11 GeForce 710A
103c 2b20 GeForce 810A
103c 2b21 GeForce 810A
103c 2b22 GeForce 810A
17aa 367a GeForce 805A
17aa 367c GeForce 710A
1296 GK208M [GeForce 825M]
1298 GK208M [GeForce GT 720M]
1299 GK208BM [GeForce 920M]
17aa 30bb GeForce 920A
17aa 30df GeForce 920A
17aa 36a7 GeForce 920A
17aa 36af GeForce 920M
129a GK208BM [GeForce 910M]
12a0 GK208
12b9 GK208GLM [Quadro K610M]
12ba GK208GLM [Quadro K510M]
1340 GM108M [GeForce 830M]
103c 2b2b GeForce 830A
1341 GM108M
[GeForce 840M]
17aa 3697 GeForce 840A
17aa 3699 GeForce 840A
17aa 369c GeForce 840A
1344 GM108M [GeForce 845M]
1346 GM108M [GeForce 930M]
1347 GM108M [GeForce 940M]
1348 GM108M [GeForce 945M / 945A]
1349 GM108M [GeForce 930M]
134b GM108M [GeForce 940MX]
134d GM108M [GeForce 940MX]
17aa 2248 ThinkPad T570
134e GM108M [GeForce 930MX]
134f GM108M [GeForce 920MX]
137a GM108GLM [Quadro K620M / Quadro M500M]
17aa 505a Quadro M500M
137b GM108GLM [Quadro M520 Mobile]
137d GM108M [GeForce 940A]
1380 GM107 [GeForce GTX 750 Ti]
1381 GM107 [GeForce GTX 750]
1382 GM107 [GeForce GTX 745]
1389 GM107GL [GRID M30]
1390 GM107M [GeForce 845M]
1391 GM107M [GeForce GTX 850M]
17aa 3697 GeForce GTX 850A
17aa a125 GeForce GTX 850A
1392 GM107M [GeForce GTX 860M]
1393 GM107M [GeForce 840M]

1398 GM107M [GeForce 845M]
1399 GM107M [GeForce 945M]
139a GM107M [GeForce GTX 950M]
17aa 362c GeForce GTX 950A
17aa 362f GeForce GTX 950A
17aa 363f
GeForce GTX 950A
17aa 3640 GeForce GTX 950A
17aa 3647 GeForce GTX 950A
17aa 36b9 GeForce GTX 950A
139b GM107M [GeForce GTX 960M]
1028 06e4 XPS 15 9550
103c 2b4c GeForce GTX 960A
139c GM107M [GeForce 940M]
139d GM107M [GeForce GTX 750 Ti]
13b0 GM107GLM [Quadro M2000M]
13b1 GM107GLM [Quadro M1000M]
13b2 GM107GLM [Quadro M600M]
13b3 GM107GLM [Quadro K2200M]
13b4 GM107GLM [Quadro M620 Mobile]
13b6 GM107GLM [Quadro M1200 Mobile]
13b9 GM107GL [NVS 810]
13ba GM107GL [Quadro K2200]
13bb GM107GL [Quadro K620]
13bc GM107GL [Quadro K1200]
13bd GM107GL [Tesla M10]
10de 110a GRID M40
10de 1160 Tesla M10
10de 11d2 GRID M10-8Q
13c0 GM204 [GeForce GTX 980]
1043 8504 GTX980-4GD5
13c1 GM204
13c2 GM204 [GeForce GTX 970]
13c3 GM204
13d7 GM204M [GeForce GTX 980M]
13d8 GM204M [GeForce GTX 970M]
13d9 GM204M [GeForce GTX 965M]
13da GM204M [GeForce GTX 980 Mobile]
13e7 GM204GL [GeForce GTX 980 Engineering Sample]
13f0 GM204GL [Quadro
M5000]
13f1 GM204GL [Quadro M4000]
13f2 GM204GL [Tesla M60]
10de 114d GRID M60-1Q
10de 114e GRID M60-2Q
10de 1150 GRID M60-8Q
10de 11b0 GRID M60-4A
13f3 GM204GL [Tesla M6]

10de 1184 GRID M6-8Q
13f8 GM204GLM [Quadro M5000M / M5000 SE]
13f9 GM204GLM [Quadro M4000M]
13fa GM204GLM [Quadro M3000M]
10de 11c9 Quadro M3000 SE
13fb GM204GLM [Quadro M5500]
1401 GM206 [GeForce GTX 960]
1402 GM206 [GeForce GTX 950]
1406 GM206 [GeForce GTX 960 OEM]
1407 GM206 [GeForce GTX 750 v2]
1427 GM206M [GeForce GTX 965M]
103c 825b OMEN-17-w001nv
1430 GM206GL [Quadro M2000]
1431 GM206GL [Tesla M4]
1436 GM206GLM [Quadro M2200 Mobile]
15f0 GP100GL [Quadro GP100]
15f1 GP100GL
15f7 GP100GL [Tesla P100 PCIe 12GB]
15f8 GP100GL [Tesla P100 PCIe 16GB]
15f9 GP100GL [Tesla P100 SXM2 16GB]
1617 GM204M [GeForce GTX 980M]
1618 GM204M [GeForce GTX 970M]
1619 GM204M [GeForce GTX 965M]
161a GM204M [GeForce GTX 980 Mobile]
1667 GM204M [GeForce GTX 965M]
1725
GP100
172e GP100
172f GP100
174d GM108M [GeForce MX130]
174e GM108M [GeForce MX110]
1789 GM107GL [GRID M3-3020]
179c GM107 [GeForce 940MX]
1025 1094 Acer Aspire E5-575G
17c2 GM200 [GeForce GTX TITAN X]
17c8 GM200 [GeForce GTX 980 Ti]
17f0 GM200GL [Quadro M6000]
10de 1141 VCA 6000
17f1 GM200GL [Quadro M6000 24GB]
17fd GM200GL [Tesla M40]
1ad6 TU102 USB 3.1 Host Controller
1ad7 TU102 USB Type-C UCSI Controller
1ad8 TU104 USB 3.1 Host Controller
1ad9 TU104 USB Type-C UCSI Controller
1ada TU106 USB 3.1 Host Controller
1043 8673 TURBO-RTX2070-8G
1adb TU106 USB Type-C UCSI Controller
1043 8673 TURBO-RTX2070-8G

1aeb TU116 High Definition Audio Controller
1aec TU116 USB 3.1 Host Controller
1aed TU116 [GeForce GTX 1650 SUPER]
1b00 GP102 [TITAN X]
1b01 GP102 [GeForce GTX 1080 Ti 10GB]
1b02 GP102 [TITAN Xp]
1b04 GP102
1b06 GP102 [GeForce GTX 1080 Ti]
1b07 GP102 [P102-100]
1b30 GP102GL [Quadro P6000]
1b38 GP102GL [Tesla P40]
1b70
GP102GL
1b78 GP102GL
1b80 GP104 [GeForce GTX 1080]
1b81 GP104 [GeForce GTX 1070]
1b82 GP104 [GeForce GTX 1070 Ti]
1b83 GP104 [GeForce GTX 1060 6GB]
1b84 GP104 [GeForce GTX 1060 3GB]
1b87 GP104 [P104-100]
1ba0 GP104M [GeForce GTX 1080 Mobile]
1ba1 GP104M [GeForce GTX 1070 Mobile]
1458 1651 GeForce GTX 1070 Max-Q
1462 11e8 GeForce GTX 1070 Max-Q
1462 11e9 GeForce GTX 1070 Max-Q
1558 9501 GeForce GTX 1070 Max-Q
1ba2 GP104M [GeForce GTX 1070 Mobile]
1ba9 GP104M
1baa GP104M
1bad GP104 [GeForce GTX 1070 Engineering Sample]
1bb0 GP104GL [Quadro P5000]
1bb1 GP104GL [Quadro P4000]
1bb3 GP104GL [Tesla P4]
1bb4 GP104GL [Tesla P6]
1bb5 GP104GLM [Quadro P5200 Mobile]
103c 842f P5200 [Zbook 17 G5 mobile workstation]
1bb6 GP104GLM [Quadro P5000 Mobile]
1bb7 GP104GLM [Quadro P4000 Mobile]
1462 11e9 Quadro P4000 Max-Q
1bb8 GP104GLM [Quadro P3000 Mobile]
1bb9 GP104GLM [Quadro P4200 Mobile]
103c 842f P4200 [Zbook 17 G5 mobile workstation]
1bbb
GP104GLM [Quadro P3200 Mobile]
103c 842f P3200 [Zbook 17 G5 mobile workstation]
1bc7 GP104 [P104-101]
1be0 GP104BM [GeForce GTX 1080 Mobile]
1028 07c0 GeForce GTX 1080 Max-Q

1458 355b GeForce GTX 1080 Max-Q
1be1 GP104BM [GeForce GTX 1070 Mobile]
1c00 GP106
1c01 GP106
1c02 GP106 [GeForce GTX 1060 3GB]
1c03 GP106 [GeForce GTX 1060 6GB]
1c04 GP106 [GeForce GTX 1060 5GB]
1c06 GP106 [GeForce GTX 1060 6GB Rev. 2]
1c07 GP106 [P106-100]
1c09 GP106 [P106-090]
1c20 GP106M [GeForce GTX 1060 Mobile]
17aa 39b9 GeForce GTX 1060 Max-Q 3GB
1c21 GP106M [GeForce GTX 1050 Ti Mobile]
1c22 GP106M [GeForce GTX 1050 Mobile]
1c23 GP106M [GeForce GTX 1060 Mobile Rev. 2]
1414 0020 GTX 1060 Mobile
1c2d GP106M
1c30 GP106GL [Quadro P2000]
1c31 GP106GL [Quadro P2200]
1c35 GP106
1c60 GP106BM [GeForce GTX 1060 Mobile 6GB]
103c 8390 GeForce GTX 1060 Max-Q 6GB
1c61 GP106BM [GeForce GTX 1050 Ti Mobile]
1c62 GP106BM [GeForce GTX 1050 Mobile]
1c70
GP106GL
1c81 GP107 [GeForce GTX 1050]
1c82 GP107 [GeForce GTX 1050 Ti]
1043 8613 PH-GTX1050TI-4G
1458 3763 GV-N105TOC-4GD
1c83 GP107 [GeForce GTX 1050 3GB]
1c8c GP107M [GeForce GTX 1050 Ti Mobile]
1c8d GP107M [GeForce GTX 1050 Mobile]
1c8e GP107M
1c8f GP107M [GeForce GTX 1050 Ti Max-Q]
1c90 GP107M [GeForce MX150]
1c91 GP107M [GeForce GTX 1050 3 GB Max-Q]
1c92 GP107M [GeForce GTX 1050 Mobile]
1c94 GP107M [GeForce MX350]
1c96 GP107M [GeForce MX350]
1ca7 GP107GL
1ca8 GP107GL
1caa GP107GL
1cb1 GP107GL [Quadro P1000]
1cb2 GP107GL [Quadro P600]
1cb3 GP107GL [Quadro P400]
1cb6 GP107GL [Quadro P620]
1cba GP107GLM [Quadro P2000 Mobile]

103c 842c P2000 [Zbook 15 G5 mobile workstation]
103c 842f P2000 [Zbook 17 G5 mobile workstation]
1cbb GP107GLM [Quadro P1000 Mobile]
103c 8429 P1000 [Zbook Studio G5 mobile workstation]
103c 842c P1000 [Zbook 15 G5 mobile workstation]
103c 842f P1000 [Zbook 17 G5 mobile workstation]
103c 8451 P1000
[Zbook Studio x360 G5 mobile workstation]
1cbc GP107GLM [Quadro P600 Mobile]
1cbd GP107GLM [Quadro P620]
1ccc GP107BM [GeForce GTX 1050 Ti Mobile]
1ccd GP107BM [GeForce GTX 1050 Mobile]
1cfa GP107GL [Quadro P2000]
1cfb GP107GL [Quadro P1000]
1d01 GP108 [GeForce GT 1030]
1d10 GP108M [GeForce MX150]
17aa 225e ThinkPad T480
1d11 GP108M [GeForce MX230]
1d12 GP108M [GeForce MX150]
1d72 1701 Mi Notebook Pro [GeForce MX150]
1d13 GP108M [GeForce MX250]
1d16 GP108M [GeForce MX330]
1d33 GP108GLM [Quadro P500 Mobile]
1d34 GP108GLM [Quadro P520]
1d52 GP108BM [GeForce MX250]
1d81 GV100 [TITAN V]
1db1 GV100GL [Tesla V100 SXM2 16GB]
1db2 GV100GL [Tesla V100 DGXS 16GB]
1db3 GV100GL [Tesla V100 FHHL 16GB]
1db4 GV100GL [Tesla V100 PCIe 16GB]
1db5 GV100GL [Tesla V100 SXM2 32GB]
1db6 GV100GL [Tesla V100 PCIe 32GB]
1db7 GV100GL [Tesla V100 DGXS 32GB]
1db8 GV100GL [Tesla V100 SXM3 32GB]
10de 131d Tesla V100-SXM3-32GB-H
1dba GV100GL [Quadro GV100]
10de
12eb TITAN V CEO Edition
1df0 GV100GL [Tesla PG500-216]
1df2 GV100GL [Tesla PG503-216]
1df5 GV100GL [Tesla V100 SXM2 16GB]
1df6 GV100GL [Tesla V100S PCIe 32GB]
1e02 TU102 [TITAN RTX]
1e04 TU102 [GeForce RTX 2080 Ti]
1e07 TU102 [GeForce RTX 2080 Ti Rev. A]
1462 3715 RTX 2080 Ti GAMING X TRIO
1e2d TU102B
1e2e TU102B

1e30 TU102GL [Quadro RTX 6000/8000]
10de 129e Quadro RTX 8000
10de 12ba Quadro RTX 6000
1e36 TU102GL
1e37 TU102GL [GRID RTX T10-4/T10-8/T10-16]
10de 1347 GRID RTX T10-8
10de 1348 GRID RTX T10-4
10de 1370 GRID RTX T10-16
1e38 TU102GL
1e3c TU102GL
1e3d TU102GL
1e3e TU102GL
1e78 TU102GL [Quadro RTX 6000/8000]
10de 13d8 Quadro RTX 8000
10de 13d9 Quadro RTX 6000
1e81 TU104 [GeForce RTX 2080 SUPER]
1e82 TU104 [GeForce RTX 2080]
1e84 TU104 [GeForce RTX 2070 SUPER]
1e87 TU104 [GeForce RTX 2080 Rev. A]
1e89 TU104 [GeForce RTX 2060]
1e90 TU104M [GeForce RTX 2080 Mobile]
1eab TU104M
1eae TU104M
1eb0 TU104GL
[Quadro RTX 5000]
1eb1 TU104GL [Quadro RTX 4000]
1eb5 TU104GLM [Quadro RTX 5000 Mobile / Max-Q]
1eb6 TU104GLM [Quadro RTX 4000 Mobile / Max-Q]
1eb8 TU104GL [Tesla T4]
1eb9 TU104GL
1ebe TU104GL
1ec2 TU104 [GeForce RTX 2070 SUPER]
1ec7 TU104 [GeForce RTX 2070 SUPER]
1ed0 TU104BM [GeForce RTX 2080 Mobile]
1f02 TU106 [GeForce RTX 2070]
1043 8673 TURBO RTX 2070
1f04 TU106
1f06 TU106 [GeForce RTX 2060 SUPER]
1f07 TU106 [GeForce RTX 2070 Rev. A]
1f08 TU106 [GeForce RTX 2060 Rev. A]
1f09 TU106 [GeForce GTX 1660 SUPER]
1f10 TU106M [GeForce RTX 2070 Mobile]
1f11 TU106M [GeForce RTX 2060 Mobile]
1f12 TU106 [GeForce RTX 2060]
1f15 TU106 [GeForce RTX 2060]
1f2e TU106M
1f36 TU106GLM [Quadro RTX 3000 Mobile / Max-Q]
1f42 TU106 [GeForce RTX 2060 SUPER]

1f47 TU106 [GeForce RTX 2060 SUPER]
1f50 TU106BM [GeForce RTX 2070 Mobile]
1f51 TU106BM [GeForce RTX 2060 Mobile]
1f81 TU117
1f82 TU117 [GeForce GTX 1650]
1f91 TU117M [GeForce GTX 1650 Mobile
/ Max-Q]
1f92 TU117M [GeForce GTX 1650 Mobile]
1f96 TU117M [GeForce GTX 1650 Mobile / Max-Q]
1fae TU117GL
1fb8 TU117GLM [Quadro T2000 Mobile / Max-Q]
1fb9 TU117GLM [Quadro T1000 Mobile]
1fbf TU117GL
2182 TU116 [GeForce GTX 1660 Ti]
2183 TU116
2184 TU116 [GeForce GTX 1660]
2187 TU116 [GeForce GTX 1650 SUPER]
2191 TU116M [GeForce GTX 1660 Ti Mobile]
21ae TU116GL
21bf TU116GL
21c4 TU116 [GeForce GTX 1660 SUPER]
21d1 TU116BM [GeForce GTX 1660 Ti Mobile]
10df Emulex Corporation
0720 OneConnect NIC (Skyhawk)
103c 1934 FlexFabric 20Gb 2-port 650M Adapter
103c 1935 FlexFabric 20Gb 2-port 650FLB Adapter
103c 21d4 StoreFabric CN1200E 10Gb Converged Network Adapter
103c 220a FlexFabric 10Gb 2-port 556FLR-SFP+ Adapter
103c 803f Ethernet 10Gb 2-port 557SFP+ Adapter
103c 8144 FlexFabric 10GB 2-port 556FLR-T Adapter
17aa 1056 ThinkServer OCm14102-UX-L AnyFabric
17aa 1057 ThinkServer OCm14104-UX-L AnyFabric
17aa 1059 ThinkServer OCm14104-UT-L
AnyFabric
17aa 4014 ThinkServer OCm14102-NX-L AnyFabric
0722 OneConnect iSCSI Initiator (Skyhawk)
0723 OneConnect iSCSI Initiator + Target (Skyhawk)
0724 OneConnect FCoE Initiator (Skyhawk)
0728 OneConnect NIC (Skyhawk-VF)
072a OneConnect iSCSI Initiator (Skyhawk-VF)
072b OneConnect iSCSI Initiator + Target (Skyhawk-VF)
072c OneConnect FCoE Initiator (Skyhawk-VF)
1ae5 LP6000 Fibre Channel Host Adapter
e100 Proteus-X: LightPulse IOV Fibre Channel Host Adapter
e131 LightPulse 8Gb/s PCIe Shared I/O Fibre Channel Adapter
e180 Proteus-X: LightPulse IOV Fibre Channel Host Adapter
e200 LPe15000/LPe16000 Series 8Gb/16Gb Fibre Channel Adapter
1014 03f1 PCIe2 2-Port 16Gb Fibre Channel Adapter for POWER (FC EL5B; CCIN 577F)

1014 04e3 PCIe3 4-Port 10GbE SR Adapter for POWER (FC EN15/EN16; CCIN 2CE3)
1014 04e4 PCIe3 4-Port 10GbE SFP+ Adapter for POWER (FC EN18; CCIN 2CE4)
10df e280 LPe16002B-M6 2-Port 16Gb Fibre Channel Adapter
10df e281 LPe16000B-M6 1-Port
16Gb Fibre Channel Adapter
10df e282 Flex System FC5054 4-port 16Gb FC Adapter
e208 LightPulse 16Gb Fibre Channel Host Adapter (Lancer-VF)
e220 OneConnect NIC (Lancer)
17aa 1054 ThinkServer LPm16002B-M6-L AnyFabric
17aa 1055 ThinkServer LPm16004B-M8-L AnyFabric
e240 OneConnect iSCSI Initiator (Lancer)
e260 OneConnect FCoE Initiator (Lancer)
e268 OneConnect 10Gb FCoE Converged Network Adapter (Lancer-VF)
e300 LPe31000/LPe32000 Series 16Gb/32Gb Fibre Channel Adapter
1014 0614 PCIe3 4-Port 16Gb Fibre Channel Adapter for POWER (FC EN1C/EN1D; CCIN 578E)
1014 0615 PCIe3 2-Port 32Gb Fibre Channel Adapter for POWER (FC EN1A/EN1B; CCIN 578F)
10df e300 LPe32002-M2 2-Port 32Gb Fibre Channel Adapter
10df e301 LPe32000-M2 1-Port 32Gb Fibre Channel Adapter
10df e310 LPe31002-M6 2-Port 16Gb Fibre Channel Adapter
10df e311 LPe31000-M6 1-Port 16Gb Fibre Channel Adapter
10df e312 LPe31004-M6 4-Port 16Gb Fibre Channel Adapter
10df e320 LPe32002-M2-D 2-Port
32Gb Fibre Channel Adapter
10df e321 LPe32000-M2-D 1-Port 32Gb Fibre Channel Adapter
10df e322 LPe31002-M6-D 2-Port 16Gb Fibre Channel Adapter
10df e323 LPe31000-M6-D 1-Port 16Gb Fibre Channel Adapter
10df e324 LPM32002-D 2-Port 32Gb Fibre Channel Mezz Card
10df e325 LPM31002-D 2-Port 16Gb Fibre Channel Mezz Card
10df e330 LPe32002-M2-L 2-Port 32Gb PCIe Fibre Channel Adapter
10df e331 LPe32000-M2-L 1-Port 32Gb PCIe Fibre Channel Adapter
10df e332 LPe31002-M6-L 2-Port 16Gb PCIe Fibre Channel Adapter
10df e333 LPe31000-M6-L 1-Port 16Gb PCIe Fibre Channel Adapter
1590 0201 StoreFabric SN1600E 1-Port 32Gb Fibre Channel Adapter
1590 0202 StoreFabric SN1600E 2-Port 32Gb Fibre Channel Adapter
1590 0213 StoreFabric SN1200E 1-Port 16Gb Fibre Channel Adapter
1590 0214 StoreFabric SN1200E 2-Port 16Gb Fibre Channel Adapter
1590 022e Synergy 5330C 2-Port 32Gb Fibre Channel Mezz Card
f011 Saturn: LightPulse Fibre Channel Host Adapter
f015 Saturn: LightPulse
Fibre Channel Host Adapter
f085 LP850 Fibre Channel Host Adapter
f095 LP952 Fibre Channel Host Adapter
f098 LP982 Fibre Channel Host Adapter
f0a1 Thor LightPulse Fibre Channel Host Adapter
f0a5 Thor LightPulse Fibre Channel Host Adapter
f0b5 Viper LightPulse Fibre Channel Host Adapter
f0d1 Helios LightPulse Fibre Channel Host Adapter
f0d5 Helios LightPulse Fibre Channel Host Adapter

f0e1 Zephyr LightPulse Fibre Channel Host Adapter
f0e5 Zephyr LightPulse Fibre Channel Host Adapter
f0f5 Neptune LightPulse Fibre Channel Host Adapter
f100 LPe12000 Series 8Gb Fibre Channel Adapter
1014 038a 8Gb PCI Express Dual Port FC Adapter for POWER
103c 3282 8Gb Dual-port PCI-e FC HBA
10df f140 LPe12000-M8-L 1-Port 8Gb PCIe Fibre Channel Adapter
10df f141 LPe12002-M8-L 2-Port 8Gb PCIe Fibre Channel Adapter
f111 Saturn-X LightPulse Fibre Channel Host Adapter
f112 Saturn-X LightPulse Fibre Channel Host Adapter
f180 LPSe12002 EmulexSecure Fibre Channel Adapter
f400
LPe35000/LPe36000 Series 32Gb/64Gb Fibre Channel Adapter
10df f401 LPe35000-M2 1-Port 32Gb Fibre Channel Adapter
10df f402 LPe35002-M2 2-Port 32Gb Fibre Channel Adapter
10df f403 LPe36000-M64 1-Port 64Gb Fibre Channel Adapter
10df f404 LPe36002-M64 2-Port 64Gb Fibre Channel Adapter
10df f405 LPe35004-M2 4-Port 32Gb Fibre Channel Adapter
10df f406 LPe35004-X6 4-Port Fibre Channel Adapter
10df f410 LPe35002-M2-D 2-Port 32Gb Fibre Channel Adapter
10df f411 LPe35000-M2-D 1-Port 32Gb Fibre Channel Adapter
10df f418 LPe35000-M2-L 1-Port 32Gb PCIe Fibre Channel Adapter
10df f419 LPe35002-M2-L 2-Port 32Gb PCIe Fibre Channel Adapter
1590 02d5 StoreFabric SN1610E 1-Port 32Gb Fibre Channel Adapter
1590 02d6 StoreFabric SN1610E 2-Port 32Gb Fibre Channel Adapter
f700 LP7000 Fibre Channel Host Adapter
f701 LP7000 Fibre Channel Host Adapter Alternate ID (JX1:2-3, JX2:1-2)
f800 LP8000 Fibre Channel Host Adapter
f801 LP8000 Fibre Channel Host Adapter
Alternate ID (JX1:2-3, JX2:1-2)
f900 LP9000 Fibre Channel Host Adapter
f901 LP9000 Fibre Channel Host Adapter Alternate ID (JX1:2-3, JX2:1-2)
f980 LP9802 Fibre Channel Host Adapter
f981 LP9802 Fibre Channel Host Adapter Alternate ID
f982 LP9802 Fibre Channel Host Adapter Alternate ID
fa00 Thor-X LightPulse Fibre Channel Host Adapter
fb00 Viper LightPulse Fibre Channel Host Adapter
fc00 Thor-X LightPulse Fibre Channel Host Adapter
10df fc00 LP10000 LightPulse Fibre Channel Host Adapter
fc10 Helios-X LightPulse Fibre Channel Host Adapter
fc20 Zephyr-X LightPulse Fibre Channel Host Adapter
fc40 Saturn-X: LightPulse Fibre Channel Host Adapter
fc50 Proteus-X: LightPulse IOV Fibre Channel Host Adapter
fd00 Helios-X LightPulse Fibre Channel Host Adapter
Also IBM FC 5759 / FC 1910 for POWER
10df fd02 LightPulse LP11002 Dual-port 4Gigabit PCI Fibre Channel Adapter
fd11 Helios-X LightPulse Fibre Channel Host Adapter
fd12 Helios-X LightPulse Fibre Channel

Host Adapter
fe00 Zephyr-X LightPulse Fibre Channel Host Adapter
fe05 Zephyr-X: LightPulse FCoE Adapter
fe11 Zephyr-X LightPulse Fibre Channel Host Adapter
fe12 Zephyr-X LightPulse FCoE Adapter
ff00 Neptune LightPulse Fibre Channel Host Adapter
10e0 Integrated Micro Solutions Inc.
5026 IMS5026/27/28
5027 IMS5027
5028 IMS5028
8849 IMS8849
8853 IMS8853
9128 IMS9128 [Twin turbo 128]
10e1 Tekram Technology Co.,Ltd.
0391 TRM-S1040
10e1 0391 DC-315U SCSI-3 Host Adapter
690c DC-690c
dc29 DC-290
10e2 Aptix Corporation
10e3 Tundra Semiconductor Corp.
0000 CA91C042 [Universe]
0108 Tsi108 Host Bridge for Single PowerPC
0148 Tsi148 [Tempe]
1775 1100 VR11 Single Board Computer
0860 CA91C860 [QSpan]
0862 CA91C862A [QSpan-II]
8111 Tsi381 PCIe to PCI Bridge
8260 CA91L8200B [Dual PCI PowerSpan II]
8261 CA91L8260B [Single PCI PowerSpan II]
a108 Tsi109 Host Bridge for Dual PowerPC
10e4 Tandem Computers
8029 Realtek 8029 Network Card
10e5 Micro Industries
Corporation
10e6 Gainbery Computer Products Inc.
10e7 Vadem
10e8 Applied Micro Circuits Corp.
1072 INES GPIB-PCI (AMCC5920 based)
2011 Q-Motion Video Capture/Edit board
4750 S5930 [Matchmaker]
5920 S5920
8043 LANai4.x [Myrinet LANai interface chip]
8062 S5933_PARASTATION
807d S5933 [Matchmaker]
8088 Kongsberg Spacetec Format Synchronizer
8089 Kongsberg Spacetec Serial Output Board
809c S5933_HEPC3
80b9 Harmonix Hi-Card P8 (4x active ISDN BRI)

80d7 PCI-9112
80d8 PCI-7200
80d9 PCI-9118
80da PCI-9812
80fc APCI1500 Signal processing controller (16 dig. inputs + 16 dig. outputs)
811a PCI-IEEE1355-DS-DE Interface
814c Fastcom ESCC-PCI (Commtech, Inc.)
8170 S5933 [Matchmaker] (Chipset Development Tool)
81e6 Multimedia video controller
828d APCI3001 Signal processing controller (up to 16 analog inputs)
8291 Fastcom 232/8-PCI (Commtech, Inc.)
82c4 Fastcom 422/4-PCI (Commtech, Inc.)
82c5 Fastcom 422/2-PCI (Commtech, Inc.)
82c6 Fastcom
IG422/1-PCI (Commtech, Inc.)
82c7 Fastcom IG232/2-PCI (Commtech, Inc.)
82ca Fastcom 232/4-PCI (Commtech, Inc.)
82db AJA HDNTV HD SDI Framestore
82e2 Fastcom DIO24H-PCI (Commtech, Inc.)
8406 PCIcanx/PCIcan CAN interface [Kvaser AB]
8407 PCIcan II CAN interface (A1021, PCB-07, PCB-08) [Kvaser AB]
8851 S5933 on Innes Corp FM Radio Capture card
e004 X-Gen PCIe bridge
10e9 Alps Electric Co., Ltd.
10ea Integraphics
1680 IGA-1680
1682 IGA-1682
1683 IGA-1683
2000 CyberPro 2000
2010 CyberPro 2000A
5000 CyberPro 5000
5050 CyberPro 5050
5202 CyberPro 5202
CyberPro5202 Audio Function
5252 CyberPro5252
10eb Artists Graphics
0101 3GA
8111 Twist3 Frame Grabber
10ec Realtek Semiconductor Co., Ltd.
0139 RTL-8139/8139C/8139C+ Ethernet Controller
5208 RTS5208 PCI Express Card Reader
5209 RTS5209 PCI Express Card Reader
5227 RTS5227 PCI Express Card Reader
17aa 220e ThinkPad T440p
17aa 2214 ThinkPad X240
5229 RTS5229 PCI Express Card Reader
1025

0813 Aspire R7-571
103c 194e ProBook 455 G1 Notebook
103c 1985 Pavilion 17-e163sg Notebook PC
17aa 3832 Yoga 520
522a RTS522A PCI Express Card Reader
103c 8079 EliteBook 840 G3
103c 825b OMEN-17-w001nv
17aa 5124 ThinkPad E595
5249 RTS5249 PCI Express Card Reader
103c 1909 ZBook 15
524a RTS524A PCI Express Card Reader
5250 RTS5250 PCI Express Card Reader
525a RTS525A PCI Express Card Reader
1028 06dc Latitude E7470
1028 06e4 XPS 15 9550
17aa 224f ThinkPad X1 Carbon 5th Gen
5260 RTS5260 PCI Express Card Reader
5286 RTS5286 PCI Express Card Reader
5287 RTL8411B PCI Express Card Reader
1025 1094 Acer Aspire E5-575G
5288 RTS5288 PCI Express Card Reader
5289 RTL8411 PCI Express Card Reader
1043 1457 K55A Laptop
8029 RTL-8029(AS)
10b8 2011 EZ-Card (SMC1208)
10ec 8029 RTL-8029(AS)
1113 1208 EN1208
1186 0300 DE-528
1259 2400 AT-2400
1af4 1100 QEMU Virtual Machine
8125 RTL8125 2.5GbE Controller
8129 RTL-8129
10ec
8129 RT8129 Fast Ethernet Adapter
11ec 8129 RTL8111/8168 PCIe Gigabit Ethernet (misconfigured)
8136 RTL810xE PCI Express Fast Ethernet controller
103c 1985 RTL8106E on Pavilion 17-e163sg Notebook PC
103c 2a8c Compaq 500B Microtower
103c 2ab1 Pavilion p6774
103c 30cc Pavilion dv6700
1179 ff64 RTL8102E PCI-E Fast Ethernet NIC
17c0 1053 RTL8101e Medion WIM 2210 Notebook PC [MD96850]
8137 RTL8104E PCIe Fast Ethernet Controller
8138 RT8139 (B/C) Cardbus Fast Ethernet Adapter
10ec 8138 RT8139 (B/C) Fast Ethernet Adapter
8139 RTL-8100/8101L/8139 PCI Fast Ethernet Adapter
0357 000a TTP-Monitoring Card V2.0
1025 005a TravelMate 290

1025 8920 ALN-325
1025 8921 ALN-325
103c 006a NX9500
103c 2a20 Pavilion t3030.de Desktop PC
103c 30d9 Presario C700
1043 1045 L8400B, L3C/S, X58LE notebook
1043 8109 P5P800-MX Mainboard
1071 8160 MIM2000
10bd 0320 EP-320X-R
10ec 8139 RTL-8100/8101L/8139 PCI Fast Ethernet Adapter
10f7 8338 Panasonic
CF-Y5 laptop
1113 ec01 LevelOne FNC-0107TX/FNC-0109TX
1186 1104 DFE-520TX Fast Ethernet PCI Adapter (rev. D1)
1186 1300 DFE-538TX
1186 1320 SN5200
1186 8139 DRN-32TX
11f6 8139 FN22-3(A) LinxPRO Ethernet Adapter
1259 2500 AT-2500TX
1259 2503 AT-2500TX/ACPI
1385 f31d FA311 v2
1395 2100 AMB2100
1429 d010 ND010/ND012
1432 9130 EN-9130TX
1436 8139 RT8139
144d c00c P30/P35 notebook
1458 e000 GA-7VM400M/7VT600 Motherboard
1462 0131 MS-1013 Notebook
1462 217c Aspire L250
1462 788c 865PE Neo2-V Mainboard
146c 1439 FE-1439TX
1489 6001 GF100TXRII
1489 6002 GF100TXRA
149c 139a LFE-8139ATX
149c 8139 LFE-8139TX
14cb 0200 LNR-100 Family 10/100 Base-TX Ethernet
1565 2300 P4TSV Onboard LAN (RTL8100B)
1631 7003 Onboard RTL8111 on GA-8SIML Rev1.0 Mainboard
1695 9001 Onboard RTL8101L 10/100 MBit
16ec 00ff USR997900A
1799 5000 F5D5000 PCI Card/Desktop Network PCI Card
1799 5010 F5D5010 CardBus Notebook Network
Card
187e 3303 FN312
1904 8139 RTL8139D Fast Ethernet Adapter
1af4 1100 QEMU Virtual Machine
2646 0001 KNE120TX
8e2e 7000 KF-230TX

8e2e 7100 KF-230TX/2
a0a0 0007 ALN-325C
8167 RTL-8110SC/8169SC Gigabit Ethernet
105b 0e10 RTL-8110SC-GR on a N15235/A74MX mainboard
1458 e000 GA-MA69G-S3H Motherboard
1462 235c P965 Neo MS-7235 mainboard
1462 236c 945P Neo3-F motherboard
8168 RTL8111/8168/8411 PCI Express Gigabit Ethernet Controller
1019 8168 RTL8111/8168 PCI Express Gigabit Ethernet controller
1025 1094 Acer Aspire E5-575G
1028 0283 Vostro 220
1028 04b2 Vostro 3350
1028 04da Vostro 3750
1028 06f2 Latitude 3470
1028 06f3 Latitude 3570
103c 1611 Pavilion DM1Z-3000
103c 1950 ProBook 450/455
103c 2a6f Asus IPIBL-LB Motherboard
103c 825b OMEN-17-w001nv
103c 8615 Pavilion Laptop 15-cw1xxx
1043 11f5 Notebook motherboard (one of many models)
1043 16d5 U6V/U31J laptop
1043 81aa P5B
1043 82c6 M3A78 Series Motherboard
1043
83a3 M4A785/P7P55 Motherboard
1043 8432 P8P67 and other motherboards
1043 8505 P8 series motherboard
105b 0d7c D270S/D250S Motherboard
10ec 8168 RTL8111/8168 PCI Express Gigabit Ethernet controller
144d c652 RTL8168 on a NP300E5C series laptop
1458 e000 Onboard Ethernet
1462 238c Onboard RTL8111b on MSI P965 Platinum Mainboard
1462 345c RTL8111B on MS-7345 Motherboard
1462 368c K9AG Neo2
1462 4180 Wind PC MS-7418
1462 7522 X58 Pro-E
1462 7c37 X570-A PRO motherboard
1775 11cc CC11/CL11
17aa 3814 Z50-75
17aa 5124 ThinkPad E595
1849 8168 Motherboard (one of many)
7470 3468 TG-3468 Gigabit PCI Express Network Adapter
8086 2055 NUC Kit DN2820FYKH
8086 d615 Desktop Board D510MO/D525MW
8169 RTL8169 PCI Gigabit Ethernet Controller
1025 0079 Aspire 5024WLMi
10bd 3202 EP-320G-TX1 32-bit PCI Gigabit Ethernet Adapter

10ec 8169 RTL8169/8110 Family PCI Gigabit Ethernet NIC
1259 c107 CG-LAPCIGT
1371 434e ProG-2000L
1385
311a GA311
1385 5200 GA511 Gigabit PC Card
1458 e000 GA-8I915ME-G Mainboard
1462 030c K8N Neo-FSR v2.0 mainboard
1462 065c Hetis 865GV-E (MS-7065)
1462 702c K8T NEO 2 motherboard
1462 7094 K8T Neo2-F V2.0
16ec 011f USR997903
1734 1091 D2030-A1
a0a0 0449 AK86-L motherboard
8171 RTL8191SEvA Wireless LAN Controller
8172 RTL8191SEvB Wireless LAN Controller
8173 RTL8192SE Wireless LAN Controller
8174 RTL8192SE Wireless LAN Controller
8176 RTL8188CE 802.11b/g/n WiFi Adapter
1043 84b5 PCE-N10
1a3b 1139 AW-NE139H Half-size Mini PCIe Card
8177 RTL8191CE PCIe Wireless Network Adapter
8178 RTL8192CE PCIe Wireless Network Adapter
8179 RTL8188EE Wireless Network Adapter
103c 197d RTL8188EE mini-PCIe card
8180 RTL8180L 802.11b MAC
1385 4700 MA521 802.11b Wireless PC Card
1737 0019 WPC11v4 802.11b Wireless-B Notebook Adapter
8185 RTL-8185 IEEE 802.11a/b/g Wireless LAN Controller
818b RTL8192EE PCIe Wireless Network Adapter
8190
RTL8190 802.11n PCI Wireless Network Adapter
8191 RTL8192CE PCIe Wireless Network Adapter
8192 RTL8192E/RTL8192SE Wireless LAN Controller
8193 RTL8192DE Wireless LAN Controller
8196 RTL8196 Integrated PCI-e Bridge
8197 SmartLAN56 56K Modem
8199 RTL8187SE Wireless LAN Controller
1462 6894 MN54G2 / MS-6894 Wireless Mini PCIe Card
8723 RTL8723AE PCIe Wireless Network Adapter
8812 RTL8812AE 802.11ac PCIe Wireless Network Adapter
8813 RTL8813AE 802.11ac PCIe Wireless Network Adapter
8821 RTL8821AE 802.11ac PCIe Wireless Network Adapter
b723 RTL8723BE PCIe Wireless Network Adapter
10ec 8739 Dell Wireless 1801
17aa b736 Z50-75
b822 RTL8822BE 802.11a/b/g/n/ac WiFi adapter
103c 831b Realtek RTL8822BE 802.11ac 2 × 2 Wi-Fi + Bluetooth 4.2 Combo Adapter (MU-MIMO supported)

17aa 5124 ThinkPad E595
17aa b023 ThinkPad E595
c821 RTL8821CE 802.11ac PCIe Wireless Network Adapter
c822 RTL8822CE 802.11ac PCIe Wireless Network Adapter
d723 RTL8723DE 802.11b/g/n
PCIe Adapter
10ed Ascii Corporation
7310 V7310
10ee Xilinx Corporation
0001 EUROCOM for PCI (ECOMP)
0002 Octal E1/T1 for PCI ETP Card
0007 Default PCIe endpoint ID
0205 Wildcard TE205P
0210 Wildcard TE210P
0300 Spartan 3 Designs (Xilinx IP)
0314 Wildcard TE405P/TE410P (1st Gen)
0405 Wildcard TE405P (2nd Gen)
0410 Wildcard TE410P (2nd Gen)
0600 Xilinx 6 Designs (Xilinx IP)
3fc0 RME Digi96
3fc1 RME Digi96/8
3fc2 RME Digi96/8 Pro
3fc3 RME Digi96/8 Pad
3fc4 RME Digi9652 (Hammerfall)
3fc5 RME Hammerfall DSP
3fc6 RME Hammerfall DSP MADI
7038 FPGA Card XC7VX690T
17aa 402f FPGA XC7VX690T-3FFG1157E
8380 Ellips ProfiXpress Profibus Master
8381 Ellips Santos Frame Grabber
d154 Copley Controls CAN card (PCI-CAN-02)
SED is assigned Xilinx PCI device IDs ebf0 through ebff
ebf0 SED Systems Modulator/Demodulator
ebf1 SED Systems Audio Interface Card
ebf2 SED Systems Common PCI Interface
ebf3 SED Systems PCIe-AXI Bridge
10ef Racore Computer
Products, Inc.
8154 M815x Token Ring Adapter
10f0 Peritek Corporation
10f1 Tyan Computer
2865 Tyan Thunder K8E S2865
5300 Tyan S5380 Mainboard
10f2 Achme Computer, Inc.
10f3 Alaris, Inc.
10f4 S-MOS Systems, Inc.
10f5 NKK Corporation
a001 NDR4000 [NR4600 Bridge]

10f6 Creative Electronic Systems SA
 10f7 Matsushita Electric Industrial Co., Ltd.
 10f8 Altos India Ltd
 10f9 PC Direct
 10fa Truevision
 000c TARGA 1000
 10fb Thesys Gesellschaft fuer Mikroelektronik mbH
 186f TH 6255
 10fc I-O Data Device, Inc.
 # What's in the cardbus end of a Sony ACR-A01 card, comes with newer Vaio CD-RW drives
 0003 Cardbus IDE Controller
 0005 Cardbus SCSI CBSC II
 10fd Soyo Computer, Inc
 10fe Fast Multimedia AG
 10ff NCube
 1100 Jazz Multimedia
 1101 Initio Corporation
 0002 INI-920 Ultra SCSI Adapter
 1060 INI-A100U2W
 1622 INI-1623 PCI SATA-II Controller
 9100 INI-9100/9100W
 9400 INI-940 Fast Wide SCSI Adapter
 9401 INI-935 Fast Wide SCSI Adapter
 9500 INI-950 SCSI Adapter
 9502
 INI-950P Ultra Wide SCSI Adapter
 1102 Creative Labs
 0002 EMU10k1 [Sound Blaster Live! Series]
 100a 1102 SB Live! 5.1 Digital OEM SB0220 EMU10K1-JFF
 1102 0020 CT4670/4850 SBLive! Value
 1102 0021 CT4620 SBLive!
 1102 002f M002/M003 Integrated SBLive!
 1102 100a SB0220/0229 SBLive! 5.1 Digital OEM
 1102 4001 E-mu APS
 1102 8022 CT4780 SBLive! Value
 1102 8023 CT4790 SoundBlaster PCI512
 1102 8024 CT4760 SBLive!
 1102 8025 CT1140/SB0040 Integrated SBLive!
 1102 8026 CT4830 SBLive! Value
 1102 8027 CT4832 SBLive! Value
 1102 8028 CT4870 SBLive! Value
 1102 8029 CT4872 SBLive! Value
 1102 802a CT4890 SoundBlaster PCI256
 1102 802b CT4891 SoundBlaster PCI256
 1102 8031 CT4831 SBLive! Value
 1102 8032 CT4871 SBLive! Value
 1102 8033 CT4893 SoundBlaster PCI256
 1102 8035 CT0060 SBLive!

1102 8040 CT4760 SBLive!
1102 8050 CT4750 SoundBlaster PCI512
1102 8051 CT4850 SBLive! Value
1102 8061 SB060 SBLive! Player 5.1
1102 8062 SB0100
SBLive! 5.1
1102 8063 DXW Integrated SBLive! 5.1
1102 8064 SB0100/SB0102 SBLive! 5.1
1102 8065 SB0220/0222 SBLive! 5.1 Digital
1102 8066 SB0228 SBLive! 5.1 Digital
1102 8067 SB0220 SBLive! 5.1
1102 8068 CT0061 SBLive!
1102 8069 SB0101 SBLive! 5.1 Value
1102 806a SB0103 SBLive! 5.1
1102 806b SB0105 SBLive! 5.1
1102 806c SB0221 SBLive! 5.1
1102 8071 SB0150 SoundBlaster PCI512
EMU8008 PCI version of emu8000 chip
0003 SB AWE64(D)
1102 0010 CT4600 AWE64D
1102 0030 CT4650 AWE64D
1102 0031 CT4655 AWE64D
0004 EMU10k2/CA0100/CA0102/CA10200 [Sound Blaster Audigy Series]
1102 0040 SB0090 Audigy Player
Probably an early engineering sample
1102 0041 CT4820 SBLive!2
1102 0042 CT0070 Audigy
1102 0043 CT0072 Audigy
1102 0051 SB0090 Audigy Player/Platinum (EX)
1102 0052 SB0162 Audigy ES
1102 0053 CT0090/SB0092 Audigy Player/OEM
1102 0054 SB0161 Audigy ES
1102 0055 SB0192 Audigy
1102 0056 SB0191 Audigy
1102 0057 SB0091 Audigy
1102
0058 SB0095 Audigy Player/OEM
1102 0059 SB0230 Audigy
1102 005a SB0231 Audigy
1102 005b SB0232 Audigy
1102 005c SB0238 Audigy
1102 1002 SB0240 Audigy 2 Platinum 6.1
1102 1003 SB0350 Audigy 2 / SB0243 Audigy 2 OEM
1102 1004 SB0242 Audigy 2
1102 1005 SB0280 Audigy 2 Platinum Ex
1102 1006 SB0245 Audigy 2 OEM
1102 1007 SB0240/SB0244 Audigy 2 Platinum
1102 1008 SB0320 Audigy 2

1102 1009 SB0249 Audigy 2 OEM
1102 100a SB0246 Audigy 2
1102 2001 SB0360 Audigy 2 ZS Platinum Pro
1102 2002 SB0350 Audigy 2 ZS
1102 2003 SB0352 Audigy 2 ZS
1102 2004 SB0355 Audigy 2 ZS
1102 2005 SB0359 Audigy 2 ZS
1102 2006 SB035x Audigy 2 OEM
1102 2007 SB0380 Audigy 4 Pro
1102 4001 E-MU 1010 [MAEM8810]
1102 4002 E-MU 0404
1102 4003 E-MU 1010
0005 EMU20k1 [Sound Blaster X-Fi Series]
1102 0021 X-Fi Platinum
1102 002c X-Fi XtremeGamer FATALITY PRO
1102 1003 X-Fi XtremeMusic
This chip is also known as CA0103 on Sound Blaster 5.1
SB0680 card.
0006 EMU10k1X / CA0103 [SB Live! OEM / SB 5.1 / Ectiva 5.1]
1102 1001 SB0680 Sound Blaster 5.1
1102 1003 SB0203 SB Live! 5.1 (Dell)
1102 1004 TP0033 Ectiva Audio 5.1
0007 CA0106/CA0111 [SB Live!/Audigy/X-Fi Series]
1102 0007 SBLive! 24bit
1102 1001 SB0310 Audigy LS
1102 1002 SB0312 Audigy LS
1102 1006 SB0410 SBLive! 24-bit
1102 100a SB0570 [SB Audigy SE]
1102 1012 SB0790 X-Fi XA
1102 1013 Soundblaster X-Fi Xtreme Audio
1462 1009 K8N Diamond
0008 CA0108/CA10300 [Sound Blaster Audigy Series]
1102 0008 EMU0404 Digital Audio System
1102 1001 SB0400 Audigy 2 Value
1102 1021 SB0610 Audigy 4 Value
1102 1022 SBxxx Audigy 2/4 Value
1102 1023 SB0612 Audigy 2 LS
1102 1024 SB1550 Audigy 5/Rx
1102 1101 SBxxxx Audigy 2 SA
1102 2001 SB0530 Audigy 2 ZS Notebook
1102 2021 SBxxxx Audigy 4 Notebook
1102 4002 E-MU 0404
1102 4003 E-MU 1010
1102 4004 EMU1010 Digital Audio System [MAEM8960]
1102 4005 E-MU 0404 [MAEM8984]
1102
4007 E-MU 1010 [MAEM8982]
1102 4201 E-MU 0202 [MAEM8950]

0009 CA0110 [Sound Blaster X-Fi Xtreme Audio]
1102 0010 MB0820 Integrated
1102 0018 SB1040 PCI Express
000b EMU20k2 [Sound Blaster X-Fi Titanium Series]
1102 0041 SB0880 [SoundBlaster X-Fi Titanium PCI-e]
1102 0062 SB1270 [SoundBlaster X-Fi Titanium HD]
0012 Sound Core3D [Sound Blaster Recon3D / Z-Series]
1102 0010 SB1570 SB Audigy Fx
4001 SB Audigy FireWire Port
1102 0010 SB Audigy FireWire Port
7002 SB Live! Game Port
1102 0020 Gameport Joystick
7003 SB Audigy Game Port
1102 0040 SB Audigy Game Port
1102 0060 SB Audigy2 MIDI/Game Port
7004 [SB Live! Value] Input device controller
7005 SB Audigy LS Game Port
1102 1001 SB0310 Audigy LS MIDI/Game port
1102 1002 SB0312 Audigy LS MIDI/Game port
7006 [SB X-Fi Xtreme Audio] CA0110-IBG PCIe to PCI Bridge
8938 Ectiva EV1938
1033 80e5 SlimTower-Jim (NEC)
1071 7150 Mitac 7150
110a 5938 Siemens Scenic Mobile 510PIII
13bd
100c Ceres-C (Sharp, Intel BX)
13bd 100d Sharp, Intel Banister
13bd 100e TwinHead P09S/P09S3 (Sharp)
13bd f6f1 Marlin (Sharp)
14ff 0e70 P88TE (TWINHEAD INTERNATIONAL Corp)
14ff c401 Notebook 9100/9200/2000 (TWINHEAD INTERNATIONAL Corp)
156d b400 G400 - Geo (AlphaTop (Taiwan))
156d b550 G560 (AlphaTop (Taiwan))
156d b560 G560 (AlphaTop (Taiwan))
156d b700 G700/U700 (AlphaTop (Taiwan))
156d b795 G795 (AlphaTop (Taiwan))
156d b797 G797 (AlphaTop (Taiwan))
nee Triones Technologies, Inc.
1103 HighPoint Technologies, Inc.
0003 HPT343/345/346/363
0004 HPT366/368/370/370A/372/372N
1103 0001 HPT370A
1103 0004 HPT366 UDMA66 (r1) / HPT368 UDMA66 (r2) / HPT370 UDMA100 (r3) / HPT370 UDMA100
RAID (r4)
1103 0005 HPT370 UDMA100
1103 0006 HPT302/302N
0005 HPT372A/372N
0006 HPT302/302N

0007 HPT371/371N
0008 HPT374
0009 HPT372N
0620 RocketRAID 620 2 Port SATA-III Controller
0622 RocketRAID 622 2 Port SATA-III Controller
0640
RocketRAID 640 4 Port SATA-III Controller
0641 RocketRAID 640L 4 Port SATA-III Controller
0642 RocketRAID 642L SATA-III Controller (2 eSATA ports + 2 internal SATA ports)
0644 RocketRAID 644 4 Port SATA-III Controller (eSATA)
0645 RocketRAID 644L 4 Port SATA-III Controller (eSATA)
0646 RocketRAID 644LS SATA-III Controller (4 eSATA devices connected by 1 SAS cable)
1720 RocketRAID 1720 (2x SATA II RAID Controller)
1740 RocketRAID 1740
1742 RocketRAID 1742
2210 RocketRAID 2210 SATA-II Controller
11ab 11ab 88SX6042
2300 RocketRAID 230x 4 Port SATA-II Controller
2310 RocketRAID 2310 4 Port SATA-II Controller
2320 RocketRAID 2320 SATA-II Controller
2322 RocketRAID 2322 SATA-II Controller
2340 RocketRAID 2340 16 Port SATA-II Controller
2640 RocketRAID 2640 SAS/SATA Controller
2722 RocketRAID 2722
SFF-8087 Mini-SAS 16 port internal
2740 RocketRAID 2740
SFF-8088 Mini-SAS 16 port external
2744 RocketRaid 2744
SFF-8088 8 port external / SFF-8087
24 port internal
2782 RocketRAID 2782
3120 RocketRAID 3120
3220 RocketRAID 3220
3320 RocketRAID 3320
4310 RocketRaid 4310
1104 RasterOps Corp.
1105 Sigma Designs, Inc.
1105 REALmagic Xcard MPEG 1/2/3/4 DVD Decoder
8300 REALmagic Hollywood Plus DVD Decoder
8400 EM840x REALmagic DVD/MPEG-2 Audio/Video Decoder
8401 EM8401 REALmagic DVD/MPEG-2 A/V Decoder
8470 EM8470 REALmagic DVD/MPEG-4 A/V Decoder
8471 EM8471 REALmagic DVD/MPEG-4 A/V Decoder
8475 EM8475 REALmagic DVD/MPEG-4 A/V Decoder
1105 0001 REALmagic X-Card
8476 EM8476 REALmagic DVD/MPEG-4 A/V Decoder
127d 0000 CineView II
8485 EM8485 REALmagic DVD/MPEG-4 A/V Decoder

8486 EM8486 REALmagic DVD/MPEG-4 A/V Decoder
Found in Cisco DMP-4305G
c621 EM8621L Digital Media Processor
c622 EM8622L MPEG-4.10 (H.264) and SMPTE 421M (VC-1) A/V Decoder
1106 VIA Technologies, Inc.
0102 Embedded VIA Ethernet Controller
0130 VT6305 1394.A Controller
0198 P4X600 Host Bridge
0204 K8M800 Host Bridge
0208
PT890 Host Bridge
0238 K8T890 Host Bridge
0258 PT880 Host Bridge
0259 CN333/CN400/PM880 Host Bridge
0269 KT880 Host Bridge
0282 K8T800Pro Host Bridge
1043 80a3 A8V Deluxe
0290 K8M890 Host Bridge
0293 PM896 Host Bridge
0296 P4M800 Host Bridge
0305 VT8363/8365 [KT133/KM133]
1019 0987 K7VZA Mainboard
1043 8033 A7V Mainboard
1043 803e A7V-E Mainboard
1043 8042 A7V133/A7V133-C Mainboard
147b a401 KT7/KT7-RAID/KT7A/KT7A-RAID Mainboard
0308 PT880 Ultra/PT894 Host Bridge
1043 8199 P4V800D-X Mainboard
1849 0308 Motherboard
0314 CN700/VN800/P4M800CE/Pro Host Bridge
0324 CX700/VX700 Host Bridge
0327 P4M890 Host Bridge
0336 K8M890CE Host Bridge
0340 PT900 Host Bridge
0351 K8T890CF Host Bridge
0353 VX800 Host Bridge
0364 CN896/VN896/P4M900 Host Bridge
1043 81ce P5VD2-VM motherboard
0391 VT8371 [KX133]
0409 VX855/VX875 Host Bridge: Host Control
0410 VX900 Host Bridge: Host Control
0415 VT6415 PATA IDE Host Controller
1043
838f Motherboard
0501 VT8501 [Apollo MVP4]
0505 VT82C505
Shares chip with :0576. The VT82C576M has :1571 instead of :0561.
0561 VT82C576MV

0571 VT82C586A/B/VT82C686/A/B/VT823x/A/C PIPC Bus Master IDE
1019 0985 P6VXA Motherboard
1019 0a81 L7VTA v1.0 Motherboard (KT400-8235)
1043 8052 VT8233A Bus Master ATA100/66/33 IDE
1043 808c A7V8X / A7V333 motherboard
1043 80a1 A7V8X-X motherboard rev. 1.01
1043 80ed A7V600/K8V-X/A8V Deluxe motherboard
1106 0571 VT82C586/B/VT82C686/A/B/VT8233/A/C/VT8235 PIPC Bus Master IDE
1179 0001 Magnia Z310
1297 f641 FX41 motherboard
1458 5002 GA-7VAX Mainboard
1462 5901 KT6 Delta-FIS2R (MS-6590)
1462 7020 K8T NEO 2 motherboard
1462 7094 K8T Neo2-F V2.0
1462 7120 KT4AV motherboard
1462 7181 K8MM3-V mainboard
147b 1407 KV8-MAX3 motherboard
probably all K7VT2/4*/6
1849 0571 K7VT series Motherboards
0576 VT82C576 3V [Apollo Master]
0581 CX700/VX700 RAID Controller
Upgrade bios to get correct ID:
5324 instead of 0581
1106 0581 Wrong IDE ID
0585 VT82C585VP [Apollo VP1/VPX]
0586 VT82C586/A/B PCI-to-ISA [Apollo VP]
1106 0000 MVP3 ISA Bridge
0591 VT8237A SATA 2-Port Controller
0595 VT82C595 [Apollo VP2]
0596 VT82C596 ISA [Mobile South]
1106 0000 VT82C596/A/B PCI to ISA Bridge
1458 0596 VT82C596/A/B PCI to ISA Bridge
0597 VT82C597 [Apollo VP3]
0598 VT82C598 [Apollo MVP3]
0601 VT8601 [Apollo ProMedia]
0605 VT8605 [ProSavage PM133]
103c 1254 D9840-60001 [Brio BA410 Motherboard]
1043 802c CUV4X mainboard
0680 VT82C680 [Apollo P6]
0686 VT82C686 [Apollo Super South]
1019 0985 P6VXA Motherboard
103c 1256 D9840-60001 [Brio BA410 Motherboard]
1043 802c CUV4X mainboard
1043 8033 A7V Mainboard
1043 803e A7V-E Mainboard
1043 8040 A7M266 Mainboard
1043 8042 A7V133/A7V133-C Mainboard
1106 0000 VT82C686/A PCI to ISA Bridge

1106 0686 VT82C686/A PCI to ISA Bridge
1179 0001 Magnia Z310
147b a702 KG7-Lite Mainboard
0691 VT82C693A/694x
[Apollo PRO133x]
1019 0985 P6VXA Motherboard
1179 0001 Magnia Z310
1458 0691 VT82C691 Apollo Pro System Controller
0693 VT82C693 [Apollo Pro Plus]
0698 VT82C693A [Apollo Pro133 AGP]
0709 VX11 Standard Host Bridge
070a VX11 PCI Express Root Port
070b VX11 PCI Express Root Port
070c VX11 PCI Express Root Port
070d VX11 PCI Express Root Port
070e VX11 PCI Express Root Port
0926 VT82C926 [Amazon]
1000 VT82C570MV
1106 VT82C570MV
1122 VX800/VX820 Chrome 9 HC3 Integrated Graphics
1204 K8M800 Host Bridge
1208 PT890 Host Bridge
1238 K8T890 Host Bridge
1258 PT880 Host Bridge
1259 CN333/CN400/PM880 Host Bridge
1269 KT880 Host Bridge
1282 K8T800Pro Host Bridge
1290 K8M890 Host Bridge
1293 PM896 Host Bridge
1296 P4M800 Host Bridge
1308 PT894 Host Bridge
1314 CN700/VN800/P4M800CE/Pro Host Bridge
1324 CX700/VX700 Host Bridge
1327 P4M890 Host Bridge
1336 K8M890CE Host Bridge
1340 PT900 Host Bridge
1351 VT3351 Host Bridge
1353
VX800/VX820 Error Reporting
1364 CN896/VN896/P4M900 Host Bridge
1409 VX855/VX875 Error Reporting
1410 VX900 Error Reporting
1571 VT82C576M/VT82C586
1595 VT82C595/97 [Apollo VP2/97]
1732 VT1732 [Envy24 II] PCI Multi-Channel Audio Controller
2106 VIA Rhine Family Fast Ethernet Adapter (VT6105)
2204 K8M800 Host Bridge
2208 PT890 Host Bridge

2238 K8T890 Host Bridge
2258 PT880 Host Bridge
2259 CN333/CN400/PM880 CPU Host Bridge
2269 KT880 Host Bridge
2282 K8T800Pro Host Bridge
2290 K8M890 Host Bridge
2293 PM896 Host Bridge
2296 P4M800 Host Bridge
2308 PT894 Host Bridge
2314 CN700/VN800/P4M800CE/Pro Host Bridge
2324 CX700/VX700 Host Bridge
2327 P4M890 Host Bridge
2336 K8M890CE Host Bridge
2340 PT900 Host Bridge
2351 VT3351 Host Bridge
2353 VX800/VX820 Host Bus Control
2364 CN896/VN896/P4M900 Host Bridge
2409 VX855/VX875 Host Bus Control
2410 VX900 CPU Bus Controller
287a VT8251 PCI to PCI Bridge
287b VT8251 Host Bridge
287c VT8251
PCIE Root Port
287d VT8251 PCIE Root Port
287e VT8237/8251 Ultra VLINK Controller
3022 CLE266
3038 VT82xx/62xx UHCI USB 1.1 Controller
0925 1234 onboard UHCI USB 1.1 Controller
1019 0985 P6VXA Motherboard
1019 0a81 L7VTA v1.0 Motherboard (KT400-8235)
1043 8080 A7V333 motherboard
1043 808c VT6202 USB2.0 4 port controller
1043 80a1 A7V8X-X motherboard
1043 80ed A7V600/K8V-X/A8V Deluxe motherboard
1179 0001 Magnia Z310
1458 5004 GA-7VAX Mainboard
1462 5901 KT6 Delta-FIS2R (MS-6590)
1462 7020 K8T NEO 2 motherboard
1462 7094 K8T Neo2-F V2.0
1462 7120 KT4AV motherboard
1462 7181 K8MM3-V mainboard
147b 1407 KV8-MAX3 motherboard
182d 201d CN-029 USB2.0 4 port PCI Card
probably all K7VT2/4*/6
1849 3038 K7VT series Motherboards
19da a179 ZBOX nano VD01
1af4 1100 QEMU Virtual Machine
3040 VT82C586B ACPI

3043 VT86C100A [Rhine]
10bd 0000 VT86C100A Fast Ethernet Adapter
1106 0100 VT86C100A Fast Ethernet Adapter
1186 1400
DFE-530TX PCI Fast Ethernet Adapter (rev. A)
3044 VT6306/7/8 [Fire II(M)] IEEE 1394 OHCI Controller
0010 0001 IEEE 1394 4port DCST 1394-3+1B
1025 005a TravelMate 290
103c 2a20 Pavilion t3030.de Desktop PC
103c 2a3b Media Center PC m7590n
1043 808a A8V/A8N/P4P800/P5SD2 series motherboard
1043 81fe Motherboard
1458 1000 GA-7VT600-1394 Motherboard
1462 207d K8NGM2 series motherboard
1462 217d Aspire L250
1462 590d KT6 Delta-FIS2R (MS-6590)
1462 702d K8T NEO 2 motherboard
1462 971d MS-6917
3050 VT82C596 Power Management
3051 VT82C596 Power Management
3053 VT6105M [Rhine-III]
1186 1404 DFE-530TX PCI Fast Ethernet Adapter (rev. D)
3057 VT82C686 [Apollo Super ACPI]
1019 0985 P6VXA Motherboard
1019 0987 K7VZA Motherboard
1043 8033 A7V Mainboard
1043 803e A7V-E Mainboard
1043 8040 A7M266 Mainboard
1043 8042 A7V133/A7V133-C Mainboard
1179 0001 Magnia Z310
3058 VT82C686 AC97 Audio Controller
0e11 0097 SoundMax Digital Integrated
Audio
0e11 b194 Soundmax integrated digital audio
1019 0985 P6VXA Motherboard
1019 0987 K7VZA Motherboard
103c 1251 D9840-60001 [Brio BA410 Motherboard]
1043 1106 A7V133/A7V133-C Mainboard
1106 4511 Onboard Audio on EP7KXA
1106 aa03 VT1612A AC'97 Audio Controller
11d4 5348 AD1881A audio
1458 7600 Onboard Audio
1462 3091 MS-6309 Onboard Audio
1462 3092 MS-6309 v2.x Mainboard (VIA VT1611A codec)
1462 3300 MS-6330 Onboard Audio
1462 3400 MS-6340 (VT8363) motherboard
15dd 7609 Onboard Audio
3059 VT8233/A/8235/8237 AC97 Audio Controller

1019 0a81 L7VTA v1.0 Motherboard (KT400-8235)
 1019 1841 M811 (VT8367/VT8235/VT6103) [KT333] motherboard
 1019 1877 K8M800-M2 (V2.0) onboard audio
 1043 8095 A7V8X Motherboard (Realtek ALC650 codec)
 1043 80a1 A7V8X-X Motherboard
 1043 80b0 A7V600/K8V-X/K8V Deluxe motherboard (ADI AD1980 codec [SoundMAX])
 1043 80f3 SK8V motherboard
 1043 810d P5VD1-X (AD1888 codec [SoundMax])
 1043 812a
 A8V Deluxe motherboard (Realtek ALC850 codec)
 10ec 8168 High Definition Audio
 1106 3059 L7VMM2 Motherboard
 1106 4161 K7VT2 motherboard
 1106 4170 PCPartner P4M800-8237R Motherboard
 1106 4552 Soyo KT-600 Dragon Plus (Realtek ALC 650)
 1297 c160 FX41 motherboard (Realtek ALC650 codec)
 1413 147b KV8 Pro motherboard onboard audio
 1458 a002 GA-7VAX Onboard Audio (Realtek ALC650)
 1462 0080 K8T NEO 2 motherboard
 1462 3800 KT266 onboard audio
 1462 5901 KT6 Delta-FIS2R (MS-6590)
 1462 7181 K8MM3-V mainboard
 147b 1407 KV8-MAX3 motherboard
 1695 300c Realtek ALC655 audio on EP-8KRA series mainboard
 1849 0850 ASRock 775Dual-880 Pro onboard audio (Realtek ALC850)
 1849 9739 P4VT8 Mainboard (C-Media CMI9739A codec)
 # probably all K7VT2/4*/6
 1849 9761 K7VT series Motherboards
 4005 4710 MSI K7T266 Pro2-RU (MSI-6380 v2) onboard audio (Realtek/ALC 200/200P)
 a0a0 01b6 AK77-8XN onboard audio
 a0a0 0342 AK86-L motherboard
 3065 VT6102/VT6103 [Rhine-II]
 1043
 80a1 A7V8X-X Motherboard
 1043 80ed A7V600-X Motherboard
 1106 0102 VT6102/6103 [Rhine II] Ethernet Controller
 1186 1400 DFE-530TX PCI Fast Ethernet Adapter (rev. A)
 1186 1401 DFE-530TX PCI Fast Ethernet Adapter (rev. B)
 1186 1402 DFE-530TX PCI Fast Ethernet Adapter (rev. B)
 13b9 1421 LD-10/100AL PCI Fast Ethernet Adapter (rev.B)
 1462 7061 MS-7061
 1462 7181 K8MM3-V mainboard
 147b 1c09 NV7 Motherboard
 1695 3005 VT6103
 # probably all K7VT2/4*/6
 1849 3065 K7VT series Motherboards
 # This hosts more than just the Intel 537 codec, it also hosts Pctel (SIL33) and SmartLink (SIL34) codecs
 3068 AC'97 Modem Controller

1462 309e MS-6309 Saturn Motherboard
3074 VT8233 PCI to ISA Bridge
1043 8052 VT8233A
3091 VT8633 [Apollo Pro266]
3099 VT8366/A/7 [Apollo KT266/A/333]
1019 1841 M811 (VT8367/VT8235/VT6103) [KT333] motherboard
1043 8064 A7V266-E Mainboard
1043 807f A7V333 Mainboard
1849 3099 K7VT2 motherboard
3101 VT8653 Host Bridge
3102
VT8662 Host Bridge
3103 VT8615 Host Bridge
3104 USB 2.0
0925 1234 onboard EHCI USB 2.0 Controller
1019 0a81 L7VTA v1.0 Motherboard (KT400-8235)
1043 808c A7V8X motherboard
1043 80a1 A7V8X-X motherboard rev 1.01
1043 80ed A7V600/K8V-X/A8V Deluxe motherboard
1106 3104 USB 2.0 Controller
1297 f641 FX41 motherboard
1458 5004 GA-7VAX Mainboard
1462 5901 KT6 Delta-FIS2R (MS-6590)
1462 7020 K8T NEO 2 motherboard
1462 7094 K8T Neo2-F V2.0
1462 7120 KT4AV motherboard
1462 7181 K8MM3-V mainboard
147b 1407 KV8-MAX3 motherboard
182d 201d CN-029 USB 2.0 4 port PCI Card
probably all K7VT2/4*/6
1849 3104 K7VT series Motherboards
19da a179 ZBOX nano VD01
3106 VT6105/VT6106S [Rhine-III]
1106 0105 VT6106S [Rhine-III]
1186 1403 DFE-530TX PCI Fast Ethernet Adapter (rev. C)
1186 1405 DFE-520TX Fast Ethernet PCI Adapter
1186 1406 DFE-530TX+ rev F2
1186 1407 DFE-538TX
3108 K8M800/K8N800/K8N800A [S3 UniChrome Pro]
3109 VT8233C
PCI to ISA Bridge
3112 VT8361 [KLE133] Host Bridge
3113 VPX/VPX2 PCI to PCI Bridge Controller
3116 VT8375 [KM266/KL266] Host Bridge
1297 f641 FX41 motherboard
3118 CN400/PM800/PM880/PN800/PN880 [S3 UniChrome Pro]
3119 VT6120/VT6121/VT6122 Gigabit Ethernet Adapter
3122 VT8623 [Apollo CLE266] integrated CastleRock graphics

3123 VT8623 [Apollo CLE266]
3128 VT8753 [P4X266 AGP]
3133 VT3133 Host Bridge
3142 VT6651 WiFi Adapter, 802.11b
3147 VT8233A ISA Bridge
1043 808c A7V333 motherboard
3148 P4M266 Host Bridge
3149 VIA VT6420 SATA RAID Controller
1043 80ed A7V600/K8V Deluxe/K8V-X/A8V Deluxe motherboard
1458 b003 GA-7VM400AM(F) Motherboard
1462 5901 KT6 Delta-FIS2R (MS-6590)
1462 7020 K8T Neo 2 Motherboard
1462 7094 K8T Neo2-F V2.0
1462 7181 K8MM3-V mainboard
147b 1407 KV8-MAX3 motherboard
147b 1408 KV7
1849 3149 K7VT6 motherboard
a0a0 04ad AK86-L motherboard
3156 P/KN266 Host Bridge
3157 CX700/VX700 [S3 UniChrome Pro]
3164
VT6410 ATA133 RAID controller
1043 80f4 P4P800 Mainboard Deluxe ATX
1462 7028 915P/G Neo2
3168 P4X333/P4X400/PT800 AGP Bridge
1849 3168 P4VT8 Mainboard
3177 VT8235 ISA Bridge
1019 0a81 L7VTA v1.0 Motherboard (KT400-8235)
1019 1841 M811 (VT8367/VT8235/VT6103) [KT333] motherboard
1043 808c A7V8X motherboard
1043 80a1 A7V8X-X motherboard
1106 0000 KT4AV motherboard
1297 f641 FX41 motherboard
1458 5001 GA-7VAX Mainboard
probably all K7VT2/4*/6
1849 3177 K7VT series Motherboards
3178 ProSavageDDR P4N333 Host Bridge
3188 VT8385 [K8T800 AGP] Host Bridge
1043 80a3 K8V Deluxe/K8V-X motherboard
147b 1407 KV8-MAX3 motherboard
3189 VT8377 [KT400/KT600 AGP] Host Bridge
1043 807f A7V8X motherboard
1106 0000 KT4AV motherboard (KT400A)
1458 5000 GA-7VAX Mainboard
probably all K7VT2/4*/6
1849 3189 K7VT series Motherboards
31b0 VX11 Standard Host Bridge
31b1 VX11 Standard Host Bridge

31b2 VX11 DRAM Controller
31b3 VX11 Power Management
Controller
31b4 VX11 I/O APIC
31b5 VX11 Scratch Device
31b7 VX11 Standard Host Bridge
31b8 VX11 PCI to PCI Bridge
3204 K8M800 Host Bridge
3205 VT8378 [KM400/A] Chipset Host Bridge
1458 5000 GA-7VM400M Motherboard
3208 PT890 Host Bridge
3213 VPX/VPX2 PCI to PCI Bridge Controller
3218 K8T800M Host Bridge
3227 VT8237 ISA bridge [KT600/K8T800/K8T890 South]
1043 80ed A7V600/K8V-X/A8V Deluxe motherboard
1106 3227 DFI KT600-AL / Soltek SL-B9D-FGR Motherboard
1458 5001 GA-7VT600 Motherboard
147b 1407 KV8-MAX3 motherboard
1849 3227 K7VT4 motherboard
3230 K8M890CE/K8N890CE [Chrome 9]
3238 K8T890 Host Bridge
3249 VT6421 IDE/SATA Controller
1106 3249 VT6421 IDE/SATA Controller
324a CX700/VX700 PCI to PCI Bridge
324b CX700/VX700 Host Bridge
324e CX700/VX700 Internal Module Bus
3253 VT6655 WiFi Adapter, 802.11a/b/g
3258 PT880 Host Bridge
3259 CN333/CN400/PM880 Host Bridge
3260 VIA Chrome9 HC IGP
3269 KT880 Host Bridge
3282 K8T800Pro
Host Bridge
3287 VT8251 PCI to ISA Bridge
3288 VT8237A/VT8251 HDA Controller
19da a179 ZBOX VD01
3290 K8M890 Host Bridge
3296 P4M800 Host Bridge
3324 CX700/VX700 Host Bridge
3327 P4M890 Host Bridge
3336 K8M890CE Host Bridge
3337 VT8237A PCI to ISA Bridge
3340 PT900 Host Bridge
3343 P4M890 [S3 UniChrome Pro]
3344 CN700/P4M800 Pro/P4M800 CE/VN800 Graphics [S3 UniChrome Pro]
3349 VT8251 AHCI/SATA 4-Port Controller
3351 VT3351 Host Bridge
3353 VX800 PCI to PCI Bridge

3364 CN896/VN896/P4M900 Host Bridge
3371 CN896/VN896/P4M900 [Chrome 9 HC]
3372 VT8237S PCI to ISA Bridge
337a VT8237A PCI to PCI Bridge
337b VT8237A Host Bridge
3403 VT6315 Series Firewire Controller
1043 8374 M5A88-V EVO
1043 8384 P8P67 Deluxe Motherboard
3409 VX855/VX875 DRAM Bus Control
3410 VX900 DRAM Bus Control
19da a179 ZBOX nano VD01
3432 VL80x xHCI USB 3.0 Controller
3456 VX11 Standard Host Bridge
345b VX11 Miscellaneous Bus
3483 VL805 USB 3.0 Host
Controller
3a01 VX11 Graphics [Chrome 645/640]
4149 VIA VT6420 (ATA133) Controller
4204 K8M800 Host Bridge
4208 PT890 Host Bridge
4238 K8T890 Host Bridge
4258 PT880 Host Bridge
4259 CN333/CN400/PM880 Host Bridge
4269 KT880 Host Bridge
4282 K8T800Pro Host Bridge
4290 K8M890 Host Bridge
4293 PM896 Host Bridge
4296 P4M800 Host Bridge
4308 PT894 Host Bridge
4314 CN700/VN800/P4M800CE/Pro Host Bridge
4324 CX700/VX700 Host Bridge
4327 P4M890 Host Bridge
4336 K8M890CE Host Bridge
4340 PT900 Host Bridge
4351 VT3351 Host Bridge
4353 VX800/VX820 Power Management Control
4364 CN896/VN896/P4M900 Host Bridge
4409 VX855/VX875 Power Management Control
4410 VX900 Power Management and Chip Testing Control
19da a179 ZBOX nano VD01
5030 VT82C596 ACPI [Apollo PRO]
5122 VX855/VX875 Chrome 9 HCM Integrated Graphics
5208 PT890 I/O APIC Interrupt Controller
5238 K8T890 I/O APIC Interrupt Controller
5287 VT8251 Serial ATA Controller
5290 K8M890 I/O APIC
Interrupt Controller
5308 PT894 I/O APIC Interrupt Controller

5324 VX800 Serial ATA and EIDE Controller
5327 P4M890 I/O APIC Interrupt Controller
5336 K8M890CE I/O APIC Interrupt Controller
5340 PT900 I/O APIC Interrupt Controller
5351 VT3351 I/O APIC Interrupt Controller
5353 VX800/VX820 APIC and Central Traffic Control
5364 CN896/VN896/P4M900 I/O APIC Interrupt Controller
5372 VT8237/8251 Serial ATA Controller
5409 VX855/VX875 APIC and Central Traffic Control
5410 VX900 APIC and Central Traffic Control
6100 VT85C100A [Rhine II]
6287 SATA RAID Controller
6290 K8M890CE Host Bridge
6327 P4M890 Security Device
6353 VX800/VX820 Scratch Registers
6364 CN896/VN896/P4M900 Security Device
6409 VX855/VX875 Scratch Registers
6410 VX900 Scratch Registers
19da a179 ZBOX nano VD01
7122 VX900 Graphics [Chrome9 HD]
7204 K8M800 Host Bridge
7205 KM400/KN400/P4M800 [S3 UniChrome]
1458 d000 Gigabyte GA-7VM400(A)M(F) Motherboard
1462 7061 MS-7061
7208
PT890 Host Bridge
7238 K8T890 Host Bridge
7258 PT880 Host Bridge
7259 CN333/CN400/PM880 Host Bridge
7269 KT880 Host Bridge
7282 K8T800Pro Host Bridge
7290 K8M890 Host Bridge
7293 PM896 Host Bridge
7296 P4M800 Host Bridge
7308 PT894 Host Bridge
7314 CN700/VN800/P4M800CE/Pro Host Bridge
7324 CX700/VX700 Host Bridge
7327 P4M890 Host Bridge
7336 K8M890CE Host Bridge
7340 PT900 Host Bridge
7351 VT3351 Host Bridge
7353 VX800/VX820 North-South Module Interface Control
7364 CN896/VN896/P4M900 Host Bridge
7409 VX855/VX875 North-South Module Interface Control
7410 VX900 North-South Module Interface Control
19da a179 ZBOX nano VD01
8231 VT8231 [PCI-to-ISA Bridge]
8235 VT8235 ACPI

8305 VT8363/8365 [KT133/KM133 AGP]
8324 CX700/VX700 PCI to ISA Bridge
8353 VX800/VX820 Bus Control and Power Management
8391 VT8371 [KX133 AGP]
8400 MVP4
8409 VX855/VX875 Bus Control and Power Management
8410 VX900 Bus Control and Power Management
19da a179
ZBOX VD01
8500 KLE133/PLE133/PLE133T
8501 VT8501 [Apollo MVP4 AGP]
8596 VT82C596 [Apollo PRO AGP]
8597 VT82C597 [Apollo VP3 AGP]
8598 VT82C598/694x [Apollo MVP3/Pro133x AGP]
1019 0985 P6VXA Motherboard
8601 VT8601 [Apollo ProMedia AGP]
8605 VT8605 [PM133 AGP]
8691 VT82C691 [Apollo Pro]
8693 VT82C693 [Apollo Pro Plus] PCI Bridge
8a25 PL133/PL133T [S3 ProSavage]
8a26 KL133/KL133A/KM133/KM133A [S3 ProSavage]
8d01 PN133/PN133T [S3 Twister]
8d04 KM266/P4M266/P4M266A/P4N266 [S3 ProSavageDDR]
9001 VX900 Serial ATA Controller
9082 Standard AHCI 1.0 SATA Controller
9140 HDMI Audio Device
9201 USB3.0 Controller
9530 Secure Digital Memory Card Controller
95d0 SDIO Host Controller
a208 PT890 PCI to PCI Bridge Controller
a238 K8T890 PCI to PCI Bridge Controller
a327 P4M890 PCI to PCI Bridge Controller
a353 VX8xx South-North Module Interface Control
a364 CN896/VN896/P4M900 PCI to PCI Bridge Controller
a409 VX855/VX875 USB Device Controller
a410
VX900 PCI Express Root Port 0
b091 VT8633 [Apollo Pro266 AGP]
b099 VT8366/A/7 [Apollo KT266/A/333 AGP]
b101 VT8653 AGP Bridge
b102 VT8362 AGP Bridge
b103 VT8615 AGP Bridge
b112 VT8361 [KLE133] AGP Bridge
b113 VPX/VPX2 I/O APIC Interrupt Controller
b115 VT8363/8365 [KT133/KM133] PCI Bridge
b168 VT8235 PCI Bridge
b188 VT8237/8251 PCI bridge [K8M890/K8T800/K8T890 South]
147b 1407 KV8-MAX3 motherboard

b198 VT8237/VX700 PCI Bridge
b213 VPX/VPX2 I/O APIC Interrupt Controller
b353 VX855/VX875/VX900 PCI to PCI Bridge
b410 VX900 PCI Express Root Port 1
b999 [K8T890 North / VT8237 South] PCI Bridge
c208 PT890 PCI to PCI Bridge Controller
c238 K8T890 PCI to PCI Bridge Controller
c327 P4M890 PCI to PCI Bridge Controller
c340 PT900 PCI to PCI Bridge Controller
c353 VX800/VX820 PCI Express Root Port
c364 CN896/VN896/P4M900 PCI to PCI Bridge Controller
c409 VX855/VX875 EIDE Controller
c410 VX900 PCI Express Root Port 2
d104 VT8237R USB UDCI Controller
d208
PT890 PCI to PCI Bridge Controller
d213 VPX/VPX2 PCI to PCI Bridge Controller
d238 K8T890 PCI to PCI Bridge Controller
d340 PT900 PCI to PCI Bridge Controller
d410 VX900 PCI Express Root Port 3
e208 PT890 PCI to PCI Bridge Controller
e238 K8T890 PCI to PCI Bridge Controller
e340 PT900 PCI to PCI Bridge Controller
e353 VX800/VX820 PCI Express Root Port
e410 VX900 PCI Express Physical Layer Electrical Sub-block
f208 PT890 PCI to PCI Bridge Controller
f238 K8T890 PCI to PCI Bridge Controller
f340 PT900 PCI to PCI Bridge Controller
f353 VX800/VX820 PCI Express Root Port
1107 Stratus Computers
0576 VIA VT82C570MV [Apollo] (Wrong vendor ID!)
1108 Proteon, Inc.
0100 p1690plus_AA
0101 p1690plus_AB
0105 P1690Plus
0108 P1690Plus
0138 P1690Plus
0139 P1690Plus
013c P1690Plus
013d P1690Plus
1109 Cogent Data Technologies, Inc.
1400 EM110TX [EX110TX]
110a Siemens AG
0002 Pirahna 2-port
0005 Tulip controller, power management, switch extender
0006
FSC PINC (I/O-APIC)
0015 FSC Multiprocessor Interrupt Controller

001d FSC Copernicus Management Controller
007b FSC Remote Service Controller, mailbox device
007c FSC Remote Service Controller, shared memory device
007d FSC Remote Service Controller, SMIC device
2101 HST SAPHIR V Primary PCI (ISDN/PMx)
Superfastcom-PCI (Commtech, Inc.) or DSCC4 WAN Adapter
2102 DSCC4 PEB/PEF 20534 DMA Supported Serial Communication Controller with 4 Channels
2104 Eicon Diva 2.02 compatible passive ISDN card
3141 SIMATIC NET CP 5611 / 5621
3142 SIMATIC NET CP 5613 / 5614
3143 SIMATIC NET CP 1613
4021 SIMATIC NET CP 5512 (Profibus and MPI Cardbus Adapter)
4029 SIMATIC NET CP 5613 A2
110a 4029 SIMATIC NET CP 5613 A2
110a c029 SIMATIC NET CP 5614 A2
4035 SIMATIC NET CP 1613 A2
4036 SIMATIC NET CP 1616
4038 SIMATIC NET CP 1604
4069 SIMATIC NET CP 5623
110a 4069 SIMATIC NET CP 5623
110a c069 SIMATIC NET CP 5624
407c SIMATIC NET CP 5612
407d SIMATIC
NET CP 5613 A3
407e SIMATIC NET CP 5622
4083 SIMATIC NET CP 5614 A3
4084 SIMATIC NET CP 1626
4942 FPGA I-Bus Tracer for MBD
6120 SZB6120
110b Chromatic Research Inc.
0001 Mpact Media Processor
0004 Mpact 2
110c Mini-Max Technology, Inc.
110d Znyx Advanced Systems
110e CPU Technology
110f Ross Technology
1110 Powerhouse Systems
6037 Firepower Powerized SMP I/O ASIC
6073 Firepower Powerized SMP I/O ASIC
1111 Santa Cruz Operation
Also claimed to be RNS or Rockwell International, current PCISIG records list Osicom
1112 Osicom Technologies Inc
2200 FDDI Adapter
2300 Fast Ethernet Adapter
2340 4 Port Fast Ethernet Adapter
2400 ATM Adapter
1113 Accton Technology Corporation
1211 SMC2-1211TX

103c 1207 EN-1207D Fast Ethernet Adapter
1113 1211 EN-1207D Fast Ethernet Adapter
1216 EN-1216 Ethernet Adapter
1113 1216 EN1207F series PCI Fast Ethernet Adapter
1113 2220 EN2220A Cardbus Fast Ethernet Adapter
1113 2242 EN2242 10/100 Ethernet
Mini-PCI Card
111a 1020 SpeedStream 1020 PCI 10/100 Ethernet Adaptor [EN-1207F-TX ?]
1217 EN-1217 Ethernet Adapter
5105 10Mbps Network card
9211 EN-1207D Fast Ethernet Adapter
1113 9211 EN-1207D Fast Ethernet Adapter
9511 21x4x DEC-Tulip compatible Fast Ethernet
d301 CPWNA100 (Philips wireless PCMCIA)
ec02 SMC 1244TX v3
ee23 SMCWPCIT-G 108Mbps Wireless PCI adapter
1114 Atmel Corporation
0506 at76c506 802.11b Wireless Network Adaptor
1115 3D Labs
1116 Data Translation
0022 DT3001
0023 DT3002
0024 DT3003
0025 DT3004
0026 DT3005
0027 DT3001-PGL
0028 DT3003-PGL
0051 DT322
0060 DT340
0069 DT332
80c2 DT3162
1117 Datacube, Inc
9500 Max-1C SVGA card
9501 Max-1C image processing
1118 Berg Electronics
1119 ICP Vortex Computersysteme GmbH
0000 GDT 6000/6020/6050
0001 GDT 6000B/6010
0002 GDT 6110/6510
0003 GDT 6120/6520
0004 GDT 6530
0005 GDT 6550
0006 GDT 6117/6517
0007 GDT 6127/6527
0008 GDT 6537
0009 GDT 6557/6557-ECC
000a

GDT 6115/6515
000b GDT 6125/6525
000c GDT 6535
000d GDT 6555/6555-ECC
0100 GDT 6117RP/6517RP
0101 GDT 6127RP/6527RP
0102 GDT 6537RP
0103 GDT 6557RP
0104 GDT 6111RP/6511RP
0105 GDT 6121RP/6521RP
0110 GDT 6117RD/6517RD
0111 GDT 6127RD/6527RD
0112 GDT 6537RD
0113 GDT 6557RD
0114 GDT 6111RD/6511RD
0115 GDT 6121RD/6521RD
0118 GDT 6118RD/6518RD/6618RD
0119 GDT 6128RD/6528RD/6628RD
011a GDT 6538RD/6638RD
011b GDT 6558RD/6658RD
0120 GDT 6117RP2/6517RP2
0121 GDT 6127RP2/6527RP2
0122 GDT 6537RP2
0123 GDT 6557RP2
0124 GDT 6111RP2/6511RP2
0125 GDT 6121RP2/6521RP2
0136 GDT 6113RS/6513RS
0137 GDT 6123RS/6523RS
0138 GDT 6118RS/6518RS/6618RS
0139 GDT 6128RS/6528RS/6628RS
013a GDT 6538RS/6638RS
013b GDT 6558RS/6658RS
013c GDT 6533RS/6633RS
013d GDT 6543RS/6643RS
013e GDT 6553RS/6653RS
013f GDT 6563RS/6663RS
0166 GDT 7113RN/7513RN/7613RN
0167 GDT 7123RN/7523RN/7623RN
0168 GDT 7118RN/7518RN/7618RN
0169 GDT 7128RN/7528RN/7628RN
016a
GDT 7538RN/7638RN
016b GDT 7558RN/7658RN
016c GDT 7533RN/7633RN
016d GDT 7543RN/7643RN
016e GDT 7553RN/7653RN
016f GDT 7563RN/7663RN
01d6 GDT 4x13RZ

01d7 GDT 4x23RZ
01f6 GDT 8x13RZ
01f7 GDT 8x23RZ
01fc GDT 8x33RZ
01fd GDT 8x43RZ
01fe GDT 8x53RZ
01ff GDT 8x63RZ
0210 GDT 6519RD/6619RD
0211 GDT 6529RD/6629RD
0260 GDT 7519RN/7619RN
0261 GDT 7529RN/7629RN
02ff GDT MAXRP
0300 GDT NEWRX
0301 GDT NEWRX2
111a Efficient Networks, Inc
0000 155P-MF1 (FPGA)
0002 155P-MF1 (ASIC)
0003 ENI-25P ATM
 111a 0000 ENI-25p Miniport ATM Adapter
0005 SpeedStream (LANAI)
 111a 0001 ENI-3010 ATM
 111a 0009 ENI-3060 ADSL (VPI=0)
 111a 0101 ENI-3010 ATM
 111a 0109 ENI-3060CO ADSL (VPI=0)
 111a 0809 ENI-3060 ADSL (VPI=0 or 8)
 111a 0909 ENI-3060CO ADSL (VPI=0 or 8)
 111a 0a09 ENI-3060 ADSL (VPI=<0..15>)
0007 SpeedStream ADSL
 111a 1001 ENI-3061 ADSL [ASIC]
1020 SpeedStream PCI 10/100 Network Card
1203 SpeedStream 1023 Wireless PCI Adapter
111b
 Teledyne Electronic Systems
111c Tricord Systems Inc.
 0001 Powerbis Bridge
now owned by Microchip Technology
111d Microsemi / PMC / IDT
 0001 IDT77201/77211 155Mbps ATM SAR Controller [NICStAR]
 0003 IDT77222/77252 155Mbps ATM MICRO ABR SAR Controller
 0004 IDT77V252 155Mbps ATM MICRO ABR SAR Controller
 0005 IDT77V222 155Mbps ATM MICRO ABR SAR Controller
 8018 PES12N3A 12-lane 3-Port PCI Express Switch
 801c PES24N3A PCI Express Switch
 8028 PES4T4 PCI Express Switch
 802b PES8T5A PCI Express Switch
 802c PES16T4 PCI Express Switch
 802d PES16T7 PCI Express Switch
 802e PES24T6 PCI Express Switch

802f PES32T8 PCI Express Switch
 8032 PES48T12 PCI Express Switch
 8034 PES16/22/34H16 PCI Express Switch
 8035 PES32H8 PCI Express Switch
 8036 PES48H12 PCI Express Switch
 8037 PES64H16 PCI Express Switch
 8039 PES3T3 PCI Express Switch
 803a PES4T4 PCI Express Switch
 803c PES5T5 PCI Express Switch
 803d PES6T5 PCI Express Switch
 8048 PES8NT2 PCI
 Express Switch
 8049 PES8NT2 PCI Express Switch
 804a PES8NT2 PCI Express Internal NTB
 804b PES8NT2 PCI Express External NTB
 804c PES16NT2 PCI Express Switch
 804d PES16NT2 PCI Express Switch
 804e PES16NT2 PCI Express Internal NTB
 804f PES16NT2 PCI Express External NTB
 8058 PES12NT3 PCI Express Switch
 8059 PES12NT3 PCI Express Switch
 805a PES12NT3 PCI Express Internal NTB
 805b PES12NT3 PCI Express External NTB
 805c PES24NT3 PCI Express Switch
 805d PES24NT3 PCI Express Switch
 805e PES24NT3 PCI Express Internal NTB
 805f PES24NT3 PCI Express External NTB
 8060 PES16T4G2 PCI Express Gen2 Switch
 8061 PES12T3G2 PCI Express Gen2 Switch
 8068 PES6T6G2 PCI Express Gen2 Switch
 806a PES24T3G2 PCI Express Gen2 Switch
 14c1 000c 10G-PCIE2-8B2
 806c PES16T4A/4T4G2 PCI Express Gen2 Switch
 806e PES24T6G2 PCI Express Gen2 Switch
 806f HIO524G2 PCI Express Gen2 Switch
 8077 89HPES64H16G2 64-Lane 16-Port PCIe Gen2 System Interconnect Switch
 8088 PES32NT8BG2 PCI Express
 Switch
 1093 752f PXIe-8383mc Device
 1093 7543 PXIe-8383mc System Host
 1093 755c PXIe-8364
 1093 755d PXIe-8374
 1093 75ff PXIe-8383mc DMA
 1093 7600 PXIe-8383mc DMA
 1093 7602 PXIe-8384
 # 32-lanes 24-ports Gen.2
 808a 89HPES32NT24BG2 PCI Express Switch
 # 32-lanes 24-ports Gen.2

808c 89HPES32NT24AG2 PCI Express Switch
808e PES24NT24G2 PCI Express Switch
808f 89HPES32NT8AG2 32-Lane 8-Port PCIe Gen2 System Interconnect Switch with Non-Transparent Bridging
8090 89HPES16NT16G2 16-Lane 16-Port PCIe Gen2 System Interconnect Switch
8092 89HPES12NT12G2 12-Lane 12-Port PCIe Gen2 System Interconnect Switch
80cf F32P08xG3 [PCIe boot mode]
80d2 F32P08xG3 NVMe controller
111e Eldec
111f Precision Digital Images
4a47 Precision MX Video engine interface
5243 Frame capture bus interface
formerly EMC Corporation
1120 Dell EMC
2306 Unity Fibre Channel Controller
2501 Unity Ethernet Controller
2505 Unity Fibre Channel Controller
1121 Zilog
1122 Multi-tech
Systems, Inc.
1123 Excellent Design, Inc.
1124 Leutron Vision AG
2581 Picport Monochrome
1125 Eurocore
1126 Vigra
1127 FORE Systems Inc
0200 ForeRunner PCA-200 ATM
0210 PCA-200PC
0250 ATM
0300 ForeRunner PCA-200EPC ATM
0310 ATM
0400 ForeRunnerHE ATM Adapter
1127 0400 ForeRunnerHE ATM
1129 Firmworks
112a Hermes Electronics Company, Ltd.
nee Linotype - Hell AG
112b Heidelberger Druckmaschinen AGHeidelberger Druckmaschinen AG
112c Zenith Data Systems
112d Ravicad
112e Infomedia Microelectronics Inc.
112f Dalsa Inc.
0000 MVC IC-PCI
0001 MVC IM-PCI Video frame grabber/processor
0004 PCDig Digital Image Capture
0008 PC-CamLink PCI framegrabber
1130 Computervision
1131 Philips Semiconductors
1561 USB 1.1 Host Controller
1775 c200 C2K onboard USB 1.1 host controller

1562 USB 2.0 Host Controller
1775 c200 C2K onboard USB 2.0 host controller
3400 SmartPCI56(UCB1500) 56K Modem
5400 TriMedia TM1000/1100
12ca 0000 BlueICE
5402 TriMedia
TM1300
1244 0f00 Fritz!Card DSL
15eb 1300 DT1300
15eb 1302 DT1302
15eb 1304 DT1304
15eb 1305 DT1305
15eb 1306 PMCDT1306
15eb 1308 DT1308
15eb 1331 DT1301 with SAA7121
15eb 1337 DT1301 with SAA7127
15eb 2d3d X3D
15eb 7022 PTM1300
5405 TriMedia TM1500
1136 0005 LCP-1500
5406 TriMedia TM1700
540b PNX1005 Media Processor
1131 0020 PNXLite PCI Demo Board
7130 SAA7130 Video Broadcast Decoder
0000 4016 Behold TV 401
0000 4051 Behold TV 405 FM
0000 5051 Behold TV 505 RDS
0000 505b Behold TV 505 RDS
102b 48d0 Matrox CronosPlus
1048 226b ELSA EX-VISION 300TV
107d 6655 WinFast DTV1000S
1131 0000 SAA7130-based TV tuner card
1131 2001 10MOONS PCI TV CAPTURE CARD
1131 2005 Techcom (India) TV Tuner Card (SSD-TV-670)
1458 9006 GT-PS700 DVB-S tuner
1461 050c Nagase Sangyo TransGear 3000TV
1461 10ff AVerMedia DVD EZMaker
1461 2108 AVerMedia AverTV/305
1461 2115 AVerMedia AverTV Studio 305
153b 1152 Terratec
Cinergy 200 TV
185b c100 Compro VideoMate TV PVR/FM
185b c901 Videomate DVB-T200
5168 0138 LifeView FlyVIDEO2000
5ace 5010 Behold TV 501
5ace 5050 Behold TV 505 FM
7133 SAA7131/SAA7133/SAA7135 Video Broadcast Decoder
0000 4091 Beholder BeholdTV 409 FM

0000 5071 Behold TV 507 RDS
0000 507b Behold TV 507 RDS
0000 5201 Behold TV Columbus
0070 6701 WinTV HVR-1110
1019 4cb5 Elitegroup ECS TVP3XP FM1236 Tuner Card (NTSC,FM)
1043 0210 FlyTV mini Asus Digimatrix
1043 4843 TV-FM 7133
1043 4845 TV-FM 7135
1043 4862 P7131 Dual
1043 4876 My Cinema-P7131 Hybrid
1131 0000 SAA713x-based TV tuner card
1131 2001 Proteus Pro [philips reference design]
1131 2018 Tiger reference design
1131 4ee9 MonsterTV Mobile
1131 7133 Pinnacle PCTV 301i
11bd 002b PCTV Stereo
11bd 002e PCTV 110i (saa7133)
12ab 0800 PURPLE TV
13c2 2804 Technotrend Budget T-3000 Hybrid
1421 0335 Instant TV DVB-T Cardbus
1421 1370 Instant TV (saa7135)
1435
7330 VFG7330
1435 7350 VFG7350
1458 9001 GC-PTV-TAF Hybrid TV card
1458 9002 GT-PTV-TAF-RH DVB-T/Analog TV/FM tuner
1458 9003 GT-PTV-AF-RH Analog TV/FM tuner
1458 9004 GT-P8000 DVB-T/Analog TV/FM tuner
1458 9005 GT-P6000 Analog TV/FM tuner
1458 9008 GT-P5100 Analog TV tuner
1461 1044 AVerTVHD MCE A180
1461 4836 M10D Hybrid DVBT
1461 861e M105 PAL/SECAM/NTSC/FM Tuner
1461 a14b AVerTV Studio 509
1461 a836 M115 DVB-T, PAL/SECAM/NTSC Tuner
1461 f01d DVB-T Super 007
1461 f31f Avermedia AVerTV GO 007 FM
1461 f936 Hybrid+FM PCI (rev A16D)
1462 6231 TV@nywhere Plus
1489 0214 LifeView FlyTV Platinum FM
14c0 1212 LifeView FlyTV Platinum Mini2
153b 1160 Cinergy 250 PCI TV
153b 1162 Terratec Cinergy 400 mobile
17de 7256 PlusTV All In One PI610 card
17de 7350 ATSC 110 Digital / Analog HDTV Tuner
17de 7352 ATSC 115 Digital / Analog HDTV Tuner
185b c100 VideoMate TV
185b c900 VideoMate T750

5168 0306 LifeView FlyDVB-T DUO
5168
0319 LifeView FlyDVB Trio
5168 0502 LifeView FlyDVB-T Duo CardBus
5168 0520 LifeView FlyDVB Trio CardBus
5168 1502 LifeView FlyTV CardBus
5168 2502 LifeView FlyDVB-T CardBus
5168 2520 LifeView FlyDVB-S Duo CardBus
5168 3502 LifeView FlyDVB-T Hybrid CardBus
5168 3520 LifeView FlyDVB Trio N CardBus
5ace 5030 Behold TV 503 FM
5ace 5090 Behold TV 509 FM
5ace 6090 Behold TV 609 FM
5ace 6091 Behold TV 609 FM
5ace 6092 Behold TV 609 RDS
5ace 6093 Behold TV 609 RDS
5ace 6190 Behold TV M6
5ace 6191 Behold TV M63
5ace 6193 Behold TV M6 Extra
5ace 6290 Behold TV H6
5ace 7090 Behold TV A7
5ace 7150 Behold TV H75
5ace 7151 Behold TV H75
5ace 7190 Behold TV H7
5ace 7191 Behold TV H7
5ace 7290 Behold TV T7
5ace 7591 Behold TV X7
5ace 7595 Behold TV X7
7134 SAA7134/SAA7135HL Video Broadcast Decoder
0000 4036 Behold TV 403
0000 4037 Behold TV 403 FM
0000 4071 Behold TV 407 FM
1019 4cb4 Elitegroup ECS TVP3XP
FM1216 Tuner Card(PAL-BG,FM)
1043 0210 Digimatrix TV
1043 4840 TV-FM 7134
1043 4842 TV-FM 7134
1131 0000 SAA713x-based TV tuner card
1131 2004 EUROPA V3 reference design
1131 4e85 SKNet Monster TV
1131 6752 EMPRESS
11bd 002b PCTV Stereo
11bd 002d PCTV 300i DVB-T + PAL
1461 2c00 AVerTV Hybrid+FM PCI
1461 9715 AVerTV Studio 307
1461 a70a AVermedia AVerTV 307
1461 a70b AVerMedia M156 / Medion 2819
1461 d6ee Cardbus TV/Radio (E500)

1471 b7e9 AVerTV Cardbus plus
153b 1142 Terratec Cinergy 400 TV
153b 1143 Terratec Cinergy 600 TV
153b 1158 Terratec Cinergy 600 TV MK3
1540 9524 ProVideo PV952
16be 0003 Medion 7134
185b c200 Compro VideoMate Gold+ Pal
185b c900 Videomate DVB-T300
1894 a006 KNC One TV-Station DVR
1894 fe01 KNC One TV-Station RDS / Typhoon TV Tuner RDS
5168 0138 FLY TV PRIME 34FM
5168 0300 FlyDVB-S
5ace 5070 Behold TV 507 FM
5ace 6070 Behold TV 607 FM
5ace 6071 Behold TV 607 FM
5ace 6072
Behold TV 607 RDS
5ace 6073 Behold TV 607 RDS
7145 SAA7145
7146 SAA7146
110a 0000 Fujitsu/Siemens DVB-C card rev1.5
110a ffff Fujitsu/Siemens DVB-C card rev1.5
1124 2581 Leutron Vision PicPort
1131 4f56 KNC1 DVB-S Budget
1131 4f60 Fujitsu-Siemens Activy DVB-S Budget Rev AL
1131 4f61 Activy DVB-S Budget Rev GR
1131 5f61 Activy DVB-T Budget
114b 2003 DVRaptor Video Edit/Capture Card
1159 0040 MuTech M-Vision 500 (MV-500 rev. E)
1159 0050 MuTech M-Vision 500 (MV-500 rev. F)
11bd 0006 DV500 Overlay
11bd 000a DV500 Overlay
11bd 000f DV500 Overlay
13c2 0000 Siemens/Technotrend/Hauppauge DVB card rev1.3 or rev1.5
13c2 0001 Technotrend/Hauppauge DVB card rev1.3 or rev1.6
13c2 0002 Technotrend/Hauppauge DVB card rev2.1
13c2 0003 Technotrend/Hauppauge DVB card rev2.1
13c2 0004 Technotrend/Hauppauge DVB card rev2.1
13c2 0006 Technotrend/Hauppauge DVB card rev1.3 or rev1.6
13c2 0008 Technotrend/Hauppauge DVB-T
13c2 000a Octal/Technotrend
DVB-C for iTV
13c2 000e Technotrend/Hauppauge DVB card rev2.3
13c2 1003 Technotrend-Budget/Hauppauge WinTV-NOVA-S DVB card
13c2 1004 Technotrend-Budget/Hauppauge WinTV-NOVA-C DVB card
13c2 1005 Technotrend-Budget/Hauppauge WinTV-NOVA-T DVB card
13c2 100c Technotrend-Budget/Hauppauge WinTV-NOVA-CI DVB card
13c2 100f Technotrend-Budget/Hauppauge WinTV-NOVA-CI DVB card

13c2 1010 DVB C-1500
13c2 1011 Technotrend-Budget/Hauppauge WinTV-NOVA-T DVB card
13c2 1012 DVB T-1500
13c2 1013 SATELCO Multimedia DVB
13c2 1016 WinTV-NOVA-SE DVB card
13c2 1018 DVB S-1401
13c2 1019 S2-3200
13c2 1102 Technotrend/Hauppauge DVB card rev2.1
153b 1155 Cinergy 1200 DVB-S
153b 1156 Cinergy 1200 DVB-C
153b 1157 Cinergy 1200 DVB-T
153b 1176 Cinergy 1200 DVB-C (MK3)
1894 0020 KNC One DVB-C V1.0
1894 0023 TVStation DVB-C plus
<http://www.knc1.com/gb.htm>
1894 0054 TV-Station DVB-S
7160 SAA7160
1458 9009 E8000 DVB-T/Analog TV/FM tuner
1461
1455 AVerTV Hybrid Speedy PCI-E (H788)
7162 SAA7162
11bd 0101 Pinnacle PCTV 7010iX TV Card
7164 SAA7164
0070 8800 WinTV HVR-2250
0070 8810 WinTV HVR-2250
0070 8851 WinTV HVR-2250
0070 8853 WinTV HVR-2250
0070 8880 WinTV HVR-2250
0070 8891 WinTV HVR-2250
0070 88a0 WinTV HVR-2250
0070 88a1 WinTV HVR-2250
0070 8900 WinTV HVR-2200
0070 8901 WinTV HVR-2200
0070 8940 WinTV HVR-2200 (submodel 89619)
0070 8951 WinTV HVR-2200
0070 8953 WinTV HVR-2200
0070 8980 WinTV HVR-2200
0070 8991 WinTV HVR-2200
0070 8993 WinTV HVR-2200
0070 89a0 WinTV HVR-2200
0070 89a1 WinTV HVR-2200
0070 f120 WinTV HVR-2205
0070 f123 WinTV HVR-2215
7231 SAA7231
5ace 8000 Behold TV H8
5ace 8001 Behold TV H8
5ace 8050 Behold TV H85
5ace 8051 Behold TV H85

5ace 8100 Behold TV A8
5ace 8101 Behold TV A8
5ace 8150 Behold TV A85
5ace 8151 Behold TV A85
5ace 8201 Behold TV T8
9730 SAA9730 Integrated Multimedia and Peripheral Controller
1131
0000 Integrated Multimedia and Peripheral Controller
1132 Mitel Corp.
1133 Dialogic Corporation
7701 Eiconcard C90
7711 Eiconcard C91
7901 EiconCard S90
7902 EiconCard S90
7911 EiconCard S91
7912 EiconCard S91
7921 Eiconcard S92
7941 EiconCard S94
7942 EiconCard S94
7943 EiconCard S94
7944 EiconCard S94
7945 Eiconcard S94
7948 Eiconcard S94 64bit/66MHz
9711 Eiconcard S91 V2
9911 Eiconcard S91 V2
9941 Eiconcard S94 V2
9a41 Eiconcard S94 PCIe
b921 EiconCard P92
b922 EiconCard P92
b923 EiconCard P92
e001 Diva Pro 2.0 S/T
e002 Diva 2.0 S/T PCI
e003 Diva Pro 2.0 U
e004 Diva 2.0 U PCI
e005 Diva 2.01 S/T PCI
e006 Diva CT S/T PCI
e007 Diva CT U PCI
e008 Diva CT Lite S/T PCI
e009 Diva CT Lite U PCI
e00a Diva ISDN+V.90 PCI
e00b Diva ISDN PCI 2.02
e00c Diva 2.02 PCI U
e00d Diva Pro 3.0 PCI
e00e Diva ISDN+CT S/T PCI Rev 2
e010 Diva Server BRI-2M PCI
110a 0021 Fujitsu Siemens ISDN S0
e011 Diva Server BRI S/T

Rev 2
e012 Diva Server 4BRI-8M PCI
e013 4BRI
1133 1300 Diva V-4BRI-8 PCI v2
1133 e013 Diva 4BRI-8 PCI v2
e014 Diva Server PRI-30M PCI
e015 Diva PRI PCI v2
e016 Diva Server Voice 4BRI PCI
e017 Diva Server Voice 4BRI Rev 2
1133 e017 Diva Server Voice 4BRI-8M 2.0 PCI
e018 BRI
1133 1800 Diva V-BRI-2 PCI v2
1133 e018 Diva BRI-2 PCI v2
e019 Diva Server Voice PRI Rev 2
1133 e019 Diva Server Voice PRI 2.0 PCI
e01a Diva BRI-2FX PCI v2
e01b Diva Server Voice BRI-2M 2.0 PCI
1133 e01b Diva Server Voice BRI-2M 2.0 PCI
e01c PRI
1133 1c01 Diva PRI/E1/T1-8 PCI v3
1133 1c02 Diva PRI/T1-24 PCI(e) v3
1133 1c03 Diva PRI/E1-30 PCI(e) v3
1133 1c04 Diva PRI/E1/T1-CTI PCI(e) v3
1133 1c05 Diva V-PRI/T1-24 PCI(e) v3
1133 1c06 Diva V-PRI/E1-30 PCI(e) v3
1133 1c07 Diva Server PRI/E1/T1-8 Cornet NQ
1133 1c08 Diva Server PRI/T1-24 Cornet NQ
1133 1c09 Diva Server PRI/E1-30 Cornet NQ
1133 1c0a Diva Server PRI/E1/T1 Cornet NQ
1133 1c0b Diva
Server V-PRI/T1-24 Cornet NQ
1133 1c0c Diva Server V-PRI/E1-30 Cornet NQ
e01e 2PRI
1133 1e01 Diva 2PRI/E1/T1-60 PCI v1
1133 e01e Diva V-2PRI/E1/T1-60 PCI v1
e020 4PRI
1133 2001 Diva 4PRI/E1/T1-120 PCI v1
1133 e020 Diva V-4PRI/E1/T1-120 PCI v1
e022 Analog-2
1133 2200 Diva V-Analog-2 PCI v1
1133 e022 Diva Analog-2 PCI v1
e024 Analog-4
1133 2400 Diva V-Analog-4 PCI v1
1133 e024 Diva Analog-4 PCI v1
e028 Analog-8
1133 2800 Diva V-Analog-8 PCI v1
1133 e028 Diva Analog-8 PCI v1
e02a Diva IPM-300 PCI v1

e02c Diva IPM-600 PCI v1
e02e 4BRI
1133 2e01 Diva V-4BRI-8 PCIe v2
1133 e02e Diva 4BRI-8 PCIe v2
e032 BRI
1133 3201 Diva V-BRI-2 PCIe v2
1133 e032 Diva BRI-2 PCIe v2
e034 Diva BRI-CTI PCI v2
1134 Mercury Computer Systems
0001 Raceway Bridge
0002 Dual PCI to RapidIO Bridge
000b POET Serial RapidIO Bridge
000d POET PSDMS Device
1135 Fuji Xerox Co Ltd
0001 Printer controller
1136 Momentum Data Systems
0002 PCI-JTAG
1137
Cisco Systems Inc
0023 VIC 81 PCIe Upstream Port
0040 VIC PCIe Upstream Port
1137 004f VIC 1280 Dual 40Gb Mezzanine
1137 0084 VIC 1240 Dual 40Gb MLOM
1137 0085 VIC 1225 Dual 10Gb SFP+ PCIe
1137 00cd VIC 1285 Dual 40Gb QSFP+ PCIe
1137 00ce VIC 1225T Dual 10GBaseT PCIe
1137 012a VIC M4308 Dual 40Gb
1137 012c VIC 1340 Dual 40Gb MLOM
1137 012e VIC 1227 Dual 10Gb SFP+ PCIe
1137 0137 VIC 1380 Dual 40Gb Mezzanine
1137 014d VIC 1385 Dual 40Gb PCIe
0041 VIC PCIe Downstream Port
0042 VIC Management Controller
1137 0047 VIC P81E PCIe Management Controller
1137 0085 VIC 1225 PCIe Management Controller
1137 00cd VIC 1285 PCIe Management Controller
1137 00ce VIC 1225T PCIe Management Controller
1137 012e VIC 1227 PCIe Management Controller
1137 014d VIC 1385 PCIe Management Controller
0043 VIC Ethernet NIC
1137 0047 VIC P81E PCIe Ethernet NIC
1137 0048 VIC M81KR Mezzanine Ethernet NIC
1137 004f VIC 1280 Mezzanine Ethernet NIC
1137
0084 VIC 1240 MLOM Ethernet NIC
1137 0085 VIC 1225 PCIe Ethernet NIC
1137 00cd VIC 1285 PCIe Ethernet NIC
1137 00ce VIC 1225T PCIe Ethernet NIC

1137 012a VIC M4308 Ethernet NIC
1137 012c VIC 1340 MLOM Ethernet NIC
1137 012e VIC 1227 PCIe Ethernet NIC
1137 0137 VIC 1380 Mezzanine Ethernet NIC
1137 014d VIC 1385 PCIe Ethernet NIC
1137 015d VIC 1387 MLOM Ethernet NIC
1137 0215 VIC 1440 Mezzanine Ethernet NIC
1137 0216 VIC 1480 MLOM Ethernet NIC
1137 0217 VIC 1455 PCIe Ethernet NIC
1137 0218 VIC 1457 MLOM Ethernet NIC
1137 0219 VIC 1485 PCIe Ethernet NIC
1137 021a VIC 1487 MLOM Ethernet NIC
1137 024a VIC 1495 PCIe Ethernet NIC
1137 024b VIC 1497 MLOM Ethernet NIC
0044 VIC Ethernet NIC Dynamic
1137 0047 VIC P81E PCIe Ethernet NIC Dynamic
1137 0048 VIC M81KR Mezzanine Ethernet NIC Dynamic
1137 004f VIC 1280 Mezzanine Ethernet NIC Dynamic
1137 0084 VIC 1240 MLOM Ethernet NIC Dynamic
1137 0085 VIC 1225 PCIe Ethernet NIC
Dynamic
1137 00cd VIC 1285 PCIe Ethernet NIC Dynamic
1137 00ce VIC 1225T PCIe Ethernet NIC Dynamic
1137 012a VIC M4308 Ethernet NIC Dynamic
1137 012c VIC 1340 MLOM Ethernet NIC Dynamic
1137 012e VIC 1227 PCIe Ethernet NIC Dynamic
1137 0137 VIC 1380 Mezzanine Ethernet NIC Dynamic
1137 014d VIC 1385 PCIe Ethernet NIC Dynamic
0045 VIC FCoE HBA
1137 0047 VIC P81E PCIe FCoE HBA
1137 0048 VIC M81KR Mezzanine FCoE HBA
1137 004f VIC 1280 Mezzanine FCoE HBA
1137 0084 VIC 1240 MLOM FCoE HBA
1137 0085 VIC 1225 PCIe FCoE HBA
1137 00cd VIC 1285 PCIe FCoE HBA
1137 00ce VIC 1225T PCIe FCoE HBA
1137 012a VIC M4308 FCoE HBA
1137 012c VIC 1340 MLOM FCoE HBA
1137 012e VIC 1227 PCIe FCoE HBA
1137 0137 VIC 1380 Mezzanine FCoE HBA
1137 014d VIC 1385 PCIe FCoE HBA
0046 VIC SCSI Controller
1137 012a VIC M4308 SCSI Controller
004e VIC 82 PCIe Upstream Port
0071 VIC SR-IOV VF
007a VIC 1300 PCIe Upstream Port
1137 012a VIC M4308 Dual 40Gb
1137

012c VIC 1340 Dual 40Gb MLOM
1137 0137 VIC 1380 Dual 40Gb Mezzanine
1137 014d VIC 1385 Dual 40Gb PCIe
00cf VIC Userspace NIC
1137 004f VIC 1280 Mezzanine Userspace NIC
1137 0084 VIC 1240 MLOM Userspace NIC
1137 0085 VIC 1225 PCIe Userspace NIC
1137 00cd VIC 1285 PCIe Userspace NIC
1137 00ce VIC 1225T PCIe Userspace NIC
1137 012a VIC M4308 Userspace NIC
1137 012c VIC 1340 MLOM Userspace NIC
1137 012e VIC 1227 PCIe Userspace NIC
1137 0137 VIC 1380 Mezzanine Userspace NIC
023e 1GigE I350 LOM
1138 Ziatech Corporation
8905 8905 [STD 32 Bridge]
1139 Dynamic Pictures, Inc
0001 VGA Compatible 3D Graphics
113a FWB Inc
113b Network Computing Devices
113c Cyclone Microsystems, Inc.
0000 PCI-9060 i960 Bridge
0001 PCI-SDK [PCI i960 Evaluation Platform]
0911 PCI-911 [i960Jx-based Intelligent I/O Controller]
0912 PCI-912 [i960CF-based Intelligent I/O Controller]
0913 PCI-913
0914 PCI-914 [I/O Controller w/ secondary PCI bus]
113d Leading
Edge Products Inc
113e Sanyo Electric Co - Computer Engineering Dept
113f Equinox Systems, Inc.
0808 SST-64P Adapter
1010 SST-128P Adapter
80c0 SST-16P DB Adapter
80c4 SST-16P RJ Adapter
80c8 SST-16P Adapter
8888 SST-4P Adapter
9090 SST-8P Adapter
1140 Intervice Inc
1141 Crest Microsystem Inc
1142 Alliance Semiconductor Corporation
3210 AP6410
6422 ProVideo 6422
6424 ProVideo 6424
6425 ProMotion AT25
643d ProMotion AT3D
1143 NetPower, Inc
1144 Cincinnati Milacron

0001 Noservo controller
1145 Workbit Corporation
8007 NinjaSCSI-32 Workbit
f007 NinjaSCSI-32 KME
f010 NinjaSCSI-32 Workbit
f012 NinjaSCSI-32 Logitech
f013 NinjaSCSI-32 Logitech
f015 NinjaSCSI-32 Melco
f020 NinjaSCSI-32 Sony PCGA-DVD51
f021 NinjaPATA-32 Delkin Cardbus UDMA
f024 NinjaPATA-32 Delkin Cardbus UDMA
f103 NinjaPATA-32 Delkin Cardbus UDMA
1146 Force Computers
1147 Interface Corp
Nee Schneider & Koch
1148 SysKonnnect
4000 FDDI Adapter
0e11 b03b Netelligent
100 FDDI DAS Fibre SC
0e11 b03c Netelligent 100 FDDI SAS Fibre SC
0e11 b03d Netelligent 100 FDDI DAS UTP
0e11 b03e Netelligent 100 FDDI SAS UTP
0e11 b03f Netelligent 100 FDDI SAS Fibre MIC
1148 5521 FDDI SK-5521 (SK-NET FDDI-UP)
1148 5522 FDDI SK-5522 (SK-NET FDDI-UP DAS)
1148 5541 FDDI SK-5541 (SK-NET FDDI-FP)
1148 5543 FDDI SK-5543 (SK-NET FDDI-LP)
1148 5544 FDDI SK-5544 (SK-NET FDDI-LP DAS)
1148 5821 FDDI SK-5821 (SK-NET FDDI-UP64)
1148 5822 FDDI SK-5822 (SK-NET FDDI-UP64 DAS)
1148 5841 FDDI SK-5841 (SK-NET FDDI-FP64)
1148 5843 FDDI SK-5843 (SK-NET FDDI-LP64)
1148 5844 FDDI SK-5844 (SK-NET FDDI-LP64 DAS)
4200 Token Ring adapter
4300 SK-9872 Gigabit Ethernet Server Adapter (SK-NET GE-ZX dual link)
1148 9821 SK-9821 Gigabit Ethernet Server Adapter (SK-NET GE-T)
1148 9822 SK-9822 Gigabit Ethernet Server Adapter (SK-NET GE-T dual link)
1148 9841 SK-9841 Gigabit Ethernet Server Adapter (SK-NET GE-LX)
1148 9842 SK-9842 Gigabit Ethernet
Server Adapter (SK-NET GE-LX dual link)
1148 9843 SK-9843 Gigabit Ethernet Server Adapter (SK-NET GE-SX)
1148 9844 SK-9844 Gigabit Ethernet Server Adapter (SK-NET GE-SX dual link)
1148 9861 SK-9861 Gigabit Ethernet Server Adapter (SK-NET GE-SX Volition)
1148 9862 SK-9862 Gigabit Ethernet Server Adapter (SK-NET GE-SX Volition dual link)
1148 9871 SK-9871 Gigabit Ethernet Server Adapter (SK-NET GE-ZX)
1148 9872 SK-9872 Gigabit Ethernet Server Adapter (SK-NET GE-ZX dual link)
1259 2970 AT-2970SX Gigabit Ethernet Adapter
1259 2971 AT-2970LX Gigabit Ethernet Adapter

1259 2972 AT-2970TX Gigabit Ethernet Adapter
1259 2973 AT-2971SX Gigabit Ethernet Adapter
1259 2974 AT-2971T Gigabit Ethernet Adapter
1259 2975 AT-2970SX/2SC Gigabit Ethernet Adapter
1259 2976 AT-2970LX/2SC Gigabit Ethernet Adapter
1259 2977 AT-2970TX/2TX Gigabit Ethernet Adapter
4320 SK-98xx V2.0 Gigabit Ethernet Adapter [Marvell 88E8001]
1148 0121 Marvell RDK-8001 Adapter
1148
0221 Marvell RDK-8002 Adapter
1148 0321 Marvell RDK-8003 Adapter
1148 0421 Marvell RDK-8004 Adapter
1148 0621 Marvell RDK-8006 Adapter
1148 0721 Marvell RDK-8007 Adapter
1148 0821 Marvell RDK-8008 Adapter
1148 0921 Marvell RDK-8009 Adapter
1148 1121 Marvell RDK-8011 Adapter
1148 1221 Marvell RDK-8012 Adapter
1148 3221 SK-9521 V2.0 10/100/1000Base-T Adapter
1148 5021 SK-9821 V2.0 Gigabit Ethernet 10/100/1000Base-T Adapter
1148 5041 SK-9841 V2.0 Gigabit Ethernet 1000Base-LX Adapter
1148 5043 SK-9843 V2.0 Gigabit Ethernet 1000Base-SX Adapter
1148 5051 SK-9851 V2.0 Gigabit Ethernet 1000Base-SX Adapter
1148 5061 SK-9861 V2.0 Gigabit Ethernet 1000Base-SX Adapter
1148 5071 SK-9871 V2.0 Gigabit Ethernet 1000Base-ZX Adapter
1148 9521 SK-9521 10/100/1000Base-T Adapter
1259 2916 AT-2916T
4400 SK-9Dxx Gigabit Ethernet Adapter
4500 SK-9Mxx Gigabit Ethernet Adapter
9000 SK-9Sxx Gigabit Ethernet Server Adapter PCI-X [Marvell 88E8022]
1148
2100 SK-9S21 10/100/1000Base-T Server Adapter, PCI-X, Copper RJ-45
1148 2200 SK-9S22 10/100/1000Base-T Dual Port Server Adapter, PCI-X, 2 Copper RJ-45
1148 2210 SK-9P22 10/100/1000 Base-T Dual Port PMC card
1148 2220 TPMC-GBE-CO
1148 8100 SK-9S81 1000Base-SX Server Adapter, PCI-X, Fiber SX/LC
1148 8200 SK-9S82 1000Base-SX Dual Port Server Adapter, PCI-X, 2 Fiber SX/LC
1148 8210 SK-9P82 1000 Base-SX Dual Port PMC card
1148 8220 TPMC-GBE-FI
1148 9100 SK-9S91 1000Base-LX Server Adapter, PCI-X, Fiber LX/LC
1148 9200 SK-9S92 1000Base-LX Dual Port Server Adapter, PCI-X, 2 Fiber LX/LC
1259 2973 AT-2971SX v2 Gigabit Adapter
1259 2974 AT-2971T v2 Gigabit Adapter
1259 2978 AT-2971LX Gigabit Adapter
9843 [Fujitsu] Gigabit Ethernet
9e00 SK-9E21D 10/100/1000Base-T Adapter, Copper RJ-45
1148 2100 SK-9E21 Server Adapter
1148 21d0 SK-9E21D 10/100/1000Base-T Adapter

1148 2200 SK-9E22 Server Adapter
1148 8100 SK-9E81 Server Adapter
1148 8200 SK-9E82
Server Adapter
1148 9100 SK-9E91 Server Adapter
1148 9200 SK-9E92 Server Adapter
9e01 SK-9E21M 10/100/1000Base-T Adapter
1149 Win System Corporation
114a VMIC
5565 GE-IP PCI5565,PMC5565 Reflective Memory Node
5579 VMIPCI-5579 (Reflective Memory Card)
5587 VMIPCI-5587 (Reflective Memory Card)
6504 VMIC PCI 7755 FPGA
7587 VMIVME-7587
114b Canopus Co., Ltd
114c Annabooks
114d IC Corporation
114e Nikon Systems Inc
114f Digi International
0002 AccelePort EPC
0003 RightSwitch SE-6
0004 AccelePort Xem
0005 AccelePort Xr
0006 AccelePort Xr,C/X
0009 AccelePort Xr/J
000a AccelePort EPC/J
000c DataFirePRIme T1 (1-port)
000d SyncPort 2-Port (x.25/FR)
0011 AccelePort 8r EIA-232 (IBM)
0012 AccelePort 8r EIA-422
0013 AccelePort Xr
0014 AccelePort 8r EIA-422
0015 AccelePort Xem
0016 AccelePort EPC/X
0017 AccelePort C/X
001a DataFirePRIme E1 (1-port)
001b AccelePort C/X (IBM)
001c AccelePort Xr (SAIP)
001d DataFire RAS T1/E1/PRI
114f
0050 DataFire RAS E1 Adapter
114f 0051 DataFire RAS Dual E1 Adapter
114f 0052 DataFire RAS T1 Adapter
114f 0053 DataFire RAS Dual T1 Adapter
0023 AccelePort RAS
0024 DataFire RAS B4 ST/U
114f 0030 DataFire RAS BRI U Adapter
114f 0031 DataFire RAS BRI S/T Adapter

0026 AccelePort 4r 920
0027 AccelePort Xr 920
0028 ClassicBoard 4
0029 ClassicBoard 8
0034 AccelePort 2r 920
0035 DataFire DSP T1/E1/PRI cPCI
0040 AccelePort Xp
114f 0042 AccelePort 2p PCI
114f 0043 AccelePort 4p PCI
114f 0044 AccelePort 8p PCI
114f 0045 AccelePort 16p PCI
114f 004e AccelePort 32p PCI
0042 AccelePort 2p
0043 AccelePort 4p
0044 AccelePort 8p
0045 AccelePort 16p
004e AccelePort 32p
0070 Datafire Micro V IOM2 (Europe)
0071 Datafire Micro V (Europe)
0072 Datafire Micro V IOM2 (North America)
0073 Datafire Micro V (North America)
00b0 Digi Neo 4
00b1 Digi Neo 8
00c8 Digi Neo 2 DB9
00c9 Digi Neo 2 DB9 PRI
00ca Digi Neo 2 RJ45
00cb Digi Neo
2 RJ45 PRI
00cc Digi Neo 1 422
00cd Digi Neo 1 422 485
00ce Digi Neo 2 422 485
00d0 ClassicBoard 4 422
00d1 ClassicBoard 8 422
00f1 Digi Neo PCI-E 4 port
00f4 Digi Neo 4 (IBM version)
6001 Avastar
1150 Thinking Machines Corp
1151 JAE Electronics Inc.
1152 Megatek
1153 Land Win Electronic Corp
1154 Melco Inc
1155 Pine Technology Ltd
1156 Periscope Engineering
1157 Avsys Corporation
1158 Voarx R & D Inc
3011 Tokenet/vg 1001/10m anylan
9050 Lanfleet/Truevalue
9051 Lanfleet/Truevalue

1159 MuTech Corporation
0001 MV-1000
0002 MV-1500
115a Harlequin Ltd
115b Parallax Graphics
115c Photron Ltd.
115d Xircom
0003 Cardbus Ethernet 10/100
1014 0181 10/100 EtherJet Cardbus Adapter
1014 1181 10/100 EtherJet Cardbus Adapter
1014 8181 10/100 EtherJet Cardbus Adapter
1014 9181 10/100 EtherJet Cardbus Adapter
115d 0181 Cardbus Ethernet 10/100
115d 0182 RealPort2 CardBus Ethernet 10/100 (R2BE-100)
115d 1181 Cardbus Ethernet 10/100
1179
0181 Cardbus Ethernet 10/100
8086 8181 EtherExpress PRO/100 Mobile CardBus 32 Adapter
8086 9181 EtherExpress PRO/100 Mobile CardBus 32 Adapter
0005 Cardbus Ethernet 10/100
1014 0182 10/100 EtherJet Cardbus Adapter
1014 1182 10/100 EtherJet Cardbus Adapter
115d 0182 Cardbus Ethernet 10/100
115d 1182 Cardbus Ethernet 10/100
0007 Cardbus Ethernet 10/100
1014 0182 10/100 EtherJet Cardbus Adapter
1014 1182 10/100 EtherJet Cardbus Adapter
115d 0182 Cardbus Ethernet 10/100
115d 1182 Cardbus Ethernet 10/100
000b Cardbus Ethernet 10/100
1014 0183 10/100 EtherJet Cardbus Adapter
115d 0183 Cardbus Ethernet 10/100
000c Mini-PCI V.90 56k Modem
000f Cardbus Ethernet 10/100
1014 0183 10/100 EtherJet Cardbus Adapter
115d 0183 Cardbus Ethernet 10/100
00d4 Mini-PCI K56Flex Modem
0101 Cardbus 56k modem
115d 1081 Cardbus 56k Modem
0103 Cardbus Ethernet + 56k Modem
1014 9181 Cardbus 56k Modem
1115 1181 Cardbus Ethernet 100 + 56k Modem
115d
1181 CBEM56G-100 Ethernet + 56k Modem
8086 9181 PRO/100 LAN + Modem56 CardBus
115e Peer Protocols Inc
115f Maxtor Corporation
1160 Megasoft Inc

1161 PFU Limited
1162 OA Laboratory Co Ltd
1163 Rendition
0001 Verite 1000
2000 Verite V2000/V2100/V2200
1092 2000 Stealth II S220
1164 Advanced Peripherals Technologies
1165 Imagraph Corporation
0001 Motion TPEG Recorder/Player with audio
nee ServerWorks
1166 Broadcom
0000 CMIC-LE
0005 CNB20-LE Host Bridge
0006 CNB20HE Host Bridge
0007 CNB20-LE Host Bridge
0008 CNB20HE Host Bridge
0009 CNB20LE Host Bridge
0010 CIOB30
0011 CMIC-HE
0012 CMIC-WS Host Bridge (GC-LE chipset)
0013 CNB20-HE Host Bridge
0014 CMIC-LE Host Bridge (GC-LE chipset)
0015 CMIC-GC Host Bridge
0016 CMIC-GC Host Bridge
0017 GCNB-LE Host Bridge
0031 HT1100 HPX0 HT Host Bridge
0036 BCM5785 [HT1000] PCI/PCI-X Bridge
0101 CIOB-X2 PCI-X I/O Bridge
0103 EPB PCI-Express to PCI-X Bridge
0104 BCM5785 [HT1000] PCI/PCI-X Bridge
0110
CIOB-E I/O Bridge with Gigabit Ethernet
0130 BCM5780 [HT2000] PCI-X bridge
0132 BCM5780 [HT2000] PCI-Express Bridge
1166 0132 HT2000 PCI-Express bridge
0140 HT2100 PCI-Express Bridge
0141 HT2100 PCI-Express Bridge
0142 HT2100 PCI-Express Bridge
0144 HT2100 PCI-Express Bridge
0200 OSB4 South Bridge
0201 CSB5 South Bridge
4c53 1080 CT8 mainboard
0203 CSB6 South Bridge
1734 1012 PRIMERGY RX/TX series
0205 BCM5785 [HT1000] Legacy South Bridge
0211 OSB4 IDE Controller
0212 CSB5 IDE Controller
1028 014a PowerEdge 1750

1028 810b PowerEdge 1650/2550
4c53 1080 CT8 mainboard
0213 CSB6 RAID/IDE Controller
1028 4134 PowerEdge 600SC
1028 c134 Poweredge SC600
1734 1012 PRIMERGY RX/TX series onboard IDE
0214 BCM5785 [HT1000] IDE
1028 0205 PowerEdge 2970 HT1000 IDE
0217 CSB6 IDE Controller
1028 4134 Poweredge SC600
021b HT1100 HD Audio
0220 OSB4/CSB5 OHCI USB Controller
4c53 1080 CT8 mainboard
0221 CSB6 OHCI USB Controller
1734
1012 PRIMERGY RX/TX series onboard OHCI
0223 BCM5785 [HT1000] USB
1028 0205 PowerEdge 2970 HT1000 USB Controller
1028 020b PowerEdge T605 HT1000 USB Controller
0225 CSB5 LPC bridge
0227 GCLE-2 Host Bridge
1734 1012 PRIMERGY RX/TX series
0230 CSB5 LPC bridge
4c53 1080 CT8 mainboard
0234 BCM5785 [HT1000] LPC
1028 0205 PowerEdge 2970 HT1000 LPC
1028 020b PowerEdge T605 HT1000 LPC
0235 BCM5785 [HT1000] XIOAPIC0-2
0238 BCM5785 [HT1000] WDTimer
0240 K2 SATA
0241 RAIDCore RC4000
0242 RAIDCore BC4000
024a BCM5785 [HT1000] SATA (Native SATA Mode)
1028 020b PowerEdge T605 onboard SATA Controller
The device starts as 024A, and changes to 024B if set to PATA mode in BIOS
024b BCM5785 [HT1000] SATA (PATA/IDE Mode)
1028 0205 PowerEdge 2970 HT1000 SATA controller
0406 HT1100 PCI-X Bridge
0408 HT1100 Legacy Device
040a HT1100 ISA-LPC Bridge
1028 0223 PowerEdge R905 HT1100 ISA-LPC Bridge
0410 HT1100 SATA Controller (Native SATA Mode)
0411
HT1100 SATA Controller (PATA / IDE Mode)
0412 HT1100 USB OHCI Controller
0414 HT1100 USB EHCI Controller
0416 HT1100 USB EHCI Controller (with Debug Port)
0420 HT1100 PCI-Express Bridge

0421 HT1100 SAS/SATA Controller
0422 HT1100 PCI-Express Bridge
1167 Mutoh Industries Inc
1168 Thine Electronics Inc
1169 Centre for Development of Advanced Computing
nee Polaris Communications
116a Luminex Software, Inc.
6100 Bus/Tag Channel
6800 Escon Channel
7100 Bus/Tag Channel
7800 Escon Channel
116b Connectware Inc
116c Intelligent Resources Integrated Systems
116d Martin-Marietta
116e Electronics for Imaging
116f Workstation Technology
1170 Inventec Corporation
1171 Loughborough Sound Images Plc
1172 Altera Corporation
00a7 Stratix V
0530 Stratix IV
1173 Adobe Systems, Inc
1174 Bridgeport Machines
1175 Mitron Computer Inc.
1176 SBE Incorporated
1177 Silicon Engineering
1178 Alfa, Inc.
afa1 Fast Ethernet Adapter
1179 Toshiba Corporation
0102
Extended IDE Controller
0103 EX-IDE Type-B
010f NVMe Controller
0110 NVMe SSD Controller Cx5
1028 1ffb Express Flash NVMe 960G (RI) U.2 (CD5)
1028 1ffc Express Flash NVMe 1.92T (RI) U.2 (CD5)
1028 1ffd Express Flash NVMe 3.84T (RI) U.2 (CD5)
1028 1ffe Express Flash NVMe 7.68T (RI) U.2 (CD5)
1179 0001 KIOXIA CM5-R series SSD
1179 0021 KIOXIA CD5 series SSD
1d49 4039 Thinksystem U.2 CM5 NVMe SSD
1d49 403a Thinksystem AIC CM5 NVMe SSD
0113 BG3 NVMe SSD Controller
0115 XG4 NVMe SSD Controller
0404 DVD Decoder card
0406 Tecra Video Capture device
0407 DVD Decoder card (Version 2)
0601 CPU to PCI bridge

1179 0001 Satellite Pro
0602 PCI to ISA bridge
0603 ToPIC95 PCI to CardBus Bridge for Notebooks
0604 PCI-Docking Host bridge
060a ToPIC95
1179 0001 Satellite Pro
060f ToPIC97
1179 0001 Satellite 4010
0617 ToPIC100 PCI to Cardbus Bridge with ZV Support
0618 CPU to PCI and PCI to ISA bridge
0701 FIR Port Type-O
0803 TC6371AF
SD Host Controller
0804 TC6371AF SmartMedia Controller
0805 SD TypA Controller
0d01 FIR Port Type-DO
1179 0001 FIR Port Type-DO
117a A-Trend Technology
117b L G Electronics, Inc.
117c ATTO Technology, Inc.
002c ExpressSAS R380
002d ExpressSAS R348
0030 Ultra320 SCSI Host Adapter
117c 8013 ExpressPCI UL4D
117c 8014 ExpressPCI UL4S
117c 8027 ExpressPCI UL5D
117c 802f ExpressPCI UL5D Low Profile
0033 SAS Adapter
0041 ExpressSAS R30F
0042 ExpressSAS 6Gb/s SAS/SATA HBA
117c 0042 ExpressSAS H680
117c 0043 ExpressSAS H608
117c 0044 ExpressSAS H60F
117c 0045 ExpressSAS H6F0
117c 0046 ExpressSAS H644
117c 004f ExpressSAS M608
117c 0057 ExpressSAS M680
117c 0058 ExpressSAS M644
117c 0059 ExpressSAS W608
117c 005a ExpressSAS W680
117c 005b ExpressSAS W644
0049 ExpressSAS 6Gb SAS/SATA RAID Adapter
117c 0049 ExpressSAS R680
117c 004a ExpressSAS R608
117c 004b ExpressSAS R60F
117c 004c ExpressSAS R6F0
117c 004d ExpressSAS

R644
117c 004e ExpressSAS R648
0064 Celerity FC 16Gb/s Gen 5 Fibre Channel HBA
117c 0063 Celerity FC-161E
117c 0064 Celerity FC-162E
117c 0065 Celerity FC-164E
0094 Celerity FC 16/32Gb/s Gen 6 Fibre Channel HBA
117c 0094 Celerity FC-162P
117c 00a0 Celerity FC-161P
117c 00a1 Celerity FC-164P
117c 00a2 Celerity FC-321E
117c 00a3 Celerity FC-322E
117c 00ac Celerity FC-324E
8013 ExpressPCI UL4D
8014 ExpressPCI UL4S
8027 ExpressPCI UL5D
8070 ExpressSAS 12Gb/s SAS/SATA HBA
117c 0070 ExpressSAS H1280
117c 0071 ExpressSAS H1208
117c 0080 ExpressSAS H1244
8072 ExpressSAS 12Gb/s SAS/SATA HBA
117c 0072 ExpressSAS H12F0
117c 0073 ExpressSAS H120F
117c 0082 ExpressSAS H1288
117d Becton & Dickinson
117e T/R Systems
117f Integrated Circuit Systems
1180 Ricoh Co Ltd
0465 RL5c465
0466 RL5c466
0475 RL5c475
144d c006 vpr Matrix 170B4 CardBus bridge
0476 RL5c476 II
1014 0185 ThinkPad A/T/X Series
1014 0555 ThinkPad
X41
1014 056c ThinkPad Z60t
1028 014f Latitude X300 laptop
1028 0188 Inspiron 6000 laptop
103c 30c0 Compaq 6710b
103c 30c1 Compaq 6910p
1043 1017 X58LE
1043 1237 A6J-Q008
1043 1967 V6800V
1043 1987 A4K and Z81K notebooks, possibly others (mid-2005 machines)
104d 80df Vaio PCG-FX403
104d 80e7 VAIO PCG-GR214EP/GR214MP/GR215MP/GR314MP/GR315MP
104d 814e VAIO GRZ390Z

10f7 8338 Panasonic CF-Y5 laptop
144d c005 X10 Laptop
144d c00c P30/P35 notebook
14ef 0220 PCD-RP-220S
17aa 201c ThinkPad X60/X60s
17aa 20c4 ThinkPad T61/R61
17aa 20c6 ThinkPad R61/T400
0477 RL5c477
0478 RL5c478
1014 0184 ThinkPad A30p
0511 R5C511
0522 R5C522 IEEE 1394 Controller
1014 01cf ThinkPad A30p
1043 1967 V6800V
0551 R5C551 IEEE 1394 Controller
144d c006 vpr Matrix 170B4
0552 R5C552 IEEE 1394 Controller
1014 0511 ThinkPad A/T/X Series
1028 014f Latitude X300 laptop
1028 0188 Inspiron 6000 laptop
1043 1237 A6J-Q008
1043 1757
M2400N laptop
144d c005 X10 Laptop
144d c00c P30/P35 notebook
17aa 201e ThinkPad X60/X60s
0554 R5C554
0575 R5C575 SD Bus Host Adapter
0576 R5C576 SD Bus Host Adapter
0592 R5C592 Memory Stick Bus Host Adapter
1025 0121 Aspire 5920G
1028 01d7 XPS M1210
1028 01f3 Inspiron 1420
1028 022f Inspiron 1525
103c 1521 HP EliteBook 8540w
103c 30b5 Presario V3242AU
103c 30b7 Presario V6133CL
103c 30cc Pavilion dv6700
103c 30cf Pavilion dv95xx/96xx/97xx/98xx series
1043 1017 X58LE
1043 1237 A6J-Q008
1043 1967 V6800V
104d 9035 VAIO VGN-FW11ZRU
144d c018 X20 IV
17aa 20ca ThinkPad T61/T400
0811 R5C811
0822 R5C822 SD/SDIO/MMC/MS/MSPRO Host Adapter
1014 0556 ThinkPad X40 / X41 / X60s / Z60t

1014 0598 ThinkPad Z60m
1025 0121 Aspire 5920G
1028 0188 Inspiron 6000 laptop
1028 01a2 Inspiron 9200
1028 01d7 XPS M1210
1028 01f3 Inspiron 1420
1028 022f Inspiron 1525
103c 03b5 Presario V3242AU
103c 30b7 Presario V6133CL
103c
30c1 Compaq 6910p
103c 30cc Pavilion dv6700
103c 30cf Pavilion dv9668eg Laptop
1043 1017 X58LE
1043 1237 A6J-Q008
1043 1967 V6800V
10f7 8338 Panasonic CF-Y5 laptop
144d c018 X20 IV
17aa 201d ThinkPad X60/X60s
17aa 20c7 ThinkPad T61
17aa 20c8 ThinkPad T400/W500
0832 R5C832 IEEE 1394 Controller
1025 0121 Aspire 5920G
1028 01d7 XPS M1210
1028 01f3 Inspiron 1420
1028 022f Inspiron 1525
1028 024d Latitude E4300
103c 30b5 Presario V3242AU
103c 30b7 Presario V6133CL
103c 30c1 Compaq 6910p
103c 30cc Pavilion dv6700
103c 30cf Pavilion dv9668eg Laptop
17aa 20c5 ThinkPad R61
17aa 20c7 ThinkPad R61
0841 R5C841 CardBus/SD/SDIO/MMC/MS/MSPPro/xD/IEEE1394
0843 R5C843 MMC Host Controller
1025 0121 Aspire 5920G
1028 01d7 XPS M1210
1028 01f3 Inspiron 1420
1028 01f5 Inspiron 1501
1028 024f Latitude e6500
103c 03b5 Presario V3242AU
103c 1521 HP EliteBook 8540w
103c 30b7 Presario V6133CL
103c 30cf Pavilion
dv9500/9600/9700 series
1043 1017 X58LE
1183 0843 Alienware Aurora m9700

0852 xD-Picture Card Controller
1025 0121 Aspire 5920G
1028 01f3 Inspiron 1420
1028 022f Inspiron 1525
103c 30b5 Presario V3242AU
103c 30b7 Presario V6133CL
103c 30cc Pavilion dv6700
103c 30cf Pavilion dv9668eg Laptop
1043 1967 V6800V
1180 0852 Pavilion 2410us
1324 10cf P7120
17aa 20cb ThinkPad T400
e230 R5U2xx (R5U230 / R5U231 / R5U241) [Memory Stick Host Controller]
e476 CardBus bridge
1028 040a Latitude E6410
1028 040b Latitude E6510
e822 MMC/SD Host Controller
1028 040a Latitude E6410
1028 040b Latitude E6510
17aa 21cf ThinkPad T520
e823 PCIe SDXC/MMC Host Controller
17aa 21cf ThinkPad T520
e832 R5C832 PCIe IEEE 1394 Controller
1028 040a Latitude E6410
1028 040b Latitude E6510
17aa 21cf ThinkPad T520
e852 PCIe xD-Picture Card Controller
1181 Telmatics International
1183 Fujikura Ltd
1184 Forks Inc
1185 Dataworld International
Ltd
1186 D-Link System Inc
1002 DL10050 Sundance Ethernet
1186 1002 DFE-550TX/FX
1186 1012 DFE-580TX
1025 AirPlus Xtreme G DWL-G650 Adapter
1026 AirXpert DWL-AG650 Wireless Cardbus Adapter
1043 AirXpert DWL-AG650 Wireless Cardbus Adapter
1300 RTL8139 Ethernet
1186 1300 DFE-538TX 10/100 Ethernet Adapter
1186 1301 DFE-530TX+ 10/100 Ethernet Adapter
1186 1303 DFE-528TX 10/100 Fast Ethernet PCI Adapter
1340 DFE-690TXD CardBus PC Card
1540 DFE-680TX
1541 DFE-680TXD CardBus PC Card
1561 DRP-32TXD Cardbus PC Card
3300 DWL-510 / DWL-610 802.11b [Realtek RTL8180L]

1186 3300 DWL-610 Wireless Cardbus Adapter
1186 3301 DWL-510 Wireless PCI Adapter
3a10 AirXpert DWL-AG650 Wireless Cardbus Adapter(rev.B)
3a11 AirXpert DWL-AG520 Wireless PCI Adapter(rev.B)
4000 DL2000-based Gigabit Ethernet
4001 DGE-550SX PCI-X Gigabit Ethernet Adapter
4200 DFE-520TX Fast Ethernet PCI Adapter
1186 1103 DFE-520TX Fast Ethernet PCI Adapter (rev. C1)
4300 DGE-528T
Gigabit Ethernet Adapter
1186 4300 DGE-528T PCI Gigabit Ethernet Adapter
rev. B1; RealTek RTL8168E.
1186 4b10 DGE-560T PCI Express (x1) Gigabit Ethernet Adapter
4302 DGE-530T Gigabit Ethernet Adapter (rev.C1) [Realtek RTL8169]
4b00 DGE-560T PCI Express Gigabit Ethernet Adapter
4b01 DGE-530T Gigabit Ethernet Adapter (rev 11)
4b02 DGE-560SX PCI Express Gigabit Ethernet Adapter
4b03 DGE-550T Gigabit Ethernet Adapter V.B1
4c00 Gigabit Ethernet Adapter
1186 4c00 DGE-530T Gigabit Ethernet Adapter
8400 D-Link DWL-650+ CardBus PC Card
1187 Advanced Technology Laboratories, Inc.
1188 Shima Seiki Manufacturing Ltd.
1189 Matsushita Electronics Co Ltd
118a Hilevel Technology
118b Hypertec Pty Limited
118c Corollary, Inc
0014 PCIB [C-bus II to PCI bus host bridge chip]
1117 Intel 8-way XEON Profusion Chipset [Cache Coherency Filter]
118d BitFlow Inc
0001 Raptor-PCI framegrabber
0012 Model 12 Road Runner Frame Grabber
0014 Model 14 Road Runner Frame
Grabber
0024 Model 24 Road Runner Frame Grabber
0044 Model 44 Road Runner Frame Grabber
0112 Model 12 Road Runner Frame Grabber
0114 Model 14 Road Runner Frame Grabber
0124 Model 24 Road Runner Frame Grabber
0144 Model 44 Road Runner Frame Grabber
0212 Model 12 Road Runner Frame Grabber
0214 Model 14 Road Runner Frame Grabber
0224 Model 24 Road Runner Frame Grabber
0244 Model 44 Road Runner Frame Grabber
0312 Model 12 Road Runner Frame Grabber
0314 Model 14 Road Runner Frame Grabber
0324 Model 24 Road Runner Frame Grabber
0344 Model 44 Road Runner Frame Grabber

118e Hermstedt GmbH
118f Green Logic
1190 Tripace
c731 TP-910/920/940 PCI Ultra(Wide) SCSI Adapter
1191 Artop Electronic Corp
0003 SCSI Cache Host Adapter
0004 ATP8400
0005 ATP850UF
0006 ATP860 NO-BIOS
0007 ATP860
0008 ATP865 NO-ROM
0009 ATP865
000a ATP867-A
000b ATP867-B
000d ATP8620
000e ATP8620
8002 AEC6710 SCSI-2 Host Adapter
8010 AEC6712UW SCSI
8020 AEC6712U SCSI
8030
AEC6712S SCSI
8040 AEC6712D SCSI
8050 AEC6712SUW SCSI
8060 AEC6712 SCSI
8080 AEC67160 SCSI
8081 AEC67160S SCSI
808a AEC67162 2-ch. LVD SCSI
1192 Densan Company Ltd
1193 Zeitnet Inc.
0001 1221
0002 1225
1194 Toucan Technology
1195 Ratoc System Inc
1196 Hytec Electronics Ltd
1197 Gage Applied Sciences, Inc.
010c CompuScope 82G 8bit 2GS/s Analog Input Card
1198 Lambda Systems Inc
1199 Attachmate Corporation
0101 Advanced ISCA/PCI Adapter
119a Mind Share, Inc.
119b Omega Micro Inc.
1221 82C092G
119c Information Technology Inst.
119d Bug, Inc. Sapporo Japan
119e Fujitsu Microelectronics Ltd.
0001 FireStream 155
0003 FireStream 50
119f Bull HN Information Systems

1081 BXI Host Channel Adapter
BXI stands for Bull eXascale Interconnect
1101 BXI Host Channel Adapter v1.2
BXI stands for Bull eXascale Interconnect
1121 BXI Host Channel Adapter v1.3
11a0 Convex Computer Corporation
11a1 Hamamatsu Photonics K.K.
11a2 Sierra Research and Technology
11a3
Deuretzbacher GmbH & Co. Eng. KG
11a4 Barco Graphics NV
11a5 Microunity Systems Eng. Inc
11a6 Pure Data Ltd.
11a7 Power Computing Corp.
11a8 Systech Corp.
11a9 InnoSys Inc.
4240 AMCC S933Q Intelligent Serial Card
11aa Actel
Nee Galileo Technology, Inc.
11ab Marvell Technology Group Ltd.
0146 GT-64010/64010A System Controller
0f53 88E6318 Link Street network controller
11ab MV88SE614x SATA II PCI-E controller
138f W8300 802.11 Adapter (rev 07)
1fa6 Marvell W8300 802.11 Adapter
1186 3b08 AirPlus G DWL-G630 Wireless Cardbus Adapter (rev.A1)
1fa7 88W8310 and 88W8000G [Libertas] 802.11g client chipset
1faa 88w8335 [Libertas] 802.11b/g Wireless
1385 4e00 WG511v2 54 Mbps Wireless PC Card
1385 6b00 WG311v3 802.11g Wireless PCI Adapter
1737 0040 WPC54G v5 802.11g Wireless-G Notebook Adapter
2211 88SB2211 PCI Express to PCI Bridge
2a01 88W8335 [Libertas] 802.11b/g Wireless
2a02 88W8361 [TopDog] 802.11n Wireless
07d1 3b02 DIR-615 rev.
A1 Mini PCI Wireless Module
1385 7c00 WN511T RangeMax Next 300 Mbps Wireless PC Card
1385 7c01 WN511T RangeMax Next 300 Mbps Wireless Notebook Adapter
1385 7e00 WN311T RangeMax Next 300 Mbps Wireless PCI Adapter
1799 801b F5D8011 v2 802.11n N1 Wireless Notebook Card
2a08 88W8362e [TopDog] 802.11a/b/g/n Wireless
2a0a 88W8363 [TopDog] 802.11n Wireless
2a0c 88W8363 [TopDog] 802.11n Wireless
2a24 88W8363 [TopDog] 802.11n Wireless
2a2b 88W8687 [TopDog] 802.11b/g Wireless
2a30 88W8687 [TopDog] 802.11b/g Wireless
2a40 88W8366 [TopDog] 802.11n Wireless
2a41 88W8366 [TopDog] 802.11n Wireless

2a42 88W8366 [TopDog] 802.11n Wireless
2a43 88W8366 [TopDog] 802.11n Wireless
2a55 88W8864 [Avastar] 802.11ac Wireless
2b36 88W8764 [Avastar] 802.11n Wireless
2b38 88W8897 [AVASTAR] 802.11ac Wireless
2b40 88W8964 [Avastar] 802.11ac Wireless
4101 OLPC Cafe Controller Secure Digital Controller
4320 88E8001 Gigabit Ethernet Controller
1019 0f38 Marvell 88E8001 Gigabit
Ethernet Controller (ECS)
1019 8001 Marvell 88E8001 Gigabit Ethernet Controller (ECS)
1043 173c Marvell 88E8001 Gigabit Ethernet Controller (Asus)
1043 811a Marvell 88E8001 Gigabit Ethernet Controller (Asus)
105b 0c19 Marvell 88E8001 Gigabit Ethernet Controller (Foxconn)
10b8 b452 EZ Card 1000 (SMC9452TXV.2)
11ab 0121 Marvell RDK-8001
11ab 0321 Marvell RDK-8003
11ab 1021 Marvell RDK-8010
11ab 4320 Marvell Yukon Gigabit Ethernet 10/100/1000Base-T Controller (Asus)
11ab 5021 Marvell Yukon Gigabit Ethernet 10/100/1000Base-T Controller (64 bit)
11ab 9521 Marvell Yukon Gigabit Ethernet 10/100/1000Base-T Controller (32 bit)
1458 e000 Marvell 88E8001 Gigabit Ethernet Controller (Gigabyte)
147b 1406 Marvell 88E8001 Gigabit Ethernet Controller (Abit)
15d4 0047 Marvell 88E8001 Gigabit Ethernet Controller (Iwill)
1695 9025 Marvell 88E8001 Gigabit Ethernet Controller (Epox)
17f2 1c03 Marvell 88E8001 Gigabit Ethernet Controller (Albatron)
270f
2803 Marvell 88E8001 Gigabit Ethernet Controller (Chaintech)
4340 88E8021 PCI-X IPMI Gigabit Ethernet Controller
4341 88E8022 PCI-X IPMI Gigabit Ethernet Controller
4342 88E8061 PCI-E IPMI Gigabit Ethernet Controller
4343 88E8062 PCI-E IPMI Gigabit Ethernet Controller
4344 88E8021 PCI-X IPMI Gigabit Ethernet Controller
4345 88E8022 PCI-X IPMI Gigabit Ethernet Controller
4346 88E8061 PCI-E IPMI Gigabit Ethernet Controller
4347 88E8062 PCI-E IPMI Gigabit Ethernet Controller
4c53 10d0 Telum ASLP10 PrAMC Gigabit Ethernet
4350 88E8035 PCI-E Fast Ethernet Controller
1179 0001 Marvell 88E8035 Fast Ethernet Controller (Toshiba)
11ab 3521 Marvell RDK-8035
1854 000d Marvell 88E8035 Fast Ethernet Controller (LGE)
1854 000e Marvell 88E8035 Fast Ethernet Controller (LGE)
1854 000f Marvell 88E8035 Fast Ethernet Controller (LGE)
1854 0011 Marvell 88E8035 Fast Ethernet Controller (LGE)
1854 0012 Marvell 88E8035 Fast Ethernet Controller (LGE)
1854 0016 Marvell
88E8035 Fast Ethernet Controller (LGE)
1854 0017 Marvell 88E8035 Fast Ethernet Controller (LGE)

1854 0018 Marvell 88E8035 Fast Ethernet Controller (LGE)
1854 0019 Marvell 88E8035 Fast Ethernet Controller (LGE)
1854 001c Marvell 88E8035 Fast Ethernet Controller (LGE)
1854 001e Marvell 88E8035 Fast Ethernet Controller (LGE)
1854 0020 Marvell 88E8035 Fast Ethernet Controller (LGE)
4351 88E8036 PCI-E Fast Ethernet Controller
107b 4009 Marvell 88E8036 Fast Ethernet Controller (Wistron)
10f7 8338 Marvell 88E8036 Fast Ethernet Controller (Panasonic)
1179 0001 Marvell 88E8036 Fast Ethernet Controller (Toshiba)
1179 ff00 Marvell 88E8036 Fast Ethernet Controller (Compal)
1179 ff10 Marvell 88E8036 Fast Ethernet Controller (Inventec)
11ab 3621 Marvell RDK-8036
13d1 ac12 Abocom EFE3K - 10/100 Ethernet Expresscard
161f 203d Marvell 88E8036 Fast Ethernet Controller (Arima)
1854 000d Marvell 88E8036 Fast Ethernet Controller (LGE)
1854 000e Marvell
88E8036 Fast Ethernet Controller (LGE)
1854 000f Marvell 88E8036 Fast Ethernet Controller (LGE)
1854 0011 Marvell 88E8036 Fast Ethernet Controller (LGE)
1854 0012 Marvell 88E8036 Fast Ethernet Controller (LGE)
1854 0016 Marvell 88E8036 Fast Ethernet Controller (LGE)
1854 0017 Marvell 88E8036 Fast Ethernet Controller (LGE)
1854 0018 Marvell 88E8036 Fast Ethernet Controller (LGE)
1854 0019 Marvell 88E8036 Fast Ethernet Controller (LGE)
1854 001c Marvell 88E8036 Fast Ethernet Controller (LGE)
1854 001e Marvell 88E8036 Fast Ethernet Controller (LGE)
1854 0020 Marvell 88E8036 Fast Ethernet Controller (LGE)
4352 88E8038 PCI-E Fast Ethernet Controller
4353 88E8039 PCI-E Fast Ethernet Controller
104d 902d VAIO VGN-NR120E
4354 88E8040 PCI-E Fast Ethernet Controller
1028 022f Inspiron 1525
144d c06a R730 Laptop
144d c072 Notebook N150P
4355 88E8040T PCI-E Fast Ethernet Controller
1179 ff50 Satellite P305D-S8995E
4356 88EC033 PCI-E Fast Ethernet
Controller
4357 88E8042 PCI-E Fast Ethernet Controller
435a 88E8048 PCI-E Fast Ethernet Controller
4360 88E8052 PCI-E ASF Gigabit Ethernet Controller
1043 8134 Marvell 88E8052 Gigabit Ethernet Controller (Asus)
107b 4009 Marvell 88E8052 Gigabit Ethernet Controller (Wistron)
11ab 5221 Marvell RDK-8052
1458 e000 Marvell 88E8052 Gigabit Ethernet Controller (Gigabyte)
1462 052c Marvell 88E8052 Gigabit Ethernet Controller (MSI)
1849 8052 Marvell 88E8052 Gigabit Ethernet Controller (ASRock)
a0a0 0509 Marvell 88E8052 Gigabit Ethernet Controller (Aopen)

4361 88E8050 PCI-E ASF Gigabit Ethernet Controller
107b 3015 Marvell 88E8050 Gigabit Ethernet Controller (Gateway)
11ab 5021 Marvell 88E8050 Gigabit Ethernet Controller (Intel)
8086 3063 D925XCVLK mainboard
8086 3439 Marvell 88E8050 Gigabit Ethernet Controller (Intel)
4362 88E8053 PCI-E Gigabit Ethernet Controller
103c 2a0d Marvell 88E8053 Gigabit Ethernet Controller (Asus)
1043 8142 Marvell
88E8053 Gigabit Ethernet controller PCIe (Asus)
109f 3197 Marvell 88E8053 Gigabit Ethernet Controller (Trigem)
10f7 8338 Marvell 88E8053 Gigabit Ethernet Controller (Panasonic)
10fd a430 Marvell 88E8053 Gigabit Ethernet Controller (SOYO)
1179 0001 Marvell 88E8053 Gigabit Ethernet Controller (Toshiba)
1179 ff00 Marvell 88E8053 Gigabit Ethernet Controller (Compal)
1179 ff10 Marvell 88E8053 Gigabit Ethernet Controller (Inventec)
11ab 5321 Marvell RDK-8053
1297 c240 Marvell 88E8053 Gigabit Ethernet Controller (Shuttle)
1297 c241 Marvell 88E8053 Gigabit Ethernet Controller (Shuttle)
1297 c242 Marvell 88E8053 Gigabit Ethernet Controller (Shuttle)
1297 c243 Marvell 88E8053 Gigabit Ethernet Controller (Shuttle)
1297 c244 Marvell 88E8053 Gigabit Ethernet Controller (Shuttle)
13d1 ac11 EGE5K - Giga Ethernet Expresscard
1458 e000 Marvell 88E8053 Gigabit Ethernet Controller (Gigabyte)
1462 058c Marvell 88E8053 Gigabit Ethernet Controller (MSI)
14c0
0012 Marvell 88E8053 Gigabit Ethernet Controller (Compal)
1558 04a0 Marvell 88E8053 Gigabit Ethernet Controller (Clevo)
15bd 1003 Marvell 88E8053 Gigabit Ethernet Controller (DFI)
161f 203c Marvell 88E8053 Gigabit Ethernet Controller (Arima)
161f 203d Marvell 88E8053 Gigabit Ethernet Controller (Arima)
1695 9029 Marvell 88E8053 Gigabit Ethernet Controller (Epox)
17f2 2c08 Marvell 88E8053 Gigabit Ethernet Controller (Albatron)
17ff 0585 Marvell 88E8053 Gigabit Ethernet Controller (Quanta)
1849 8053 Marvell 88E8053 Gigabit Ethernet Controller (ASRock)
1854 000b Marvell 88E8053 Gigabit Ethernet Controller (LGE)
1854 000c Marvell 88E8053 Gigabit Ethernet Controller (LGE)
1854 0010 Marvell 88E8053 Gigabit Ethernet Controller (LGE)
1854 0013 Marvell 88E8053 Gigabit Ethernet Controller (LGE)
1854 0014 Marvell 88E8053 Gigabit Ethernet Controller (LGE)
1854 0015 Marvell 88E8053 Gigabit Ethernet Controller (LGE)
1854 001a Marvell 88E8053 Gigabit Ethernet
Controller (LGE)
1854 001b Marvell 88E8053 Gigabit Ethernet Controller (LGE)
1854 001d Marvell 88E8053 Gigabit Ethernet Controller (LGE)
1854 001f Marvell 88E8053 Gigabit Ethernet Controller (LGE)
1854 0021 Marvell 88E8053 Gigabit Ethernet Controller (LGE)
1854 0022 Marvell 88E8053 Gigabit Ethernet Controller (LGE)
270f 2801 Marvell 88E8053 Gigabit Ethernet Controller (Chaintech)

a0a0 0506 Marvell 88E8053 Gigabit Ethernet Controller (Aopen)
 4363 88E8055 PCI-E Gigabit Ethernet Controller
 4364 88E8056 PCI-E Gigabit Ethernet Controller
 1043 81f8 Motherboard
 11ba 00ba 8056 Gigabit Ethernet Controller
 4365 88E8070 based Ethernet Controller
 4366 88EC036 PCI-E Gigabit Ethernet Controller
 4367 88EC032 Ethernet Controller
 4368 88EC034 Ethernet Controller
 4369 88EC042 Ethernet Controller
 436a 88E8058 PCI-E Gigabit Ethernet Controller
 11ab 00ba Imac 8,1 Wired Ethernet Adapter
 436b 88E8071 PCI-E Gigabit Ethernet Controller
 436c 88E8072 PCI-E
 Gigabit Ethernet Controller
 436d 88E8055 PCI-E Gigabit Ethernet Controller
 4370 88E8075 PCI-E Gigabit Ethernet Controller
 4380 88E8057 PCI-E Gigabit Ethernet Controller
 # AVB = "Audio Video Bridging"
 4381 Yukon Optima 88E8059 [PCIe Gigabit Ethernet Controller with AVB]
 1259 2803 AT-2814FX
 1259 2804 AT-2874xx
 4611 GT-64115 System Controller
 4620 GT-64120/64120A/64121A System Controller
 4801 GT-48001
 5005 Belkin F5D5005 Gigabit Desktop Network PCI Card
 5040 MV88SX5040 4-port SATA I PCI-X Controller
 5041 MV88SX5041 4-port SATA I PCI-X Controller
 5080 MV88SX5080 8-port SATA I PCI-X Controller
 5081 MV88SX5081 8-port SATA I PCI-X Controller
 5181 88f5181 [Orion-1] ARM SoC
 5182 88f5182 [Orion-NAS] ARM SoC
 5281 88f5281 [Orion-2] ARM SoC
 6041 MV88SX6041 4-port SATA II PCI-X Controller
 6042 88SX6042 PCI-X 4-Port SATA-II
 6081 MV88SX6081 8-port SATA II PCI-X Controller
 6101 88SE6101/6102 single-port PATA133 interface
 1043 82e0 P5K PRO Motherboard
 6121
 88SE6111/6121 SATA II / PATA Controller
 # 6111: 1 SATA port; 6121: 2 SATA ports
 11ab 6121 88SE6111/6121 1/2 port SATA II + 1 port PATA Controller
 6141 88SE614x SATA II PCI-E controller
 6145 88SE6145 SATA II PCI-E controller
 6180 88F6180 [Kirkwood] ARM SoC
 6192 88F6190/6192 [Kirkwood] ARM SoC
 6281 88F6281 [Kirkwood] ARM SoC
 # This device ID was used for earlier chips.

6381 MV78xx0 [Discovery Innovation] ARM SoC
6440 88SE6440 SAS/SATA PCIe controller
6450 64560 System Controller
6460 MV64360/64361/64362 System Controller
6480 MV64460/64461/64462 System Controller
1775 c200 C2K CompactPCI single board computer
6485 MV64460/64461/64462 System Controller, Revision B
7042 88SX7042 PCI-e 4-port SATA-II
16b8 434b Tempo SATA E4P
7810 MV78100 [Discovery Innovation] ARM SoC
7820 MV78200 [Discovery Innovation] ARM SoC
7823 MV78230 [Armada XP] ARM SoC
7846 88F6820 [Armada 385] ARM SoC
d40f Bobcat3 Ethernet Switch
f003 GT-64010 Primary Image Piranha Image
Generator
11ac Canon Information Systems Research Aust.
11ad Lite-On Communications Inc
0002 LNE100TX
11ad 0002 LNE100TX
11ad 0003 LNE100TX
11ad f003 LNE100TX
11ad ffff LNE100TX
1385 f004 FA310TX
2646 f002 KNE110TX EtheRx Fast Ethernet
c115 LNE100TX [Linksys EtherFast 10/100]
11ad c001 LNE100TX [ver 2.0]
2646 000b KNE111TX
11ae Aztech System Ltd
11af Avid Technology Inc.
0001 Cinema
ee40 Digidesign Audiomedia III
11b0 V3 Semiconductor Inc.
0002 V300PSC
0292 V292PBC [Am29030/40 Bridge]
0960 V96xPBC
880a Deltacast Delta-HD-22
c960 V96DPC
11b1 Apricot Computers
11b2 Eastman Kodak
11b3 Barr Systems Inc.
11b4 Leitch Technology International
11b5 Radstone Technology Plc
11b6 United Video Corp
11b7 Motorola
11b8 XPoint Technologies, Inc
0001 Quad PeerMaster
11b9 Pathlight Technology Inc.

c0ed SSA Controller
11ba Videotron Corp
11bb Pyramid Technology
11bc Network Peripherals Inc
0001 NP-PCI
11bd Pinnacle Systems Inc.
002e
PCTV 40i
0040 Royal TS Function 1
11bd 0044 PCTV 2000i Dual DVB-T Pro PCI Tuner 1
11bd 0045 PCTV Dual Sat Pro PCI 4000i Tuner 1
0041 RoyalTS Function 2
11bd 0044 PCTV 2000i Dual DVB-T Pro PCI Tuner 2
11bd 0045 PCTV Dual Sat Pro PCI 4000i Tuner 2
0042 Royal TS Function 3
11bd 0044 PCTV 2000i Dual DVB-T Pro PCI Common
11bd 0045 PCTV Dual Sat Pro PCI 4000i Common
0051 PCTV HD 800i
bede AV/DV Studio Capture Card
11be International Microcircuits Inc
11bf Astrodesign, Inc.
11c0 Hewlett Packard
nee Agere Systems nee Lucent Microelectronics
11c1 LSI Corporation
0440 56k WinModem
1033 8015 LT WinModem 56k Data+Fax+Voice+Dsvd
1033 8047 LT WinModem 56k Data+Fax+Voice+Dsvd
1033 804f LT WinModem 56k Data+Fax+Voice+Dsvd
10cf 102c LB LT Modem V.90 56k
10cf 104a BIBLO LT Modem 56k
10cf 105f LB2 LT Modem V.90 56k
1179 0001 Internal V.90 Modem
11c1 0440 LT WinModem 56k Data+Fax+Voice+Dsvd
122d 4101 MDP7800-U Modem
122d 4102 MDP7800SP-U Modem
13e0
0040 LT WinModem 56k Data+Fax+Voice+Dsvd
13e0 0440 LT WinModem 56k Data+Fax+Voice+Dsvd
13e0 0441 LT WinModem 56k Data+Fax+Voice+Dsvd
13e0 0450 LT WinModem 56k Data+Fax+Voice+Dsvd
13e0 f100 LT WinModem 56k Data+Fax+Voice+Dsvd
13e0 f101 LT WinModem 56k Data+Fax+Voice+Dsvd
144d 2101 LT56PV Modem
149f 0440 LT WinModem 56k Data+Fax+Voice+Dsvd
0441 56k WinModem
1033 804d LT WinModem 56k Data+Fax
1033 8065 LT WinModem 56k Data+Fax
1092 0440 Supra 56i

1179 0001 Internal V.90 Modem
11c1 0440 LT WinModem 56k Data+Fax
11c1 0441 LT WinModem 56k Data+Fax
122d 4100 MDP7800-U Modem
13e0 0040 LT WinModem 56k Data+Fax
13e0 0100 LT WinModem 56k Data+Fax
13e0 0410 LT WinModem 56k Data+Fax
13e0 0420 TelePath Internet 56k WinModem
13e0 0440 LT WinModem 56k Data+Fax
13e0 0443 LT WinModem 56k Data+Fax
13e0 f102 LT WinModem 56k Data+Fax
1416 9804 CommWave 56k Modem
141d 0440 LT WinModem 56k Data+Fax
144f 0441 Lucent 56k V.90
DF Modem
144f 0449 Lucent 56k V.90 DF Modem
144f 110d Lucent Win Modem
1468 0441 Presario 56k V.90 DF Modem
1668 0440 Lucent Win Modem
0442 56k WinModem
11c1 0440 LT WinModem 56k Data+Fax+Voice+VoiceView+Dsvd
11c1 0442 LT WinModem 56k Data+Fax+Voice+VoiceView+Dsvd
13e0 0412 LT WinModem 56k Data+Fax+Voice+VoiceView+Dsvd
13e0 0442 LT WinModem 56k Data+Fax+Voice+VoiceView+Dsvd
13fc 2471 LT WinModem 56k Data+Fax+Voice+VoiceView+Dsvd
144d 2104 LT56PT Modem
144f 1104 LT WinModem 56k Data+Fax+Voice+VoiceView+Dsvd
149f 0440 LT WinModem 56k Data+Fax+Voice+VoiceView+Dsvd
1668 0440 LT WinModem 56k Data+Fax+Voice+VoiceView+Dsvd
0443 LT WinModem
0444 LT WinModem
0445 LT WinModem
8086 2203 PRO/100+ MiniPCI (probably an Ambit U98.003.C.00 combo card)
8086 2204 PRO/100+ MiniPCI on Armada E500
0446 LT WinModem
0447 LT WinModem
0448 WinModem 56k
1014 0131 Lucent Win Modem
1033 8066 LT WinModem 56k Data+Fax+Voice+Dsvd
13e0 0030 56k Voice
Modem
13e0 0040 LT WinModem 56k Data+Fax+Voice+Dsvd
Actiontech eth+modem card as used by Dell &c.
1668 2400 LT WinModem 56k (MiniPCI Ethernet+Modem)
0449 L56xM+S [Mars-2] WinModem 56k
0e11 b14d 56k V.90 Modem
1014 018c ThinkPad 600X
13e0 0020 LT WinModem 56k Data+Fax

13e0 0041 TelePath Internet 56k WinModem
1436 0440 Lucent Win Modem
144f 0449 Lucent 56k V.90 DFi Modem
1468 0410 IBM ThinkPad T23
1468 0440 Lucent Win Modem
1468 0449 Presario 56k V.90 DFi Modem
044a F-1156IV WinModem (V90, 56KFlex)
10cf 1072 LB Global LT Modem
13e0 0012 LT WinModem 56k Data+Fax+Voice+VoiceView+Dsvd
13e0 0042 LT WinModem 56k Data+Fax+Voice+VoiceView+Dsvd
144f 1005 LT WinModem 56k Data+Fax+Voice+VoiceView+Dsvd
044b LT WinModem
044c LT WinModem
044d LT WinModem
044e LT WinModem
044f V90 WildWire Modem
0450 LT WinModem
1033 80a8 Versa Note Vxi
144f 4005 Magnia SG20
1468 0450 Evo N600c
0451 LT WinModem
0452 LT WinModem
0453 LT WinModem
0454
LT WinModem
0455 LT WinModem
0456 LT WinModem
0457 LT WinModem
0458 LT WinModem
0459 LT WinModem
045a LT WinModem
045c LT WinModem
0461 V90 WildWire Modem
0462 V90 WildWire Modem
0480 Venus Modem (V90, 56KFlex)
048c V.92 56K WinModem
InPorte Home Internal 56k Modem/fax/answering machine/SMS Features
048f V.92 56k WinModem
0620 Lucent V.92 Data/Fax Modem
2600 StarPro26XX family (SP2601, SP2603, SP2612) DSP
5400 OR3TP12 FPSC
5656 Venus Modem
5801 USB
5802 USS-312 USB Controller
5803 USS-344S USB Controller
5811 FW322/323 [TrueFire] 1394a Controller
103c 2a34 Pavilion a1677c
103c 2a6f Asus IPIBL-LB Motherboard

103c 2a9e Pavilion p6310f
1043 8294 LSI FW322/323 IEEE 1394a FireWire Controller
11bd 000e LSI FW323
8086 524c D865PERL mainboard
9005 0033 Adaptec AFW-2100 (HP) 2102900-R
dead 0800 FireWire Host Bus Adapter
5901 FW643 [TrueFire] PCIe 1394b Controller
11c1 5900 FW643 [TrueFire] PCIe 1394b Controller
1443
0643 FireBoard800-e V.2
1546 0643 FWB-PCIE1X2x
5903 FW533 [TrueFire] PCIe 1394a Controller
8110 T8110 H.100/H.110 TDM switch
12d9 000c E1/T1 PMXc cPCI carrier card
ab10 WL60010 Wireless LAN MAC
ab11 WL60040 Multimode Wireless LAN MAC
11c1 ab12 WaveLAN 11abg Cardbus card (Model 1102)
11c1 ab13 WaveLAN 11abg MiniPCI card (Model 0512)
11c1 ab15 WaveLAN 11abg Cardbus card (Model 1106)
11c1 ab16 WaveLAN 11abg MiniPCI card (Model 0516)
ab20 ORiNOCO PCI Adapter
ab21 Agere Wireless PCI Adapter
ab30 Hermes2 Mini-PCI WaveLAN a/b/g
14cd 2012 Hermes2 Mini-PCI WaveLAN a/b/g
ed00 ET-131x PCI-E Ethernet Controller
ed01 ET-131x PCI-E Ethernet Controller
11c2 Sand Microelectronics
11c3 NEC Corporation
11c4 Document Technologies, Inc
11c5 Shiva Corporation
11c6 Dainippon Screen Mfg. Co. Ltd
11c7 D.C.M. Data Systems
11c8 Dolphin Interconnect Solutions AS
0658 PSB32 SCI-Adapter D31x
d665 PSB64 SCI-Adapter D32x
d667 PSB66 SCI-Adapter D33x
11c9 Magma
0010
16-line serial port w/- DMA
0011 4-line serial port w/- DMA
11ca LSI Systems, Inc
11cb Specialix Research Ltd.
2000 PCI_9050
11cb 0200 SX
11cb b008 I/O8+
4000 SUPI_1
8000 T225
11cc Michels & Kleberhoff Computer GmbH

11cd HAL Computer Systems, Inc.
11ce Netaccess
11cf Pioneer Electronic Corporation
11d0 Lockheed Martin Federal Systems-Manassas
11d1 Auravision
01f7 VxP524
01f9 VxP951
11d2 Intercom Inc.
11d3 Trancell Systems Inc
11d4 Analog Devices
1535 Blackfin BF535 processor
1805 SM56 PCI modem
11d5 Ikon Corporation
0115 10115
0117 10117
11d6 Tekelec Telecom
11d7 Trenton Technology, Inc.
11d8 Image Technologies Development
11d9 TEC Corporation
11da Novell
11db Sega Enterprises Ltd
11dc Qestra Corporation
11dd Crosfield Electronics Limited
11de Zoran Corporation
6017 miroVIDEO DC30
6057 ZR36057PQC Video cutting chipset
1031 7efe DC10 Plus
1031 fc00 MiroVIDEO DC50, Motion JPEG Capture/CODEC Board
12f8 8a02 Tekram Video
Kit
13ca 4231 JPEG/TV Card
6120 ZR36120
1328 f001 Cinemaster C DVD Decoder
13c2 0000 MediaFocus Satellite TV Card
1de1 9fff Video Kit C210
11df New Wave PDG
11e0 Cray Communications A/S
11e1 GEC Plessey Semi Inc.
11e2 Samsung Information Systems America
11e3 Quicklogic Corporation
0001 COM-ON-AIR Dosch&Amand DECT
0560 QL5064 Companion Design Demo Board
5030 PC Watchdog
8417 QL5064 [QuickPCI] PCI v2.2 bridge for SMT417 Dual TMS320C6416T PMC Module
11e4 Second Wave Inc
11e5 IIX Consulting
11e6 Mitsui-Zosen System Research
11e7 Toshiba America, Elec. Company

11e8 Digital Processing Systems Inc.
11e9 Highwater Designs Ltd.
11ea Elsag Bailey
11eb Formation Inc.
11ec Coreco Inc
000d Oculus-F/64P
1800 Cobra/C6
11ed Mediamatics
11ee Dome Imaging Systems Inc
11ef Nicolet Technologies B.V.
11f0 Compu-Shack
4231 FDDI
4232 FASTline UTP Quattro
4233 FASTline FO
4234 FASTline UTP
4235 FASTline-II UTP
4236 FASTline-II FO
4731 GIGAline
11f1
Symbios Logic Inc
11f2 Picture Tel Japan K.K.
11f3 Keithley Metrabyte
0011 KPCI-PIO24
11f4 Kinetic Systems Corporation
2915 CAMAC controller
11f5 Computing Devices International
11f6 Compex
0112 ENet100VG4
0113 FreedomLine 100
1401 ReadyLink 2000
2011 RL100-ATX 10/100
11f6 2011 RL100-ATX
2201 ReadyLink 100TX (Winbond W89C840)
11f6 2011 ReadyLink 100TX
9881 RL100TX Fast Ethernet
11f7 Scientific Atlanta
11f8 PMC-Sierra Inc.
5220 BR522x [PMC-Sierra maxRAID SAS Controller]
7364 PM7364 [FREEDM - 32 Frame Engine & Datalink Mgr]
7375 PM7375 [LASAR-155 ATM SAR]
7384 PM7384 [FREEDM - 84P672 Frm Engine & Datalink Mgr]
8000 PM8000 [SPC - SAS Protocol Controller]
8009 PM8009 SPCve 8x6G
8018 PM8018 Adaptec SAS Adaptor ASA-70165H PCIe Gen3 x8 6 Gbps 16-lane 4x SFF-8644
8032 PM8032 Tachyon QE8
117c 003a Celerity FC-81EN Fibre Channel Adapter
117c 003b Celerity FC-82EN Fibre Channel Adapter
117c 003c Celerity FC-84EN Fibre Channel Adapter

117c 403b
ThunderLink FC 1082 Fibre Channel Adapter
8053 PM8053 SXP 12G 24-port SAS/SATA expander
8054 PM8054 SXP 12G 36-port SAS/SATA expander
8055 PM8055 SXP 12G 48-port SAS/SATA expander
8056 PM8056 SXP 12G 68-port SAS/SATA expander
8060 PM8060 SRCv 12G eight-port SAS/SATA RoC
8063 PM8063 SRCv 12G 16-port SAS/SATA RoC
8070 PM8070 Tachyon SPCv 12G eight-port SAS/SATA controller
8071 PM8071 Tachyon SPCve 12G eight-port SAS/SATA controller
8072 PM8072 Tachyon SPCv 12G 16-port SAS/SATA controller
8073 PM8073 Tachyon SPCve 12G 16-port SAS/SATA controller
8531 PM8531 PFX 24xG3 Fanout PCIe Switches
8546 PM8546 B-FEIP PSX 96xG3 PCIe Storage Switch
11f9 I-Cube Inc
11fa Kasan Electronics Company, Ltd.
11fb Datel Inc
11fc Silicon Magic
11fd High Street Consultants
11fe Pepperl+Fuchs Control, Inc.
0001 RocketPort PCI 32-port w/external I/F
0002 RocketPort PCI 8-port w/external I/F
0003 RocketPort PCI 16-port w/external I/F
0004 RocketPort PCI 4-port w/Quad Cable
0005
RocketPort PCI 8-port w/Octa Cable
0006 RocketPort PCI 8-port w/RJ11 connectors
0007 RocketPort PCI 4-port w/RJ45 connectors
0008 RocketPort PCI 8-port w/DB78 SNI connector (Siemens)
0009 RocketPort PCI 16-port w/DB78 SNI connector (Siemens)
000a RocketPort PCI Plus 4-port w/Quad Cable
000b RocketPort PCI Plus 8-port w/Octa Cable
000c RocketModem II 6-port
000d RocketModem 4-port
000e RocketPort PCI Plus 2-port RS-232 w/DB9 connectors
000f RocketPort PCI Plus 2-port SMPTE w/DB9 connectors
0040 RocketPort INFINITY 8-port w/Octa Cable RJ45
0041 RocketPort INFINITY 32-port w/external I/F
0042 RocketPort INFINITY 8-port w/external I/F
0043 RocketPort INFINITY 16-port w/external I/F
0044 RocketPort INFINITY 4-port w/Quad Cable DB
0045 RocketPort INFINITY 8-port w/Octa Cable DB
0046 RocketPort INFINITY 4-port w/external I/F
0047 RocketPort INFINITY 4J (4-port) w/RJ45 connectors
0048 RocketPort INFINITY 4J (4-port) w/RJ45 connectors
004a RocketPort
INFINITY Plus 4-port
004b RocketPort INFINITY Plus 8-port

004c RocketModem INFINITY III 8-port
004d RocketModem INFINITY III 4-port
004e RocketPort INFINITY Plus 2-port
004f RocketPort INFINITY 2-port SMPTE w/DB9 connectors
0050 RocketPort INFINITY Plus 4-port RJ45
0051 RocketPort INFINITY Plus 8-port RJ11
0052 RocketPort INFINITY 8-port SMPTE w/DB9 Connectors
0060 RocketPort EXPRESS 8-port w/Octa Cable
0061 RocketPort EXPRESS 32-port w/external I/F
0062 RocketPort EXPRESS 8-Port w/external I/F
0063 RocketPort EXPRESS 16-port w/external I/F
0064 RocketPort EXPRESS 4-port w/Quad Cable
0065 RocketPort EXPRESS 8-port w/Octa Cable
0066 RocketPort EXPRESS 4-port w/external I/F
0067 RocketPort EXPRESS 4J (4-port) w/RJ45 connectors
0068 RocketPort EXPRESS 8J (8-port) w/RJ11 connectors
006f RocketPort EXPRESS SMPTE 2-port
0072 RocketPort EXPRESS SMPTE 8-port w/external I/F
0801 RocketPort uPCI 32-port w/external I/F
0802 RocketPort uPCI 8-port w/external
I/F
0803 RocketPort uPCI 16-port w/external I/F
0805 RocketPort uPCI 8-port w/Octa Cable
080b RocketPort Plus uPCI 8-port w/Octa Cable
080c RocketModem III 8-port
080d RocketModem III 4-port
080e RocketPort uPCI 2-port RS232 w/DB9 connectors
080f RocketPort uPCI SMPTE 2-port
0810 RocketPort Plus uPCI 4J (4-port) w/RJ45 connectors
0811 RocketPort Plus uPCI 8J (8-port) w/RJ11 connectors
0812 RocketPort Plus uPCI 422 8-port
0813 RocketModem IV uPCI 8-port
0814 RocketModem IV uPCI 4-port
0903 RocketPort Compact PCI 16 port w/external I/F
16954 UART
8015 RocketPort 550 4-port
8805 RocketPort uPCI 4-port w/Quad Cable
880b RocketPort Plus uPCI 4-port w/Quad Cable
8812 RocketPort Plus uPCI 4-port RS422 w/Quad Cable
11ff Scion Corporation
0003 AG-5
1200 CSS Corporation
1201 Vista Controls Corp
1202 Network General Corp.
4300 Gigabit Ethernet Adapter
1202 9841 SK-9841 LX
1202 9842 SK-9841 LX dual link
1202 9843 SK-9843 SX

1202 9844 SK-9843
SX dual link
1203 Bayer Corporation, Agfa Division
1204 Lattice Semiconductor Corporation
1965 SB6501 802.11ad Wireless Network Adapter
1205 Array Corporation
1206 Amdahl Corporation
1208 Parsytec GmbH
4853 HS-Link Device
1209 SCI Systems Inc
120a Synaptel
120b Adaptive Solutions
120c Technical Corp.
120d Compression Labs, Inc.
120e Cyclades Corporation
0100 Cyclom-Y below first megabyte
0101 Cyclom-Y above first megabyte
0102 Cyclom-4Y below first megabyte
0103 Cyclom-4Y above first megabyte
0104 Cyclom-8Y below first megabyte
0105 Cyclom-8Y above first megabyte
0200 Cyclades-Z below first megabyte
0201 Cyclades-Z above first megabyte
0300 PC300/RSV or /X21 (2 ports)
0301 PC300/RSV or /X21 (1 port)
0310 PC300/TE (2 ports)
0311 PC300/TE (1 port)
0320 PC300/TE-M (2 ports)
0321 PC300/TE-M (1 port)
0400 PC400
120f Essential Communications
0001 Roadrunner serial HIPPI
1210 Hyperparallel Technologies
1211 Braintech Inc
1213 Applied Intelligent
Systems, Inc.
1214 Performance Technologies, Inc.
1215 Interware Co., Ltd
1216 Purup Prepress A/S
1217 O2 Micro, Inc.
00f7 Firewire (IEEE 1394)
1071 8209 Medion MIM 2240 Notebook PC [MD98100]
1179 ff50 Satellite P305D-S8995E
10f7 1394 OHCI Compliant Host Controller
11f7 OZ600 1394a-2000 Controller
1028 04a3 Precision M4600
13f7 1394 OHCI Compliant Host Controller
6729 OZ6729

673a OZ6730
6832 OZ6832/6833 CardBus Controller
6836 OZ6836/6860 CardBus Controller
6872 OZ6812 CardBus Controller
6925 OZ6922 CardBus Controller
6933 OZ6933/711E1 CardBus/SmartCardBus Controller
1025 1016 Travelmate 612 TX
6972 OZ601/6912/711E0 CardBus/SmartCardBus Controller
1014 020c ThinkPad R30
1028 0152 Latitude D500
1179 0001 Magnia Z310
7110 OZ711Mx 4-in-1 MemoryCardBus Accelerator
103c 088c NC8000 laptop
103c 0890 NC6000 laptop
1734 106c Amilo A1645
7112 OZ711EC1/M1 SmartCardBus/MemoryCardBus Controller
7113 OZ711EC1 SmartCardBus Controller
1025
0035 TravelMate 660
7114 OZ711M1/MC1 4-in-1 MemoryCardBus Controller
7120 Integrated MMC/SD Controller
1071 8209 Medion MIM 2240 Notebook PC [MD98100]
1179 ff50 Satellite P305D-S8995E
7130 Integrated MS/xD Controller
1071 8209 Medion MIM 2240 Notebook PC [MD98100]
1179 ff50 Satellite P305D-S8995E
7134 OZ711MP1/MS1 MemoryCardBus Controller
7135 Cardbus bridge
7136 OZ711SP1 Memory CardBus Controller
71e2 OZ711E2 SmartCardBus Controller
7212 OZ711M2 4-in-1 MemoryCardBus Controller
7213 OZ6933E CardBus Controller
7223 OZ711M3/MC3 4-in-1 MemoryCardBus Controller
103c 088c NC8000 laptop
103c 0890 NC6000 laptop
10cf 11c4 Lifebook P5020D Laptop
7233 OZ711MP3/MS3 4-in-1 MemoryCardBus Controller
8120 Integrated MMC/SD Controller
8130 Integrated MS/MSPRO/xD Controller
8220 OZ600FJ1/OZ900FJ1 SD/MMC Card Reader Controller
8221 OZ600FJ0/OZ900FJ0/OZ600FJS SD/MMC Card Reader Controller
8320 OZ600RJ1/OZ900RJ1 SD/MMC Card Reader Controller
1028
04a3 Precision M4600
8321 OZ600RJ0/OZ900RJ0/OZ600RJS SD/MMC Card Reader Controller
8330 OZ600 MS/xD Controller
1028 04a3 Precision M4600
8331 O2 Flash Memory Card

8520 SD/MMC Card Reader Controller
8621 SD/MMC Card Reader Controller
1218 Hybricon Corp.
1219 First Virtual Corporation
121a 3Dfx Interactive, Inc.
0001 Voodoo
0002 Voodoo 2
0003 Voodoo Banshee
1092 0003 Monster Fusion
1092 4000 Monster Fusion
1092 4002 Monster Fusion
1092 4801 Monster Fusion AGP
1092 4803 Monster Fusion AGP
1092 8030 Monster Fusion
1092 8035 Monster Fusion AGP
10b0 0001 Dragon 4000
1102 1017 3D Blaster Banshee PCI (CT6760)
1102 1018 3D Blaster Banshee VE
121a 0001 Voodoo Banshee AGP
121a 0003 Voodoo Banshee AGP SGRAM
121a 0004 Voodoo Banshee
139c 0016 Raven
139c 0017 Raven
14af 0002 Maxi Gamer Phoenix
0004 Voodoo Banshee [Velocity 100]
0005 Voodoo 3
121a 0004 Voodoo3 AGP
121a 0030 Voodoo3 AGP
121a 0031 Voodoo3 AGP
121a
0034 Voodoo3 AGP
121a 0036 Voodoo3 2000 PCI
121a 0037 Voodoo3 AGP
121a 0038 Voodoo3 AGP
121a 003a Voodoo3 AGP
121a 0044 Voodoo3
121a 004b Velocity 100
121a 004c Velocity 200
121a 004d Voodoo3 AGP
121a 004e Voodoo3 AGP
121a 0051 Voodoo3 AGP
121a 0052 Voodoo3 AGP
121a 0057 Voodoo3 3000 PCI
121a 0060 Voodoo3 3500 TV (NTSC)
121a 0061 Voodoo3 3500 TV (PAL)
121a 0062 Voodoo3 3500 TV (SECAM)
0009 Voodoo 4 / Voodoo 5
121a 0003 Voodoo5 PCI 5500

121a 0009 Voodoo5 AGP 5500/6000
0057 Voodoo 3/3000 [Avenger]
121b Advanced Telecommunications Modules
121c Nippon Texaco., Ltd
121d LiPPERT ADLINK Technology GmbH
121e CSPI
0201 Myrinet 2000 Scalable Cluster Interconnect
121f Arcus Technology, Inc.
1220 Ariel Corporation
1220 AMCC 5933 TMS320C80 DSP/Imaging board
1221 Contec Co., Ltd
9172 PO-64L(PCI)H [Isolated Digital Output Board for PCI]
91a2 PO-32L(PCI)H [Isolated Digital Output Board for PCI]
91c3 DA16-16(LPCI)L [Un-insulated
highly precise analog output board for Low Profile PCI]
b152 DIO-96D2-LPCI
c103 ADA16-32/2(PCI)F [High-Speed Analog I/O Board for PCI]
1222 Ancor Communications, Inc.
1223 Artesyn Communication Products
0003 PM/Link
0004 PM/T1
0005 PM/E1
0008 PM/SLS
0009 BajaSpan Resource Target
000a BajaSpan Section 0
000b BajaSpan Section 1
000c BajaSpan Section 2
000d BajaSpan Section 3
000e PM/PPC
1224 Interactive Images
1225 Power I/O, Inc.
1227 EIZO Rugged Solutions
0006 Raptor GFX 8P
0023 Raptor GFX [1100T]
0045 Raptor 4000-L [Linux version]
004a Raptor 4000-LR-L [Linux version]
1228 Norsk Elektro Optikk A/S
1229 Data Kinesis Inc.
122a Integrated Telecom
122b LG Industrial Systems Co., Ltd
122c Sican GmbH
122d Aztech System Ltd
1206 368DSP
1400 Trident PCI288-Q3DII (NX)
50dc 3328 Audio
122d 0001 3328 Audio
80da 3328 Audio
122d 0001 3328 Audio

122e Xyratex
7722 Napatech XL1
7724 Napatech XL2/XA
7729 Napatech XD
122f Andrew
Corporation
1230 Fishcamp Engineering
1231 Woodward McCoach, Inc.
04e1 Desktop PCI Telephony 4
05e1 Desktop PCI Telephony 5/6
0d00 LightParser
0d02 LightParser 2
0d13 Desktop PCI L1/L3 Telephony
1232 GPT Limited
1233 Bus-Tech, Inc.
nee Risq Modular Systems, Inc.
1235 SMART Modular Technologies
1236 Sigma Designs Corporation
0000 RealMagic64/GX
6401 REALmagic 64/GX (SD 6425)
1237 Alta Technology Corporation
1238 Adtran
1239 3DO Company
123a Visicom Laboratories, Inc.
123b Seeq Technology, Inc.
123c Century Systems, Inc.
123d Engineering Design Team, Inc.
0000 EasyConnect 8/32
0002 EasyConnect 8/64
0003 EasyIO
123e Simutech, Inc.
nee C-Cube Microsystems / acquired by Magnum Semiconductor
123f LSI Logic
00e4 MPEG
8120 DVxplere Codec
10de 01e1 NVTV PAL
10de 01e2 NVTV NTSC
10de 01e3 NVTV PAL
10de 0248 NVTV NTSC
10de 0249 NVTV PAL
11bd 0006 DV500 E4
11bd 000a DV500 E4
11bd 000f DV500 E4
1809 0016 Emuzed MAUI-III PCI PVR FM
TV
8888 Cinemaster C 3.0 DVD Decoder
1002 0001 Cinemaster C 3.0 DVD Decoder
1002 0002 Cinemaster C 3.0 DVD Decoder

1328 0001 Cinemaster C 3.0 DVD Decoder
1240 Marathon Technologies Corp.
1241 DSC Communications
Formerly Jaycor Networks, Inc.
1242 JNI Corporation
1560 JNIC-1560 PCI-X Fibre Channel Controller
1242 6562 FCX2-6562 Dual Channel PCI-X Fibre Channel Adapter
1242 656a FCX-6562 PCI-X Fibre Channel Adapter
4643 FCI-1063 Fibre Channel Adapter
6562 FCX2-6562 Dual Channel PCI-X Fibre Channel Adapter
656a FCX-6562 PCI-X Fibre Channel Adapter
1243 Delphax
Audio-Visuelles Marketing und Computersysteme
1244 AVM GmbH
0700 B1 ISDN
0800 C4 ISDN
0a00 A1 ISDN [Fritz]
1244 0a00 FRITZ!Card ISDN Controller
0e00 Fritz!Card PCI v2.0 ISDN
0e80 Fritz!Card PCI v2.1 ISDN
1244 0e00 PSB 3100F (AVM KAFKA) [Fritz!Card PCI v2.1]
1100 C2 ISDN
1200 T1 ISDN
2700 Fritz!Card DSL SL
2900 Fritz!Card DSL v2.0
1245 A.P.D., S.A.
1246 Dipix Technologies,
Inc.
1247 Xylon Research, Inc.
1248 Central Data Corporation
1249 Samsung Electronics Co., Ltd.
124a AEG Electrocom GmbH
124b SBS/Greenspring Modular I/O
0040 PCI-40A or cPCI-200 Quad IndustryPack carrier
124b 9080 PCI9080 Bridge
124c Solitron Technologies, Inc.
124d Stallion Technologies, Inc.
0000 EasyConnection 8/32
0002 EasyConnection 8/64
0003 EasyIO
0004 EasyConnection/RA
124e Cylink
124f Infortrend Technology, Inc.
0041 IFT-2000 Series RAID Controller
1250 Hitachi Microcomputer System Ltd
1251 VLSI Solutions Oy
1253 Guzik Technical Enterprises
1254 Linear Systems Ltd.

0065 DVB Master FD
007c DVB Master Quad/o
1255 Optibase Ltd
1110 MPEG Forge
1210 MPEG Fusion
2110 VideoPlex
2120 VideoPlex CC
2130 VideoQuest
1256 Perceptive Solutions, Inc.
4201 PCI-2220I
4401 PCI-2240I
5201 PCI-2000
1257 Vertex Networks, Inc.
1258 Gilbarco, Inc.
nee Allied Telesyn International
1259 Allied Telesis
2560 AT-2560 Fast Ethernet Adapter (i82557B)
2801
AT-2801FX (RTL-8139)
a117 RTL81xx Fast Ethernet
a11e RTL81xx Fast Ethernet
a120 21x4x DEC-Tulip compatible 10/100 Ethernet
125a ABB Power Systems
125b Asix Electronics Corporation
1400 AX88141 Fast Ethernet Controller
1186 1100 AX8814X Based PCI Fast Ethernet Adapter
125c Aurora Technologies, Inc.
0101 Saturn 4520P
0640 Aries 16000P
125d ESS Technology
0000 ES336H Fax Modem (Early Model)
1948 ES1948 Maestro-1
1968 ES1968 Maestro 2
1028 0085 ES1968 Maestro-2 PCI
1033 8051 ES1968 Maestro-2 Audiodrive
1969 ES1938/ES1946/ES1969 Solo-1 Audiodrive
1014 0166 ES1969 SOLO-1 AudioDrive on IBM Aptiva Mainboard
125d 8888 Solo-1 Audio Adapter
125d 8898 ES1938S TTSOLO1-SL [TerraTec 128i PCI]
153b 111b Terratec 128i PCI
1978 ES1978 Maestro 2E
0e11 b112 Armada M700/E500
1033 803c ES1978 Maestro-2E Audiodrive
1033 8058 ES1978 Maestro-2E Audiodrive
1092 4000 Monster Sound MX400
1179 0001 ES1978 Maestro-2E Audiodrive
1988 ES1988 Allegro-1
0e11

0098 Evo N600c
 1092 4100 Sonic Impact S100
 125d 0431 Allegro AudioDrive
 125d 1988 ESS Allegro-1 Audiodrive
 125d 1998 Allegro AudioDrive
 125d 1999 Allegro-1 AudioDrive
 1989 ESS Modem
 125d 1989 ESS Modem
 1998 ES1983S Maestro-3i PCI Audio Accelerator
 1028 00b1 Latitude C600
 1028 00e5 Latitude C810
 1028 00e6 ES1983S Maestro-3i (Dell Inspiron 8100)
 1999 ES1983S Maestro-3i PCI Modem Accelerator
 199a ES1983S Maestro-3i PCI Audio Accelerator
 199b ES1983S Maestro-3i PCI Modem Accelerator
 2808 ES336H Fax Modem (Later Model)
 2838 ES2838/2839 SuperLink Modem
 2898 ES2898 Modem
 125d 0424 ES56-PI Data Fax Modem
 125d 0425 ES56T-PI Data Fax Modem
 125d 0426 ES56V-PI Data Fax Modem
 125d 0427 VW-PI Data Fax Modem
 125d 0428 ES56ST-PI Data Fax Modem
 125d 0429 ES56SV-PI Data Fax Modem
 147a c001 ES56-PI Data Fax Modem
 148d 1030 HCF WV-PI56 [ESS ES56-PI Data Fax Modem]
 14fe 0428 ES56-PI Data Fax Modem
 14fe 0429 ES56-PI Data
 Fax Modem
 125e Specialvideo Engineering SRL
 125f Concurrent Technologies, Inc.
 # 4 x serial ports, 2 x printer ports
 2071 CC PMC/232
 # 4 x serial ports, 2 x printer ports
 2084 CC PMC/23P
 # 4 x serial ports, RS422
 2091 CC PMC/422
 1260 Intersil Corporation
 3872 ISL3872 [Prism 3]
 1468 0202 LAN-Express IEEE 802.11b Wireless LAN
 3873 ISL3874 [Prism 2.5]/ISL3872 [Prism 3]
 10cf 1169 MBH7WM01-8734 802.11b Wireless Mini PCI Card [ISL3874]
 1186 3501 DWL-520 Wireless PCI Adapter (rev A or B) [ISL3874]
 1186 3700 DWL-520 Wireless PCI Adapter (rev E1) [ISL3872]
 1385 4105 MA311 802.11b wireless adapter [ISL3874]
 1668 0414 HWP01170-01 802.11b PCI Wireless Adapter
 16a5 1601 AIR.mate PC-400 PCI Wireless LAN Adapter
 1737 3874 WMP11 v1 802.11b Wireless-B PCI Adapter [ISL3874]

4033 7033 PCW200 802.11b Wireless PCI Adapter [ISL3874]
8086 2510 M3AWEB Wireless 802.11b MiniPCI Adapter
8086 2513 Wireless 802.11b MiniPCI Adapter
3877 ISL3877 [Prism Indigo]
3886
ISL3886 [Prism Javelin/Prism Xbow]
17cf 0037 XG-901 and clones Wireless Adapter
3890 ISL3890 [Prism GT/Prism Duette]/ISL3886 [Prism Javelin/Prism Xbow]
10b8 2802 SMC2802W V1 Wireless PCI Adapter [ISL3890]
10b8 2835 SMC2835W Wireless Cardbus Adapter
10b8 a835 SMC2835W V2 Wireless Cardbus Adapter
1113 4203 WN4201B
1113 8201 T-Com T-Sinus 154pcicard Wireless PCI Adapter
1113 b301 T-Sinus 154card Cardbus
1113 ee03 SMC2802W V2 Wireless PCI Adapter [ISL3886]
1113 ee08 SMC2835W V3 EU Wireless Cardbus Adapter
1186 3202 DWL-G650 A1 Wireless Adapter
1259 c104 CG-WLCB54GT Wireless Adapter
1260 0000 WG511 v1 54 Mbps Wireless PC Card
1385 4800 WG511 v2/v3 54 Mbps Wireless PC Card
16a5 1605 ALLNET ALL0271 Wireless PCI Adapter
17cf 0014 XG-600 and clones Wireless Adapter
17cf 0020 XG-900 and clones Wireless Adapter
187e 3403 G-110 802.11g Wireless Cardbus Adapter
8130 HMP8130 NTSC/PAL Video Decoder
8131 HMP8131 NTSC/PAL Video Decoder
This is
probably more likely a HW fault, but I am keeping it for now --mj
ffff ISL3886IK
1260 0000 Senao 3054MP+ (J) mini-PCI WLAN 802.11g adapter
1261 Matsushita-Kotobuki Electronics Industries, Ltd.
1262 ES Computer Company, Ltd.
1263 Sonic Solutions
1264 Aval Nagasaki Corporation
1265 Casio Computer Co., Ltd.
1266 Microdyne Corporation
0001 NE10/100 Adapter (i82557B)
1910 NE2000Plus (RT8029) Ethernet Adapter
1266 1910 NE2000Plus Ethernet Adapter
1267 S. A. Telecommunications
5352 PCR2101
5a4b Telsat Turbo
1268 Tektronix
1269 Thomson-CSF/TTM
126a Lexmark International, Inc.
126b Adax, Inc.
126c Northern Telecom
1211 10/100BaseTX [RTL81xx]

126c 802.11b Wireless Ethernet Adapter
126d Splash Technology, Inc.
126e Sumitomo Metal Industries, Ltd.
126f Silicon Motion, Inc.
0501 SM501 VoyagerGX Rev. AA
0510 SM501 VoyagerGX Rev. B
0710 SM710 LynxEM
0712 SM712 LynxEM+
0718 SM718 LynxSE+
0720 SM720 Lynx3DM
0730 SM731 Cougar3DR
0750 SM750
0810 SM810
LynxE
0811 SM811 LynxE
0820 SM820 Lynx3D
0910 SM910
1270 Olympus Optical Co., Ltd.
1271 GW Instruments
1272 Telematics International
1273 Hughes Network Systems
0002 DirecPC
1274 Ensoniq
1171 ES1373 / Creative Labs CT5803 [AudioPCI]
1371 ES1371/ES1373 / Creative Labs CT2518
0e11 0024 AudioPCI on Motherboard Compaq Deskpro
0e11 b1a7 ES1371, ES1373 AudioPCI
1033 80ac ES1371, ES1373 AudioPCI
1042 1854 Tazer
107b 8054 Tabor2
1274 1371 Audio PCI 64V/128/5200 / Creative CT4810/CT5803/CT5806 [Sound Blaster PCI]
1274 8001 CT4751 board
1462 6470 ES1371, ES1373 AudioPCI On Motherboard MS-6147 1.1A
1462 6560 ES1371, ES1373 AudioPCI On Motherboard MS-6156 1.10
1462 6630 ES1371, ES1373 AudioPCI On Motherboard MS-6163BX 1.0A
1462 6631 ES1371, ES1373 AudioPCI On Motherboard MS-6163VIA 1.0A
1462 6632 ES1371, ES1373 AudioPCI On Motherboard MS-6163BX 2.0A
1462 6633 ES1371, ES1373 AudioPCI On Motherboard MS-6163VIA 2.0A
1462 6820 ES1371, ES1373 AudioPCI
On Motherboard MS-6182 1.00
1462 6822 ES1371, ES1373 AudioPCI On Motherboard MS-6182 1.00A
1462 6830 ES1371, ES1373 AudioPCI On Motherboard MS-6183 1.00
1462 6880 ES1371, ES1373 AudioPCI On Motherboard MS-6188 1.00
1462 6900 ES1371, ES1373 AudioPCI On Motherboard MS-6190 1.00
1462 6910 ES1371, ES1373 AudioPCI On Motherboard MS-6191
1462 6930 ES1371, ES1373 AudioPCI On Motherboard MS-6193
1462 6990 ES1371, ES1373 AudioPCI On Motherboard MS-6199BX 2.0A
1462 6991 ES1371, ES1373 AudioPCI On Motherboard MS-6199VIA 2.0A

14a4 2077 ES1371, ES1373 AudioPCI On Motherboard KR639
14a4 2105 ES1371, ES1373 AudioPCI On Motherboard MR800
14a4 2107 ES1371, ES1373 AudioPCI On Motherboard MR801
14a4 2172 ES1371, ES1373 AudioPCI On Motherboard DR739
1509 9902 ES1371, ES1373 AudioPCI On Motherboard KW11
1509 9903 ES1371, ES1373 AudioPCI On Motherboard KW31
1509 9904 ES1371, ES1373 AudioPCI On Motherboard KA11
1509 9905 ES1371, ES1373 AudioPCI On Motherboard
KC13
152d 8801 ES1371, ES1373 AudioPCI On Motherboard CP810E
152d 8802 ES1371, ES1373 AudioPCI On Motherboard CP810
152d 8803 ES1371, ES1373 AudioPCI On Motherboard P3810E
152d 8804 ES1371, ES1373 AudioPCI On Motherboard P3810-S
152d 8805 ES1371, ES1373 AudioPCI On Motherboard P3820-S
270f 2001 ES1371, ES1373 AudioPCI On Motherboard 6CTR
270f 2200 ES1371, ES1373 AudioPCI On Motherboard 6WTX
270f 3000 ES1371, ES1373 AudioPCI On Motherboard 6WSV
270f 3100 ES1371, ES1373 AudioPCI On Motherboard 6WIV2
270f 3102 ES1371, ES1373 AudioPCI On Motherboard 6WIV
270f 7060 ES1371, ES1373 AudioPCI On Motherboard 6ASA2
8086 4249 ES1371, ES1373 AudioPCI On Motherboard BI440ZX
8086 424c ES1371, ES1373 AudioPCI On Motherboard BL440ZX
8086 425a ES1371, ES1373 AudioPCI On Motherboard BZ440ZX
8086 4341 ES1371, ES1373 AudioPCI On Motherboard Cayman
8086 4343 ES1371, ES1373 AudioPCI On Motherboard Cape Cod
8086 4541 D815EEA Motherboard
8086 4649 ES1371,
ES1373 AudioPCI On Motherboard Fire Island
8086 464a ES1371, ES1373 AudioPCI On Motherboard FJ440ZX
8086 4d4f ES1371, ES1373 AudioPCI On Motherboard Montreal
8086 4f43 ES1371, ES1373 AudioPCI On Motherboard OC440LX
8086 5243 ES1371, ES1373 AudioPCI On Motherboard RC440BX
8086 5352 ES1371, ES1373 AudioPCI On Motherboard SunRiver
8086 5643 ES1371, ES1373 AudioPCI On Motherboard Vancouver
8086 5753 ES1371, ES1373 AudioPCI On Motherboard WS440BX
5000 ES1370 [AudioPCI]
5880 5880B / Creative Labs CT5880
1274 2000 Creative CT4810 [Sound Blaster AudioPCI 128]
1274 2003 Creative SoundBlaster AudioPCI 128
1274 5880 Creative CT4750 [Sound Blaster PCI 128]
1274 8001 Sound Blaster 16PCI 4.1ch
1458 a000 5880 AudioPCI On Motherboard 6OXET
1462 6880 5880 AudioPCI On Motherboard MS-6188 1.00
270f 2001 5880 AudioPCI On Motherboard 6CTR
270f 2200 5880 AudioPCI On Motherboard 6WTX
270f 7040 5880 AudioPCI On Motherboard 6ATA4
8001 CT5880 [AudioPCI]
8002

5880A [AudioPCI]
1275 Network Appliance Corporation
1276 Switched Network Technologies, Inc.
1277 Comstream
1278 Transtech Parallel Systems Ltd.
0701 TPE3/TM3 PowerPC Node
0710 TPE5 PowerPC PCI board
1100 PMC-FPGA02
1101 TS-C43 card with 4 ADSP-TS101 processors
1279 Transmeta Corporation
0060 TM8000 Northbridge
0061 TM8000 AGP bridge
0295 Northbridge
0395 LongRun Northbridge
0396 SDRAM controller
0397 BIOS scratchpad
127a Rockwell International
1002 HCF 56k Data/Fax Modem
1092 094c SupraExpress 56i PRO [Diamond SUP2380]
122d 4002 HPG / MDP3858-U
122d 4005 MDP3858-E
122d 4007 MDP3858-A/-NZ
122d 4012 MDP3858-SA
122d 4017 MDP3858-W
122d 4018 MDP3858-W
127a 1002 Rockwell 56K D/F HCF Modem
1003 HCF 56k Data/Fax Modem
0e11 b0bc 229-DF Zephyr
0e11 b114 229-DF Cheetah
1033 802b 229-DF
13df 1003 PCI56RX Modem
13e0 0117 IBM
13e0 0147 IBM F-1156IV+/R3 Spain V.90 Modem
13e0 0197 IBM
13e0 01c7 IBM F-1156IV+/R3 WW
V.90 Modem
13e0 01f7 IBM
1436 1003 IBM
1436 1103 IBM 5614PM3G V.90 Modem
1436 1602 Compaq 229-DF Ducati
1004 HCF 56k Data/Fax/Voice Modem
1048 1500 MicroLink 56k Modem
10cf 1059 Fujitsu 229-DFRT
1005 HCF 56k Data/Fax/Voice/Spkp (w/Handset) Modem
1005 127a AOpen FM56-P
1033 8029 229-DFSV
1033 8054 Modem
10cf 103c Fujitsu

10cf 1055 Fujitsu 229-DFSV
10cf 1056 Fujitsu 229-DFSV
122d 4003 MDP3858SP-U
122d 4006 Packard Bell MDP3858V-E
122d 4008 MDP3858SP-A/SP-NZ
122d 4009 MDP3858SP-E
122d 4010 MDP3858V-U
122d 4011 MDP3858SP-SA
122d 4013 MDP3858V-A/V-NZ
122d 4015 MDP3858SP-W
122d 4016 MDP3858V-W
122d 4019 MDP3858V-SA
13df 1005 PCI56RVP Modem
13e0 0187 IBM
13e0 01a7 IBM
13e0 01b7 IBM DF-1156IV+/R3 Spain V.90 Modem
13e0 01d7 IBM DF-1156IV+/R3 WW V.90 Modem
1436 1005 IBM
1436 1105 IBM
1437 1105 IBM 5614PS3G V.90 Modem
1022 HCF 56k Modem
1436 1303 M3-5614PM3G V.90 Modem
1023 HCF 56k Data/Fax Modem
122d
4020 Packard Bell MDP3858-WE
122d 4023 MDP3858-UE
13e0 0247 IBM F-1156IV+/R6 Spain V.90 Modem
13e0 0297 IBM
13e0 02c7 IBM F-1156IV+/R6 WW V.90 Modem
1436 1203 IBM
1436 1303 IBM
1024 HCF 56k Data/Fax/Voice Modem
1025 HCF 56k Data/Fax/Voice/Spkp (w/Handset) Modem
10cf 106a Fujitsu 235-DFSV
122d 4021 Packard Bell MDP3858V-WE
122d 4022 MDP3858SP-WE
122d 4024 MDP3858V-UE
122d 4025 MDP3858SP-UE
1026 HCF 56k PCI Speakerphone Modem
1032 HCF 56k Modem
1033 HCF 56k Modem
1034 HCF 56k Modem
1035 HCF 56k PCI Speakerphone Modem
1036 HCF 56k Modem
1085 HCF 56k Volcano PCI Modem
2004 HSF 56k Data/Fax/Voice/Spkp (w/Handset) Modem
2005 HCF 56k Data/Fax Modem
104d 8044 229-DFSV

104d 8045 229-DFSV
104d 8055 PBE/Aztech 235W-DFSV
104d 8056 235-DFSV
104d 805a Modem
104d 805f Modem
104d 8074 Modem
2013 HSF 56k Data/Fax Modem
1179 0001 Modem
1179 ff00 Modem
2014 HSF 56k Data/Fax/Voice Modem
10cf 1057 Fujitsu Citicorp
III
122d 4050 MSP3880-U
122d 4055 MSP3880-W
2015 HSF 56k Data/Fax/Voice/Spkp (w/Handset) Modem
10cf 1063 Fujitsu
10cf 1064 Fujitsu
1468 2015 Fujitsu
2016 HSF 56k Data/Fax/Voice/Spkp Modem
122d 4051 MSP3880V-W
122d 4052 MSP3880SP-W
122d 4054 MSP3880V-U
122d 4056 MSP3880SP-U
122d 4057 MSP3880SP-A
4311 Riptide HSF 56k PCI Modem
127a 4311 Ring Modular? Riptide HSF RT HP Dom
13e0 0210 HP-GVC
4320 Riptide PCI Audio Controller
1235 4320 Riptide PCI Audio Controller
4321 Riptide HCF 56k PCI Modem
1235 4321 Hewlett Packard DF
1235 4324 Hewlett Packard DF
13e0 0210 Hewlett Packard DF
144d 2321 Riptide
4322 Riptide PCI Game Controller
1235 4322 Riptide PCI Game Controller
8234 RapidFire 616X ATM155 Adapter
108d 0022 RapidFire 616X ATM155 Adapter
108d 0027 RapidFire 616X ATM155 Adapter
127b Pixera Corporation
127c Crosspoint Solutions, Inc.
127d Vela Research
127e Winnov, L.P.
0010 Videum 1000 Plus
127f Fujifilm
1280
Photocript Group Ltd.
1281 Yokogawa Electric Corporation

1282 Davicom Semiconductor, Inc.
6585 DM562P V90 Modem
9009 Ethernet 100/10 MBit
9100 21x4x DEC-Tulip compatible 10/100 Ethernet
9102 21x4x DEC-Tulip compatible 10/100 Ethernet
Subsystem ID is main ID reversed.
0291 8212 DM9102A (DM9102AE, SM9102AF) Ethernet 100/10 MBit
9132 Ethernet 100/10 MBit
1283 Integrated Technology Express, Inc.
673a IT8330G
8152 IT8152F/G Advanced RISC-to-PCI Companion Chip
8211 ITE 8211F Single Channel UDMA 133
1043 8138 P5GD1-VW Mainboard
8212 IT8212 Dual channel ATA RAID controller
1283 0001 IT/ITE8212 Dual channel ATA RAID controller
8213 IT8213 IDE Controller
1458 b000 GA-EG45M-DS2H Mainboard
8330 IT8330G
8872 IT887xF PCI to ISA I/O chip with SMB, GPIO, Serial or Parallel Port
8888 IT8888F/G PCI to ISA Bridge with SMB [Golden Gate]
8889 IT8889F PCI to ISA Bridge
8892 IT8892E PCIe to PCI Bridge
8893 IT8893E PCIe to PCI Bridge
e886 IT8330G
1284
Sahara Networks, Inc.
1285 Platform Technologies, Inc.
0100 AGOGO sound chip (aka ESS Maestro 1)
1286 Mazet GmbH
1287 M-Pact, Inc.
001e LS220D DVD Decoder
001f LS220C DVD Decoder
1288 Timestep Corporation
1289 AVC Technology, Inc.
128a Asante Technologies, Inc.
128b Transwitch Corporation
128c Retix Corporation
128d G2 Networks, Inc.
0021 ATM155 Adapter
128e Hoontech Corporation/Samho Multi Tech Ltd.
0008 ST128 WSS/SB
0009 ST128 SAM9407
000a ST128 Game Port
000b ST128 MPU Port
000c ST128 Ctrl Port
128f Tateno Dennou, Inc.
1290 Sord Computer Corporation
1291 NCS Computer Italia

1292 Tritech Microelectronics Inc
fc02 Pyramid3D TR25202
1293 Media Reality Technology
1294 Rhetorex, Inc.
1295 Imagenation Corporation
0800 PXR800
1000 PXD1000
1296 Kofax Image Products
1297 Holco Enterprise Co, Ltd/Shuttle Computer
1298 Spellcaster Telecommunications Inc.
1299 Knowledge Technology Lab.
129a VMetro, inc.
0615 PBT-615 PCI-X Bus Analyzer
1100 PMC-FPGA05
1106
XMC-FPGA05F, PCI interface
1107 XMC-FPGA05F, PCIe interface
1108 XMC-FPGA05D, PCI interface
1109 XMC-FPGA05D, PCIe interface
129b Image Access
129c Jaycor
129d Compcore Multimedia, Inc.
129e Victor Company of Japan, Ltd.
129f OEC Medical Systems, Inc.
12a0 Allen-Bradley Company
12a1 Simpack Associates, Inc.
12a2 Newgen Systems Corporation
12a3 Lucent Technologies
8105 T8105 H100 Digital Switch
12a4 NTT Electronics Corporation
12a5 Vision Dynamics Ltd.
12a6 Scalable Networks, Inc.
12a7 AMO GmbH
12a8 News Datacom
12a9 Xiotech Corporation
12aa SDL Communications, Inc.
12ab YUAN High-Tech Development Co., Ltd.
0000 MPG160/Kuroutoshikou ITVC15-STVLP
0002 AU8830 [Vortex2] Based Sound Card With A3D Support
0003 T507 (DVB-T) TV tuner/capture device
2300 Club-3D Zap TV2100
3000 MPG-200C PCI DVD Decoder Card
4789 MPC788 MiniPCI Hybrid TV Tuner
fff3 MPG600/Kuroutoshikou ITVC16-STVLP
ffff MPG600/Kuroutoshikou ITVC16-STVLP
12ac Measurex Corporation
12ad

Multidata GmbH
12ae Alteon Networks Inc.
0001 AceNIC Gigabit Ethernet
1014 0104 Gigabit Ethernet-SX PCI Adapter
12ae 0001 Gigabit Ethernet-SX (Universal)
0002 AceNIC Gigabit Ethernet (Copper)
10a9 8002 Acenic Gigabit Ethernet
12ae 0002 Gigabit Ethernet-T (3C986-T)
00fa Farallon PN9100-T Gigabit Ethernet
12af TDK USA Corp
12b0 Jorge Scientific Corp
12b1 GammaLink
12b2 General Signal Networks
12b3 Inter-Face Co Ltd
12b4 FutureTel Inc
12b5 Granite Systems Inc.
12b6 Natural Microsystems
12b7 Cognex Corporation
12b8 Korg
Nee US Robotics
12b9 3Com Corp, Modem Division
1006 WinModem
12b9 005c USR 56k Internal Voice WinModem (Model 3472)
12b9 005e USR 56k Internal WinModem (Models 662975)
12b9 0062 USR 56k Internal Voice WinModem (Model 662978)
12b9 0068 USR 56k Internal Voice WinModem (Model 5690)
12b9 007a USR 56k Internal Voice WinModem (Model 662974)
12b9 007f USR 56k Internal WinModem (Models 5698, 5699)
12b9 0080 USR 56k
Internal WinModem (Models 2975, 3528)
12b9 0081 USR 56k Internal Voice WinModem (Models 2974, 3529)
12b9 0091 USR 56k Internal Voice WinModem (Model 2978)
1007 USR 56k Internal WinModem
12b9 00a3 USR 56k Internal WinModem (Model 3595)
12b9 00c4 U.S. Robotics V.92 Voice Faxmodem (2884A/B/C)
1008 56K FaxModem Model 5610
12b9 00a2 USR 56k Internal FAX Modem (Model 2977)
12b9 00aa USR 56k Internal Voice Modem (Model 2976)
12b9 00ab USR 56k Internal Voice Modem (Model 5609)
12b9 00ac USR 56k Internal Voice Modem (Model 3298)
12b9 00ad USR 56k Internal FAX Modem (Model 5610)
12b9 00d3 USR 56K Internal V92 FAX Modem (Model 5610)
12b9 baba USR 56K Internal Voice Modem 3CP3298-DEL (Model 5601) [Hawk]
12ba BittWare, Inc.
12bb Nippon Unisoft Corporation
12bc Array Microsystems
12bd Computerm Corp.
12be Anchor Chips Inc.

3041 AN3041Q CO-MEM
3042 AN3042Q CO-MEM Lite
12be 3042 Anchor Chips Lite Evaluation Board
12bf Fujifilm Microdevices
12c0 Infimed
12c1
GMM Research Corp
12c2 Mentec Limited
12c3 Holtek Microelectronics Inc
0058 PCI NE2K Ethernet
5598 PCI NE2K Ethernet
12c4 Connect Tech Inc
0001 Blue HEAT/PCI 8 (RS232/CL/RJ11)
0002 Blue HEAT/PCI 4 (RS232)
0003 Blue HEAT/PCI 2 (RS232)
0004 Blue HEAT/PCI 8 (UNIV, RS485)
0005 Blue HEAT/PCI 4+4/6+2 (UNIV, RS232/485)
0006 Blue HEAT/PCI 4 (OPTO, RS485)
0007 Blue HEAT/PCI 2+2 (RS232/485)
0008 Blue HEAT/PCI 2 (OPTO, Tx, RS485)
0009 Blue HEAT/PCI 2+6 (RS232/485)
000a Blue HEAT/PCI 8 (Tx, RS485)
000b Blue HEAT/PCI 4 (Tx, RS485)
000c Blue HEAT/PCI 2 (20 MHz, RS485)
000d Blue HEAT/PCI 2 PTM
0100 NT960/PCI
0201 cPCI Titan - 2 Port
0202 cPCI Titan - 4 Port
0300 CTI PCI UART 2 (RS232)
0301 CTI PCI UART 4 (RS232)
0302 CTI PCI UART 8 (RS232)
0310 CTI PCI UART 1+1 (RS232/485)
0311 CTI PCI UART 2+2 (RS232/485)
0312 CTI PCI UART 4+4 (RS232/485)
0320 CTI PCI UART 2
0321 CTI PCI UART 4
0322 CTI PCI UART 8
0330 CTI PCI UART 2 (RS485)
0331
CTI PCI UART 4 (RS485)
0332 CTI PCI UART 8 (RS485)
12c5 Picture Elements Incorporated
007e Imaging/Scanning Subsystem Engine
007f Imaging/Scanning Subsystem Engine
0081 PCIVST [Grayscale Thresholding Engine]
0085 Video Simulator/Sender
0086 THR2 Multi-scale Thresholder
12c6 Mitani Corporation

12c7 Dialogic Corp
12 Line, 6 port, CT-BUS/SC-BUS, loopstart FXO adaptor.
0546 Springware D/120JCT-LS
24 Channel, 1 Port, CT-BUS/SC-BUS, T1/PRI adaptor.
0647 Springware D/240JCT-T1
4 Line, 4 port, CT-BUS/SC-BUS, loopstart FXO adaptor. Revision 01
0676 Springware D/41JCT-LS
48 Channel, 2 Port, CT-BUS/SC-BUS, T1/PRI adaptor.
0685 Springware D/480JCT-2T1
12c8 G Force Co, Ltd
12c9 Gigi Operations
12ca Integrated Computing Engines
12cb Antex Electronics Corporation
0027 SC4 (StudioCard)
002e StudioCard 2000
12cc Pluto Technologies International
12cd Aims Lab
12ce Netspeed Inc.
12cf Prophet Systems, Inc.
12d0 GDE Systems, Inc.
12d1 PSITech
12d2 NVidia / SGS
Thomson (Joint Venture)
0008 NV1
0009 DAC64
0018 Riva128
1048 0c10 VICTORY Erazor
107b 8030 STB Velocity 128
1092 0350 Viper V330
1092 1092 Viper V330
10b4 1b1b STB Velocity 128
10b4 1b1d STB Velocity 128
10b4 1b1e STB Velocity 128, PAL TV-Out
10b4 1b20 STB Velocity 128 Sapphire
10b4 1b21 STB Velocity 128
10b4 1b22 STB Velocity 128 AGP, NTSC TV-Out
10b4 1b23 STB Velocity 128 AGP, PAL TV-Out
10b4 1b27 STB Velocity 128 DVD
10b4 1b88 MVP Pro 128
10b4 222a STB Velocity 128 AGP
10b4 2230 STB Velocity 128
10b4 2232 STB Velocity 128
10b4 2235 STB Velocity 128 AGP
2a15 54a3 3DVision-SAGP / 3DexPloer 3000
0019 Riva128ZX
0020 TNT
0028 TNT2
0029 UTNT2

002c VTNT2
 00a0 ITNT2
 12d3 Vingmed Sound A/S
 12d4 Ulticom (Formerly DGM&S)
 0200 T1 Card
 12d5 Equator Technologies Inc
 0003 BSP16
 1000 BSP15
 12d6 Analogic Corp
 12d7 Biotronic SRL
 # acquired by Diodes Inc.
 12d8 Pericom Semiconductor
 01a7 7C21P100 2-port PCI-X to PCI-X
 Bridge
 # 3Port-3Lane PCI Express Switch GreenPacket Family
 0303 PCI Express Switch 3-3
 # PI7C9X20508GP 5Port-8Lane PCI Express Switch GreenPacket Family
 0508 PI7C9X20508GP PCI Express Switch 5Port-8Lane
 2304 PI7C9X2G304 EL/SL PCIe2 3-Port/4-Lane Packet Switch
 2404 PI7C9X2G404 EL/SL PCIe2 4-Port/4-Lane Packet Switch
 2608 PI7C9X2G608GP PCIe2 6-Port/8-Lane Packet Switch
 400a PI7C9X442SL PCI Express Bridge Port
 400e PI7C9X442SL USB OHCI Controller
 400f PI7C9X442SL USB EHCI Controller
 71e2 PI7C7300A/PI7C7300D PCI-to-PCI Bridge
 71e3 PI7C7300A/PI7C7300D PCI-to-PCI Bridge (Secondary Bus 2)
 8140 PI7C8140A PCI-to-PCI Bridge
 8148 PI7C8148A/PI7C8148B PCI-to-PCI Bridge
 8150 PCI to PCI Bridge
 8152 PI7C8152A/PI7C8152B/PI7C8152BI PCI-to-PCI Bridge
 8154 PI7C8154A/PI7C8154B/PI7C8154BI PCI-to-PCI Bridge
 e110 PI7C9X110 PCI Express to PCI bridge
 1775 11cc CC11/CL11 CompactPCI Bridge
 e111 PI7C9X111SL PCIe-to-PCI Reversible Bridge
 e130 PCI Express to PCI-XPI7C9X130 PCI-X
 Bridge
 12d9 Aculab PLC
 0002 PCI Prosody
 0004 cPCI Prosody
 0005 Aculab E1/T1 PCI card
 1078 Prosody X class e1000 device
 12d9 000d Prosody X PCI
 12d9 000e Prosody X cPCI
 12da True Time Inc.
 12db Annapolis Micro Systems, Inc
 12dc Symicron Computer Communication Ltd.
 12dd Management Graphics
 12de Rainbow Technologies

0200 CryptoSwift CS200
12df SBS Technologies Inc
12e0 Chase Research
0010 ST16C654 Quad UART
0020 ST16C654 Quad UART
0030 ST16C654 Quad UART
12e1 Nintendo Co, Ltd
12e2 Datum Inc. Bancomm-Timing Division
12e3 Imation Corp - Medical Imaging Systems
12e4 Brooktrout Technology Inc
12e5 Apex Semiconductor Inc
12e6 Cirel Systems
12e7 Sunsgroup Corporation
12e8 Crisc Corp
12e9 GE Spacenet
12ea Zuken
12eb Aureal Semiconductor
0001 Vortex 1
104d 8036 AU8820 Vortex Digital Audio Processor
1092 2000 Sonic Impact A3D
1092 2100 Sonic Impact A3D
1092 2110 Sonic Impact A3D
1092 2200 Sonic Impact A3D
122d 1002 AU8820 Vortex Digital
Audio Processor
12eb 0001 AU8820 Vortex Digital Audio Processor
5053 3355 Montego
50b2 1111 XLerate
0002 Vortex 2
104d 8049 AU8830 Vortex 3D Digital Audio Processor
104d 807b AU8830 Vortex 3D Digital Audio Processor
1092 3000 Monster Sound II
1092 3001 Monster Sound II
1092 3002 Monster Sound II
1092 3003 Monster Sound II
1092 3004 Monster Sound II
12eb 0002 AU8830 Vortex 3D Digital Audio Processor
12eb 0088 AU8830 Vortex 3D Digital Audio Processor
144d 3510 AU8830 Vortex 3D Digital Audio Processor
5053 3356 Montego II
0003 AU8810 Vortex Digital Audio Processor
104d 8049 AU8810 Vortex Digital Audio Processor
104d 8077 AU8810 Vortex Digital Audio Processor
109f 1000 AU8810 Vortex Digital Audio Processor
12eb 0003 AU8810 Vortex Digital Audio Processor
1462 6780 AU8810 Vortex Digital Audio Processor
14a4 2073 AU8810 Vortex Digital Audio Processor
14a4 2091 AU8810 Vortex Digital Audio Processor

14a4 2104 AU8810 Vortex
Digital Audio Processor
14a4 2106 AU8810 Vortex Digital Audio Processor
8803 Vortex 56k Software Modem
12eb 8803 Vortex 56k Software Modem
12ec 3A International, Inc.
12ed Optivision Inc.
12ee Orange Micro
12ef Vienna Systems
12f0 Pentek
12f1 Sorenson Vision Inc
12f2 Gammagraphx, Inc.
12f3 Radstone Technology
12f4 Megatel
12f5 Forks
12f6 Dawson France
12f7 Cognex
12f8 Electronic Design GmbH
0002 VideoMaker
12f9 Four Fold Ltd
12fb Spectrum Signal Processing
0001 PMC-MAI
00f5 F5 Dakar
02ad PMC-2MAI
2adc ePMC-2ADC
3100 PRO-3100
3500 PRO-3500
4d4f Modena
8120 ePMC-8120
da62 Daytona C6201 PCI (Hurricane)
db62 Ingliston XBIF
dc62 Ingliston PLX9054
dd62 Ingliston JTAG/ISP
eddc ePMC-MSDDC
fa01 ePMC-FPGA
12fc Capital Equipment Corp
12fd I2S
12fe ESD Electronic System Design GmbH
12ff Lexicon
1300 Harman International Industries Inc
1302 Computer Sciences Corp
1303 Innovative Integration
0030 X3-SDF 4-channel XMC acquisition board
1304
Juniper Networks
1305 Netphone, Inc
1306 Duet Technologies
Nee ComputerBoards

1307 Measurement Computing

0001 PCI-DAS1602/16
000b PCI-DIO48H
000c PCI-PDISO8
000d PCI-PDISO16
000f PCI-DAS1200
0010 PCI-DAS1602/12
0014 PCI-DIO24H
0015 PCI-DIO24H/CTR3
0016 PCI-DIO48H/CTR15
0017 PCI-DIO96H
0018 PCI-CTR05
0019 PCI-DAS1200/JR
001a PCI-DAS1001
001b PCI-DAS1002
001c PCI-DAS1602JR/16
001d PCI-DAS6402/16
001e PCI-DAS6402/12
001f PCI-DAS16/M1
0020 PCI-DDA02/12
0021 PCI-DDA04/12
0022 PCI-DDA08/12
0023 PCI-DDA02/16
0024 PCI-DDA04/16
0025 PCI-DDA08/16
0026 PCI-DAC04/12-HS
0027 PCI-DAC04/16-HS
0028 PCI-DIO24
0029 PCI-DAS08
002c PCI-INT32
0033 PCI-DUAL-AC5
0034 PCI-DAS-TC
0035 PCI-DAS64/M1/16
0036 PCI-DAS64/M2/16
0037 PCI-DAS64/M3/16
004c PCI-DAS1000
004d PCI-QUAD04
0052 PCI-DAS4020/12
0053 PCIM-DDA06/16
0054 PCI-DIO96
005d PCI-DAS6023
005e PCI-DAS6025
005f PCI-DAS6030
0060 PCI-DAS6031
0061 PCI-DAS6032
0062
PCI-DAS6033
0063 PCI-DAS6034

0064 PCI-DAS6035
0065 PCI-DAS6040
0066 PCI-DAS6052
0067 PCI-DAS6070
0068 PCI-DAS6071
006f PCI-DAS6036
0070 PCI-DAC6702
0078 PCI-DAS6013
0079 PCI-DAS6014
0115 PCIe-DAS1602/16
1308 Jato Technologies Inc.
0001 NetCelerator Adapter
1308 0001 NetCelerator Adapter
1309 AB Semiconductor Ltd
130a Mitsubishi Electric Microcomputer
130b Colorgraphic Communications Corp
130c Ambex Technologies, Inc
130d Accelerix Inc
130e Yamatake-Honeywell Co. Ltd
130f Advanet Inc
1310 Gespac
1311 Videoserver, Inc
1312 Acuity Imaging, Inc
1313 Yaskawa Electric Co.
1315 Wavesat
1316 Teradyne Inc
1317 ADMtek
0981 21x4x DEC-Tulip compatible 10/100 Ethernet
0985 NC100 Network Everywhere Fast Ethernet 10/100
1734 100c Scenic N300 ADMtek AN983 10/100 Mbps PCI Adapter
1985 21x4x DEC-Tulip compatible 10/100 Ethernet
1385 511a FA511
1395 2103 CB100-EZ (4-LED version)
2850 HSP MicroModem 56
5120 ADM5120 OpenGate System-on-Chip
8201
ADM8211 802.11b Wireless Interface
10b8 2635 SMC2635W v1 802.11b Wireless Cardbus Adapter
1317 8201 SMC2635W v2 802.11b Wireless Cardbus Adapter
8211 ADM8211 802.11b Wireless Interface
9511 21x4x DEC-Tulip compatible 10/100 Ethernet
1318 Packet Engines Inc.
0911 GNIC-II PCI Gigabit Ethernet [Hamachi]
1319 Fortemedia, Inc
0801 Xwave QS3000A [FM801]
1319 1319 FM801 PCI Audio
0802 Xwave QS3000A [FM801 game port]
1319 1319 FM801 PCI Joystick

1000 FM801 PCI Audio
1001 FM801 PCI Joystick
131a Finisar Corp.
131c Nippon Electro-Sensory Devices Corp
131d Sysmic, Inc.
131e Xinex Networks Inc
131f Siig Inc
1000 CyberSerial (1-port) 16550
1001 CyberSerial (1-port) 16650
1002 CyberSerial (1-port) 16850
1010 Duet 1S(16550)+1P
1011 Duet 1S(16650)+1P
1012 Duet 1S(16850)+1P
1020 CyberParallel (1-port)
1021 CyberParallel (2-port)
1030 CyberSerial (2-port) 16550
1031 CyberSerial (2-port) 16650
1032 CyberSerial (2-port) 16850
1034 Trio 2S(16550)+1P
1035
Trio 2S(16650)+1P
1036 Trio 2S(16850)+1P
1050 CyberSerial (4-port) 16550
1051 CyberSerial (4-port) 16650
1052 CyberSerial (4-port) 16850
2000 CyberSerial (1-port) 16550
2001 CyberSerial (1-port) 16650
2002 CyberSerial (1-port) 16850
2010 Duet 1S(16550)+1P
2011 Duet 1S(16650)+1P
2012 Duet 1S(16850)+1P
2020 CyberParallel (1-port)
2021 CyberParallel (2-port)
2030 CyberSerial (2-port) 16550
131f 2030 PCI Serial Card
2031 CyberSerial (2-port) 16650
2032 CyberSerial (2-port) 16850
2040 Trio 1S(16550)+2P
2041 Trio 1S(16650)+2P
2042 Trio 1S(16850)+2P
2050 CyberSerial (4-port) 16550
2051 CyberSerial (4-port) 16650
2052 CyberSerial (4-port) 16850
2060 Trio 2S(16550)+1P
2061 Trio 2S(16650)+1P
2062 Trio 2S(16850)+1P
2081 CyberSerial (8-port) ST16654
1320 Crypto AG

1321 Arcobel Graphics BV
1322 MTT Co., Ltd
1323 Dome Inc
1324 Sphere Communications
1325 Salix Technologies, Inc
1326 Seachange international
1327 Voss scientific
1328
 quadrant international
1329 Productivity Enhancement
132a Microcom Inc.
132b Broadband Technologies
132c Micrel Inc
132d Integrated Silicon Solution, Inc.
1330 MMC Networks
1331 RadiSys Corporation
0030 ENP-2611
8200 82600 Host Bridge
8201 82600 IDE
8202 82600 USB
8210 82600 PCI Bridge
1332 Micro Memory
5415 MM-5415CN PCI Memory Module with Battery Backup
5425 MM-5425CN PCI 64/66 Memory Module with Battery Backup
6140 MM-6140D
1334 Redcreek Communications, Inc
1335 Videomail, Inc
1337 Third Planet Publishing
1338 BT Electronics
133a Vtel Corp
133b Softcom Microsystems
133c Holontech Corp
133d SS Technologies
133e Virtual Computer Corp
133f SCM Microsystems
1340 Atalla Corp
1341 Kyoto Microcomputer Co
1342 Promax Systems Inc
1343 Phylon Communications Inc
nee Crucial Technology
1344 Micron Technology Inc
5150 RealSSD P320h
5151 RealSSD P320m
5152 RealSSD P320s
5153 RealSSD P325m
5160 RealSSD P420h
5161 RealSSD P420m
5163 RealSSD

P425m
5180 9100 PRO NVMe SSD
5181 9100 MAX NVMe SSD
5190 9200 ECO NVMe SSD
5191 9200 PRO NVMe SSD
5192 9200 MAX NVMe SSD
1345 Arescom Inc
1347 Odetics
1349 Sumitomo Electric Industries, Ltd.
134a DTC Technology Corp.
0001 Domex 536
0002 Domex DMX3194UP SCSI Adapter
134b ARK Research Corp.
134c Chori Joho System Co. Ltd
134d PCTel Inc
2189 HSP56 MicroModem
2486 2304WT V.92 MDC Modem
7890 HSP MicroModem 56
134d 0001 PCT789 adapter
7891 HSP MicroModem 56
134d 0001 HSP MicroModem 56
7892 HSP MicroModem 56
7893 HSP MicroModem 56
7894 HSP MicroModem 56
7895 HSP MicroModem 56
7896 HSP MicroModem 56
7897 HSP MicroModem 56
134e CSTI
134f Algo System Co Ltd
1350 Systec Co. Ltd
1351 Sonix Inc
nee Thales Idatys
1353 Vierling Communication SAS
0002 Proserver
0003 PCI-FUT
0004 PCI-S0
0005 PCI-FUT-S0
1354 Dwave System Inc
1355 Kratos Analytical Ltd
1356 The Logical Co
1359 Prisa Networks
135a Brain Boxes
0a61 UC-324 [VELOCITY RS422/485]
135b
Giganet Inc
135c Quatech Inc
0010 QSC-100
0020 DSC-100

0030 DSC-200/300
0040 QSC-200/300
0050 ESC-100D
0060 ESC-100M
00f0 MPAC-100 Synchronous Serial Card (Zilog 85230)
0170 QSCLP-100
0180 DSCLP-100
0190 SSCLP-100
01a0 QSCLP-200/300
01b0 DSCLP-200/300
01c0 SSCLP-200/300
0258 DSPSX-200/300
135d ABB Network Partner AB
135e Sealevel Systems Inc
5101 Route 56.PCI - Multi-Protocol Serial Interface (Zilog Z16C32)
7101 Single Port RS-232/422/485/530
7201 Dual Port RS-232/422/485 Interface
7202 Dual Port RS-232 Interface
7401 Four Port RS-232 Interface
7402 Four Port RS-422/485 Interface
7801 Eight Port RS-232 Interface
7804 Eight Port RS-232/422/485 Interface
8001 8001 Digital I/O Adapter
135f I-Data International A-S
1360 Meinberg Funkuhren
0101 PCI32 DCF77 Radio Clock
0102 PCI509 DCF77 Radio Clock
0103 PCI510 DCF77 Radio Clock
0104 PCI511 DCF77 Radio Clock
0105 PEX511 DCF77 Radio Clock (PCI Express)
0106 PZF180PEX
High Precision DCF77 Radio Clock (PCI Express)
0201 GPS167PCI GPS Receiver
0202 GPS168PCI GPS Receiver
0203 GPS169PCI GPS Receiver
0204 GPS170PCI GPS Receiver
0205 GPS170PEX GPS Receiver (PCI Express)
0206 GPS180PEX GPS Receiver (PCI Express)
0207 GLN180PEX GPS/GLONASS receiver (PCI Express)
0208 GPS180AMC GPS Receiver (PCI Express / MicroTCA / AdvancedMC)
0209 GNS181PEX GPS/Galileo/GLONASS/BEIDOU receiver (PCI Express)
0301 TCR510PCI IRIG Timecode Reader
0302 TCR167PCI IRIG Timecode Reader
0303 TCR511PCI IRIG Timecode Reader
0304 TCR511PEX IRIG Timecode Reader (PCI Express)
0305 TCR170PEX IRIG Timecode Reader (PCI Express)
0306 TCR180PEX IRIG Timecode Reader (PCI Express)
0501 PTP270PEX PTP/IEEE1588 slave card (PCI Express)

0601 FRC511PEX Free Running Clock (PCI Express)
1361 Soliton Systems K.K.
1362 Fujifacom Corporation
1363 Phoenix Technology Ltd
1364 ATM Communications Inc
1365 Hypercope GmbH
1366 Teijin Seiki Co. Ltd
1367 Hitachi Zosen Corporation
1368
Skyware Corporation
1369 Digigram
136a High Soft Tech
0004 HST Saphir VII mini PCI
0007 HST Saphir III E MultiLink 4
0008 HST Saphir III E MultiLink 8
000a HST Saphir III E MultiLink 2
136b Kawasaki Steel Corporation
ff01 KL5A72002 Motion JPEG
136c Adtek System Science Co Ltd
136d Gigalabs Inc
136f Applied Magic Inc
1370 ATL Products
1371 CNet Technology Inc
434e GigaCard Network Adapter
1371 434e N-Way PCI-Bus Giga-Card 1000/100/10Mbps(L)
1373 Silicon Vision Inc
1374 Silicom Ltd.
0024 Silicom Dual port Giga Ethernet BGE Bypass Server Adapter
0025 Silicom Quad port Giga Ethernet BGE Bypass Server Adapter
0026 Silicom Dual port Fiber Giga Ethernet 546 Bypass Server Adapter
0027 Silicom Dual port Fiber LX Giga Ethernet 546 Bypass Server Adapter
0029 Silicom Dual port Copper Giga Ethernet 546GB Bypass Server Adapter
002a Silicom Dual port Fiber Giga Ethernet 546 TAP/Bypass Server Adapter
002b Silicom Dual port Copper Fast Ethernet 546
TAP/Bypass Server Adapter (PXE2TBI)
002c Silicom Quad port Copper Giga Ethernet 546GB Bypass Server Adapter (PXG4BPI)
002d Silicom Quad port Fiber-SX Giga Ethernet 546GB Bypass Server Adapter (PXG4BPFI)
002e Silicom Quad port Fiber-LX Giga Ethernet 546GB Bypass Server Adapter (PXG4BPFI-LX)
002f Silicom Dual port Fiber-SX Giga Ethernet 546GB Low profile Bypass Server Adapter (PXG2BPFI)
0030 Silicom Dual port Fiber-LX Giga Ethernet 546GB Low profile Bypass Server Adapter
0031 Silicom Quad port Copper Giga Ethernet PCI-E Bypass Server Adapter
0032 Silicom Dual port Copper Fast Ethernet 546 TAP/Bypass Server Adapter
0034 Silicom Dual port Copper Giga Ethernet PCI-E BGE Bypass Server Adapter
0035 Silicom Quad port Copper Giga Ethernet PCI-E BGE Bypass Server Adapter
0036 Silicom Dual port Fiber Giga Ethernet PCI-E BGE Bypass Server Adapter
0037 Silicom Dual port Copper Ethernet PCI-E Intel based Bypass Server Adapter
0038 Silicom Quad port Copper Ethernet PCI-E Intel

based Bypass Server Adapter
0039 Silicom Dual port Fiber-SX Ethernet PCI-E Intel based Bypass Server Adapter
003a Silicom Dual port Fiber-LX Ethernet PCI-E Intel based Bypass Server Adapter
003b Silicom Dual port Fiber Ethernet PMC Intel based Bypass Server Adapter (PMCX2BPFI)
003c Silicom Dual port Copper Ethernet PCI-X BGE based Bypass Server Adapter (PXG2BPRB)
003d 2-port Copper GBE Bypass with Cavium 1010 PCI-X
003e Silicom Dual port Fiber Giga Ethernet PCI-E 571 TAP/Bypass Server Adapter (PEG2TBFI)
003f Silicom Dual port Copper Giga Ethernet PCI-X 546 TAP/Bypass Server Adapter (PXG2TBI)
0040 Silicom Quad port Fiber-SX Giga Ethernet 571 Bypass Server Adapter (PEG4BPFI)
0042 4-port Copper GBE PMC-X Bypass
0043 Silicom Quad port Fiber-SX Giga Ethernet 546 Bypass Server Adapter (PXG4BPFI)
0045 Silicom 6 port Copper Giga Ethernet 546 Bypass Server Adapter (PXG6BPI)
0046 4-port bypass PCI-E w disconnect low profile
0047 Silicom Dual port Fiber-SX Giga Ethernet
571 Bypass Disconnect Server Adapter (PEG2BPFI)
004a Silicom Quad port Fiber-LX Giga Ethernet 571 Bypass Server Adapter (PEG4BPFI-LX)
004d Dual port Copper Giga Ethernet PCI-E Bypass Server Adapter
0401 Gigabit Ethernet ExpressModule Bypass Server Adapter
0420 Gigabit Ethernet ExpressModule Bypass Server Adapter
0460 Gigabit Ethernet Express Module Bypass Server Adapter
0461 Gigabit Ethernet ExpressModule Bypass Server Adapter
0462 Gigabit Ethernet ExpressModule Bypass Server Adapter
0470 Octal-port Copper Gigabit Ethernet Express Module Bypass Server Adapter
0482 Dual-port Fiber (SR) 10 Gigabit Ethernet ExpressModule Bypass Server Adapter
0483 Dual-port Fiber (LR) 10 Gigabit Ethernet ExpressModule Bypass Server Adapter
1375 Argosystems Inc
1376 LMC
1377 Electronic Equipment Production & Distribution GmbH
1378 Telemann Co. Ltd
1379 Asahi Kasei Microsystems Co Ltd
137a Mark of the Unicorn Inc
0001 PCI-324 Audiowire Interface
137b PPT Vision
137c Iwatsu
Electric Co Ltd
137d Dynachip Corporation
137e Patriot Scientific Corporation
137f Japan Satellite Systems Inc
1380 Sanritz Automation Co Ltd
1381 Brains Co. Ltd
1382 Marian - Electronic & Software
0001 ARC88 audio recording card
2008 Prodif 96 Pro sound system
2048 Prodif Plus sound system
2088 Marc 8 Midi sound system
20c8 Marc A sound system
4008 Marc 2 sound system
4010 Marc 2 Pro sound system

4048 Marc 4 MIDI sound system
4088 Marc 4 Digi sound system
4248 Marc X sound system
4424 TRACE D4 Sound System
1383 Controlnet Inc
1384 Reality Simulation Systems Inc
1385 Netgear
006b WA301 802.11b Wireless PCI Adapter
4100 MA301 802.11b Wireless PCI Adapter
4601 WAG511 802.11a/b/g Dual Band Wireless PC Card
620a GA620 Gigabit Ethernet
630a GA630 Gigabit Ethernet
1386 Video Domain Technologies
1387 Systran Corp
1388 Hitachi Information Technology Co Ltd
1389 Applicom International
0001 PCI1500PFB [Intelligent fieldbus adaptor]
138a Fusion Micromedia
Corp
003d VFS491 Validity Sensor
138b Tokimec Inc
138c Silicon Reality
138d Future Techno Designs pte Ltd
138e Basler GmbH
138f Patapsco Designs Inc
1390 Concept Development Inc
1391 Development Concepts Inc
1392 Medialight Inc
1393 Moxa Technologies Co Ltd
0001 UC7000 Serial
1020 CP-102 (2-port RS-232 PCI)
1021 CP-102UL (2-port RS-232 Universal PCI)
1022 CP-102U (2-port RS-232 Universal PCI)
1023 CP-102UF
1024 CP-102E (2-port RS-232 Smart PCI Express Serial Board)
1025 CP-102EL (2-port RS-232 Smart PCI Express Serial Board)
1040 Smartio C104H/PCI
1041 CP104U (4-port RS-232 Universal PCI)
1042 CP104JU (4-port RS-232 Universal PCI)
1043 CP104EL (4-port RS-232 Smart PCI Express)
1044 POS104UL (4-port RS-232 Universal PCI)
1045 CP-104EL-A (4-port RS-232 PCI Express Serial Board)
1080 CB108 (8-port RS-232 PC/104-plus Module)
1140 CT-114 series
1141 Industrio CP-114
1142 CB114 (4-port RS-232/422/485 PC/104-plus Module)
1143 CP-114UL (4-port

RS-232/422/485 Smart Universal PCI Serial Board)
1144 CP-114EL (4-port RS-232/422/485 Smart PCI Express Serial Board)
1180 CP118U (8-port RS-232/422/485 Smart Universal PCI)
1181 CP118EL (8-port RS-232/422/485 Smart PCI Express)
1182 CP-118EL-A (8-port RS-232/422/485 PCI Express Serial Board)
1320 CP132 (2-port RS-422/485 PCI)
1321 CP132U (2-Port RS-422/485 Universal PCI)
1322 CP-132EL (2-port RS-422/485 Smart PCI Express Serial Board)
1340 CP134U (4-Port RS-422/485 Universal PCI)
1341 CB134I (4-port RS-422/485 PC/104-plus Module)
1380 CP138U (8-port RS-232/422/485 Smart Universal PCI)
1680 Smartio C168H/PCI
1681 CP-168U V2 Smart Serial Board (8-port RS-232)
1682 CP-168EL (8-port RS-232 Smart PCI Express)
1683 CP-168EL-A (8-port RS-232 PCI Express Serial Board)
2040 Intellio CP-204J
2180 Intellio C218 Turbo PCI
3200 Intellio C320 Turbo PCI
1394 Level One Communications
0001 LXT1001 Gigabit Ethernet
1186 4800 DGE-500SX
1394 0001 NetCelerator
Adapter
1395 Ambicom Inc
1396 Cipher Systems Inc
1397 Cologne Chip Designs GmbH
08b4 ISDN network Controller [HFC-4S]
1397 08b4 HFC-4S [Cologne Chip HFC-4S Eval. Board]
1397 b51a HFC-4S [Allo.com BRI card]
1397 b520 HFC-4S [IOB4ST]
1397 b540 HFC-4S [Swyx SX2 QuadBri]
1397 b550 HFC-4S [Junghanns.NET quadBRI]
1397 b556 HFC-4S [Junghanns.NET duoBRI]
1397 b559 HFC-4S [Junghanns.NET duoBRI miniPCI]
1397 b560 HFC-4S [BeroNet BN4S0]
1397 b566 HFC-4S [BeroNet BN2S0]
1397 b567 HFC-4S [BeroNet BN1S0 miniPCI]
1397 b568 HFC-4S [BeroNet BN4S0 miniPCI]
1397 b569 HFC-4S [BeroNet BN2S0 miniPCI]
1397 b620 HFC-4S
1397 b752 HFC-4S [Junghanns.NET quadBRI PCIe]
1397 b761 HFC-4S [BeroNet BN2S0 PCIe]
1397 b762 HFC-4S [BeroNet BN4S0 PCIe]
1397 e884 HFC-4S [OpenVox B200P]
1397 e888 HFC-4S [OpenVox B200P / B400P]
16b8 ISDN network Controller [HFC-8S]
1397 16b8 HFC-8S [Cologne Chip HFC-8S Eval. Board]
1397 b521 HFC-8S [IOB4ST Recording]

1397
b522 HFC-8S [IOB8ST]
1397 b552 HFC-8S [Junghanns.NET octoBRI]
1397 b55b HFC-8S [Junghanns.NET octoBRI]
1397 b562 HFC-8S [BeroNet BN8S0]
1397 b56b HFC-8S [BeroNet BN8S0+]
1397 b622 HFC-8S
1397 e998 HFC-8S [OpenVox B800P]
2bd0 ISDN network controller [HFC-PCI]
0675 1704 ISDN Adapter (PCI Bus, D, C)
0675 1708 ISDN Adapter (PCI Bus, D, C, ACPI)
1397 2bd0 ISDN Board
e4bf 1000 CI1-1-Harp
30b1 ISDN network Controller [HFC-E1]
1397 30b1 HFC-E1 [Cologne Chip HFC-E1 Eval. Board]
1397 b523 HFC-E1 [IOB1E1]
1397 b543 HFC-E1 [Swyx SX2 SinglePRI V2]
1397 b544 HFC-E1 [Swyx SX2 DualPRI V2]
1397 b553 HFC-E1 [Junghanns.NET singleE1]
1397 b554 HFC-E1 [Junghanns.NET doubleE1]
1397 b555 HFC-E1 [Junghanns.NET doubleE1 2.0]
1397 b55a HFC-E1 [Junghanns.NET singleE1 miniPCI]
1397 b563 HFC-E1 [beroNet BN1E1]
1397 b564 HFC-E1 [beroNet BN2E1]
1397 b565 HFC-E1 [beroNet BN2E1+]
1397 b56a HFC-E1 [beroNet BN1E1 miniPCI]
b700 ISDN network controller
PrimuX S0 [HFC-PCI]
f001 GSM Network Controller [HFC-4GSM]
1398 Clarion co. Ltd
1399 Rios systems Co Ltd
139a Alacritech Inc
0001 Quad Port 10/100 Server Accelerator
0003 Single Port 10/100 Server Accelerator
0005 Single Port Gigabit Server Accelerator
139b Mediasonic Multimedia Systems Ltd
139c Quantum 3d Inc
139d EPL limited
139e Media4
139f Aethra s.r.l.
13a0 Crystal Group Inc
13a1 Kawasaki Heavy Industries Ltd
13a2 Ositech Communications Inc
13a3 Hifn Inc.
0005 7751 Security Processor
0006 6500 Public Key Processor
0007 7811 Security Processor
0012 7951 Security Processor

0014 78XX Security Processor
0016 8065 Security Processor
0017 8165 Security Processor
0018 8154 Security Processor
001d 7956 Security Processor
001f 7855 Security Processor
0020 7955 Security Processor
0026 8155 Security Processor
002e 9630 Compression Processor
002f 9725 Compression and Security Processor
13a3 1600 DR1600 Acceleration Card
13a3 1605 DR1605
Acceleration Card
13a3 1610 DR1610 Acceleration Card
13a3 1615 DR1615 Acceleration Card
13a3 1620 DR1620 Acceleration Card
13a3 1625 DR1625 Acceleration Card
0033 8201 Acceleration Processor
13a3 0036 DX1710 Acceleration Card
0034 8202 Acceleration Processor
13a3 0036 DX1720 Acceleration Card
0035 8203 Acceleration Processor
13a3 0036 DX1730 Acceleration Card
0037 8204 Acceleration Processor
13a3 0036 DX1740 Acceleration Card
13a4 Rascom Inc
13a5 Audio Digital Imaging Inc
13a6 Videonics Inc
13a7 Teles AG
13a8 Exar Corp.
0152 XR17C/D152 Dual PCI UART
0154 XR17C154 Quad UART
0158 XR17C158 Octal UART
0252 XR17V252 Dual UART PCI controller
0254 XR17V254 Quad UART PCI controller
0258 XR17V258 Octal UART PCI controller
0352 XR17V3521 Dual PCIe UART
13a9 Siemens Medical Systems, Ultrasound Group
13aa Broadband Networks Inc
13ab Arcom Control Systems Ltd
13ac Motion Media Technology Ltd
13ad Nexus Inc
13ae ALD Technology Ltd
13af T.Square
13b0
Maxspeed Corp
13b1 Tamura corporation
13b2 Techno Chips Co. Ltd

13b3 Lanart Corporation
13b4 Wellbean Co Inc
13b5 ARM
13b6 Dlog GmbH
13b7 Logic Devices Inc
13b8 Nokia Telecommunications oy
13b9 Elecom Co Ltd
13ba Oxford Instruments
13bb Sanyo Technosound Co Ltd
13bc Bitran Corporation
13bd Sharp corporation
13be Miroku Jyoho Service Co. Ltd
13bf Sharewave Inc
13c0 Microgate Corporation
0010 SyncLink Adapter v1
0020 SyncLink SCC Adapter
0030 SyncLink Multiport Adapter
0070 SyncLink GT Adapter
0080 SyncLink GT4 Adapter
00a0 SyncLink GT2 Adapter
0210 SyncLink Adapter v2
13c1 3ware Inc
1000 5xxx/6xxx-series PATA-RAID
1001 7xxx/8xxx-series PATA/SATA-RAID
13c1 1001 7xxx/8xxx-series PATA/SATA-RAID
1002 9xxx-series SATA-RAID
1003 9550SX SATA-II RAID PCI-X
1004 9650SE SATA-II RAID PCIe
1005 9690SA SAS/SATA-II RAID PCIe
1010 9750 SAS2/SATA-II RAID PCIe
13c2 Technotrend Systemtechnik GmbH
000e Technotrend/Hauppage DVB card rev2.3
1019
TTechnoTrend-budget DVB S2-3200
13c3 Janz Computer AG
13c4 Phase Metrics
13c5 Alphi Technology Corp
13c6 Condor Engineering Inc
0520 CEI-520 A429 Card
0620 CEI-620 A429 Card
0820 CEI-820 A429 Card
0830 CEI-830 A429 Card
1004 P-SER Multi-channel PMC to RS-485/422/232 adapter
13c7 Blue Chip Technology Ltd
0adc PCI-ADC
0b10 PCI-PIO
0d10 PCI-DIO
524c PCI-RLY

5744 PCI-WDT
13c8 Apptech Inc
13c9 Eaton Corporation
13ca Iomega Corporation
13cb Yano Electric Co Ltd
13cc Metheus Corporation
13cd Compatible Systems Corporation
13ce Cocom A/S
13cf Studio Audio & Video Ltd
13d0 Techsan Electronics Co Ltd
2103 B2C2 FlexCopII DVB chip / Technisat SkyStar2 DVB card
2104 B2C2 FlexCopIII DVB chip / Technisat SkyStar2 DVB card (rev 01)
2200 B2C2 FlexCopIII DVB chip / Technisat SkyStar2 DVB card
13d1 Abocom Systems Inc
ab02 ADMtek Centaur-C rev 17 [D-Link DFE-680TX] CardBus Fast Ethernet Adapter
ab03 21x4x DEC-Tulip compatible 10/100 Ethernet
ab06 RTL8139
[FE2000VX] CardBus Fast Ethernet Attached Port Adapter
ab08 21x4x DEC-Tulip compatible 10/100 Ethernet
13d2 Shark Multimedia Inc
13d4 Graphics Microsystems Inc
13d5 Media 100 Inc
13d6 K.I. Technology Co Ltd
13d7 Toshiba Engineering Corporation
13d8 Phobos corporation
13d9 Apex PC Solutions Inc
13da Intresource Systems pte Ltd
13db Janich & Klass Computertechnik GmbH
13dc Netboost Corporation
13dd Multimedia Bundle Inc
13de ABB Robotics Products AB
13df E-Tech Inc
0001 PCI56RVP Modem
13df 0001 PCI56RVP Modem
13e0 GVC Corporation
13e1 Silicom Multimedia Systems Inc
13e2 Dynamics Research Corporation
13e3 Nest Inc
13e4 Calculex Inc
13e5 Telesoft Design Ltd
13e6 Argosy research Inc
13e7 NAC Incorporated
13e8 Chip Express Corporation
13e9 Intraserver Technology Inc
13ea Dallas Semiconductor
13eb Hauppauge Computer Works Inc
13ec Zydacron Inc
000a NPC-RC01 Remote control receiver

13ed Raytheon E-Systems
13ee Hayes Microcomputer Products Inc
13ef Coppercom
Inc
13f0 Sundance Technology Inc / IC Plus Corp
0200 IC Plus IP100A Integrated 10/100 Ethernet MAC + PHY
1043 8213 NX1001
0201 ST201 Sundance Ethernet
1021 TC902x Gigabit Ethernet
1023 IP1000 Family Gigabit Ethernet
1043 8180 NX1101
13f1 Océ - Technologies B.V.
13f2 Ford Microelectronics Inc
13f3 Madata Corporation
13f4 Troika Networks, Inc.
1401 Zentai Fibre Channel Adapter
13f5 Kansai Electric Co. Ltd
13f6 C-Media Electronics Inc
0011 CMI8738
0100 CM8338A
13f6 ffff CMI8338/C3DX PCI Audio Device
0101 CM8338B
13f6 0101 CMI8338-031 PCI Audio Device
0111 CMI8738/CMI8768 PCI Audio
1019 0970 P6STP-FL motherboard
1043 8035 CUSI-FX motherboard
1043 8077 CMI8738 6-channel audio controller
1043 80e2 CMI8738 6ch-MX
13f6 0111 CMI8738/C3DX PCI Audio Device
13f6 9761 Theatron Agrippa
153b 1144 Aureon 5.1
153b 1170 Aureon 7.1
1681 a000 Gamesurround MUSE XL
17ab 0604 PSC604 Dynamic Edge
17ab 0605 PSC605 Sonic Edge
17ab 7777
PSC605 Sonic Edge
270f 1103 CT-7NJS Ultra motherboard
270f f462 7NJS1 motherboard
584d 3731 Digital X-Mystique
584d 3741 X-Plosion 7.1
584d 3751 X-Raider 7.1
584d 3761 X-Mystique 7.1 LP
584d 3771 X-Mystique 7.1 LP Value
7284 8384 Striker 7.1
0211 CM8738
5011 CM8888 [Oxygen Express]
13f6 5011 HDA Controller

8788 CMI8788 [Oxygen HD Audio]
1043 8269 Virtuoso 200 (Xonar D2)
1043 8275 Virtuoso 100 (Xonar DX)
1043 82b7 Virtuoso 200 (Xonar D2X)
1043 8314 Virtuoso 200 (Xonar HDAV1.3)
1043 8327 Virtuoso 100 (Xonar DX)
1043 834f Virtuoso 100 (Xonar D1)
1043 835c Virtuoso 100 (Xonar Essence STX)
1043 835d Virtuoso 100 (Xonar ST)
1043 835e Virtuoso 200 (Xonar HDAV1.3 Slim)
1043 838e Virtuoso 66 (Xonar DS)
1043 8428 Virtuoso 100 (Xonar Xense)
1043 8467 CMI8786 (Xonar DG)
1043 8521 CMI8786 (Xonar DGX)
1043 8522 Xonar DSX
1043 85f4 Virtuoso 100 (Xonar Essence STX II)
13f6 8782 PCI 2.0 HD Audio
13f6 ffff CMI8787-HG2PCI
14c3
1710 HiFier Fantasia
14c3 1711 HiFier Serenade
14c3 1713 HiFier Serenade III
1a58 0910 Barracuda AC-1
415a 5431 X-Meridian 7.1
5431 017a X-Meridian 7.1 2G
584d 3781 HDA X-Purity 7.1 Platinum
7284 9761 CLARO
7284 9781 CLARO halo
7284 9783 eCLARO
7284 9787 CLARO II
13f7 Wildfire Communications
13f8 Ad Lib Multimedia Inc
13f9 NTT Advanced Technology Corp.
13fa Pentland Systems Ltd
13fb Aydin Corp
13fc Computer Peripherals International
13fd Micro Science Inc
13fe Advantech Co. Ltd
1240 PCI-1240 4-channel stepper motor controller card
1600 PCI-16xx series PCI multiport serial board (function 0)
This board has two PCI functions, appears as two PCI devices
1601 0002 PCI-1601 2-port unisolated RS-422/485
This board has two PCI functions, appears as two PCI devices
1602 0002 PCI-1602 2-port isolated RS-422/485
1612 0004 PCI-1612 4-port RS-232/422/485
1603 PCI-1603 2-port isolated RS-232/current loop
1604 PCI-1604 2-port RS-232
1680

PCI-1680 Rev.A1 2-port CAN-bus with isolation protection
16ff PCI-16xx series PCI multiport serial board (function 1: RX/TX steering CPLD)
1601 0000 PCI-1601 2-port unisolated RS-422/485 PCI communications card
1602 0000 PCI-1602 2-port isolated RS-422/485
1612 0000 PCI-1612 4-port RS-232/422/485
1711 PCI-1711 16-channel data acquisition card 12-bit, 100kS/s
1713 PCI-1713 32-channel isolated analog input card
1733 PCI-1733 32-channel isolated digital input card
1734 PCI-1734 32-channel isolated digital output card
1752 PCI-1752 64-channel Isolated Digital Output Card
1754 PCI-1754 64-channel Isolated Digital Input Card
1756 PCI-1756 64-ch Isolated Digital I/O PCI Card
a004 PCI-1612 4-port RS-232/422/485
FPGA bridge to two SJA1000
c302 MIOe-3680 2-Port CAN-Bus MIOe Module with Isolation Protection
13ff Silicon Spice Inc
1400 Artx Inc
1401 9432 TX
1401 CR-Systems A/S
1402 Meilhaus Electronic GmbH
0630 ME-630
0940 ME-94
0950 ME-95
0960
ME-96
1000 ME-1000
100a ME-1000
100b ME-1000
1400 ME-1400
140a ME-1400A
140b ME-1400B
140c ME-1400C
140d ME-1400D
140e ME-1400E
14ea ME-1400EA
14eb ME-1400EB
1604 ME-1600/4U
1608 ME-1600/8U
160c ME-1600/12U
160f ME-1600/16U
168f ME-1600/16U8I
4610 ME-4610
4650 ME-4650
4660 ME-4660
4661 ME-4660I
4662 ME-4660
4663 ME-4660I
4670 ME-4670

4671 ME-4670I
4672 ME-4670S
4673 ME-4670IS
4680 ME-4680
4681 ME-4680I
4682 ME-4680S
4683 ME-4680IS
6004 ME-6000/4
6008 ME-6000/8
600f ME-6000/16
6014 ME-6000I/4
6018 ME-6000I/8
601f ME-6000I/16
6034 ME-6000ISLE/4
6038 ME-6000ISLE/8
603f ME-6000ISLE/16
6044 ME-6000/4/DIO
6048 ME-6000/8/DIO
604f ME-6000/16/DIO
6054 ME-6000I/4/DIO
6058 ME-6000I/8/DIO
605f ME-6000I/16/DIO
6074 ME-6000ISLE/4/DIO
6078 ME-6000ISLE/8/DIO
607f ME-6000ISLE/16/DIO
6104 ME-6100/4
6108 ME-6100/8
610f ME-6100/16
6114 ME-6100I/4
6118 ME-6100I/8
611f ME-6100I/16
6134 ME-6100ISLE/4
6138
ME-6100ISLE/8
613f ME-6100ISLE/16
6144 ME-6100/4/DIO
6148 ME-6100/8/DIO
614f ME-6100/16/DIO
6154 ME-6100I/4/DIO
6158 ME-6100I/8/DIO
615f ME-6100I/16/DIO
6174 ME-6100ISLE/4/DIO
6178 ME-6100ISLE/8/DIO
617f ME-6100ISLE/16/DIO
6259 ME-6200I/9/DIO
6359 ME-6300I/9/DIO
810a ME-8100A
810b ME-8100B

820a ME-8200A
820b ME-8200B
1403 Ascor Inc
1404 Fundamental Software Inc
1405 Excalibur Systems Inc
1406 Oce' Printing Systems GmbH
1407 Lava Computer mfg Inc
0100 Lava Dual Serial
0101 Lava Quatro A
0102 Lava Quatro B
0110 Lava DSerial-PCI Port A
0111 Lava DSerial-PCI Port B
0120 Quattro-PCI A
0121 Quattro-PCI B
0180 Lava Octo A
0181 Lava Octo B
0200 Lava Port Plus
0201 Lava Quad A
0202 Lava Quad B
0220 Lava Quattro PCI Ports A/B
0221 Lava Quattro PCI Ports C/D
0400 Lava 8255-PIO-PCI
0500 Lava Single Serial
0520 Lava RS422-SS-PCI
0600 Lava Port 650
8000 Lava Parallel
8001 Dual parallel port controller A
8002 Lava
Dual Parallel port A
8003 Lava Dual Parallel port B
8800 BOCA Research IOPPAR
1408 Aloka Co. Ltd
1409 Timedia Technology Co Ltd
7168 PCI2S550 (Dual 16550 UART)
1409 0002 SER4036A3V (2x RS232 port)
1409 4027 SER4027A (1x RS232 port)
1409 4037 SER4037A(L) [SUNIX SUN1889] (2x RS232 port)
Single DC-37 connector
1409 4056 SER4056A (4x RS232)
1409 5027 SER4027D
1409 5037 SER4037D (2x RS232 port)
Single DC-62 connector
1409 5066 SER4066R (8x RS232)
4x 8p8c connectors
1409 6056 SER4056D (4x RS232 port)
7268 SUN1888 (Dual IEEE1284 parallel port)
1409 0103 PAR4008A
1409 0104 PAR4018A

140a DSP Research Inc
Formerly RAMiX, GE Fanuc, GE Intelligent Platforms
140b Abaco Systems, Inc.
140c Elmic Systems Inc
140d Matsushita Electric Works Ltd
140e Goepel Electronic GmbH
140f Salient Systems Corp
1410 Midas lab Inc
1411 Ikos Systems Inc
Nee IC Ensemble Inc.
1412 VIA Technologies Inc.
1712 ICE1712 [Envy24] PCI Multi-Channel I/O Controller
1412
1712 Hoontech ST Audio DSP 24
1412 d630 M-Audio Delta 1010
1412 d631 M-Audio Delta DiO
1412 d632 M-Audio Delta 66
1412 d633 M-Audio Delta 44
1412 d634 M-Audio Delta Audiophile 2496
1412 d635 M-Audio Delta TDIF
1412 d637 M-Audio Delta RBUS
1412 d638 M-Audio Delta 410
1412 d63b M-Audio Delta 1010LT
1412 d63c Digigram VX442
1416 1712 Hoontech ST Audio DSP 24 Media 7.1
153b 1115 EWS88 MT
153b 1125 EWS88 MT (Master)
153b 112b EWS88 D
153b 112c EWS88 D (Master)
153b 1130 EWX 24/96
153b 1138 DMX 6fire 24/96
153b 1151 PHASE88
16ce 1040 Edirol DA-2496
1724 VT1720/24 [Envy24PT/HT] PCI Multi-Channel Audio Controller
10b0 0200 Hollywood@Home 7.1
1412 1724 Albatron PX865PE 7.1
1412 3630 M-Audio Revolution 7.1
1412 3631 M-Audio Revolution 5.1
1412 3632 M-Audio Audiophile 192
153b 1145 Aureon 7.1 Space
153b 1147 Aureon 5.1 Sky
153b 1150 PHASE 22
153b 1153 Aureon 7.1 Universe
17ab 1906 PSC 724 [Ultimate Edge]
270f
f641 ZNF3-150
270f f645 ZNF3-250
3130 4154 MAYA 44 MKII

1413 Addonics
1414 Microsoft Corporation
0001 MN-120 (ADMtek Centaur-C based)
0002 MN-130 (ADMtek Centaur-P based)
5353 Hyper-V virtual VGA
5801 XMA Decoder (Xenon)
5802 SATA Controller - CdRom (Xenon)
5803 SATA Controller - Disk (Xenon)
5804 OHCI Controller 0 (Xenon)
5805 EHCI Controller 0 (Xenon)
5806 OHCI Controller 1 (Xenon)
5807 EHCI Controller 1 (Xenon)
580a Fast Ethernet Adapter (Xenon)
580b Secure Flash Controller (Xenon)
580d System Management Controller (Xenon)
5811 Xenos GPU (Xenon)
1415 Oxford Semiconductor Ltd
8401 OX9162 Mode 1 (8-bit bus)
8403 OX9162 Mode 0 (parallel port)
9500 OX16PCI954 (Quad 16950 UART) function 0 (Disabled)
9501 OX16PCI954 (Quad 16950 UART) function 0 (Uart)
12c4 0201 Titan/cPCI (2 port)
12c4 0202 Titan/cPCI (4 port)
12c4 0203 Titan/cPCI (8 port)
12c4 0210 Titan/104-Plus (8 port, p1-4)
131f 2050 CyberPro (4-port)
Model IO1085,
Part No: JJ-P46012
131f 2051 CyberSerial 4S Plus
15ed 2000 MCCR Serial p0-3 of 8
15ed 2001 MCCR Serial p0-3 of 16
9505 OXuPCI952 (Dual 16C950 UART)
950a EXSYS EX-41092 Dual 16950 Serial adapter
950b OXCB950 Cardbus 16950 UART
9510 OX16PCI954 (Quad 16950 UART) function 1 (Disabled)
12c4 0200 Titan/cPCI (Unused)
9511 OX16PCI954 (Quad 16950 UART) function 1 (8bit bus)
12c4 0211 Titan/104-Plus (8 port, p5-8)
15ed 2000 MCCR Serial p4-7 of 8
15ed 2001 MCCR Serial p4-15 of 16
9512 OX16PCI954 (Quad 16950 UART) function 1 (32bit bus)
9513 OX16PCI954 (Quad 16950 UART) function 1 (parallel port)
9521 OX16PCI952 (Dual 16950 UART)
9523 OX16PCI952 Integrated Parallel Port
c158 OXPCIE952 Dual 16C950 UART
e4bf c504 CP4-SCAT Wireless Technologies Carrier Board
e4bf d551 DU1-MUSTANG Dual-Port RS-485 Interface
c308 EX-44016 16-port serial

1416 Multiwave Innovation pte Ltd
1417 Convergenet Technologies Inc
1418 Kyushu electronics systems Inc
1419 Excel
Switching Corp
141a Apache Micro Peripherals Inc
141b Zoom Telephonics Inc
141d Digitan Systems Inc
141e Fanuc Ltd
141f Visiontech Ltd
1420 Psion Dacom plc
8002 Gold Card NetGlobal 56k+10/100Mb CardBus (Ethernet part)
8003 Gold Card NetGlobal 56k+10/100Mb CardBus (Modem part)
1421 Ads Technologies Inc
1422 Ygrec Systems Co Ltd
1423 Custom Technology Corp.
1424 Videoserver Connections
1425 Chelsio Communications Inc
000b T210 Protocol Engine
000c T204 Protocol Engine
0022 10GbE Ethernet Adapter
0030 T310 10GbE Single Port Adapter
103c 705e PCIe 10GBase-SR [AD386A]
0031 T320 10GbE Dual Port Adapter
0032 T302 1GbE Dual Port Adapter
0033 T304 1GbE Quad Port Adapter
0034 B320 10GbE Dual Port Adapter
0035 S310-CR 10GbE Single Port Adapter
0036 S320-LP-CR 10GbE Dual Port Adapter
0037 N320-G2-CR 10GbE Dual Port Adapter
4001 T420-CR Unified Wire Ethernet Controller
4002 T422-CR Unified Wire Ethernet Controller
4003 T440-CR Unified Wire Ethernet Controller
4004
T420-BCH Unified Wire Ethernet Controller
4005 T440-BCH Unified Wire Ethernet Controller
4006 T440-CH Unified Wire Ethernet Controller
4007 T420-SO Unified Wire Ethernet Controller
4008 T420-CX Unified Wire Ethernet Controller
4009 T420-BT Unified Wire Ethernet Controller
400a T404-BT Unified Wire Ethernet Controller
400b B420-SR Unified Wire Ethernet Controller
400c B404-BT Unified Wire Ethernet Controller
400d T480 Unified Wire Ethernet Controller
400e T440-LP-CR Unified Wire Ethernet Controller
400f T440 [Amsterdam] Unified Wire Ethernet Controller
4080 T480-4080 T480 Unified Wire Ethernet Controller
4081 T440F-4081 T440-FCoE Unified Wire Ethernet Controller

4082 T420-4082 Unified Wire Ethernet Controller
4083 T420X-4083 Unified Wire Ethernet Controller
4084 T440-4084 Unified Wire Ethernet Controller
4085 T420-4085 SFP+ Unified Wire Ethernet Controller
4086 T440-4086 10Gbase-T Unified Wire Ethernet Controller
4087 T440T-4087 Unified
Wire Ethernet Controller
4088 T440-4088 Unified Wire Ethernet Controller
4401 T420-CR Unified Wire Ethernet Controller
4402 T422-CR Unified Wire Ethernet Controller
4403 T440-CR Unified Wire Ethernet Controller
4404 T420-BCH Unified Wire Ethernet Controller
4405 T440-BCH Unified Wire Ethernet Controller
4406 T440-CH Unified Wire Ethernet Controller
4407 T420-SO Unified Wire Ethernet Controller
4408 T420-CX Unified Wire Ethernet Controller
4409 T420-BT Unified Wire Ethernet Controller
440a T404-BT Unified Wire Ethernet Controller
440b B420-SR Unified Wire Ethernet Controller
440c B404-BT Unified Wire Ethernet Controller
440d T480 Unified Wire Ethernet Controller
440e T440-LP-CR Unified Wire Ethernet Controller
440f T440 [Amsterdam] Unified Wire Ethernet Controller
4480 T480-4080 T480 Unified Wire Ethernet Controller
4481 T440F-4081 T440-FCoE Unified Wire Ethernet Controller
4482 T420-4082 Unified Wire Ethernet Controller
4483 T420X-4083 Unified
Wire Ethernet Controller
4484 T440-4084 Unified Wire Ethernet Controller
4485 T420-4085 SFP+ Unified Wire Ethernet Controller
4486 T440-4086 10Gbase-T Unified Wire Ethernet Controller
4487 T440T-4087 Unified Wire Ethernet Controller
4488 T440-4088 Unified Wire Ethernet Controller
4501 T420-CR Unified Wire Storage Controller
4502 T422-CR Unified Wire Storage Controller
4503 T440-CR Unified Wire Storage Controller
4504 T420-BCH Unified Wire Storage Controller
4505 T440-BCH Unified Wire Storage Controller
4506 T440-CH Unified Wire Storage Controller
4507 T420-SO Unified Wire Storage Controller
4508 T420-CX Unified Wire Storage Controller
4509 T420-BT Unified Wire Storage Controller
450a T404-BT Unified Wire Storage Controller
450b B420-SR Unified Wire Storage Controller
450c B404-BT Unified Wire Storage Controller
450d T480 Unified Wire Storage Controller
450e T440-LP-CR Unified Wire Storage Controller
450f T440 [Amsterdam] Unified Wire Storage

Controller

- 4580 T480-4080 T480 Unified Wire Storage Controller
- 4581 T440F-4081 T440-FCoE Unified Wire Storage Controller
- 4582 T420-4082 Unified Wire Storage Controller
- 4583 T420X-4083 Unified Wire Storage Controller
- 4584 T440-4084 Unified Wire Storage Controller
- 4585 T420-4085 SFP+ Unified Wire Storage Controller
- 4586 T440-4086 10Gbase-T Unified Wire Storage Controller
- 4587 T440T-4087 Unified Wire Storage Controller
- 4588 T440-4088 Unified Wire Storage Controller
- 4601 T420-CR Unified Wire Storage Controller
- 4602 T422-CR Unified Wire Storage Controller
- 4603 T440-CR Unified Wire Storage Controller
- 4604 T420-BCH Unified Wire Storage Controller
- 4605 T440-BCH Unified Wire Storage Controller
- 4606 T440-CH Unified Wire Storage Controller
- 4607 T420-SO Unified Wire Storage Controller
- 4608 T420-CX Unified Wire Storage Controller
- 4609 T420-BT Unified Wire Storage Controller
- 460a T404-BT Unified Wire Storage Controller
- 460b B420-SR Unified Wire Storage Controller
- 460c
B404-BT Unified Wire Storage Controller
- 460d T480 Unified Wire Storage Controller
- 460e T440-LP-CR Unified Wire Storage Controller
- 460f T440 [Amsterdam] Unified Wire Storage Controller
- 4680 T480-4080 T480 Unified Wire Storage Controller
- 4681 T440F-4081 T440-FCoE Unified Wire Storage Controller
- 4682 T420-4082 Unified Wire Storage Controller
- 4683 T420X-4083 Unified Wire Storage Controller
- 4684 T440-4084 Unified Wire Storage Controller
- 4685 T420-4085 SFP+ Unified Wire Storage Controller
- 4686 T440-4086 10Gbase-T Unified Wire Storage Controller
- 4687 T440T-4087 Unified Wire Storage Controller
- 4688 T440-4088 Unified Wire Storage Controller
- 4701 T420-CR Unified Wire Ethernet Controller
- 4702 T422-CR Unified Wire Ethernet Controller
- 4703 T440-CR Unified Wire Ethernet Controller
- 4704 T420-BCH Unified Wire Ethernet Controller
- 4705 T440-BCH Unified Wire Ethernet Controller
- 4706 T440-CH Unified Wire Ethernet Controller
- 4707 T420-SO Unified Wire Ethernet
Controller
- 4708 T420-CX Unified Wire Ethernet Controller
- 4709 T420-BT Unified Wire Ethernet Controller
- 470a T404-BT Unified Wire Ethernet Controller
- 470b B420-SR Unified Wire Ethernet Controller
- 470c B404-BT Unified Wire Ethernet Controller

470d T480 Unified Wire Ethernet Controller
470e T440-LP-CR Unified Wire Ethernet Controller
470f T440 [Amsterdam] Unified Wire Ethernet Controller
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4784 T440-4084 Unified Wire Ethernet Controller
4785 T420-4085 SFP+ Unified Wire Ethernet Controller
4786 T440-4086 10Gbase-T Unified Wire Ethernet Controller
4787 T440T-4087 Unified Wire Ethernet Controller
4788 T440-4088 Unified Wire Ethernet Controller
4801 T420-CR Unified Wire Ethernet Controller [VF]
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T440-CR Unified Wire Ethernet Controller [VF]
4804 T420-BCH Unified Wire Ethernet Controller [VF]
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4809 T420-BT Unified Wire Ethernet Controller [VF]
480a T404-BT Unified Wire Ethernet Controller [VF]
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SFP+ Unified Wire Ethernet Controller [VF]
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4887 T440T-4087 Unified Wire Ethernet Controller [VF]
4888 T440-4088 Unified Wire Ethernet Controller [VF]
5001 T520-CR Unified Wire Ethernet Controller
193d 1001 510F-B
5002 T522-CR Unified Wire Ethernet Controller
5003 T540-CR Unified Wire Ethernet Controller
5004 T520-BCH Unified Wire Ethernet Controller
5005 T540-BCH Unified Wire Ethernet Controller
5006 T540-CH Unified Wire Ethernet Controller
5007 T520-SO Unified Wire Ethernet Controller
5008 T520-CX Unified Wire Ethernet Controller
5009 T520-BT Unified Wire Ethernet Controller

500a T504-BT Unified Wire Ethernet Controller
500b B520-SR Unified Wire Ethernet Controller
500c B504-BT Unified Wire Ethernet Controller
500d T580-CR Unified Wire Ethernet Controller
500e T540-LP-CR Unified Wire Ethernet Controller
500f T540 [Amsterdam] Unified Wire Ethernet Controller
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Wire Ethernet Controller
5011 T520-LL-CR Unified Wire Ethernet Controller
5012 T560-CR Unified Wire Ethernet Controller
5013 T580-CHR Unified Wire Ethernet Controller
5014 T580-SO-CR Unified Wire Ethernet Controller
5015 T502-BT Unified Wire Ethernet Controller
5016 T580-OCP-SO Unified Wire Ethernet Controller
5017 T520-OCP-SO Unified Wire Ethernet Controller
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509a T520-509A Unified Wire Ethernet Controller
509b T540-509B Unified Wire Ethernet Controller
509c T520-509C Unified Wire Ethernet Controller
509d T540-509D Unified Wire Ethernet Controller
509e T520-509E Unified Wire Ethernet Controller
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Unified Wire Ethernet Controller
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50a6 T522-50A6 Unified Wire Ethernet Controller
50a7 T580-50A7 Unified Wire Ethernet Controller
50a8 T580-50A8 Unified Wire Ethernet Controller
50a9 T580-50A9 Unified Wire Ethernet Controller
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50b0 T520-50B0 Unified Wire Ethernet Controller
5401 T520-CR Unified Wire Ethernet Controller
5402 T522-CR Unified Wire Ethernet Controller
5403 T540-CR Unified Wire Ethernet Controller
5404 T520-BCH Unified Wire Ethernet Controller
5405 T540-BCH Unified Wire Ethernet Controller
5406 T540-CH Unified Wire
Ethernet Controller
5407 T520-SO Unified Wire Ethernet Controller
5408 T520-CX Unified Wire Ethernet Controller
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540b B520-SR Unified Wire Ethernet Controller
540c B504-BT Unified Wire Ethernet Controller
540d T580-CR Unified Wire Ethernet Controller
540e T540-LP-CR Unified Wire Ethernet Controller
540f T540 [Amsterdam] Unified Wire Ethernet Controller
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5411 T520-LL-CR Unified Wire Ethernet Controller
5412 T560-CR Unified Wire Ethernet Controller
5413 T580-CHR Unified Wire Ethernet Controller
5414 T580-SO-CR Unified Wire Ethernet Controller
5415 T502-BT Unified Wire Ethernet Controller
5416 T580-OCP-SO Unified Wire Ethernet Controller
5417 T520-OCP-SO Unified Wire Ethernet Controller
5418 T540-BT Unified Wire Ethernet Controller
5419 T540-LP-BT Unified Wire Ethernet Controller
541a T540-SO-BT Unified Wire Ethernet
Controller
541b T540-SO-CR Unified Wire Ethernet Controller
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5491 T522-5091 Unified Wire Ethernet Controller
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5494 T540-5094 Unified Wire Ethernet Controller
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5497 T520-5097 Unified Wire Ethernet Controller
5498 T580-5098 Unified Wire

Ethernet Controller

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549f T540-509F Unified Wire Ethernet Controller
54a0 T540-50A0 Unified Wire Ethernet Controller
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54a9 T580-50A9 Unified Wire Ethernet Controller
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54ab T520-50AB Unified Wire Ethernet Controller
54ac T540-50AC Unified Wire

Ethernet Controller

54ad T520-50AD Unified Wire Ethernet Controller
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54b0 T520-50B0 Unified Wire Ethernet Controller
5501 T520-CR Unified Wire Storage Controller
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5503 T540-CR Unified Wire Storage Controller
5504 T520-BCH Unified Wire Storage Controller
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5506 T540-CH Unified Wire Storage Controller

5507 T520-SO Unified Wire Storage Controller
5508 T520-CX Unified Wire Storage Controller
5509 T520-BT Unified Wire Storage Controller
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550b B520-SR Unified Wire Storage Controller
550c B504-BT Unified Wire Storage Controller
550d T580-CR Unified Wire Storage Controller
550e T540-LP-CR Unified Wire Storage Controller
550f T540 [Amsterdam] Unified Wire Storage Controller
5510 T580-LP-CR Unified Wire Storage Controller
5511 T520-LL-CR

Unified Wire Storage Controller

5512 T560-CR Unified Wire Storage Controller
5513 T580-CHR Unified Wire Storage Controller
5514 T580-SO-CR Unified Wire Storage Controller
5515 T502-BT Unified Wire Storage Controller
5516 T580-OCP-SO Unified Wire Storage Controller
5517 T520-OCP-SO Unified Wire Storage Controller
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5519 T540-LP-BT Unified Wire Storage Controller
551a T540-SO-BT Unified Wire Storage Controller
551b T540-SO-CR Unified Wire Storage Controller
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Storage Controller

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5599 T580-5099 Unified Wire Storage Controller
559a T520-509A Unified Wire Storage Controller
559b T540-509B Unified Wire Storage Controller
559c T520-509C Unified Wire Storage Controller
559d T540-509D Unified Wire Storage Controller
559e T520-509E Unified Wire Storage Controller

559f T540-509F Unified Wire Storage Controller
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55a3 T580-50A3 Unified Wire Storage Controller
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T540-50A4 Unified Wire Storage Controller
55a5 T522-50A5 Unified Wire Storage Controller
55a6 T522-50A6 Unified Wire Storage Controller
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55b0 T520-50B0 Unified Wire Storage Controller
5601 T520-CR Unified Wire Storage Controller
5602 T522-CR Unified Wire Storage Controller
5603 T540-CR Unified Wire Storage Controller
5604 T520-BCH Unified Wire Storage Controller
5605 T540-BCH Unified Wire Storage Controller
5606 T540-CH Unified Wire Storage Controller
5607 T520-SO Unified Wire Storage Controller
5608 T520-CX Unified Wire Storage
Controller
5609 T520-BT Unified Wire Storage Controller
560a T504-BT Unified Wire Storage Controller
560b B520-SR Unified Wire Storage Controller
560c B504-BT Unified Wire Storage Controller
560d T580-CR Unified Wire Storage Controller
560e T540-LP-CR Unified Wire Storage Controller
560f T540 [Amsterdam] Unified Wire Storage Controller
5610 T580-LP-CR Unified Wire Storage Controller
5611 T520-LL-CR Unified Wire Storage Controller
5612 T560-CR Unified Wire Storage Controller
5613 T580-CHR Unified Wire Storage Controller
5614 T580-SO-CR Unified Wire Storage Controller
5615 T502-BT Unified Wire Storage Controller
5616 T580-OCP-SO Unified Wire Storage Controller
5617 T520-OCP-SO Unified Wire Storage Controller
5618 T540-BT Unified Wire Storage Controller
5619 T540-LP-BT Unified Wire Storage Controller
561a T540-SO-BT Unified Wire Storage Controller
561b T540-SO-CR Unified Wire Storage Controller
5680 T540-5080 Unified Wire Storage Controller

5681

T540-5081 Unified Wire Storage Controller

5682 T504-5082 Unified Wire Storage Controller

5683 T540-5083 Unified Wire Storage Controller

5684 T540-5084 Unified Wire Storage Controller

5685 T580-5085 Unified Wire Storage Controller

5686 T580-5086 Unified Wire Storage Controller

5687 T580-5087 Unified Wire Storage Controller

5688 T570-5088 Unified Wire Storage Controller

5689 T520-5089 Unified Wire Storage Controller

5690 T540-5090 Unified Wire Storage Controller

5691 T522-5091 Unified Wire Storage Controller

5692 T520-5092 Unified Wire Storage Controller

5693 T580-5093 Unified Wire Storage Controller

5694 T540-5094 Unified Wire Storage Controller

5695 T540-5095 Unified Wire Storage Controller

5696 T580-5096 Unified Wire Storage Controller

5697 T520-5097 Unified Wire Storage Controller

5698 T580-5098 Unified Wire Storage Controller

5699 T580-5099 Unified Wire Storage Controller

569a T520-509A Unified Wire Storage Controller

569b T540-509B Unified

Wire Storage Controller

569c T520-509C Unified Wire Storage Controller

569d T540-509D Unified Wire Storage Controller

569e T520-509E Unified Wire Storage Controller

569f T540-509F Unified Wire Storage Controller

56a0 T540-50A0 Unified Wire Storage Controller

56a1 T540-50A1 Unified Wire Storage Controller

56a2 T580-50A2 Unified Wire Storage Controller

56a3 T580-50A3 Unified Wire Storage Controller

56a4 T540-50A4 Unified Wire Storage Controller

56a5 T522-50A5 Unified Wire Storage Controller

56a6 T522-50A6 Unified Wire Storage Controller

56a7 T580-50A7 Unified Wire Storage Controller

56a8 T580-50A8 Unified Wire Storage Controller

56a9 T580-50A9 Unified Wire Storage Controller

56aa T580-50AA Unified Wire Storage Controller

56ab T520-50AB Unified Wire Storage Controller

56ac T540-50AC Unified Wire Storage Controller

56ad T520-50AD Unified Wire Storage Controller

56ae T540-50AE Unified Wire Storage Controller

56af T580-50AF Unified Wire Storage Controller

56b0

T520-50B0 Unified Wire Storage Controller

5701 T520-CR Unified Wire Ethernet Controller

5702 T522-CR Unified Wire Ethernet Controller

5703 T540-CR Unified Wire Ethernet Controller

5704 T520-BCH Unified Wire Ethernet Controller
5705 T540-BCH Unified Wire Ethernet Controller
5706 T540-CH Unified Wire Ethernet Controller
5707 T520-SO Unified Wire Ethernet Controller
5708 T520-CX Unified Wire Ethernet Controller
5709 T520-BT Unified Wire Ethernet Controller
570a T504-BT Unified Wire Ethernet Controller
570b B520-SR Unified Wire Ethernet Controller
570c B504-BT Unified Wire Ethernet Controller
570d T580-CR Unified Wire Ethernet Controller
570e T540-LP-CR Unified Wire Ethernet Controller
570f T540 [Amsterdam] Unified Wire Ethernet Controller
5710 T580-LP-CR Unified Wire Ethernet Controller
5711 T520-LL-CR Unified Wire Ethernet Controller
5712 T560-CR Unified Wire Ethernet Controller
5713 T580-CR Unified Wire Ethernet Controller
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Unified Wire Ethernet Controller
5715 T502-BT Unified Wire Ethernet Controller
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5794 T540-5094 Unified Wire Ethernet Controller
5795 T540-5095 Unified Wire Ethernet Controller
5796 T580-5096 Unified Wire Ethernet Controller
5797 T520-5097 Unified Wire Ethernet Controller
5801 T520-CR
Unified Wire Ethernet Controller [VF]
5802 T522-CR Unified Wire Ethernet Controller [VF]
5803 T540-CR Unified Wire Ethernet Controller [VF]
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5813 T580-CHR Unified Wire Ethernet Controller
[VF]
5814 T580-SO-CR Unified Wire Ethernet Controller [VF]
5815 T502-BT Unified Wire Ethernet Controller [VF]
5816 T580-OCP-SO Unified Wire Ethernet Controller [VF]
5817 T520-OCP-SO Unified Wire Ethernet Controller [VF]
5818 T540-BT Unified Wire Ethernet Controller [VF]
5819 T540-LP-BT Unified Wire Ethernet Controller [VF]
581a T540-SO-BT Unified Wire Ethernet Controller [VF]
581b T540-SO-CR Unified Wire Ethernet Controller [VF]
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5890 T540-5090 Unified Wire Ethernet Controller [VF]
5891 T522-5091 Unified Wire Ethernet Controller [VF]
5892 T520-5092 Unified Wire Ethernet Controller [VF]
5893 T580-5093 Unified Wire Ethernet Controller [VF]
5894 T540-5094 Unified Wire Ethernet Controller [VF]
5895 T540-5095 Unified Wire Ethernet Controller [VF]
5896 T580-5096 Unified Wire Ethernet Controller [VF]
5897 T520-5097 Unified Wire Ethernet Controller [VF]
5898 T580-5098 Unified Wire Ethernet Controller [VF]
5899 T580-5099 Unified Wire Ethernet Controller [VF]
589a T520-509A Unified Wire Ethernet Controller [VF]
589b T540-509B Unified Wire Ethernet Controller [VF]
589c T520-509C Unified Wire Ethernet Controller [VF]
589d T540-509D Unified Wire Ethernet Controller [VF]
589e T520-509E Unified Wire Ethernet Controller [VF]
589f T540-509F Unified Wire Ethernet Controller [VF]
58a0 T540-50A0 Unified Wire Ethernet Controller [VF]
58a1 T540-50A1 Unified Wire Ethernet Controller [VF]
58a2

T580-50A2 Unified Wire Ethernet Controller [VF]
58a3 T580-50A3 Unified Wire Ethernet Controller [VF]
58a4 T540-50A4 Unified Wire Ethernet Controller [VF]
58a5 T522-50A5 Unified Wire Ethernet Controller [VF]
58a6 T522-50A6 Unified Wire Ethernet Controller [VF]
58a7 T580-50A7 Unified Wire Ethernet Controller [VF]
58a8 T580-50A8 Unified Wire Ethernet Controller [VF]
58a9 T580-50A9 Unified Wire Ethernet Controller [VF]
58aa T580-50AA Unified Wire Ethernet Controller [VF]
58ab T520-50AB Unified Wire Ethernet Controller [VF]
58ac T540-50AC Unified Wire Ethernet Controller [VF]
58ad T520-50AD Unified Wire Ethernet Controller [VF]
58ae T540-50AE Unified Wire Ethernet Controller [VF]
58af T580-50AF Unified Wire Ethernet Controller [VF]
58b0 T520-50B0 Unified Wire Ethernet Controller [VF]
6001 T6225-CR Unified Wire Ethernet Controller
6002 T6225-SO-CR Unified Wire Ethernet Controller
6003 T6425-CR Unified Wire Ethernet Controller
6004 T6425-SO-CR Unified Wire Ethernet Controller
6005 T6225-OCP-SO Unified Wire Ethernet Controller
6006 T62100-OCP-SO Unified Wire Ethernet Controller
6007 T62100-LP-CR Unified Wire Ethernet Controller
6008 T62100-SO-CR Unified Wire Ethernet Controller
6009 T6210-BT Unified Wire Ethernet Controller
600d T62100-CR Unified Wire Ethernet Controller
6011 T6225-LL-CR Unified Wire Ethernet Controller
6014 T61100-OCP-SO Unified Wire Ethernet Controller
6015 T6201-BT Unified Wire Ethernet Controller
6080 T6225-6080 Unified Wire Ethernet Controller
6081 T62100-6081 Unified Wire Ethernet Controller
6082 T6225-6082 Unified Wire Ethernet Controller
6083 T62100-6083 Unified Wire Ethernet Controller
6084 T64100-6084 Unified Wire Ethernet Controller
6085 T6240-6085 Unified Wire Ethernet Controller
6086 T6225-6086 Unified Wire Ethernet Controller
6087 T6225-6087 Unified Wire Ethernet Controller
6088 T62100-6088 Unified Wire Ethernet Controller
6089 T62100-6089 Unified Wire Ethernet Controller
608a
T62100-608a Unified Wire Ethernet Controller
6401 T6225-CR Unified Wire Ethernet Controller
6402 T6225-SO-CR Unified Wire Ethernet Controller
6403 T6425-CR Unified Wire Ethernet Controller
6404 T6425-SO-CR Unified Wire Ethernet Controller
6405 T6225-OCP-SO Unified Wire Ethernet Controller
6406 T62100-OCP-SO Unified Wire Ethernet Controller
6407 T62100-LP-CR Unified Wire Ethernet Controller

6408 T62100-SO-CR Unified Wire Ethernet Controller
6409 T6210-BT Unified Wire Ethernet Controller
640d T62100-CR Unified Wire Ethernet Controller
6411 T6225-LL-CR Unified Wire Ethernet Controller
6414 T61100-OCP-SO Unified Wire Ethernet Controller
6415 T6201-BT Unified Wire Ethernet Controller
6480 T6225-6080 Unified Wire Ethernet Controller
6481 T62100-6081 Unified Wire Ethernet Controller
6482 T6225-6082 Unified Wire Ethernet Controller
6483 T62100-6083 Unified Wire Ethernet Controller
6484 T64100-6084 Unified Wire Ethernet Controller
6485 T6240-6085

Unified Wire Ethernet Controller

6486 T6225-6086 Unified Wire Ethernet Controller
6487 T6225-6087 Unified Wire Ethernet Controller
6488 T62100-6088 Unified Wire Ethernet Controller
6489 T62100-6089 Unified Wire Ethernet Controller
648a T62100-608a Unified Wire Ethernet Controller
6501 T6225-CR Unified Wire Storage Controller
6502 T6225-SO-CR Unified Wire Storage Controller
6503 T6425-CR Unified Wire Storage Controller
6504 T6425-SO-CR Unified Wire Storage Controller
6505 T6225-OCP-SO Unified Wire Storage Controller
6506 T62100-OCP-SO Unified Wire Storage Controller
6507 T62100-LP-CR Unified Wire Storage Controller
6508 T62100-SO-CR Unified Wire Storage Controller
6509 T6210-BT Unified Wire Storage Controller
650d T62100-CR Unified Wire Storage Controller
6511 T6225-LL-CR Unified Wire Storage Controller
6514 T61100-OCP-SO Unified Wire Storage Controller
6515 T6201-BT Unified Wire Storage Controller
6580 T6225-6080 Unified Wire Storage Controller
6581

T62100-6081 Unified Wire Storage Controller
6582 T6225-6082 Unified Wire Storage Controller
6583 T62100-6083 Unified Wire Storage Controller
6584 T64100-6084 Unified Wire Storage Controller
6585 T6240-6085 Unified Wire Storage Controller
6586 T6225-6086 Unified Wire Storage Controller
6587 T6225-6087 Unified Wire Storage Controller
6588 T62100-6088 Unified Wire Storage Controller
6589 T62100-6089 Unified Wire Storage Controller
658a T62100-608a Unified Wire Storage Controller
6601 T6225-CR Unified Wire Storage Controller
6602 T6225-SO-CR Unified Wire Storage Controller
6603 T6425-CR Unified Wire Storage Controller
6604 T6425-SO-CR Unified Wire Storage Controller
6605 T6225-OCP-SO Unified Wire Storage Controller

6606 T62100-OCP-SO Unified Wire Storage Controller
6607 T62100-LP-CR Unified Wire Storage Controller
6608 T62100-SO-CR Unified Wire Storage Controller
6609 T6210-BT Unified Wire Storage Controller
660d T62100-CR Unified Wire Storage Controller
6611
T6225-LL-CR Unified Wire Storage Controller
6614 T61100-OCP-SO Unified Wire Storage Controller
6615 T6201-BT Unified Wire Storage Controller
6680 T6225-6080 Unified Wire Storage Controller
6681 T62100-6081 Unified Wire Storage Controller
6682 T6225-6082 Unified Wire Storage Controller
6683 T62100-6083 Unified Wire Storage Controller
6684 T64100-6084 Unified Wire Storage Controller
6685 T6240-6085 Unified Wire Storage Controller
6686 T6225-6086 Unified Wire Storage Controller
6687 T6225-6087 Unified Wire Storage Controller
6688 T62100-6088 Unified Wire Storage Controller
6689 T62100-6089 Unified Wire Storage Controller
668a T62100-608a Unified Wire Storage Controller
6801 T6225-CR Unified Wire Ethernet Controller [VF]
6802 T6225-SO-CR Unified Wire Ethernet Controller [VF]
6803 T6425-CR Unified Wire Ethernet Controller [VF]
6804 T6425-SO-CR Unified Wire Ethernet Controller [VF]
6805 T6225-OCP-SO Unified Wire Ethernet Controller [VF]
6806
T62100-OCP-SO Unified Wire Ethernet Controller [VF]
6807 T62100-LP-CR Unified Wire Ethernet Controller [VF]
6808 T62100-SO-CR Unified Wire Ethernet Controller [VF]
6809 T6210-BT Unified Wire Ethernet Controller [VF]
680d T62100-CR Unified Wire Ethernet Controller [VF]
6811 T6225-LL-CR Unified Wire Ethernet Controller [VF]
6814 T61100-OCP-SO Unified Wire Ethernet Controller [VF]
6815 T6201-BT Unified Wire Ethernet Controller [VF]
6880 T6225-6080 Unified Wire Ethernet Controller [VF]
6881 T62100-6081 Unified Wire Ethernet Controller [VF]
6882 T6225-6082 Unified Wire Ethernet Controller [VF]
6883 T62100-6083 Unified Wire Ethernet Controller [VF]
6884 T64100-6084 Unified Wire Ethernet Controller [VF]
6885 T6240-6085 Unified Wire Ethernet Controller [VF]
6886 T6225-6086 Unified Wire Ethernet Controller [VF]
6887 T6225-6087 Unified Wire Ethernet Controller [VF]
6888 T62100-6088 Unified Wire Ethernet Controller [VF]
6889 T62100-6089 Unified Wire Ethernet
Controller [VF]
688a T62100-608a Unified Wire Ethernet Controller [VF]
a000 PE10K Unified Wire Ethernet Controller
1426 Storage Technology Corp.

1427 Better On-Line Solutions
1428 Edec Co Ltd
1429 Unex Technology Corp.
142a Kingmax Technology Inc
142b Radiolan
142c Minton Optic Industry Co Ltd
142d Pix stream Inc
142e Vitec Multimedia
4020 VM2-2 [Video Maker 2] MPEG1/2 Encoder
4337 VM2-2-C7 [Video Maker 2 rev. C7] MPEG1/2 Encoder
142f Radicom Research Inc
1430 ITT Aerospace/Communications Division
1431 Gilat Satellite Networks
1432 Edimax Computer Co.
9130 RTL81xx Fast Ethernet
1433 Eltec Elektronik GmbH
Nee Real Time Devices US Inc.
1435 RTD Embedded Technologies, Inc.
4520 PCI4520
6020 SPM6020
6030 SPM6030
6420 SPM186420
6430 SPM176430
6431 SPM176431
7520 DM7520
7540 SDM7540
7820 DM7820
1436 CIS Technology Inc
1437 Nissin Inc Co
1438 Atmel-dream
1439 Outsource Engineering & Mfg. Inc
143a Stargate Solutions Inc
143b Canon Research Center,
America
143c Amlogic Inc
143d Tamarack Microelectronics Inc
143e Jones Futurex Inc
143f Lightwell Co Ltd - Zax Division
1440 ALGOL Corp.
1441 AGIE Ltd
1442 Phoenix Contact GmbH & Co.
1443 Unibrain S.A.
1444 TRW
1445 Logical DO Ltd
1446 Graphin Co Ltd
1447 AIM GmbH
1448 Alesis Studio Electronics
1449 TUT Systems Inc

144a Adlink Technology
6208 PCI-6208V
7250 PCI-7250
7296 PCI-7296
7432 PCI-7432
7433 PCI-7433
7434 PCI-7434
7841 PCI-7841
8133 PCI-8133
8164 PCI-8164
8554 PCI-8554
9111 PCI-9111
9113 PCI-9113
9114 PCI-9114
2-16 MB SRAM, 4x UART, I2C, misc I/O
a001 ADi-BSEC
nee Loronix Information Systems Inc.
144b Verint Systems Inc.
144c Catalina Research Inc
144d Samsung Electronics Co Ltd
1600 Apple PCIe SSD
a800 XP941 PCIe SSD
a802 NVMe SSD Controller SM951/PM951
a804 NVMe SSD Controller SM961/PM961
a808 NVMe SSD Controller SM981/PM981/PM983
1d49 403b Thinksystem U.2 PM983 NVMe SSD
a820 NVMe SSD Controller 171X
1028
1f95 Express Flash NVMe XS1715 SSD 400GB
1028 1f96 Express Flash NVMe XS1715 SSD 800GB
1028 1f97 Express Flash NVMe XS1715 SSD 1600GB
1028 1fa4 Express Flash NVMe SM1715 3.2TB SFF
1028 1fa6 Express Flash NVMe SM1715 3.2TB AIC
1028 1fba Express Flash NVMe SM1715 800GB SFF
1028 1fbb Express Flash NVMe SM1715 1.6TB SFF
1028 1fbc Express Flash NVMe SM1715 1.6TB AIC
a821 NVMe SSD Controller 172X
1028 1fb7 Express Flash NVMe PM1725 3.2TB SFF
1028 1fb8 Express Flash NVMe PM1725 3.2TB AIC
1028 1fb9 Express Flash NVMe PM1725 6.4TB AIC
1028 1fc1 Express Flash NVMe PM1725 800GB SFF
1028 1fc2 Express Flash NVMe PM1725 1.6TB SFF
1028 1fc4 Express Flash NVMe PM1725 1.6TB AIC
a822 NVMe SSD Controller 172Xa/172Xb
1014 0621 PCIe3 1.6TB NVMe Flash Adapter II x8
1014 0622 PCIe3 3.2TB NVMe Flash Adapter II x8
1014 0629 PCIe3 6.4TB NVMe Flash Adapter II x8
1014 064a PCIe3 1.6TB NVMe Flash Adapter III x8

1014 064b PCIe3 3.2TB NVMe Flash Adapter III
x8
1014 064c PCIe3 6.4TB NVMe Flash Adapter III x8
1028 1fd9 Express Flash PM1725a 800GB SFF
1028 1fda Express Flash PM1725a 1.6TB SFF
1028 1fdb Express Flash PM1725a 3.2TB SFF
1028 1fdc Express Flash PM1725a 6.4TB SFF
1028 1fdd Express Flash PM1725a 1.6TB AIC
1028 1fde Express Flash PM1725a 3.2TB AIC
1028 1fdf Express Flash PM1725a 6.4TB AIC
1028 1ff3 Express Flash PM1725b 1.6TB SFF
1028 1ff4 Express Flash PM1725b 3.2TB SFF
1028 1ff5 Express Flash PM1725b 6.4TB SFF
1028 1ff6 Express Flash PM1725b 12.8TB SFF
1028 1ff7 Express Flash PM1725b 1.6TB AIC
1028 1ff8 Express Flash PM1725b 3.2TB AIC
1028 1ff9 Express Flash PM1725b 6.4TB AIC
1028 1ffa Express Flash PM1725b 12.8TB AIC
a824 NVMe SSD Controller PM173X
1028 2040 EMC PowerEdge Express Flash Ent NVMe AGN SED MU U.2 Gen4 1.6TB / AGN MU U.2 Gen4
1.6TB
1028 2041 EMC PowerEdge Express Flash Ent NVMe AGN SED MU U.2 Gen4 3.2TB
1028 2042 EMC PowerEdge Express Flash Ent NVMe AGN SED
MU U.2 Gen4 6.4TB
1028 2043 EMC PowerEdge Express Flash Ent NVMe AGN SED MU U.2 Gen4 12.8TB
1028 2044 EMC PowerEdge Express Flash Ent NVMe AGN SED MU AIC Gen4 1.6TB
1028 2045 EMC PowerEdge Express Flash Ent NVMe AGN SED MU AIC Gen4 3.2TB
1028 2046 EMC PowerEdge Express Flash Ent NVMe AGN SED MU AIC Gen4 6.4TB
1028 2070 EMC PowerEdge Express Flash Ent NVMe AGN SED RI U.2 Gen4 1.92TB
1028 2071 EMC PowerEdge Express Flash Ent NVMe AGN SED RI U.2 Gen4 3.84TB
1028 2072 EMC PowerEdge Express Flash Ent NVMe AGN SED RI U.2 Gen4 7.68TB
144e OLITEC
144f Askey Computer Corp.
1450 Octave Communications Ind.
1451 SP3D Chip Design GmBH
1453 MYCOM Inc
1454 Altiga Networks
1455 Logic Plus Plus Inc
1456 Advanced Hardware Architectures
1457 Nuera Communications Inc
1458 Gigabyte Technology Co., Ltd
1459 DOOIN Electronics
145a Escalate Networks Inc
145b PRAIM SRL
145c Cryptek
145d Gallant Computer Inc
145e Aashima Technology B.V.
145f Baldor Electric Company

0001 NextMove
PCI
1460 DYNARC INC
1461 Avermedia Technologies Inc
a3ce M179
a3cf M179
a836 M115 DVB-T, PAL/SECAM/NTSC Tuner
e836 M115S Hybrid Analog/DVB PAL/SECAM/NTSC Tuner
f436 AVerTV Hybrid+FM
1462 Micro-Star International Co., Ltd. [MSI]
aaf0 Radeon RX 580 Gaming X 8G
1463 Fast Corporation
1464 Interactive Circuits & Systems Ltd
1465 GN NETTEST Telecom DIV.
1466 Designpro Inc.
1467 DIGICOM SPA
1468 AMBIT Microsystem Corp.
1469 Cleveland Motion Controls
formerly IFR.
146a Aeroflex
1.5 GHz to 3.0 GHz x 1Hz
3010 3010 RF Synthesizer
3a11 3011A PXI RF Synthesizer
146b Parascan Technologies Ltd
146c Ruby Tech Corp.
1430 FE-1430TX Fast Ethernet PCI Adapter
146d Tachyon, INC.
146e Williams Electronics Games, Inc.
146f Multi Dimensional Consulting Inc
1470 Bay Networks
1471 Integrated Telecom Express Inc
1472 DAIKIN Industries, Ltd
1473 ZAPEX Technologies Inc
1474 Doug Carson & Associates
1475 PICAZO Communications
1476 MORTARA Instrument Inc
1477 Net
Insight
1478 DIATREND Corporation
1479 TORAY Industries Inc
147a FORMOSA Industrial Computing
147b ABIT Computer Corp.
1084 IP35 [Dark Raider]
147c AWARE, Inc.
147d Interworks Computer Products
147e Matsushita Graphic Communication Systems, Inc.
147f NIHON UNISYS, Ltd.
1480 SCII Telecom

1481 BIOPAC Systems Inc
1482 ISYTEC - Integrierte Systemtechnik GmbH
0001 PCI-16 Host Interface for ITC-16
1483 LABWAY Corporation
1484 Logic Corporation
1485 ERMA - Electronic GmbH
1486 L3 Communications Telemetry & Instrumentation
1487 MARQUETTE Medical Systems
1489 KYE Systems Corporation
148a OPTO
148b INNOMEDIALOGIC Inc.
148c Tul Corporation / PowerColor
148d DIGICOM Systems, Inc.
1003 HCF 56k Data/Fax Modem
148e OSI Plus Corporation
148f Plant Equipment, Inc.
1490 Stone Microsystems PTY Ltd.
1491 ZEAL Corporation
1492 Time Logic Corporation
1493 MAKER Communications
1494 WINTOP Technology, Inc.
1495 TOKAI Communications Industry Co. Ltd
1496 JOYTECH Computer Co.,
Ltd.
1497 SMA Regelsysteme GmbH
1497 SMA Technologie AG
1498 TEWS Technologies GmbH
0330 TPMC816 2 Channel CAN bus controller.
035d TPMC861 4-Channel Isolated Serial Interface RS422/RS485
0385 TPMC901 Extended CAN bus with 2/4/6 CAN controller
21cc TCP460 CompactPCI 16 Channel Serial Interface RS232/RS422
21cd TCP461 CompactPCI 8 Channel Serial Interface RS232/RS422
3064 TPCI100 (2 Slot IndustryPack PCI Carrier)
30c8 TPCI200 4 Slot IndustryPack PCI Carrier
70c8 TPCE200 4 Slot IndustryPack PCIe Carrier
9177 TXMC375 8 channel RS232/RS422/RS485 programmable serial interface
1499 EMTEC CO., Ltd
149a ANDOR Technology Ltd
149b SEIKO Instruments Inc
149c OVISLINK Corp.
149d NEWTEK Inc
0001 Video Toaster for PC
149e Mapletree Networks Inc.
149f LECTRON Co Ltd
14a0 SOFTING GmbH
14a1 Systembase Co Ltd
14a2 Millennium Engineering Inc
14a3 Maverick Networks

14a4 Lite-On Technology Corporation
22f1 M8Pe Series NVMe SSD
Wrong vendor ID used
4318 Broadcom
BCM4318 [AirForce One 54g] 802.11g WLAN Controller
14a5 XIONICS Document Technologies Inc
14a6 INOVA Computers GmbH & Co KG
14a7 MYTHOS Systems Inc
14a8 FEATRON Technologies Corporation
14a9 HIVERTEC Inc
14aa Advanced MOS Technology Inc
14ab Mentor Graphics Corp.
14ac Novaweb Technologies Inc
14ad Time Space Radio AB
14ae CTI, Inc
14af Guillemot Corporation
7102 3D Prophet II MX
14b0 BST Communication Technology Ltd
14b1 Nextcom K.K.
14b2 ENNOVATE Networks Inc
14b3 XPEED Inc
0000 DSL NIC
14b4 PHILIPS Business Electronics B.V.
14b5 Creamware GmbH
0200 Scope
0300 Pulsar
0400 PulsarSRB
0600 Pulsar2
0800 DSP-Board
0900 DSP-Board
0a00 DSP-Board
0b00 DSP-Board
14b6 Quantum Data Corp.
14b7 PROXIM Inc
0001 Symphony 4110
14b8 Techsoft Technology Co Ltd
14b9 Cisco Aironet Wireless Communications
0001 PC4800
0340 PC4800
0350 350 series 802.11b Wireless LAN Adapter
4500 PC4500
4800 Cisco Aironet 340 802.11b Wireless LAN Adapter/Aironet PC4800
a504
Cisco Aironet Wireless 802.11b
a505 Cisco Aironet CB20a 802.11a Wireless LAN Adapter
a506 Cisco Aironet Mini PCI b/g
14ba INTERNIX Inc.
ARCNET interface card based on SMSC COM20022 chip and manufactured for SMSC Japan

0600 ARC-PCI/22
14bb SEMTECH Corporation
14bc Globespan Semiconductor Inc.
d002 Pulsar [PCI ADSL Card]
d00f Pulsar [PCI ADSL Card]
14bd CARDIO Control N.V.
14be L3 Communications
14bf SPIDER Communications Inc.
14c0 COMPAL Electronics Inc
1201 X550 10Gb 2P RJ45 OCP Mezz
now owned by CSP, Inc.
14c1 MYRICOM Inc.
0008 Myri-10G Dual-Protocol NIC
14c1 0008 10G-PCIE-8A
14c1 0009 10G-PCIE-8A (MSI-X firmware)
14c1 000a 10G-PCIE-8B
8043 Myrinet 2000 Scalable Cluster Interconnect
103c 1240 Myrinet M2L-PCI64/2-3.0 LANai 7.4 (HP OEM)
14c2 DTK Computer
14c3 MEDIATEK Corp.
7630 MT7630e 802.11bgn Wireless Network Adapter
MT7612E too?
7662 MT7662E 802.11ac PCI Express Wireless Network Adapter
14c4 IWASAKI Information Systems Co Ltd
14c5
Automation Products AB
14c6 Data Race Inc
14c7 Modular Technology Holdings Ltd
14c8 Turbocomm Tech. Inc.
14c9 ODIN Telesystems Inc
14ca PE Logic Corp.
14cb Billionton Systems Inc
14cc NAKAYO Telecommunications Inc
14cd Universal Global Scientific Industrial Co.,Ltd
0001 USI-1514-1GbaseT [OCP1]
0002 USI-4227-SFP [OCP2]
0003 USI-X557-10GbaseT [OCP3]
14ce Whistle Communications
14cf TEK Microsystems Inc.
14d0 Ericsson Axe R & D
14d1 Computer Hi-Tech Co Ltd
14d2 Titan Electronics Inc
8001 VScom 010L 1 port parallel adaptor
8002 VScom 020L 2 port parallel adaptor
8010 VScom 100L 1 port serial adaptor
8011 VScom 110L 1 port serial and 1 port parallel adaptor
8020 VScom 200L 1 or 2 port serial adaptor
8021 VScom 210L 2 port serial and 1 port parallel adaptor

8028 VScom 200I/200I-SI 2-port serial adapter
8040 VScom 400L 4 port serial adaptor
8043 VScom 430L 4-port serial and 3-port parallel adapter
8048 VScom 400I 4-port serial adapter
8080 VScom 800L
8 port serial adaptor
8088 VScom 800I 8-port serial adapter
a000 VScom 010H 1 port parallel adaptor
a001 VScom 100H 1 port serial adaptor
a003 VScom 400H 4 port serial adaptor
a004 VScom 400HF1 4 port serial adaptor
a005 VScom 200H 2 port serial adaptor
a007 VScom PCI800EH (PCIe) 8-port serial adapter Port 1-4
a008 VScom PCI800EH (PCIe) 8-port serial adapter Port 5-8
a009 VScom PCI400EH (PCIe) 4-port serial adapter
e001 VScom 010HV2 1 port parallel adaptor
e010 VScom 100HV2 1 port serial adaptor
e020 VScom 200HV2 2 port serial adaptor
14d3 CIRTECH (UK) Ltd
0002 DTL-T14000 Rev. 1 [PS2 TOOL CD/DVD Emulator]
0003 DTL-T14000 Rev. 2 [PS2 TOOL CD/DVD Emulator]
0004 DTL-T14000 Rev. 3 [PS2 TOOL CD/DVD Emulator]
14d4 Panacom Technology Corp
14d5 Nitsuko Corporation
14d6 Accusys Inc
6101 ACS-61xxx, PCIe to SAS/SATA RAID HBA
6201 ACS-62xxx, External PCIe to SAS/SATA RAID controller
14d7 Hirakawa Hewtech Corp
14d8 HOPF Elektronik GmbH
Formerly SiPackets,
Inc., formerly API NetWorks, Inc., formerly Alpha Processor, Inc.
14d9 Alliance Semiconductor Corporation
0010 AP1011/SP1011 HyperTransport-PCI Bridge [Sturgeon]
9000 AS90L10204/10208 HyperTransport to PCI-X Bridge
14da National Aerospace Laboratories
14db AFAVLAB Technology Inc
2120 TK9902
2182 AFAVLAB Technology Inc. 8-port serial card
14dc Amplicon Liveline Ltd
0000 PCI230
0001 PCI242
0002 PCI244
0003 PCI247
0004 PCI248
0005 PCI249
0006 PCI260
0007 PCI224
0008 PCI234

0009 PCI236
000a PCI272
000b PCI215
14dd Boulder Design Labs Inc
14de Applied Integration Corporation
14df ASIC Communications Corp
14e1 INVERTEX
14e2 INFOLIBRIA
14e3 AMTELCO
14e4 Broadcom Inc. and subsidiaries
0576 BCM43224 802.11a/b/g/n
0800 Sentry5 Chipcommon I/O Controller
0804 Sentry5 PCI Bridge
0805 Sentry5 MIPS32 CPU
0806 Sentry5 Ethernet Controller
080b Sentry5 Crypto Accelerator
080f Sentry5 DDR/SDR RAM Controller
0811 Sentry5 External Interface Core
0816
BCM3302 Sentry5 MIPS32 CPU
1570 720p FaceTime HD Camera
1600 NetXtreme BCM5752 Gigabit Ethernet PCI Express
1028 01c1 Precision 490
1028 01c2 Latitude D620
103c 3015 PCIe LAN on Motherboard
107b 5048 E4500 Onboard
1259 2705 AT-2711FX
1601 NetXtreme BCM5752M Gigabit Ethernet PCI Express
1604 BCM5745X NetXtreme-E Ethernet Partition
1605 BCM5745X NetXtreme-E RDMA Partition
1606 BCM5745X NetXtreme-E RDMA Virtual Function
1609 BCM5745X NetXtreme-E Ethernet Virtual Function
1612 BCM70012 Video Decoder [Crystal HD]
1614 BCM57454 NetXtreme-E 10Gb/25Gb/40Gb/50Gb/100Gb Ethernet
1615 BCM70015 Video Decoder [Crystal HD]
1639 NetXtreme II BCM5709 Gigabit Ethernet
1028 0235 PowerEdge R710 BCM5709 Gigabit Ethernet
1028 0236 PowerEdge R610 BCM5709 Gigabit Ethernet
1028 0237 PowerEdge T610 BCM5709 Gigabit Ethernet
103c 7055 NC382i Integrated Multi-port PCI Express Gigabit Server Adapter
103c 7059 NC382T PCIe Dual Port Multifunction Gigabit Server
Adapter
10a9 8027 Quad port Gigabit Ethernet Controller
163a NetXtreme II BCM5709S Gigabit Ethernet
1028 027b PowerEdge M805 Broadcom NetXtreme II BCM5709S
1028 029c PowerEdge M710 BCM5709S Gigabit Ethernet
103c 171d NC382m Dual Port 1GbE Multifunction BL-c Adapter
103c 7056 NC382i Integrated Quad Port PCI Express Gigabit Server Adapter

1259 2984 AT-2973SX
163b NetXtreme II BCM5716 Gigabit Ethernet
1028 028c PowerEdge R410 BCM5716 Gigabit Ethernet
1028 028d PowerEdge T410 BCM5716 Gigabit Ethernet
1028 02f1 PowerEdge R510 BCM5716 Gigabit Ethernet
163c NetXtreme II BCM5716S Gigabit Ethernet
163d NetXtreme II BCM57811 10-Gigabit Ethernet
1043 858a PEB-10G/57811-1S
163e NetXtreme II BCM57811 10 Gigabit Ethernet Multi Function
163f NetXtreme II BCM57811 10-Gigabit Ethernet Virtual Function
1641 NetXtreme BCM57787 Gigabit Ethernet PCIe
1642 NetXtreme BCM57764 Gigabit Ethernet PCIe
1643 NetXtreme BCM5725 Gigabit Ethernet PCIe
1644 NetXtreme
BCM5700 Gigabit Ethernet
1014 0277 Broadcom Vigil B5700 1000Base-T
1028 00d1 Broadcom BCM5700
1028 0106 Broadcom BCM5700
1028 0109 Broadcom BCM5700 1000Base-T
1028 010a Broadcom BCM5700 1000BaseTX
10b7 1000 3C996-T 1000Base-T
10b7 1001 3C996B-T 1000Base-T
10b7 1002 3C996C-T 1000Base-T
10b7 1003 3C997-T 1000Base-T Dual Port
10b7 1004 3C996-SX 1000Base-SX
10b7 1005 3C997-SX 1000Base-SX Dual Port
10b7 1008 3C942 Gigabit LOM (31X31)
14e4 0002 NetXtreme 1000Base-SX
14e4 0003 NetXtreme 1000Base-SX
14e4 0004 NetXtreme 1000Base-T
14e4 1028 NetXtreme 1000BaseTX
14e4 1644 BCM5700 1000Base-T
1645 NetXtreme BCM5701 Gigabit Ethernet
0e11 007c NC7770 Gigabit Server Adapter (PCI-X, 10/100/1000-T)
0e11 007d NC6770 Gigabit Server Adapter (PCI-X, 1000-SX)
0e11 0085 NC7780 Gigabit Server Adapter (embedded, WOL)
0e11 0099 NC7780 Gigabit Server Adapter (embedded, WOL)
0e11 009a NC7770 Gigabit Server Adapter (PCI-X, 10/100/1000-T)
0e11 00c1
NC6770 Gigabit Server Adapter (PCI-X, 1000-SX)
1028 0121 Broadcom BCM5701 1000Base-T
103c 128a BCM5701 1000Base-T (HP, OEM 3COM)
103c 128b 1000Base-SX (PCI) [A7073A]
103c 12a4 Core Lan 1000Base-T
103c 12c1 IOX Core Lan 1000Base-T [A7109AX]
103c 1300 Core LAN/SCSI Combo [A6794A]
10a9 8010 IO9/IO10 Gigabit Ethernet (Copper)
10a9 8011 Gigabit Ethernet (Copper)

10a9 8012 Gigabit Ethernet (Fiber)
10b7 1004 3C996-SX 1000Base-SX
10b7 1006 3C996B-T 1000Base-T
10b7 1007 3C1000-T 1000Base-T
10b7 1008 3C940-BR01 1000Base-T
14e4 0001 BCM5701 1000Base-T
14e4 0005 BCM5701 1000Base-T
14e4 0006 BCM5701 1000Base-T
14e4 0007 BCM5701 1000Base-SX
14e4 0008 BCM5701 1000Base-T
14e4 1645 NetXtreme BCM5701 Gigabit Ethernet
14e4 8008 BCM5701 1000Base-T
1646 NetXtreme BCM5702 Gigabit Ethernet
0e11 00bb NC7760 1000BaseTX
1028 0126 Broadcom BCM5702 1000BaseTX
14e4 8009 BCM5702 1000BaseTX
1647 NetXtreme BCM5703 Gigabit Ethernet
0e11 0099
NC7780 1000BaseTX
0e11 009a NC7770 1000BaseTX
10a9 8010 IO9 Gigabit Ethernet (Copper)
14e4 0009 BCM5703 1000BaseTX
14e4 000a BCM5703 1000BaseSX
14e4 000b BCM5703 1000BaseTX
14e4 8009 BCM5703 1000BaseTX
14e4 800a BCM5703 1000BaseTX
1648 NetXtreme BCM5704 Gigabit Ethernet
0e11 00cf NC7772 Gigabit Server Adapter (PCI-X, 10,100,1000-T)
0e11 00d0 NC7782 Gigabit Server Adapter (PCI-X, 10,100,1000-T)
0e11 00d1 NC7783 Gigabit Server Adapter (PCI-X, 10,100,1000-T)
1028 014a PowerEdge 1750
1028 0170 PowerEdge 6850 Broadcom NetXtreme BCM5704
103c 310f NC7782 Gigabit Server Adapter (PCI-X, 10,100,1000-T)
10a9 8013 Dual Port Gigabit Ethernet (PCI-X,Copper)
10a9 8018 Dual Port Gigabit Ethernet (A330)
10a9 801a Dual Port Gigabit Ethernet (IA-blade)
10a9 801b Quad Port Gigabit Ethernet (PCI-E,Copper)
10b7 2000 3C998-T Dual Port 10/100/1000 PCI-X
10b7 3000 3C999-T Quad Port 10/100/1000 PCI-X
1166 1648 NetXtreme CIOB-E 1000Base-T
1734 100b
PRIMERGY RX/TX series onboard LAN
1649 NetXtreme BCM5704S_2 Gigabit Ethernet
164a NetXtreme II BCM5706 Gigabit Ethernet
103c 1709 NC371i Integrated PCI-X Multifunction Gigabit Server Adapter
103c 3070 NC380T PCI Express Dual Port Multifunction Gigabit Server Adapter
103c 3101 NC370T Multifunction Gigabit Server Adapter
103c 3106 NC370i Multifunction Gigabit Server Adapter

164c NetXtreme II BCM5708 Gigabit Ethernet
 1028 01f0 PowerEdge R900 Broadcom NetXtreme II BCM5708
 1028 0205 PowerEdge 2970 Broadcom NetXtreme II BCM5708
 1028 020b PowerEdge T605 Broadcom NetXtreme II BCM5708
 1028 0221 PowerEdge R805 Broadcom NetXtreme II BCM5708
 1028 0223 PowerEdge R905 Broadcom NetXtreme II BCM5708
 1028 1f12 PowerEdge R805/R905 Broadcom NetXtreme II BCM5708
 103c 7037 NC373T PCI Express Multifunction Gigabit Server Adapter
 103c 7038 NC373i Integrated Multifunction Gigabit Server Adapter
 103c 7045 NC374m PCI Express Dual Port Multifunction Gigabit Server
 Adapter
 164d NetXtreme BCM5702FE Gigabit Ethernet
 164e NetXtreme II BCM57710 10-Gigabit PCIe [Everest]
 103c 171c NC532m Dual Port 10GbE Multifunction BL-C Adapter
 103c 7058 NC532i Dual Port 10GbE Multifunction BL-C Adapter
 164f NetXtreme II BCM57711 10-Gigabit PCIe
 1650 NetXtreme II BCM57711E 10-Gigabit PCIe
 103c 171c NC532m Dual Port 10GbE Multifunction BL-C Adapter
 103c 7058 NC532i Dual Port 10GbE Multifunction BL-C Adapter
 1653 NetXtreme BCM5705 Gigabit Ethernet
 0e11 00e3 NC7761 Gigabit Server Adapter
 1734 1073 Primergy Econel 200 D2020 mainboard
 1654 NetXtreme BCM5705_2 Gigabit Ethernet
 0e11 00e3 NC7761 Gigabit Server Adapter
 103c 3100 NC1020 ProLiant Gigabit Server Adapter 32 PCI
 103c 3226 NC150T 4-port Gigabit Combo Switch & Adapter
 1655 NetXtreme BCM5717 Gigabit Ethernet PCIe
 1656 NetXtreme BCM5718 Gigabit Ethernet PCIe
 1657 NetXtreme BCM5719 Gigabit Ethernet PCIe
 1014 0420 FC 5260/5899 4-port 1 GbE Adapter for Power
 103c 169d
 Ethernet 1Gb 4-port 331FLR Adapter
 103c 22be Ethernet 1Gb 4-port 331i Adapter
 103c 3383 Ethernet 1Gb 4-port 331T Adapter
 14e4 1904 4-port 1Gb Ethernet Adapter
 1659 NetXtreme BCM5721 Gigabit Ethernet PCI Express
 1014 02c6 eServer xSeries server mainboard
 1028 01e6 PowerEdge 860
 1028 023c PowerEdge R200 Broadcom NetXtreme BCM5721
 103c 170b NC320m PCI Express Dual Port Gigabit Server Adapter
 103c 7031 NC320T PCIe Gigabit Server Adapter
 103c 7032 NC320i PCIe Gigabit Server Adapter
 1734 1061 PRIMERGY RX/TX S2 series onboard LAN
 165a NetXtreme BCM5722 Gigabit Ethernet PCI Express
 # Dual NIC server
 1014 0378 System x3350 (Machine type 4192)
 1028 020f PowerEdge R300 Broadcom NetXtreme 5722
 1028 0210 PowerEdge T300 Broadcom NetXtreme 5722

1028 0225 PowerEdge T105 Broadcom NetXtreme 5722
103c 7051 NC105i PCIe Gigabit Server Adapter
103c 7052 NC105T PCIe Gigabit Server Adapter
165b NetXtreme BCM5723 Gigabit Ethernet PCIe
103c 705d NC107i Integrated
PCI Express Gigabit Server Adapter
165c NetXtreme BCM5724 Gigabit Ethernet PCIe
165d NetXtreme BCM5705M Gigabit Ethernet
1028 865d Latitude D400
14e4 165d Dell Latitude D600
165e NetXtreme BCM5705M_2 Gigabit Ethernet
103c 088c NC8000 laptop
103c 0890 NC6000 laptop
103c 099c NX6110/NC6120
10cf 1279 LifeBook E8010D
165f NetXtreme BCM5720 2-port Gigabit Ethernet PCIe
1028 04f7 PowerEdge R320 server
1028 08fd PowerEdge R6515/R7515 LOM
1028 08ff PowerEdge Rx5xx LOM Board
1028 0900 PowerEdge C6525 LOM
103c 1786 NC332T Adapter
103c 193d NC332i Adapter
103c 2133 NC332i Adapter
103c 22e8 NC332i Adapter
103c 22eb NC332i Adapter
1662 NetXtreme II BCM57712 10 Gigabit Ethernet
1663 NetXtreme II BCM57712 10 Gigabit Ethernet Multi Function
1665 NetXtreme BCM5717 Gigabit Ethernet PCIe
1668 NetXtreme BCM5714 Gigabit Ethernet
103c 7039 NC324i PCIe Dual Port Gigabit Server Adapter
1669 NetXtreme 5714S Gigabit Ethernet
166a NetXtreme
BCM5780 Gigabit Ethernet
103c 7035 NC325i Integrated Dual port PCIe Express Gigabit Server Adapter
166b NetXtreme BCM5780S Gigabit Ethernet
166e 570x 10/100 Integrated Controller
166f NetXtreme II BCM57712 10 Gigabit Ethernet Virtual Function
1672 NetXtreme BCM5754M Gigabit Ethernet PCI Express
1673 NetXtreme BCM5755M Gigabit Ethernet PCI Express
1674 NetXtreme BCM5756ME Gigabit Ethernet PCI Express
1677 NetXtreme BCM5751 Gigabit Ethernet PCI Express
1028 0176 Dimension XPS Gen 4
1028 0177 Dimension 8400
1028 0179 Optiplex GX280
1028 0182 Latitude D610
1028 0187 Precision M70
1028 01a3 Latitude X1
1028 01a8 Precision 380

1028 01ad OptiPlex GX620
103c 3006 DC7100 SFF(DX878AV)
1462 028c 915P/G Neo2
1734 105d Scenic W620
1678 NetXtreme BCM5715 Gigabit Ethernet
103c 703e NC326i PCIe Dual Port Gigabit Server Adapter
1679 NetXtreme BCM5715S Gigabit Ethernet
103c 1707 NC326m PCIe Dual Port Adapter
103c 170c NC325m PCIe Quad
Port Adapter
103c 703c NC326i PCIe Dual Port Gigabit Server Adapter
167a NetXtreme BCM5754 Gigabit Ethernet PCI Express
1028 01da OptiPlex 745
1028 01de Precision 390
1028 01df PowerEdge SC440
1028 0214 Precision T3400
1028 021e Precision T5400
167b NetXtreme BCM5755 Gigabit Ethernet PCI Express
103c 280a DC5750 Microtower
167d NetXtreme BCM5751M Gigabit Ethernet PCI Express
1014 0577 ThinkPad X41 / Z60t
103c 0934 nx8220
103c 0940 Compaq nw8240 Mobile Workstation
103c 0944 Compaq nc6220 Notebook PC
17aa 2081 ThinkPad R60e
167e NetXtreme BCM5751F Fast Ethernet PCI Express
167f NetLink BCM5787F Fast Ethernet PCI Express
1680 NetXtreme BCM5761e Gigabit Ethernet PCIe
1681 NetXtreme BCM5761 Gigabit Ethernet PCIe
1682 NetXtreme BCM57762 Gigabit Ethernet PCIe
106b 00f6 Thunderbolt to Gigabit Ethernet Adapter
1683 NetXtreme BCM57767 Gigabit Ethernet PCIe
1684 NetXtreme BCM5764M Gigabit Ethernet PCIe
1685 NetXtreme II BCM57500S Gigabit
Ethernet
1686 NetXtreme BCM57766 Gigabit Ethernet PCIe
1687 NetXtreme BCM5762 Gigabit Ethernet PCIe
1688 NetXtreme BCM5761 10/100/1000BASE-T Ethernet
1259 2708 AT-2712 FX
The Broadcom 57800 device has two 1Gig ports and two 10Gig ports. The subsystem information can be used to
differentiate.
168a NetXtreme II BCM57800 1/10 Gigabit Ethernet
1028 1f5c BCM57800 10-Gigabit Ethernet
1028 1f5d BCM57800 10-Gigabit Ethernet
1028 1f67 BCM57800 1-Gigabit Ethernet
1028 1f68 BCM57800 1-Gigabit Ethernet
168d NetXtreme II BCM57840 10/20 Gigabit Ethernet
168e NetXtreme II BCM57810 10 Gigabit Ethernet

1014 0492 PCIe2 2-port 10 GbE BaseT RJ45 Adapter (FC EN0W; CCIN 2CC4)
103c 1798 Flex-10 10Gb 2-port 530FLB Adapter [Meru]
103c 17a5 Flex-10 10Gb 2-port 530M Adapter
103c 18d3 Ethernet 10Gb 2-port 530T Adapter
103c 1930 FlexFabric 10Gb 2-port 534FLR-SFP+ Adapter
103c 1931 StoreFabric CN1100R Dual Port Converged Network Adapter
103c 1932 FlexFabric 10Gb 2-port
534FLB Adapter
103c 1933 FlexFabric 10Gb 2-port 534M Adapter
103c 193a FlexFabric 10Gb 2-port 533FLR-T Adapter
103c 3382 Ethernet 10Gb 2-port 530FLR-SFP+ Adapter
103c 339d Ethernet 10Gb 2-port 530SFP+ Adapter
193d 1003 530F-B
193d 1006 530F-L
1690 NetXtreme BCM57760 Gigabit Ethernet PCIe
1691 NetLink BCM57788 Gigabit Ethernet PCIe
1028 04aa XPS 8300
1692 NetLink BCM57780 Gigabit Ethernet PCIe
1025 033d Aspire 7740G
1693 NetLink BCM5787M Gigabit Ethernet PCI Express
1025 0121 Aspire 5920G
103c 30c0 6710b
17aa 20d5 ThinkPad R61
1694 NetLink BCM57790 Gigabit Ethernet PCIe
1696 NetXtreme BCM5782 Gigabit Ethernet
103c 12bc d530 CMT (DG746A)
14e4 000d NetXtreme BCM5782 1000Base-T
1698 NetLink BCM5784M Gigabit Ethernet PCIe
1699 NetLink BCM5785 Gigabit Ethernet
169a NetLink BCM5786 Gigabit Ethernet PCI Express
169b NetLink BCM5787 Gigabit Ethernet PCI Express
169c NetXtreme BCM5788 Gigabit Ethernet
103c 308b MX6125
103c 30a1
NC2400
144d c018 X20
1462 590c KT6 Delta-FIS2R (MS-6590)
169d NetLink BCM5789 Gigabit Ethernet PCI Express
16a0 NetLink BCM5785 Fast Ethernet
16a1 BCM57840 NetXtreme II 10 Gigabit Ethernet
1043 866e PEB-10G/57840-2T 10GBase-T Network Adapter
16a2 BCM57840 NetXtreme II 10/20-Gigabit Ethernet
103c 1916 FlexFabric 20Gb 2-port 630FLB Adapter
103c 1917 FlexFabric 20Gb 2-port 630M Adapter
103c 2231 3820C 10/20Gb Converged Network Adapter
103c 22fa FlexFabric 10Gb 2-port 536FLB Adapter
16a3 NetXtreme BCM57786 Gigabit Ethernet PCIe
16a4 BCM57840 NetXtreme II Ethernet Multi Function

103c 1916 NPAR 20Gb 2-port 630FLB Adapter
 103c 1917 NPAR 20Gb 2-port 630M Adapter
 103c 2231 3820C 10/20Gb Converged Network Adapter (NPAR 1.5)
 103c 22fa FlexFabric 10Gb 2-port 536FLB Adapter (NPAR 1.5)
 # The Broadcom 57800 device has two 1Gig ports and two 10Gig ports. The subsystem information can be used to differentiate.

16a5 NetXtreme II BCM57800 1/10 Gigabit Ethernet
 Multi Function
 1028 1f5c NetXtreme II BCM57800 10-Gigabit Ethernet Multi Function
 1028 1f5d NetXtreme II BCM57800 10-Gigabit Ethernet Multi Function
 1028 1f67 NetXtreme II BCM57800 1-Gigabit Ethernet Multi Function
 1028 1f68 NetXtreme II BCM57800 1-Gigabit Ethernet Multi Function
 16a6 NetXtreme BCM5702X Gigabit Ethernet
 0e11 00bb NC7760 Gigabit Server Adapter (PCI-X, 10/100/1000-T)
 1028 0126 BCM5702 1000Base-T
 14e4 000c BCM5702 1000Base-T
 14e4 8009 BCM5702 1000Base-T
 16a7 NetXtreme BCM5703X Gigabit Ethernet
 0e11 00ca NC7771 Gigabit Server Adapter (PCI-X, 10,100,1000-T)
 0e11 00cb NC7781 Gigabit Server Adapter (PCI-X, 10,100,1000-T)
 1014 026f eServer xSeries server mainboard
 14e4 0009 NetXtreme BCM5703 1000Base-T
 14e4 000a NetXtreme BCM5703 1000Base-SX
 14e4 000b NetXtreme BCM5703 1000Base-T
 14e4 800a NetXtreme BCM5703 1000Base-T
 16a8 NetXtreme BCM5704S Gigabit Ethernet
 103c 132b PCI-X 1000Mbps Dual-port Built-in
 10a9 8014 Dual
 Port Gigabit Ethernet (PCI-X,Fiber)
 10a9 801c Quad Port Gigabit Ethernet (PCI-E,Fiber)
 10b7 2001 3C998-SX Dual Port 1000-SX PCI-X
 # The Broadcom 57800 device has two 1Gig ports and two 10Gig ports. The subsystem information can be used to differentiate.

16a9 NetXtreme II BCM57800 1/10 Gigabit Ethernet Virtual Function
 1028 1f5c NetXtreme II BCM57800 10-Gigabit Ethernet Virtual Function
 1028 1f5d NetXtreme II BCM57800 10-Gigabit Ethernet Virtual Function
 1028 1f67 NetXtreme II BCM57800 1-Gigabit Ethernet Virtual Function
 1028 1f68 NetXtreme II BCM57800 1-Gigabit Ethernet Virtual Function
 16aa NetXtreme II BCM5706S Gigabit Ethernet
 103c 3102 NC370F Multifunction Gigabit Server Adapter
 103c 310c NC370i Multifunction Gigabit Server Adapter
 16ab NetXtreme II BCM57840 10/20 Gigabit Ethernet Multi Function
 16ac NetXtreme II BCM5708S Gigabit Ethernet
 1014 0304 NetXtreme II BCM5708S Gigabit Ethernet
 1028 01bb PowerEdge 1955 Broadcom NetXtreme II BCM5708S
 1028
 020c PowerEdge M605 Broadcom NetXtreme II BCM5708S
 103c 1706 NC373m Multifunction Gigabit Server Adapter

103c 7038 NC373i PCI Express Multifunction Gigabit Server Adapter
103c 703b NC373i Integrated Multifunction Gigabit Server Adapter
103c 703d NC373F PCI Express Multifunction Gigabit Server Adapter
16ad NetXtreme II BCM57840 10/20 Gigabit Ethernet Virtual Function
103c 1916 FlexFabric 20Gb 2-port 630FLB Adapter
103c 1917 FlexFabric 20Gb 2-port 630M Adapter
103c 2231 3820C 10/20Gb Converged Network Adapter (SR-IOV VF)
103c 22fa FlexFabric 10Gb 2-port 536FLB Adapter (SR-IOV VF)
16ae NetXtreme II BCM57810 10 Gigabit Ethernet Multi Function
103c 1798 NPAR 10Gb 2-port 530FLB Adapter
103c 17a5 NPAR 10Gb 2-port 530M Adapter
103c 18d3 NPAR 10Gb 2-port 530T Adapter
103c 1930 NPAR 10Gb 2-port 534FLR-SFP+ Adapter
103c 1931 NPAR CN1100R Dual Port Converged Network Adapter
103c 1932 NPAR 10Gb 2-port 534FLB Adapter
103c 1933 NPAR 10Gb 2-port
534M Adapter
103c 193a NPAR 10Gb 2-port 533FLR-T Adapter
103c 3382 NPAR 10Gb 2-port 530FLR-SFP+ Adapter
103c 339d NPAR 10Gb 2-port 530SFP+ Adapter
16af NetXtreme II BCM57810 10 Gigabit Ethernet Virtual Function
103c 1798 Flex-10 10Gb 2-port 530FLB Adapter
103c 17a5 Flex-10 10Gb 2-port 530M Adapter
103c 18d3 Ethernet 10Gb 2-port 530T Adapter
103c 1930 FlexFabric 10Gb 2-port 534FLR-SFP+ Adapter
103c 1931 StoreFabric CN1100R Dual Port Converged Network Adapter
103c 1932 FlexFabric 10Gb 2-port 534FLB Adapter
103c 1933 FlexFabric 10Gb 2-port 534M Adapter
103c 193a FlexFabric 10Gb 2-port 533FLR-T Adapter
103c 3382 Ethernet 10Gb 2-port 530FLR-SFP+ Adapter
103c 339d Ethernet 10Gb 2-port 530SFP+ Adapter
16b0 NetXtreme BCM57761 Gigabit Ethernet PCIe
16b1 NetLink BCM57781 Gigabit Ethernet PCIe
1849 96b1 Z77 Extreme4 motherboard
16b2 NetLink BCM57791 Gigabit Ethernet PCIe
16b3 NetXtreme BCM57786 Gigabit Ethernet PCIe
16b4 NetXtreme BCM57765
Gigabit Ethernet PCIe
16b5 NetLink BCM57785 Gigabit Ethernet PCIe
16b6 NetLink BCM57795 Gigabit Ethernet PCIe
16b7 NetXtreme BCM57782 Gigabit Ethernet PCIe
16bc BCM57765/57785 SDXC/MMC Card Reader
16be BCM57765/57785 MS Card Reader
16bf BCM57765/57785 xD-Picture Card Reader
16c1 NetXtreme-E RDMA Virtual Function
16c6 NetXtreme BCM5702A3 Gigabit Ethernet
10b7 1100 3C1000B-T 10/100/1000 PCI
14e4 000c BCM5702 1000Base-T

14e4 8009 BCM5702 1000Base-T
16c7 NetXtreme BCM5703 Gigabit Ethernet
0e11 00ca NC7771 Gigabit Server Adapter (PCI-X, 10,100,1000-T)
0e11 00cb NC7781 Gigabit Server Adapter (PCI-X, 10,100,1000-T)
103c 12c3 Combo FC/GigE-SX [A9782A]
103c 12ca Combo FC/GigE-T [A9784A]
103c 1321 Core I/O LAN/SCSI Combo [AB314A]
14e4 0009 NetXtreme BCM5703 1000Base-T
14e4 000a NetXtreme BCM5703 1000Base-SX
16c8 BCM57301 NetXtreme-C 10Gb Ethernet Controller
16c9 BCM57302 NetXtreme-C 10Gb/25Gb Ethernet Controller
16ca BCM57304 NetXtreme-C 10Gb/25Gb/40Gb/50Gb
Ethernet Controller
16cb NetXtreme-C Ethernet Virtual Function
16cc BCM57417 NetXtreme-E Ethernet Partition
16ce BCM57311 NetXtreme-C 10Gb RDMA Ethernet Controller
16cf BCM57312 NetXtreme-C 10Gb/25Gb RDMA Ethernet Controller
16d0 BCM57402 NetXtreme-E 10Gb Ethernet Controller
16d1 BCM57404 NetXtreme-E 10Gb/25Gb Ethernet Controller
16d2 BCM57406 NetXtreme-E 10GBASE-T Ethernet Controller
16d3 NetXtreme-E Ethernet Virtual Function
16d4 BCM57402 NetXtreme-E Ethernet Partition
16d5 BCM57407 NetXtreme-E 10GBase-T Ethernet Controller
16d6 BCM57412 NetXtreme-E 10Gb RDMA Ethernet Controller
14e4 4120 NetXtreme E-Series Advanced Dual-port 10Gb SFP+ Ethernet Network Daughter Card
152d 8b20 BCM57412 NetXtreme-E 10Gb RDMA Ethernet Controller
152d 8b22 BCM57412 NetXtreme-E 25Gb RDMA Ethernet Controller
16d7 BCM57414 NetXtreme-E 10Gb/25Gb RDMA Ethernet Controller
14e4 1202 BCM957412M4122C OCP 1x25G Type1 wRoCE
14e4 1402 BCM957414A4142CC 10Gb/25Gb
Ethernet PCIe
14e4 1404 BCM957414M4142C OCP 2x25G Type1 wRoCE
14e4 4140 NetXtreme E-Series Advanced Dual-port 25Gb SFP28 Network Daughter Card
1590 020e Ethernet 25Gb 2-port 631SFP28 Adapter
1590 0211 Ethernet 25Gb 2-port 631FLR-SFP28 Adapter
16d8 BCM57416 NetXtreme-E Dual-Media 10G RDMA Ethernet Controller
1028 1feb NetXtreme-E 10Gb SFP+ Adapter
14e4 4163 BCM957416M4163C OCP 2x10GBT Type1 wRoCE
1590 020c Ethernet 10Gb 2-port 535T Adapter
1590 0212 Ethernet 10Gb 2-port 535FLR-T Adapter
16d9 BCM57417 NetXtreme-E 10GBASE-T RDMA Ethernet Controller
108e 4866 Dual Port 10GBase-T Ethernet Controller
16dc NetXtreme-E Ethernet Virtual Function
16dd NetLink BCM5781 Gigabit Ethernet PCI Express
16de BCM57412 NetXtreme-E Ethernet Partition
16df BCM57314 NetXtreme-C 10Gb/25Gb/40Gb/50Gb RDMA Ethernet Controller
16e1 NetXtreme-C Ethernet Virtual Function
16e2 BCM57417 NetXtreme-E 10Gb/25Gb RDMA Ethernet Controller

108e 4866 Dual Port 10Gb/25Gb SFP28 Ethernet
Controller
16e3 BCM57416 NetXtreme-E 10Gb RDMA Ethernet Controller
16e5 NetXtreme-C RDMA Virtual Function
16e7 BCM57404 NetXtreme-E Ethernet Partition
16e8 BCM57406 NetXtreme-E Ethernet Partition
16e9 BCM57407 NetXtreme-E 25Gb Ethernet Controller
16ec BCM57414 NetXtreme-E Ethernet Partition
16ed BCM57414 NetXtreme-E RDMA Partition
16ee BCM57416 NetXtreme-E Ethernet Partition
16ef BCM57416 NetXtreme-E RDMA Partition
16f1 BCM57452 NetXtreme-E 10Gb/25Gb/40Gb/50Gb Ethernet
16f3 NetXtreme BCM5727 Gigabit Ethernet PCIe
16f7 NetXtreme BCM5753 Gigabit Ethernet PCI Express
16fd NetXtreme BCM5753M Gigabit Ethernet PCI Express
103c 309f Compaq nx9420 Notebook
103c 30a3 Compaq nw8440
16fe NetXtreme BCM5753F Fast Ethernet PCI Express
170c BCM4401-B0 100Base-TX
1028 0188 Inspiron 6000 laptop
1028 018d Inspiron 700m/710m
1028 0196 Inspiron 5160
1028 01af Inspiron 6400
1028 01cd Inspiron 9400 Laptop
1028 01d7 XPS M1210
1028 01d8 Inspiron E1405
103c
099c NX6110/NC6120
103c 30a2 NX7300 laptop
14e4 170c HP Compaq 6720t Mobile Thin Client
170d NetXtreme BCM5901 100Base-TX
1014 0545 ThinkPad R40e
170e NetXtreme BCM5901 100Base-TX
1712 NetLink BCM5906 Fast Ethernet PCI Express
1713 NetLink BCM5906M Fast Ethernet PCI Express
1028 01f3 Inspiron 1420
1028 0209 XPS M1330
103c 30c0 Compaq 6710b
17aa 3a23 IdeaPad S10e
1750 BCM57508 NetXtreme-E 10Gb/25Gb/40Gb/50Gb/100Gb/200Gb Ethernet
1751 BCM57504 NetXtreme-E 10Gb/25Gb/40Gb/50Gb/100Gb/200Gb Ethernet
1752 BCM57502 NetXtreme-E 10Gb/25Gb/40Gb/50Gb Ethernet
1806 BCM5750X NetXtreme-E Ethernet Virtual Function
1807 BCM5750X NetXtreme-E RDMA Virtual Function
3352 BCM3352
3360 BCM3360
4210 BCM4210 iLine10 HomePNA 2.0
4211 BCM4211 iLine10 HomePNA 2.0 + V.90 56k modem

4212 BCM4212 v.90 56k modem
4220 802-11b/g Wireless PCI controller, packaged as a Linksys WPC54G ver 1.2 PCMCIA card
4222 NetXtreme BCM5753M Gigabit Ethernet PCI Express
4301
BCM4301 802.11b Wireless LAN Controller
1028 0407 TrueMobile 1180 Onboard WLAN
1043 0120 WL-103b Wireless LAN PC Card
16a5 1602 B-300 802.11b Wireless CardBus Adapter
1737 4301 WMP11 v2.7 802.11b Wireless-B PCI Adapter
4305 BCM4307 V.90 56k Modem
4306 BCM4306 802.11bg Wireless LAN controller
4307 BCM4306 802.11bg Wireless LAN Controller
4310 BCM4310 Chipcommon I/OController
4311 BCM4311 802.11b/g WLAN
1028 0007 Wireless 1390 WLAN Mini-Card
1028 0008 Wireless 1390 WLAN ExpressCard
103c 1363 BCM4311 802.11b/g Wireless LAN Controller
103c 1364 BCM4311 802.11b/g Wireless LAN Controller
103c 1365 BCM4311 802.11b/g Wireless LAN Controller
103c 1374 BCM4311 802.11b/g Wireless LAN Controller
103c 1375 BCM4311 802.11b/g Wireless LAN Controller
103c 1376 BCM4311 802.11b/g Wireless LAN Controller
103c 1377 BCM4311 802.11b/g Wireless LAN Controller
103c 137f BCM4322 802.11a/b/g/n Wireless LAN Controller
103c 1380 BCM4322 802.11a/b/g/n Wireless
LAN Controller
14e4 4311 BCM94311MCG
4312 BCM4311 802.11a/b/g
1028 0007 Wireless 1490 Dual Band WLAN Mini-Card
1028 0008 Wireless 1490 Dual Band WLAN ExpressCard
103c 135a Broadcom 802.11a/b/g WLAN
103c 135f Broadcom 802.11a/b/g WLAN
103c 1360 Broadcom 802.11a/b/g WLAN
103c 1361 Broadcom 802.11a/b/g WLAN
103c 1362 Broadcom 802.11a/b/g WLAN
103c 1370 Broadcom 802.11a/b/g WLAN
103c 1371 Broadcom 802.11a/b/g WLAN
103c 1372 Broadcom 802.11a/b/g WLAN
103c 1373 Broadcom 802.11a/b/g WLAN
103c 30b5 Presario V3242AU
106b 0089 AirPort Extreme
1371 103c Broadcom 802.11 Multiband-netwerkadapter(6715s)
4313 BCM4311 802.11a
4315 BCM4312 802.11b/g LP-PHY
1028 000b Wireless 1395 WLAN Mini-Card
1028 000c Wireless 1397 WLAN Mini-Card
103c 137c BCM4312 802.11b/g Wireless LAN Controller
103c 137d BCM4312 802.11b/g Wireless LAN Controller

103c 1507 U98Z049.00 Wireless Mini PCIe Card
105b e003 T77H030.00 Wireless Mini PCIe Card
105b
e01b T77H106.00 Wireless Half-size Mini PCIe Card
4318 BCM4318 [AirForce One 54g] 802.11g Wireless LAN Controller
1028 0005 Wireless 1370 WLAN Mini-PCI Card
1028 0006 Wireless 1370 WLAN PC Card
103c 1355 Broadcom 802.11b/g WLAN
103c 1356 Broadcom 802.11b/g WLAN
103c 1357 Broadcom 802.11b/g WLAN
1043 100f WL-138G v2 / WL-138gE / WL-100gE
1043 120f A6U notebook embedded card
1154 0355 Buffalo WLI2-PCI-G54S High Speed Mode Wireless Adapter
1468 0311 Aspire 3022WLMi, 5024WLMi, 5020
1468 0312 TravelMate 2410
14e4 0449 Gateway 7510GX
16ec 0119 U.S.Robotics Wireless MAXg PC Card
1737 0042 WMP54GS v1.1 802.11g Wireless-G PCI Adapter with SpeedBooster
1737 0048 WPC54G v3 802.11g Wireless-G Notebook Adapter
1737 0049 WPC54GS v2 802.11g Wireless-G Notebook Adapter with SpeedBooster
1799 7000 F5D7000 v4000 Wireless G Desktop Card
1799 7001 F5D7001 v2000 Wireless G Plus Desktop Card
1799 7010 F5D7010 v4000 Wireless G Notebook Card
1799 7011
F5D7011 v2000 High-Speed Mode Wireless G Notebook Card
4319 BCM4318 [AirForce 54g] 802.11a/b/g PCI Express Transceiver
1028 0005 Wireless 1470 Dual Band WLAN Mini-PCI Card
1028 0006 Wireless 1470 Dual Band WLAN PC Card
103c 1358 Broadcom 802.11a/b/g WLAN
103c 1359 Broadcom 802.11a/b/g WLAN
103c 135a Broadcom 802.11a/b/g WLAN
4320 BCM4306 802.11b/g Wireless LAN Controller
1028 0001 TrueMobile 1300 WLAN Mini-PCI Card
1028 0002 TrueMobile 1300 WLAN PC Card
1028 0003 Wireless 1350 WLAN Mini-PCI Card
1028 0004 Wireless 1350 WLAN PC Card
103c 12f4 Broadcom 802.11b/g WLAN
103c 12f8 Broadcom 802.11b/g WLAN
103c 12fa Broadcom 802.11b/g WLAN
103c 12fb Broadcom 802.11b/g WLAN
1043 100f WL-100G
1057 7025 WN825G
106b 004e AirPort Extreme
1154 0330 Buffalo WLI2-PCI-G54S High Speed Mode Wireless Desktop Adapter
144f 7050 eMachines M6805 802.11g Built-in Wireless
144f 7051 Sonnet Aria Extreme PCI
1737 0013 WMP54G v1 802.11g PCI Adapter
1737

0014 WMP54G v2 802.11g PCI Adapter
1737 0015 WMP54GS v1.0 802.11g Wireless-G PCI Adapter with SpeedBooster
1737 4320 WPC54G v1 / WPC54GS v1 802.11g Wireless-G Notebook Adapter
1799 7000 F5D7000 v1000 Wireless G Desktop Card
1799 7001 F5D7001 v1000 Wireless G Plus Desktop Card
1799 7010 F5D7010 v1000 Wireless G Notebook Card
1799 7011 F5D7011 v1000 High-Speed Mode Wireless G Notebook Card
185f 1220 TravelMate 290E WLAN Mini-PCI Card
4321 BCM4321 802.11a Wireless Network Controller
4322 BCM4322 802.11bgn Wireless Network Controller
4324 BCM4309 802.11abg Wireless Network Controller
1028 0001 Truemobile 1400
1028 0002 TrueMobile 1400 Dual Band WLAN PC Card
1028 0003 Truemobile 1450 MiniPCI
1028 0004 Wireless 1450 Dual Band WLAN PC Card
103c 12f9 Broadcom 802.11a/b/g WLAN
103c 12fc Broadcom 802.11a/b/g WLAN
4325 BCM4306 802.11bg Wireless Network Controller
1414 0003 Wireless Notebook Adapter MN-720
1414 0004 Wireless PCI Adapter
MN-730
4326 BCM4307 Chipcommon I/O Controller?
4328 BCM4321 802.11a/b/g/n
1028 0009 Wireless 1500 Draft 802.11n WLAN Mini-Card
1028 000a Wireless 1500 Draft 802.11n WLAN Mini-card
103c 1366 BCM4321 802.11a/b/g/n Wireless LAN Controller
103c 1367 BCM4321 802.11a/b/g/n Wireless LAN Controller
103c 1368 BCM4321 802.11a/b/g/n Wireless LAN Controller
103c 1369 BCM4321 802.11a/b/g/n Wireless LAN Controller
106b 0087 AirPort Extreme
106b 0088 AirPort Extreme
106b 008b AirPort Extreme
106b 008c AirPort Extreme
106b 0090 AirPort Extreme
14e4 4328 BCM4328 802.11a/b/g/n
1737 0066 WPC600N v1 802.11a/b/g/n Wireless-N CardBus Adapter
1737 0068 WEC600N v1 802.11a/b/g/n Wireless-N ExpressCard
4329 BCM4321 802.11b/g/n
1385 7b00 WN511B RangeMax NEXT Wireless Notebook Adapter
1385 7d00 WN311B RangeMax Next 270 Mbps Wireless PCI Adapter
1737 0058 WPC300N v1 Wireless-N Notebook Adapter
432a BCM4321 802.11an Wireless Network Controller
432b BCM4322
802.11a/b/g/n Wireless LAN Controller
1028 000d Wireless 1510 Wireless-N WLAN Mini-Card
106b 008d AirPort Extreme
106b 008e AirPort Extreme
432c BCM4322 802.11b/g/n

1799 d311 Dynex DX-NNBX 802.11n WLAN Cardbus Card
432d BCM4322 802.11an Wireless Network Controller
4331 BCM4331 802.11a/b/g/n
106b 00d6 AirPort Extreme
106b 00e4 AirPort Extreme
106b 00ef AirPort Extreme
106b 00f4 AirPort Extreme
106b 00f5 AirPort Extreme
106b 010e AirPort Extreme
106b 010f AirPort Extreme
4333 Serial (EDGE/GPRS modem part of Option GT Combo Edge)
4344 EDGE/GPRS data and 802.11b/g combo cardbus [GC89]
4350 BCM43222 Wireless Network Adapter
4351 BCM43222 802.11abgn Wireless Network Adapter
4353 BCM43224 802.11a/b/g/n
1028 000e Wireless 1520 Half-size Mini PCIe Card
103c 1509 WMIB-275N Half-size Mini PCIe Card
106b 0093 AirPort Extreme
106b 00d1 AirPort Extreme
106b 00e9 AirPort Extreme
14e4 04d8 Pegatron UPWL6024
4357 BCM43225 802.11b/g/n
105b
e021 T77H103.00 Wireless Half-size Mini PCIe Card
4358 BCM43227 802.11b/g/n
4359 BCM43228 802.11a/b/g/n
1028 0011 Wireless 1530 Half-size Mini PCIe Card
103c 182c BCM943228HM4L 802.11a/b/g/n 2x2 Wi-Fi Adapter
4360 BCM4360 802.11ac Wireless Network Adapter
4365 BCM43142 802.11b/g/n
1028 0016 Wireless 1704 802.11n + BT 4.0
43a0 BCM4360 802.11ac Wireless Network Adapter
43a1 BCM4360 802.11ac Wireless Network Adapter
43a2 BCM4360 802.11ac Wireless Network Adapter
43a3 BCM4350 802.11ac Wireless Network Adapter
43a9 BCM43217 802.11b/g/n
43aa BCM43131 802.11b/g/n
43ae BCM43162 802.11ac Wireless Network Adapter
43b1 BCM4352 802.11ac Wireless Network Adapter
43ba BCM43602 802.11ac Wireless LAN SoC
43bb BCM43602 802.11ac Wireless LAN SoC
43bc BCM43602 802.11ac Wireless LAN SoC
43d3 BCM43567 802.11ac Wireless Network Adapter
43d9 BCM43570 802.11ac Wireless Network Adapter
43dc BCM4355 802.11ac Wireless LAN SoC
43df BCM4354 802.11ac Wireless
LAN SoC
43e9 BCM4358 802.11ac Wireless LAN SoC

43ec BCM4356 802.11ac Wireless Network Adapter
4401 BCM4401 100Base-T
1025 0035 TravelMate 660
1025 0064 Extensa 3000 series laptop
1028 8127 Dimension 2400
103c 08b0 tc1100 tablet
1043 80a8 A7V8X motherboard
4402 BCM4402 Integrated 10/100BaseT
4403 BCM4402 V.90 56k Modem
4410 BCM4413 iLine32 HomePNA 2.0
4411 BCM4413 V.90 56k modem
4412 BCM4412 10/100BaseT
4430 BCM44xx CardBus iLine32 HomePNA 2.0
4432 BCM4432 CardBus 10/100BaseT
4464 BCM4364 802.11ac Wireless Network Adapter
brcmfmac reports it as BCM4377/4 but macOS drivers call it BCM4377b
4488 BCM4377b Wireless Network Adapter
4610 BCM4610 Sentry5 PCI to SB Bridge
4611 BCM4610 Sentry5 iLine32 HomePNA 1.0
4612 BCM4610 Sentry5 V.90 56k Modem
4613 BCM4610 Sentry5 Ethernet Controller
4614 BCM4610 Sentry5 External Interface
4615 BCM4610 Sentry5 USB Controller
4704 BCM4704 PCI to SB Bridge
4705 BCM4704 Sentry5 802.11b Wireless LAN Controller
4706
BCM4704 Sentry5 Ethernet Controller
4707 BCM4704 Sentry5 USB Controller
4708 BCM4704 Crypto Accelerator
4710 BCM4710 Sentry5 PCI to SB Bridge
4711 BCM47xx Sentry5 iLine32 HomePNA 2.0
4712 BCM47xx V.92 56k modem
4713 Sentry5 Ethernet Controller
4714 BCM47xx Sentry5 External Interface
4715 BCM47xx Sentry5 USB / Ethernet Controller
4716 BCM47xx Sentry5 USB Host Controller
4717 BCM47xx Sentry5 USB Device Controller
4718 Sentry5 Crypto Accelerator
4719 BCM47xx/53xx RoboSwitch Core
4720 BCM4712 MIPS CPU
4727 BCM4313 802.11bgn Wireless Network Adapter
1028 0010 Inspiron M5010 / XPS 8300
5365 BCM5365P Sentry5 Host Bridge
5600 BCM5600 StrataSwitch 24+2 Ethernet Switch Controller
5605 BCM5605 StrataSwitch 24+2 Ethernet Switch Controller
5615 BCM5615 StrataSwitch 24+2 Ethernet Switch Controller
5625 BCM5625 StrataSwitch 24+2 Ethernet Switch Controller
5645 BCM5645 StrataSwitch 24+2 Ethernet Switch Controller

5670 BCM5670 8-Port 10GE Ethernet
Switch Fabric
5680 BCM5680 G-Switch 8 Port Gigabit Ethernet Switch Controller
5690 BCM5690 12-port Multi-Layer Gigabit Ethernet Switch
5691 BCM5691 GE/10GE 8+2 Gigabit Ethernet Switch Controller
5692 BCM5692 12-port Multi-Layer Gigabit Ethernet Switch
5695 BCM5695 12-port + HiGig Multi-Layer Gigabit Ethernet Switch
5698 BCM5698 12-port Multi-Layer Gigabit Ethernet Switch
5820 BCM5820 Crypto Accelerator
5821 BCM5821 Crypto Accelerator
5822 BCM5822 Crypto Accelerator
5823 BCM5823 Crypto Accelerator
5824 BCM5824 Crypto Accelerator
5840 BCM5840 Crypto Accelerator
5841 BCM5841 Crypto Accelerator
5850 BCM5850 Crypto Accelerator
5e87 Valkyrie offload engine
5e88 Viper Offload Engine
8602 BCM7400/BCM7405 Serial ATA Controller
9026 CN99xx [ThunderX2] Integrated USB 3.0 xHCI Host Controller
9027 CN99xx [ThunderX2] Integrated AHCI/SATA 3 Host Controller
a8d8 BCM43224/5 Wireless Network Adapter
aa52 BCM43602 802.11ac Wireless LAN SoC
b302 BCM56302
StrataXGS 24x1GE 2x10GE Switch Controller
b334 BCM56334 StrataXGS 24x1GE 4x10GE Switch Controller
b370 BCM56370 Switch ASIC
b371 BCM56371 Switch ASIC
b372 BCM56372 Switch ASIC
b375 BCM56375 Switch ASIC
b376 BCM56376 Switch ASIC
b377 BCM56377 Switch ASIC
b379 Broadcom BCM56379 Switch ASIC
b470 BCM56470 SWITCH ASIC
b471 BCM56471 SWITCH ASIC
b472 BCM56472 SWITCH ASIC
b800 BCM56800 StrataXGS 10GE Switch Controller
b842 BCM56842 Trident 10GE Switch Controller
Trident2
b850 Broadcom BCM56850 Switch ASIC
b880 BCM56880 Switch ASIC
Tomahawk
b960 Broadcom BCM56960 Switch ASIC
Tomahawk4
b990 BCM56990 Switch ASIC
d802 BCM58802 Stingray 50Gb Ethernet SoC
14e4 8021 Stingray Dual-Port 25Gb Ethernet PCIe SmartNIC w16GB DRAM (Part No BCM958802A8046C)
14e4 8023 PS410T-H04 NetXtreme-S 4x10G 10GBaseT PCIe SmartNIC

14e4 8024 Stingray Dual-Port 25Gb Ethernet PCIe SmartNIC w4GB DRAM (Part No BCM958802A8044C)
14e4 8028 Stingray Dual-Port 25Gb Ethernet PCIe
SmartNIC w8GB DRAM (Part No BCM958802A8048C)
1bb0 0021 HPE SimpliVity Accelerator
d804 BCM58804 Stingray 100Gb Ethernet SoC
14e5 Pixelfusion Ltd
14e6 SHINING Technology Inc
14e7 3CX
14e8 RAYCER Inc
14e9 GARNETS System CO Ltd
14ea Planex Communications, Inc
ab06 FNW-3603-TX CardBus Fast Ethernet
ab07 RTL81xx RealTek Ethernet
ab08 FNW-3602-TX CardBus Fast Ethernet
14eb SEIKO EPSON Corp
nee ACQIRIS
14ec Agilent Technologies
0000 Aciris Digitizer (malformed ID)
14ed DATAKINETICS Ltd
14ee MASPRO KENKOH Corp
14ef CARRY Computer ENG. CO Ltd
14f0 CANON RESEACH CENTRE FRANCE
14f1 Conexant Systems, Inc.
1002 HCF 56k Modem
1003 HCF 56k Modem
1004 HCF 56k Modem
1005 HCF 56k Modem
1006 HCF 56k Modem
1022 HCF 56k Modem
1023 HCF 56k Modem
1024 HCF 56k Modem
1025 HCF 56k Modem
1026 HCF 56k Modem
1032 HCF 56k Modem
1033 HCF 56k Data/Fax Modem
1033 8077 NEC
122d 4027 Dell Zeus - MDP3880-W(B) Data Fax Modem
122d 4030 Dell Mercury - MDP3880-U(B)
Data Fax Modem
122d 4034 Dell Thor - MDP3880-W(U) Data Fax Modem
13e0 020d Dell Copper
13e0 020e Dell Silver
13e0 0261 IBM
13e0 0290 Compaq Goldwing
13e0 02a0 IBM
13e0 02b0 IBM
13e0 02c0 Compaq Scooter
13e0 02d0 IBM

144f 1500 IBM P85-DF (1)
144f 1501 IBM P85-DF (2)
144f 150a IBM P85-DF (3)
144f 150b IBM P85-DF Low Profile (1)
144f 1510 IBM P85-DF Low Profile (2)
1034 HCF 56k Data/Fax/Voice Modem
1035 HCF 56k Data/Fax/Voice/Spkp (w/Handset) Modem
10cf 1098 Fujitsu P85-DFSV
1036 HCF 56k Data/Fax/Voice/Spkp Modem
104d 8067 HCF 56k Modem
122d 4029 MDP3880SP-W
122d 4031 MDP3880SP-U
13e0 0209 Dell Titanium
13e0 020a Dell Graphite
13e0 0260 Gateway Red Owl
13e0 0270 Gateway White Horse
1052 HCF 56k Data/Fax Modem (Worldwide)
1053 HCF 56k Data/Fax Modem (Worldwide)
1054 HCF 56k Data/Fax/Voice Modem (Worldwide)
1055 HCF 56k Data/Fax/Voice/Spkp (w/Handset) Modem (Worldwide)
1056 HCF 56k Data/Fax/Voice/Spkp Modem
(Worldwide)
122d 4035 MDP3900V-W
1057 HCF 56k Data/Fax/Voice/Spkp Modem (Worldwide)
1059 HCF 56k Data/Fax/Voice Modem (Worldwide)
1063 HCF 56k Data/Fax Modem
1064 HCF 56k Data/Fax/Voice Modem
1065 HCF 56k Data/Fax/Voice/Spkp (w/Handset) Modem
1066 HCF 56k Data/Fax/Voice/Spkp Modem
122d 4033 Dell Athena - MDP3900V-U
1085 HCF V90 56k Data/Fax/Voice/Spkp PCI Modem
10b6 CX06834-11 HCF V.92 56k Data/Fax/Voice/Spkp Modem
1433 HCF 56k Data/Fax Modem
1434 HCF 56k Data/Fax/Voice Modem
1435 HCF 56k Data/Fax/Voice/Spkp (w/Handset) Modem
1436 HCF 56k Data/Fax Modem
1453 HCF 56k Data/Fax Modem
13e0 0240 IBM
13e0 0250 IBM
144f 1502 IBM P95-DF (1)
144f 1503 IBM P95-DF (2)
1454 HCF 56k Data/Fax/Voice Modem
1455 HCF 56k Data/Fax/Voice/Spkp (w/Handset) Modem
1456 HCF 56k Data/Fax/Voice/Spkp Modem
122d 4035 Dell Europa - MDP3900V-W
122d 4302 Dell MP3930V-W(C) MiniPCI
1610 ADSL AccessRunner PCI Arbitration Device
1611 AccessRunner PCI ADSL Interface

Device

1620 AccessRunner V2 PCI ADSL Arbitration Device
1621 AccessRunner V2 PCI ADSL Interface Device
1622 AccessRunner V2 PCI ADSL Yukon WAN Adapter
1803 HCF 56k Modem
0e11 0023 623-LAN Grizzly
0e11 0043 623-LAN Yogi
1811 MiniPCI Network Adapter
1815 HCF 56k Modem
0e11 0022 Grizzly
0e11 0042 Yogi
Integrated in CX86111/CX86113 processors
1830 CX861xx Integrated Host Bridge
2003 HSF 56k Data/Fax Modem
2004 HSF 56k Data/Fax/Voice Modem
2005 HSF 56k Data/Fax/Voice/Spkp (w/Handset) Modem
2006 HSF 56k Data/Fax/Voice/Spkp Modem
2013 HSF 56k Data/Fax Modem
0e11 b195 Bear
0e11 b196 Seminole 1
0e11 b1be Seminole 2
1025 8013 Acer
1033 809d NEC
1033 80bc NEC
155d 6793 HP
155d 8850 E Machines
2014 HSF 56k Data/Fax/Voice Modem
2015 HSF 56k Data/Fax/Voice/Spkp (w/Handset) Modem
2016 HSF 56k Data/Fax/Voice/Spkp Modem
2043 HSF 56k Data/Fax Modem (WorldW SmartDAA)
2044 HSF 56k Data/Fax/Voice Modem (WorldW SmartDAA)
2045 HSF
56k Data/Fax/Voice/Spkp (w/Handset) Modem (WorldW SmartDAA)
14f1 2045 Generic SoftK56
2046 HSF 56k Data/Fax/Voice/Spkp Modem (WorldW SmartDAA)
2063 HSF 56k Data/Fax Modem (SmartDAA)
2064 HSF 56k Data/Fax/Voice Modem (SmartDAA)
2065 HSF 56k Data/Fax/Voice/Spkp (w/Handset) Modem (SmartDAA)
2066 HSF 56k Data/Fax/Voice/Spkp Modem (SmartDAA)
2093 HSF 56k Modem
155d 2f07 Legend
2143 HSF 56k Data/Fax/Cell Modem (Mob WorldW SmartDAA)
2144 HSF 56k Data/Fax/Voice/Cell Modem (Mob WorldW SmartDAA)
2145 HSF 56k Data/Fax/Voice/Spkp (w/HS)/Cell Modem (Mob WorldW SmartDAA)
2146 HSF 56k Data/Fax/Voice/Spkp/Cell Modem (Mob WorldW SmartDAA)
2163 HSF 56k Data/Fax/Cell Modem (Mob SmartDAA)
2164 HSF 56k Data/Fax/Voice/Cell Modem (Mob SmartDAA)
2165 HSF 56k Data/Fax/Voice/Spkp (w/HS)/Cell Modem (Mob SmartDAA)

2166 HSF 56k Data/Fax/Voice/Spkp/Cell Modem (Mob SmartDAA)
2343 HSF 56k Data/Fax CardBus Modem (Mob WorldW SmartDAA)
2344 HSF 56k Data/Fax/Voice CardBus Modem (Mob
WorldW SmartDAA)
2345 HSF 56k Data/Fax/Voice/Spkp (w/HS) CardBus Modem (Mob WorldW SmartDAA)
2346 HSF 56k Data/Fax/Voice/Spkp CardBus Modem (Mob WorldW SmartDAA)
2363 HSF 56k Data/Fax CardBus Modem (Mob SmartDAA)
2364 HSF 56k Data/Fax/Voice CardBus Modem (Mob SmartDAA)
2365 HSF 56k Data/Fax/Voice/Spkp (w/HS) CardBus Modem (Mob SmartDAA)
2366 HSF 56k Data/Fax/Voice/Spkp CardBus Modem (Mob SmartDAA)
2443 HSF 56k Data/Fax Modem (Mob WorldW SmartDAA)
104d 8075 Modem
104d 8083 Modem
104d 8097 Modem
2444 HSF 56k Data/Fax/Voice Modem (Mob WorldW SmartDAA)
2445 HSF 56k Data/Fax/Voice/Spkp (w/HS) Modem (Mob WorldW SmartDAA)
2446 HSF 56k Data/Fax/Voice/Spkp Modem (Mob WorldW SmartDAA)
2463 HSF 56k Data/Fax Modem (Mob SmartDAA)
2464 HSF 56k Data/Fax/Voice Modem (Mob SmartDAA)
2465 HSF 56k Data/Fax/Voice/Spkp (w/HS) Modem (Mob SmartDAA)
2466 HSF 56k Data/Fax/Voice/Spkp Modem (Mob SmartDAA)
2702 HSFfi modem RD01-D270
1028 8d88 SmartHSFi V92 56K PCI Modem
2f00
HSF 56k HSFfi Modem
13e0 8d84 IBM HSFfi V.90
13e0 8d85 Compaq Stinger
14f1 2004 Dynalink 56PMi
2f02 HSF 56k HSFfi Data/Fax
2f11 HSF 56k HSFfi Modem
2f20 HSF 56k Data/Fax Modem
14f1 200c Soft Data Fax Modem with SmartCP
14f1 200f Dimension 3000
2f30 SoftV92 SpeakerPhone SoftRing Modem with SmartSP
14f1 2014 Devolo MikroLink 56K Modem PCI
2f50 Conexant SoftK56 Data/Fax Modem
5b7a CX23418 Single-Chip MPEG-2 Encoder with Integrated Analog Video/Broadcast Audio Decoder
0070 7444 WinTV HVR-1600
107d 6f34 WinFast DVR3100 H
5854 3343 GoTVview PCI DVD3 Hybrid
8200 CX25850
8234 RS8234 ATM SAR Controller [ServiceSAR Plus]
8800 CX23880/1/2/3 PCI Video and Audio Decoder
0070 2801 Hauppauge WinTV 28xxx (Roslyn) models
0070 3400 WinTV 34604
0070 3401 Hauppauge WinTV 34xxx models
0070 6902 WinTV HVR-4000-HD
0070 7801 WinTV HVR-1800 MCE

0070 9001 Nova-T DVB-T
0070 9200 Nova-SE2 DVB-S
0070 9202 Nova-S-Plus DVB-S
0070 9402 WinTV-HVR1100
DVB-T/Hybrid
0070 9600 WinTV 88x Video
0070 9802 WinTV-HVR1100 DVB-T/Hybrid (Low Profile)
1002 00f8 ATI TV Wonder Pro
1002 00f9 ATI TV Wonder
1002 a101 HDTV Wonder
1043 4823 PVR-416
107d 6611 Winfast TV 2000XP Expert
107d 6613 Leadtek Winfast 2000XP Expert
107d 6620 Leadtek Winfast DV2000
107d 663c Leadtek PVR 2000
107d 665f WinFast DTV1000-T
10fc d003 IODATA GV-VCP3/PCI
10fc d035 IODATA GV/BCTV7E
1421 0334 Instant TV DVB-T PCI
1461 000a AVerTV 303 (M126)
1461 000b AverTV Studio 303 (M126)
1461 8011 UltraTV Media Center PCI 550
1462 8606 MSI TV-@nywhere Master
14c7 0107 GDI Black Gold
14f1 0187 Conexant DVB-T reference design
14f1 0342 Digital-Logic MICROSPACE Entertainment Center (MEC)
153b 1166 Cinergy 1400 DVB-T
1540 2580 Provideo PV259
1554 4811 PixelView
1554 4813 Club 3D ZAP1000 MCE Edition
17de 08a1 KWorld/VStream XPert DVB-T with cx22702
17de 08a6 KWorld/VStream XPert DVB-T
17de 08b2 KWorld
DVB-S 100
17de a8a6 digitalnow DNTV Live! DVB-T
1822 0025 digitalnow DNTV Live! DVB-T Pro
185b e000 VideoMate X500
18ac d500 FusionHDTV 5 Gold
18ac d810 FusionHDTV 3 Gold-Q
18ac d820 FusionHDTV 3 Gold-T
18ac db00 FusionHDTV DVB-T1
18ac db11 FusionHDTV DVB-T Plus
18ac db50 FusionHDTV DVB-T Dual Digital
5654 2388 GoTVView PCI Hybrid TV Tuner Card
7063 3000 pcHDTV HD3000 HDTV
7063 5500 pcHDTV HD-5500
8801 CX23880/1/2/3 PCI Video and Audio Decoder [Audio Port]
0070 2801 Hauppauge WinTV 28xxx (Roslyn) models

185b e000 VideoMate X500
5654 2388 GoTView PCI Hybrid Audio AVStream Device
7063 5500 pcHDTV HD-5500
8802 CX23880/1/2/3 PCI Video and Audio Decoder [MPEG Port]
0070 2801 Hauppauge WinTV 28xxx (Roslyn) models
0070 6902 WinTV HVR-4000-HD
0070 9002 Nova-T DVB-T Model 909
0070 9402 WinTV-HVR1100 DVB-T/Hybrid
0070 9600 WinTV 88x MPEG Encoder
1043 4823 PVR-416
107d 663c Leadtek PVR 2000
107d 665f WinFast DTV1000-T
14f1
0187 Conexant DVB-T reference design
17de 08a1 XPerT DVB-T PCI BDA DVBT 23880 Transport Stream Capture
17de 08a6 KWorld/VStream XPerT DVB-T
18ac d500 DViCO FusionHDTV5 Gold
18ac d810 DViCO FusionHDTV3 Gold-Q
18ac d820 DViCO FusionHDTV3 Gold-T
18ac db00 DVICO FusionHDTV DVB-T1
18ac db10 DVICO FusionHDTV DVB-T Plus
5654 2388 GoTView PCI Hybrid TS Capture Device
7063 3000 pcHDTV HD3000 HDTV
7063 5500 pcHDTV HD-5500
8804 CX23880/1/2/3 PCI Video and Audio Decoder [IR Port]
0070 6902 WinTV HVR-4000-HD
0070 9002 Nova-T DVB-T Model 909
0070 9402 WinTV-HVR1100 DVB-T/Hybrid
7063 5500 pcHDTV HD-5500
8811 CX23880/1/2/3 PCI Video and Audio Decoder [Audio Port]
0070 3400 WinTV 34604
0070 3401 Hauppauge WinTV 34xxx models
0070 6902 WinTV HVR-4000-HD
0070 9402 WinTV-HVR1100 DVB-T/Hybrid
0070 9600 WinTV 88x Audio
1462 8606 MSI TV-@nywhere Master
18ac d500 DViCO FusionHDTV5 Gold
18ac d810 DViCO FusionHDTV3 Gold-Q
18ac d820 DViCO
FusionHDTV3 Gold-T
18ac db00 DVICO FusionHDTV DVB-T1
5654 2388 GoTView PCI Hybrid Audio Capture Device
8852 CX23885 PCI Video and Audio Decoder
0070 8010 WinTV HVR-1400 ExpressCard
0070 f038 WinTV HVR-5525
107d 6f22 WinFast PxTV1200
12ab d585 PE988J Hybrid ATSC/QAM PCI-E AVS Video Capture (SoftEncoder)
13c2 3013 TT-budget CT2-4500 CI

1461 c039 AVerTV Hybrid Express (A577)
153b 117e Cinergy T PCIe Dual
18ac db78 FusionHDTV DVB-T Dual Express
4254 0950 S950
4254 0952 S952
4254 0982 T982
4254 9580 T9580
4254 980c T980C
8880 CX23887/8 PCIe Broadcast Audio and Video Decoder with 3D Comb
0070 2259 WinTV HVR-1250
0070 6a18 WinTV-quadHD
0070 c108 WinTV-HVR-4400-HD model 1278
1461 3100 CE310B SD PCIe Video Capture Card
5654 2389 GoTVView X5 DVD Hybrid PCI-E
5654 2390 GoTVView X5 3D HYBRID PCI-E
14f2 MOBILITY Electronics
0120 EV1000 bridge
0121 EV1000 Parallel port
0122 EV1000 Serial port
0123 EV1000 Keyboard controller
0124
EV1000 Mouse controller
14f3 BroadLogic
2030 2030 DVB-S Satellite Receiver
2035 2035 DVB-S Satellite Receiver
2050 2050 DVB-T Terrestrial (Cable) Receiver
2060 2060 ATSC Terrestrial (Cable) Receiver
14f4 TOKYO Electronic Industry CO Ltd
14f5 SOPAC Ltd
14f6 COYOTE Technologies LLC
14f7 WOLF Technology Inc
14f8 AUDIOCODES Inc
2077 TP-240 dual span E1 VoIP PCI card
14f9 AG COMMUNICATIONS
14fa WANDEL & GOLTERMANN
14fb TRANSAS MARINE (UK) Ltd
14fc Quadrics Ltd
0000 QsNet Elan3 Network Adapter
0001 QsNetII Elan4 Network Adapter
0002 QsNetIII Elan5 Network Adapter
14fd JAPAN Computer Industry Inc
14fe ARCHTEK TELECOM Corp
14ff TWINHEAD INTERNATIONAL Corp
1500 DELTA Electronics, Inc
1360 RTL81xx RealTek Ethernet
1501 BANKSOFT CANADA Ltd
1502 MITSUBISHI ELECTRIC LOGISTICS SUPPORT Co Ltd
1503 KAWASAKI LSI USA Inc

1504 KAISER Electronics
1505 ITA INGENIEURBURO FUR TESTAUFGABEN GmbH
1506 CHAMELEON Systems Inc
Should be HTEC Ltd, but there are no known
HTEC chips and 1507 is already used by mistake by Motorola (see vendor ID 1057).
1507 Motorola ?? / HTEC
0001 MPC105 [Eagle]
0002 MPC106 [Grackle]
0003 MPC8240 [Kahlua]
0100 MC145575 [HFC-PCI]
0431 KTI829c 100VG
4801 Raven
4802 Falcon
4803 Hawk
4806 CPX8216
1508 HONDA CONNECTORS/MHOTRONICS Inc
1509 FIRST INTERNATIONAL Computer Inc
150a FORVUS RESEARCH Inc
150b YAMASHITA Systems Corp
150c KYOPAL CO Ltd
150d WARPSPPED Inc
150e C-PORT Corp
150f INTEC GmbH
1510 BEHAVIOR TECH Computer Corp
1511 CENTILLIUM Technology Corp
1512 ROSUN Technologies Inc
1513 Raychem
1514 TFL LAN Inc
1515 Advent design
1516 MYSON Technology Inc
0800 MTD-8xx 100/10M Ethernet PCI Adapter
0803 SURECOM EP-320X-S 100/10M Ethernet PCI Adapter
1320 10bd SURECOM EP-320X-S 100/10M Ethernet PCI Adapter
0891 MTD-8xx 100/10M Ethernet PCI Adapter
1517 ECHOTEK Corp
old ID, now 1059
1518 Kontron
1519 TELEFON AKTIEBOLAGET LM Ericsson
151a Globetek
1002 PCI-1002
1004 PCI-1004
1008
PCI-1008
151b COMBOX Ltd
151c DIGITAL AUDIO LABS Inc
0003 Prodif T 2496
4000 Prodif 88
151d Fujitsu Computer Products Of America

151e MATRIX Corp
151f TOPIC SEMICONDUCTOR Corp
0000 TP560 Data/Fax/Voice 56k modem
1520 CHAPLET System Inc
1521 BELL Corp
1522 MainPine Ltd
0100 PCI <-> IOBus Bridge
1522 0200 RockForceDUO 2 Port V.92/V.44 Data/Fax/Voice Modem
1522 0300 RockForceQUATRO 4 Port V.92/V.44 Data/Fax/Voice Modem
1522 0400 RockForceDUO+ 2 Port V.92/V.44 Data/Fax/Voice Modem
1522 0500 RockForceQUATRO+ 4 Port V.92/V.44 Data/Fax/Voice Modem
1522 0600 RockForce+ 2 Port V.90 Data/Fax/Voice Modem
1522 0700 RockForce+ 4 Port V.90 Data/Fax/Voice Modem
1522 0800 RockForceOCTO+ 8 Port V.92/V.44 Data/Fax/Voice Modem
1522 0c00 RockForceDUO+ 2 Port V.92/V.44 Data, V.34 Super-G3 Fax, Voice Modem
1522 0d00 RockForceQUATRO+ 4 Port V.92/V.44 Data, V.34 Super-G3 Fax, Voice Modem
1522 1d00 RockForceOCTO+ 8 Port V.92/V.44 Data, V.34 Super-G3 Fax, Voice
Modem
1522 2000 RockForceD1 1 Port V.90 Data Modem
1522 2100 RockForceF1 1 Port V.34 Super-G3 Fax Modem
1522 2200 RockForceD2 2 Port V.90 Data Modem
1522 2300 RockForceF2 2 Port V.34 Super-G3 Fax Modem
1522 2400 RockForceD4 4 Port V.90 Data Modem
1522 2500 RockForceF4 4 Port V.34 Super-G3 Fax Modem
1522 2600 RockForceD8 8 Port V.90 Data Modem
1522 2700 RockForceF8 8 Port V.34 Super-G3 Fax Modem
1522 3000 IQ Express D1 - 1 Port V.92 Data Modem
1522 3100 IQ Express F1 - 1 Port V.34 Super-G3 Fax Modem
1522 3200 IQ Express D2 - 2 Port V.92 Data Modem
1522 3300 IQ Express F2 - 2 Port V.34 Super-G3 Fax Modem
1522 3400 IQ Express D4 - 4 Port V.92 Data Modem
1522 3500 IQ Express F4 - 4 Port V.34 Super-G3 Fax Modem
1522 3c00 IQ Express D8 - 8 Port V.92 Data Modem
1522 3d00 IQ Express F8 - 8 Port V.34 Super-G3 Fax Modem
4000 PCI Express UART
1522 4001 IQ Express 1-port V.34 Super-G3 Fax
1522 4002 IQ Express 2-port V.34 Super-G3 Fax
1522
4004 IQ Express 4-port V.34 Super-G3 Fax
1522 4008 IQ Express 8-port V.34 Super-G3 Fax
1522 4100 IQ Express SideBand
1523 MUSIC Semiconductors
1524 ENE Technology Inc
0510 CB710 Memory Card Reader Controller
103c 006a NX9500
0520 FLASH memory: ENE Technology Inc:
0530 ENE PCI Memory Stick Card Reader Controller
0550 ENE PCI Secure Digital Card Reader Controller

0551 SD/MMC Card Reader Controller
0610 PCI Smart Card Reader Controller
0720 Memory Stick Card Reader Controller
0730 ENE PCI Memory Stick Card Reader Controller
0750 ENE PCI SmartMedia / xD Card Reader Controller
0751 ENE PCI Secure Digital / MMC Card Reader Controller
1211 CB1211 Cardbus Controller
1225 CB1225 Cardbus Controller
1410 CB1410 Cardbus Controller
1025 003c CL50 motherboard
1025 005a TravelMate 290
103c 30d5 530 Laptop
1411 CB-710/2/4 Cardbus Controller
103c 006a NX9500
1412 CB-712/4 Cardbus Controller
1420 CB1420 Cardbus Controller
1421 CB-720/2/4 Cardbus
Controller
1422 CB-722/4 Cardbus Controller
1525 IMPACT Technologies
1526 ISS, Inc
1527 SOLECTRON
1528 ACKSYS
1529 AMERICAN MICROSystems Inc
152a QUICKTURN DESIGN Systems
152b FLYTECH Technology CO Ltd
152c MACRAIGOR Systems LLC
152d QUANTA Computer Inc
152e MELEC Inc
152f PHILIPS - CRYPTO
1530 ACQIS Technology Inc
1531 CHRYON Corp
1532 ECHELON Corp
0020 LonWorks PCLTA-20 PCI LonTalk Adapter
1533 BALTIMORE
1534 ROAD Corp
1535 EVERGREEN Technologies Inc
1536 ACTIS Computer
1537 DATALEX COMMUNICATIONS
1538 ARALION Inc
0303 ARS106S Ultra ATA 133/100/66 Host Controller
1539 ATELIER INFORMATIQUES et ELECTRONIQUE ETUDES S.A.
153a ONO SOKKI
153b TERRATEC Electronic GmbH
1144 Aureon 5.1
Terratec seems to use several IDs for the same card.
1147 Aureon 5.1 Sky
1158 Philips Semiconductors SAA7134 (rev 01) [Terratec Cinergy 600 TV]

153c ANTAL Electronic
153d FILANET Corp
153e TECHWELL Inc
153f MIPS Technologies, Inc.
0001 SOC-it 101 System Controller
1540
PROVIDEO MULTIMEDIA Co Ltd
1541 MACHONE Communications
nee VIVID Technology Inc.
1542 Concurrent Real-Time
9260 RCIM-II Real-Time Clock & Interrupt Module
9271 RCIM-III Real-Time Clock & Interrupt Module (PCIe)
9272 Pulse Width Modulator Card
9277 5 Volt Delta Sigma Converter Card
9278 10 Volt Delta Sigma Converter Card
9287 Analog Output Card
9290 FPGA Card
9300 Universal Exhaust Gas Oxygen Sensor Simulator
9310 Digital Programmable Resistor
9350 Analog Input Card
1543 SILICON Laboratories
3052 Intel 537 [Winmodem]
4c22 Si3036 MC'97 DAA
1544 DCM DATA Systems
1545 VISIONTEK
1546 IOI Technology Corp
1547 MITUTOYO Corp
1548 JET PROPULSION Laboratory
1549 INTERCONNECT Systems Solutions
154a MAX Technologies Inc
154b COMPUTEX Co Ltd
154c VISUAL Technology Inc
154d PAN INTERNATIONAL Industrial Corp
154e SERVOTEST Ltd
154f STRATABEAM Technology
1550 OPEN NETWORK Co Ltd
1551 SMART Electronic DEVELOPMENT GmBH
1552 RACAL AIRTECH Ltd
1553 CHICONY
Electronics Co Ltd
1554 PROLINK Microsystems Corp
1555 GESYTEC GmBH
1556 PLDA
1100 PCI Express Core Reference Design
110f PCI Express Core Reference Design Virtual Function
1110 XpressRich Reference Design
1113 XpressSwitch
be00 PCI Express Bridge

1557 MEDIASTAR Co Ltd
1558 CLEVO/KAPOK Computer
1559 SI LOGIC Ltd
155a INNOMEDIA Inc
155b PROTAC INTERNATIONAL Corp
155c Cemax-Icon Inc
155d Mac System Co Ltd
155e LP Elektronik GmbH
155f Perle Systems Ltd
1560 Terayon Communications Systems
1561 Viewgraphics Inc
1562 Symbol Technologies
1563 A-Trend Technology Co Ltd
1564 Yamakatsu Electronics Industry Co Ltd
1565 Biostar Microtech Int'l Corp
1566 Ardent Technologies Inc
1567 Jungsoft
1568 DDK Electronics Inc
1569 Palit Microsystems Inc.
156a Avtec Systems
156b 2wire Inc
156c Vidac Electronics GmbH
156d Alpha-Top Corp
156e Alfa Inc
156f M-Systems Flash Disk Pioneers Ltd
1570 Lecroy Corp
1571 Contemporary Controls
a001 CCSI PCI20-485 ARCnet
a002 CCSI
PCI20-485D ARCnet
a003 CCSI PCI20-485X ARCnet
a004 CCSI PCI20-CXB ARCnet
a005 CCSI PCI20-CXS ARCnet
a006 CCSI PCI20-FOG-SMA ARCnet
a007 CCSI PCI20-FOG-ST ARCnet
a008 CCSI PCI20-TB5 ARCnet
a009 CCSI PCI20-5-485 5Mbit ARCnet
a00a CCSI PCI20-5-485D 5Mbit ARCnet
a00b CCSI PCI20-5-485X 5Mbit ARCnet
a00c CCSI PCI20-5-FOG-ST 5Mbit ARCnet
a00d CCSI PCI20-5-FOG-SMA 5Mbit ARCnet
a201 CCSI PCI22-485 10Mbit ARCnet
a202 CCSI PCI22-485D 10Mbit ARCnet
a203 CCSI PCI22-485X 10Mbit ARCnet
a204 CCSI PCI22-CHB 10Mbit ARCnet
a205 CCSI PCI22-FOG_ST 10Mbit ARCnet
a206 CCSI PCI22-THB 10Mbit ARCnet
1572 Otis Elevator Company

1573 Lattice - Vantis
1574 Fairchild Semiconductor
1575 Voltaire Advanced Data Security Ltd
1576 Viewcast COM
1578 HITT
4d34 VPMK4 [Video Processor Mk IV]
5615 VPMK3 [Video Processor Mk III]
1579 Dual Technology Corp
157a Japan Electronics Ind Inc
157b Star Multimedia Corp
157c Eurosoft (UK)
8001 Fix2000 PCI Y2K Compliance Card
157d Gemflex
Networks
157e Transition Networks
157f PX Instruments Technology Ltd
1580 Primex Aerospace Co
1581 SEH Computertechnik GmbH
1582 Cytec Corp
1583 Inet Technologies Inc
1584 Uniwill Computer Corp
1585 Logitron
1586 Lancast Inc
1587 Konica Corp
1588 Solidum Systems Corp
1589 Atlantek Microsystems Pty Ltd
0008 Leutron Vision PicPortExpress CL
0009 Leutron Vision PicPortExpress CL Stereo
158a Digalog Systems Inc
158b Allied Data Technologies
158c Hitachi Semiconductor & Devices Sales Co Ltd
158d Point Multimedia Systems
158e Lara Technology Inc
158f Ditect Coop
formerly 3PAR Inc.
1590 Hewlett Packard Enterprise
0001 Eagle Cluster Manager
0002 Osprey Cluster Manager
0003 Harrier Cluster Manager
a01d FC044X Fibre Channel HBA
1591 ARN
1592 Syba Tech Ltd
0781 Multi-IO Card
0782 Parallel Port Card 2xEPP
0783 Multi-IO Card
0785 Multi-IO Card
0786 Multi-IO Card
0787 Multi-IO Card

0788 Multi-IO Card
078a Multi-IO Card
1593 Bops Inc
1594 Netgame
Ltd
1595 Diva Systems Corp
1596 Folsom Research Inc
1597 Memec Design Services
1598 Granite Microsystems
1599 Delta Electronics Inc
159a General Instrument
159b Faraday Technology Corp
4321 StorLink SL3516 (Gemini) Host Bridge
159c Stratus Computer Systems
159d Ningbo Harrison Electronics Co Ltd
159e A-Max Technology Co Ltd
159f Galea Network Security
15a0 Compumaster SRL
15a1 Geocast Network Systems
15a2 Catalyst Enterprises Inc
0001 TA700 PCI Bus Analyzer/Exerciser
15a3 Italtel
15a4 X-Net OY
15a5 Toyota Macs Inc
15a6 Sunlight Ultrasound Technologies Ltd
15a7 SSE Telecom Inc
15a8 Shanghai Communications Technologies Center
15aa Moreton Bay
15ab Bluesteel Networks Inc
15ac North Atlantic Instruments
6893 3U OpenVPX Multi-function I/O Board [Model 68C3]
15ad VMware
0405 SVGA II Adapter
0710 SVGA Adapter
0720 VMXNET Ethernet Controller
0740 Virtual Machine Communication Interface
0770 USB2 EHCI Controller
0774 USB1.1 UHCI Controller
0778 USB3
xHCI 0.96 Controller
0779 USB3 xHCI 1.0 Controller
0790 PCI bridge
07a0 PCI Express Root Port
07b0 VMXNET3 Ethernet Controller
07c0 PVSCSI SCSI Controller
07e0 SATA AHCI controller
0801 Virtual Machine Interface
15ad 0800 Hypervisor ROM Interface

0820 Paravirtual RDMA controller
1977 HD Audio Controller
15ae Amersham Pharmacia Biotech
15b0 Zoltrix International Ltd
15b1 Source Technology Inc
15b2 Mosaid Technologies Inc
15b3 Mellanox Technologies
0191 MT25408 [ConnectX IB Flash Recovery]
01f6 MT27500 Family [ConnectX-3 Flash Recovery]
01f8 MT27520 Family [ConnectX-3 Pro Flash Recovery]
01ff MT27600 Family [Connect-IB Flash Recovery]
0209 MT27700 Family [ConnectX-4 Flash Recovery]
020b MT27710 Family [ConnectX-4 Lx Flash Recovery]
020d MT28800 Family [ConnectX-5 Flash Recovery]
020f MT28908A0 Family [ConnectX-6 Flash Recovery]
0210 MT28908A0 Family [ConnectX-6 Secure Flash Recovery]
0211 MT416842 Family [BlueField SoC Flash Recovery]
0212
MT2892 Family [ConnectX-6 Dx Flash Recovery]
0213 MT2892 Family [ConnectX-6 Dx Secure Flash Recovery]
0214 MT42822 Family [BlueField-2 SoC Flash Recovery]
0215 MT42822 Family [BlueField-2 Secure Flash Recovery]
0216 MT2894 Family [ConnectX-6 Lx Flash Recovery]
0217 MT2894 Family [ConnectX-6 Lx Secure Flash Recovery]
024e MT53100 [Spectrum-2, Flash recovery mode]
024f MT53100 [Spectrum-2, Secure Flash recovery mode]
0250 Spectrum-3, Flash recovery mode
0251 Spectrum-3, Secure Flash recovery mode
0252 Amos chiplet
0254 Spectrum-4, Flash recovery mode
0255 Spectrum-4, Secure Flash recovery mode
0256 Ofek chiplet
0257 Quantum-2 in Flash Recovery Mode
0262 MT27710 [ConnectX-4 Lx Programmable] EN
0263 MT27710 [ConnectX-4 Lx Programmable Virtual Function] EN
0264 Innova-2 Flex Burn image
0281 NPS-600 Flash Recovery
0538 MT2910 Family [ConnectX-7 Flash Recovery]
0539 MT2910 Family [ConnectX-7 Secure Flash Recovery]
1002 MT25400 Family [ConnectX-2 Virtual
Function]
1003 MT27500 Family [ConnectX-3]
1014 04b5 PCIe3 40GbE RoCE Converged Host Bus Adapter for Power
103c 1777 InfiniBand FDR/EN 10/40Gb Dual Port 544FLR-QSFP Adapter (Rev Cx)
103c 17c9 Infiniband QDR/Ethernet 10Gb 2-port 544i Adapter
103c 18ce InfiniBand QDR/EN 10Gb Dual Port 544M Adapter
103c 18cf InfiniBand FDR/EN 10/40Gb Dual Port 544M Adapter
103c 18d6 InfiniBand FDR/EN 10/40Gb Dual Port 544QSFP Adapter

15b3 0025 ConnectX-3 IB QDR Dual Port Mezzanine Card
15b3 0026 ConnectX-3 IB FDR Dual Port Mezzanine Card
15b3 0028 ConnectX-3 VPI Dual QSFP+ Port QDR Infiniband 40Gb/s or 10Gb Ethernet
15b3 0059 ConnectX-3 VPI IB FDR/40 GbE Single Port QSFP+ Mezzanine Card
15b3 0064 ConnectX-3 EN 10/40 GbE Single Port QSFP+ Adapter (MCX313A-BCBT)
15b3 0065 ConnectX-3 VPI IB FDR/40 GbE Dual Port QSFP+ Adapter
15b3 0066 ConnectX-3 IB FDR10 Dual Port Mezzanine Card
15b3 0067 ConnectX-3 VPI IB FDR/40 GbE Single Port QSFP+ Adapter
15b3 0071 ConnectX-3
VPI IB FDR/40 GbE Dual Port QSFP+ Mezzanine Card
SVID = 15B3 SSID = 0078
15b3 0078 ConnectX-3 10 GbE Dual Port KR Mezzanine Card
15b3 0079 ConnectX-3 40 GbE Dual Port QSFP+ Adapter
SVID = 15B3 SSID = 0080
15b3 0080 ConnectX-3 10 GbE Dual Port SFP+ Adapter
1004 MT27500/MT27520 Family [ConnectX-3/ConnectX-3 Pro Virtual Function]
1005 MT27510 Family
1006 MT27511 Family
1007 MT27520 Family [ConnectX-3 Pro]
1014 04eb 2-Port 10GbE NIC and RoCE SR PCIe3
103c 22f3 InfiniBand FDR/Ethernet 10Gb/40Gb 2-port 544+QSFP Adapter
103c 22f4 InfiniBand FDR/Ethernet 10Gb/40Gb 2-port 544+FLR-QSFP Adapter
103c 801f Ethernet 10G 2-port 546SFP+ Adapter
117c 0090 FastFrame NQ41
117c 0091 FastFrame NQ42
117c 0092 FastFrame NQ11
117c 0093 FastFrame NQ12
15b3 0006 Mellanox Technologies ConnectX-3 Pro Stand-up dual-port 40GbE MCX314A-BCCT
15b3 0078 ConnectX-3 Pro 10 GbE Dual Port KR Mezzanine Card
15b3 0079 ConnectX-3 Pro 40 GbE Dual Port QSFP+ Adapter
15b3
0080 ConnectX-3 Pro 10 GbE Dual Port SFP+ Adapter
193d 1002 520F-B
1009 MT27530 Family
100a MT27531 Family
100b MT27540 Family
100c MT27541 Family
100d MT27550 Family
100e MT27551 Family
100f MT27560 Family
1010 MT27561 Family
1011 MT27600 [Connect-IB]
1012 MT27600 Family [Connect-IB Virtual Function]
1013 MT27700 Family [ConnectX-4]
1014 04f7 PCIe3 2-port 100 GbE (NIC and RoCE) QSFP28 Adapter for Power
15b3 0003 Mellanox Technologies ConnectX-4 Stand-up single-port 40GbE MCX413A-BCAT
15b3 0005 Mellanox Technologies ConnectX-4 Stand-up single-port 40GbE MCX415A-BCAT
15b3 0006 MCX416A-BCAT, ConnectX-4 EN, 40/56GbE 2P, PCIe3.0 x16

15b3 0007 ConnectX-4 EN network interface card, 40/56GbE dual-port QSFP28, PCIe3.0 x16, tall bracket
 15b3 0008 ConnectX-4 Stand-up dual-port 100GbE MCX416A-CCAT
 15b3 0033 ConnectX-4 VPI IB EDR/100 GbE Single Port QSFP28 Adapter
 15b3 0034 ConnectX-4 VPI IB EDR/100 GbE Dual Port QSFP28 Adapter
 15b3 0050 ConnectX-4
 100 GbE Dual Port QSFP28 Adapter
 1014 MT27700 Family [ConnectX-4 Virtual Function]
 1015 MT27710 Family [ConnectX-4 Lx]
 15b3 0001 ConnectX-4 Lx EN network interface card, 25GbE single-port SFP28, PCIe3.0 x8, tall bracket, ROHS
R6
 15b3 0003 Stand-up ConnectX-4 Lx EN, 25GbE dual-port SFP28, PCIe3.0 x8, MCX4121A-ACAT
 15b3 0004 ConnectX-4 Lx Stand-up dual-port 10GbE MCX4121A-XCAT
 15b3 0005 Mellanox Technologies ConnectX-4 Lx Stand-up single-port 40GbE MCX4131A-BCAT
 15b3 0020 MCX4411A-ACQN, ConnectX-4 Lx EN OCP, 1x25Gb
 15b3 0021 MCX4421A-ACQN ConnectX-4 Lx EN OCP,2x25G
 15b3 0025 ConnectX-4 Lx 25 GbE Dual Port SFP28 rNDC
 193d 100a 620F-B
 1016 MT27710 Family [ConnectX-4 Lx Virtual Function]
 1017 MT27800 Family [ConnectX-5]
 15b3 0006 ConnectX®-5 EN network interface card, 100GbE single-port QSFP28, PCIe3.0 x16, tall bracket;
MCX515A-CCAT
 15b3 0020 ConnectX®-5 EN network interface card, 10/25GbE dual-port SFP28, PCIe3.0 x8, tall bracket ;
MCX512A-ACAT
 15b3
 0068 ConnectX®-5 EN network interface card for OCP2.0, Type 1, with host management, 25GbE dual-port
 SFP28, PCIe3.0 x8, no bracket Halogen free ; **MCX542B-ACAN**
 1018 MT27800 Family [ConnectX-5 Virtual Function]
 1019 MT28800 Family [ConnectX-5 Ex]
 15b3 0008 ConnectX-5 Ex EN network interface card, 100GbE dual-port QSFP28, PCIe4.0 x16, tall bracket;
MCX516A-CDAT
 101a MT28800 Family [ConnectX-5 Ex Virtual Function]
 101b MT28908 Family [ConnectX-6]
 101c MT28908 Family [ConnectX-6 Virtual Function]
 101d MT2892 Family [ConnectX-6 Dx]
 101e ConnectX Family mlx5Gen Virtual Function
 101f MT2894 Family [ConnectX-6 Lx]
 1020 MT28860
 1021 MT2910 Family [ConnectX-7]
 1974 MT28800 Family [ConnectX-5 PCIe Bridge]
 1975 MT416842 Family [BlueField SoC PCIe Bridge]
 1976 MT28908 Family [ConnectX-6 PCIe Bridge]
 1977 MT2892 Family [ConnectX-6 Dx PCIe Bridge]
 1978 MT42822 Family [BlueField-2 SoC PCIe Bridge]
 1979 MT2910 Family [ConnectX-7 PCIe Bridge]
 4117 MT27712A0-FDCF-AE
 1bd4
 0039 SN10XMP2P25
 1bd4 003a 25G SFP28 SP EO251FM9 Adapter

1bd4 004d SN10XMP2P25,YZPC-01191-101
5274 MT21108 InfiniBridge
5a44 MT23108 InfiniHost
5a45 MT23108 [Infinihost HCA Flash Recovery]
5a46 MT23108 PCI Bridge
5e8c MT24204 [InfiniHost III Lx HCA]
5e8d MT25204 [InfiniHost III Lx HCA Flash Recovery]
6001 NVMe SNAP Controller
6274 MT25204 [InfiniHost III Lx HCA]
6278 MT25208 InfiniHost III Ex (Tavor compatibility mode)
6279 MT25208 [InfiniHost III Ex HCA Flash Recovery]
6282 MT25208 [InfiniHost III Ex]
6340 MT25408A0-FCC-SI ConnectX, Dual Port 10Gb/s InfiniBand / 10GigE Adapter IC with PCIe 2.0 x8 2.5GT/s Interface
634a MT25408A0-FCC-DI ConnectX, Dual Port 20Gb/s InfiniBand / 10GigE Adapter IC with PCIe 2.0 x8 2.5GT/s Interface
1014 1014 4X InfiniBand DDR Expansion Card (CFFh) for IBM BladeCenter
6368 MT25448 [ConnectX EN 10GigE, PCIe 2.0 2.5GT/s]
6372 MT25458 ConnectX EN 10GBASE-T PCIe 2.5 GT/s
6732 MT25408A0-FCC-GI ConnectX, Dual Port 20Gb/s InfiniBand / 10GigE Adapter IC with PCIe 2.0 x8 5.0GT/s Interface
673c MT25408A0-FCC-QI ConnectX, Dual Port 40Gb/s InfiniBand / 10GigE Adapter IC with PCIe 2.0 x8 5.0GT/s Interface
1014 0415 PCIe2 2-port 4X InfiniBand QDR Adapter for Power
1014 0487 GX++ 1-port 4X IB QDR Adapter for Power 795
103c 1782 4X QDR InfiniBand Mezzanine HCA for c-Class BladeSystem
15b3 0021 HP InfiniBand 4X QDR CX-2 PCI-e G2 Dual Port HCA
6746 MT26438 [ConnectX VPI PCIe 2.0 5GT/s - IB QDR / 10GigE Virtualization+]
103c 1781 NC543i 1-port 4x QDR IB/Flex-10 10Gb Adapter
103c 3349 NC543i 2-port 4xQDR IB/10Gb Adapter
6750 MT26448 [ConnectX EN 10GigE, PCIe 2.0 5GT/s]
1014 0416 PCIe2 2-Port 10GbE RoCE SFP+ Adapter
1014 0461 PCIe2 2-Port 10GbE RoCE SR Adapter
15b3 0018 HP 10 GbE PCI-e G2 Dual-Port NIC (rev C1)
FC EC26
15b3 6572 IBM Flex System EN4132 2-port 10Gb RoCE Adapter
675a MT26458 ConnectX EN 10GBASE-T PCIe Gen2 5.0 GT/s
6764 MT26468 [ConnectX EN 10GigE, PCIe 2.0 5GT/s Virtualization+]
103c 3313 NC542m Dual Port Flex-10 10GbE BLc Adapter
676e MT26478 [ConnectX EN 40GigE, PCIe 2.0 5GT/s]
6778 MT26488 [ConnectX VPI PCIe 2.0 5GT/s - IB DDR / 10GigE Virtualization+]
7101 NPS-400 configuration and management interface
7102 NPS-400 network interface PF
7103 NPS-400 network interface VF
7121 NPS-600 configuration and management interface
7122 NPS-600 network interface PF
7123 NPS-600 network interface VF

8200 Innova-2 Flex Shell Logic
a2d0 MT416842 BlueField SoC Crypto enabled
a2d1 MT416842 BlueField SoC Crypto disabled
a2d2 MT416842 BlueField integrated ConnectX-5 network controller
a2d3 MT416842 BlueField multicore SoC family VF
a2d4 MT42822 BlueField-2 SoC Crypto enabled
a2d5 MT42822 BlueField-2 SoC Crypto disabled
a2d6 MT42822 BlueField-2 integrated ConnectX-6 Dx network controller
c2d2 MT416842 BlueField SoC management interfac
c2d3 MT42822 BlueField-2 SoC Management Interface
SwitchX-2, 40GbE
switch
c738 MT51136
c739 MT51136 GW
c838 MT52236
c839 MT52236 router
caf1 ConnectX-4 CAPI Function
Spectrum, 100GbE Switch
cb84 MT52100
cf08 Switch-IB2
cf6c MT53100 [Spectrum-2]
cf70 Spectrum-3
cf80 Spectrum-4
d2f0 Quantum HDR (200Gbps) switch
d2f2 Quantum-2 NDR (400Gbps) switch
15b4 CCI/TRIAD
15b5 Cimetrics Inc
15b6 Texas Memory Systems Inc
0001 XP15 DSP Accelerator
0002 XP30 DSP Accelerator
0003 XP00 Data Acquisition Device
0004 XP35 DSP Accelerator
0007 XP100 DSP Accelerator [XP100-T0]
0008 XP100 DSP Accelerator [XP100-T1]
0009 XP100 DSP Accelerator [XP100-E0]
000a XP100 DSP Accelerator [XP100-E1]
000e XP100 DSP Accelerator [XP100-0]
000f XP100 DSP Accelerator [XP100-1]
0010 XP100 DSP Accelerator [XP100-P0]
0011 XP100 DSP Accelerator [XP100-P1]
0012 XP100 DSP Accelerator [XP100-P2]
0013 XP100 DSP Accelerator [XP100-P3]
0014 RamSan Flash SSD
0015 ZBox
15b7 Sandisk Corp
2001 Skyhawk Series NVME SSD
5001 WD Black NVMe SSD
5002

WD Black 2018/PC SN720 NVMe SSD
5003 WD Black 2018/PC SN520 NVMe SSD
15b8 ADDI-DATA GmbH
1001 APCI1516 SP controller (16 digi outputs)
1003 APCI1032 SP controller (32 digi inputs w/ opto coupler)
1004 APCI2032 SP controller (32 digi outputs)
1005 APCI2200 SP controller (8/16 digi outputs (relay))
1006 APCI1564 SP controller (32 digi ins, 32 digi outs)
100a APCI1696 SP controller (96 TTL I/Os)
3001 APCI3501 SP controller (analog output board)
300f APCI3600 Noise and vibration measurement board
7001 APCI7420 2-port Serial Controller
7002 APCI7300 Serial Controller
15b9 Maestro Digital Communications
15ba Impacct Technology Corp
15bb Portwell Inc
15bc Agilent Technologies
0100 HPFC-5600 Tachyon DX2+ FC
0103 QX4 PCI Express quad 4-gigabit Fibre Channel controller
0105 Celerity FC-44XS/FC-42XS/FC-41XS/FC-44ES/FC-42ES/FC-41ES
117c 0022 Celerity FC-42XS Fibre Channel Adapter
117c 0025 Celerity FC-44ES Fibre Channel Adapter
117c 0026 Celerity
FC-42ES Fibre Channel Adapter
1100 E8001-66442 PCI Express CIC
2922 64 Bit, 133MHz PCI-X Exerciser & Protocol Checker
2928 64 Bit, 66MHz PCI Exerciser & Analyzer
2929 64 Bit, 133MHz PCI-X Analyzer & Exerciser
15bd DFI Inc
15be Sola Electronics
15bf High Tech Computer Corp (HTC)
15c0 BVM Ltd
15c1 Quantel
15c2 Newer Technology Inc
15c3 Taiwan Mycomp Co Ltd
15c4 EVSX Inc
15c5 Procomp Informatics Ltd
8010 1394b - 1394 Firewire 3-Port Host Adapter Card
15c6 Technical University of Budapest
15c7 Tateyama System Laboratory Co Ltd
0349 Tateyama C-PCI PLC/NC card Rev.01A
15c8 Penta Media Co Ltd
15c9 Serome Technology Inc
15ca Bitboys OY
15cb AG Electronics Ltd
15cc Hotrail Inc
15cd Dreamtech Co Ltd
15ce Genrad Inc

15cf Hilscher GmbH
0000 CIFS 50E-DP(M/S)
15d1 Infineon Technologies AG
15d2 FIC (First International Computer Inc)
15d3 NDS Technologies Israel Ltd
15d4 Iwill Corp
15d5 Tatung Co
15d6 Entridia Corp
15d7 Rockwell-Collins Inc
15d8 Cybernetics Technology
Co Ltd
15d9 Super Micro Computer Inc
15da Cyberfirm Inc
15db Applied Computing Systems Inc
15dc Litronic Inc
0001 Argus 300 PCI Cryptography Module
15dd Sigmatel Inc
15de Malleable Technologies Inc
15df Infinilink Corp
15e0 Cacheflow Inc
15e1 Voice Technologies Group Inc
15e2 Quicknet Technologies Inc
0500 PhoneJack-PCI
15e3 Networth Technologies Inc
15e4 VSN Systemen BV
15e5 Valley technologies Inc
15e6 Agere Inc
15e7 Get Engineering Corp
15e8 National Datacomm Corp
0130 Wireless PCI Card
0131 NCP130A2 Wireless NIC
15e9 Pacific Digital Corp
1841 ADMA-100 DiscStaQ ATA Controller
15ea Tokyo Denshi Sekei K.K.
15eb DResearch Digital Media Systems GmbH
15ec Beckhoff GmbH
3101 FC3101 Profibus DP 1 Channel PCI
5102 FC5102
15ed Macrolink Inc
15ee In Win Development Inc
15ef Intelligent Paradigm Inc
15f0 B-Tree Systems Inc
15f1 Times N Systems Inc
15f2 Diagnostic Instruments Inc
15f3 Digitmedia Corp
15f4 Valuesoft
15f5 Power Micro Research
15f6

Extreme Packet Device Inc
15f7 Banctec
15f8 Koga Electronics Co
15f9 Zenith Electronics Corp
15fa J.P. Axzam Corp
15fb Zilog Inc
15fc Techsan Electronics Co Ltd
15fd N-CUBED.NET
15fe Kinpo Electronics Inc
15ff Fastpoint Technologies Inc
1600 Northrop Grumman - Canada Ltd
1601 Tenta Technology
1602 Prosys-tec Inc
1603 Nokia Wireless Communications
1604 Central System Research Co Ltd
1605 Pairgain Technologies
1606 Europop AG
1607 Lava Semiconductor Manufacturing Inc
1608 Automated Wagering International
1609 Scimetric Instruments Inc
1612 Telesynergy Research Inc.
1618 Stone Ridge Technology
0001 RDX 11
0002 HFT-01
0400 FarSync T2P (2 port X.21/V.35/V.24)
0440 FarSync T4P (4 port X.21/V.35/V.24)
0610 FarSync T1U (1 port X.21/V.35/V.24)
0620 FarSync T2U (2 port X.21/V.35/V.24)
0640 FarSync T4U (4 port X.21/V.35/V.24)
1610 FarSync TE1 (T1,E1)
2610 FarSync DSL-S1 (SHDSL)
3640 FarSync T4E (4-port X.21/V.35/V.24)
4620 FarSync T2Ue PCI Express (2-port
X.21/V.35/V.24)
4640 FarSync T4Ue PCI Express (4-port X.21/V.35/V.24)
1619 FarSite Communications Ltd
0400 FarSync T2P (2 port X.21/V.35/V.24)
0440 FarSync T4P (4 port X.21/V.35/V.24)
0610 FarSync T1U (1 port X.21/V.35/V.24)
0620 FarSync T2U (2 port X.21/V.35/V.24)
0640 FarSync T4U (4 port X.21/V.35/V.24)
1610 FarSync TE1 (T1,E1)
1612 FarSync TE1 PCI Express (T1,E1)
2610 FarSync DSL-S1 (SHDSL)
3640 FarSync T4E (4-port X.21/V.35/V.24)
4620 FarSync T2Ue PCI Express (2-port X.21/V.35/V.24)
4640 FarSync T4Ue PCI Express (4-port X.21/V.35/V.24)
5621 FarSync T2Ee PCI Express (2 port X.21/V.35/V.24)

5641 FarSync T4Ee PCI Express (4 port X.21/V.35/V.24)
 6620 FarSync T2U-PMC PCI Express (2 port X.21/V.35/V.24)
 161f Rioworks
 1621 Lynx Studio Technology, Inc.
 0020 LynxTWO-A
 0021 LynxTWO-B
 0022 LynxTWO-C
 0023 Lynx L22
 0024 Lynx AES16
 0025 Lynx AES16-SRC
 0028 Lynx AES16e
 1626 TDK Semiconductor Corp.
 8410 RTL81xx Fast Ethernet
 1629 Kongsberg Spacetec
 AS
 1003 Format synchronizer v3.0
 1006 Format synchronizer, model 10500
 1007 Format synchronizer, model 21000
 2002 Fast Universal Data Output
 3100 IO31000 Frame Synchronizer and I/O
 3200 IO32000 Frame Synchronizer and I/O
 4002 High Rate Demodulator
 5001 High Rate FEC
 6001 High Rate Demodulator and FEC
 1631 Packard Bell B.V.
 1638 Standard Microsystems Corp [SMC]
 1100 SMC2602W EZConnect / Addtron AWA-100 / Eumitcom PCI WL11000
 163c Smart Link Ltd.
 3052 SmartLink SmartPCI562 56K Modem
 5449 SmartPCI561 Modem
 1641 MKNet Corp.
 1642 Bitland(ShenZhen) Information Technology Co., Ltd.
 # nee Brocade Communications Systems, Inc.
 1657 Cavium QLogic
 0013 425/825/42B/82B 4Gbps/8Gbps PCIe dual port FC HBA
 103c 1742 82B 8Gbps dual port FC HBA
 103c 1744 42B 4Gbps dual port FC HBA
 1657 0014 425/825 4Gbps/8Gbps PCIe dual port FC HBA
 0014 1010/1020/1007/1741 10Gbps CNA
 1657 0014 1010/1020/1007/1741 10Gbps CNA - FCOE
 1657 0015 1010/1020/1007/1741 10Gbps
 CNA - LL
 0017 415/815/41B/81B 4Gbps/8Gbps PCIe single port FC HBA
 103c 1741 41B 4Gbps single port FC HBA
 103c 1743 81B 8Gbps single port FC HBA
 1657 0014 415/815 4Gbps/8Gbps single port PCIe FC HBA
 0021 804 8Gbps FC HBA for HP Bladesystem c-class
 0022 BR-1860 Fabric Adapter

1657 0022 10Gbps CNA - FCOE
1657 0023 10Gbps CNA - LL
1657 0024 16Gbps FC HBA
Mezz card for IBM
0023 1867/1869 16Gbps FC HBA
Same Device_ID used for 410 (1port) and 420 (2 port) HBAs.
0646 400 4Gbps PCIe FC HBA
165a Epix Inc
c100 PIXCI(R) CL1 Camera Link Video Capture Board [custom QL5232]
d200 PIXCI(R) D2X Digital Video Capture Board [custom QL5232]
d300 PIXCI(R) D3X Digital Video Capture Board [custom QL5232]
eb01 PIXCI(R) EB1 PCI Camera Link Video Capture Board
Gidel Reconfigurable Computing
165c Gidel Ltd.
5361 PROCStarII60-1
5362 PROCStarII60-2
5364 PROCStarII60-4
5435 ProcSparkII
5661 ProcE60
56e1 ProcE180
5911 ProcStarIII110-1
5912 ProcStarIII110-2
5913
ProcStarIII110-3
5914 ProcStarIII110-4
5921 ProcStarIII150-1
5922 ProcStarIII150-2
5923 ProcStarIII150-3
5924 ProcStarIII150-4
5931 ProcStarIII260-1
5932 ProcStarIII260-2
5933 ProcStarIII260-3
5934 ProcStarIII260-4
5941 ProcStarIII340-1
5942 ProcStarIII340-2
5943 ProcStarIII340-3
5944 ProcStarIII340-4
5a01 ProceIII80
5a11 ProceIII110
5a21 ProceIII150
5a31 ProceIII260
5a41 ProceIII340
5b51 ProceIV360
5b61 ProceIV530
5b71 ProceIV820
5c01 ProcStarIV80-1
5c02 ProcStarIV80-2
5c03 ProcStarIV80-3

5c04 ProcStarIV80-4
5c11 ProcStarIV110-1
5c12 ProcStarIV110-2
5c13 ProcStarIV110-3
5c14 ProcStarIV110-4
5c51 ProcStarIV360-1
5c52 ProcStarIV360-2
5c53 ProcStarIV360-3
5c54 ProcStarIV360-4
5c61 ProcStarIV530-1
5c62 ProcStarIV530-2
5c63 ProcStarIV530-3
5c64 ProcStarIV530-4
5c71 ProcStarIV820-1
5c72 ProcStarIV820-2
5c73 ProcStarIV820-3
5c74 ProcStarIV820-4
5d01 Proc10480
5d11 Proc104110
5f01 ProceV_A3
5f11
ProceV_A7
5f21 ProceV_AB
5f31 ProceV_D5
5f41 ProceV_D8
6732 Proc6M
6832 Proc12M
7101 Proc10a_27
7111 Proc10a_48
7121 Proc10a_66
7141 Proc10a_115
7181 Proc10a_27S
7191 Proc10a_48S
71a1 Proc10a_66S
71b1 Proc10A
72b1 HawkEye
73b1 Proc10s
165d Hsing Tech. Enterprise Co., Ltd.
165f Linux Media Labs, LLC
1020 LMLM4 MPEG-4 encoder
1661 Worldspace Corp.
1668 Actiontec Electronics Inc
0100 Mini-PCI bridge
Formerly SiByte, Inc.
166d Broadcom Corporation
0001 SiByte BCM1125/1125H/1250 System-on-a-Chip PCI
0002 SiByte BCM1125H/1250 System-on-a-Chip HyperTransport
0012 SiByte BCM1280/BCM1480 System-on-a-Chip PCI-X

0014 Sibyte BCM1280/BCM1480 System-on-a-Chip HyperTransport
 1677 Bernecker + Rainer
 104e 5LS172.6 B&R Dual CAN Interface Card
 12d7 5LS172.61 B&R Dual CAN Interface Card
 20ad 5ACPCI.MFIO-K01 Profibus DP / K-Feldbus / COM
 1678 NetEffect
 0100 NE020 10Gb Accelerated Ethernet Adapter (iWARP RNIC)
 1679 Tokyo Electron Device Ltd.
 3000
 SD Standard host controller [Ellen]
 167b ZyDAS Technology Corp.
 2102 ZyDAS ZD1202
 187e 3406 ZyAIR B-122 CardBus 11Mbs Wireless LAN Card
 187e 3407 ZyAIR B-320 802.11b Wireless PCI Adapter
 2116 ZD1212B Wireless Adapter
 167d Samsung Electro-Mechanics Co., Ltd.
 a000 MagicLAN SWL-2210P 802.11b [Intersil ISL3874]
 167e ONNTO Corp.
 1681 Hercules
 1682 XFX Pine Group Inc.
 c580 Radeon RX 580
 1688 CastleNet Technology Inc.
 1170 WLAN 802.11b card
 # nee Atheros Communications, Inc.
 168c Qualcomm Atheros
 0007 AR5210 Wireless Network Adapter [AR5000 802.11a]
 1737 0007 WPC54A Wireless PC Card
 1b47 0100 Harmony 8450CN Wireless CardBus Module
 1b47 0110 Skyline 4030 / Harmony 8450 802.11a Wireless CardBus Adapter
 8086 2501 PRO/Wireless 5000 LAN PCI Adapter Module
 0011 AR5211 Wireless Network Adapter [AR5001A 802.11a]
 0012 AR5211 Wireless Network Adapter [AR5001X 802.11ab]
 1186 3a03 AirPro DWL-A650 Wireless Cardbus Adapter (rev.B)
 1186 3a04 AirPro DWL-AB650 Multimode
 Wireless Cardbus Adapter
 1186 3a05 AirPro DWL-AB520 Multimode Wireless PCI Adapter
 126c 8031 2201 Mobile Adapter
 1385 4400 WAB501 802.11ab Wireless CardBus Card
 1b47 aa00 8460 802.11ab Wireless CardBus Adapter
 0013 AR5212/5213/2414 Wireless Network Adapter
 0308 3402 AG-100 802.11ag Wireless Cardbus Adapter
 0308 3405 G-102 v2 802.11g Wireless Cardbus Adapter
 0308 3408 G-170S 802.11g Wireless CardBus Adapter
 0e11 00e5 NC6000/NC8000 laptop
 10b7 6002 3CRWE154A72 802.11abg Cardbus Adapter
 1113 d301 Philips CPWNA100 Wireless CardBus adapter
 1113 ee23 SMCWPCIT-G 108Mbps Wireless PCI adapter
 1154 033b Buffalo WLI-CB-AMG54

1154 034e Buffalo WLI-CB-AG108HP 802.11abg Cardbus Adapter
 1186 3202 DWL-G650 (Rev B3,B5) Wireless cardbus adapter
 1186 3203 AirPlus DWL-G520 Wireless PCI Adapter (rev. A)
 1186 3a07 AirXpert DWL-AG650 Wireless Cardbus Adapter
 1186 3a08 AirXpert DWL-AG520 Wireless PCI Adapter
 1186 3a12 D-Link AirPlus DWL-G650 Wireless
 Cardbus Adapter(rev.C)
 1186 3a13 AirPlus DWL-G520 Wireless PCI Adapter (rev. B)
 1186 3a14 AirPremier AG DWL-AG530 Wireless PCI Adapter (rev.A)
 1186 3a17 D-Link AirPremier DWL-G680 Wireless Cardbus Adapter
 1186 3a18 D-Link AirPremier DWL-G550 Wireless PCI Adapter
 1186 3a1a WNA-2330 802.11bg Wireless CardBus Adapter
 1186 3a63 D-Link AirPremier DWL-AG660 Wireless Cardbus Adapter
 1186 3a93 Conceptronic C54I Wireless 801.11g PCI card
 1186 3a94 Conceptronic C54C 802.11g Wireless Cardbus Adapter
 1186 3ab0 Allnet ALL0281 Wireless PCI Card
 1385 4600 WAG511 802.11a/b/g Dual Band Wireless PC Card
 1385 4610 WAG511 802.11a/b/g Dual Band Wireless PC Card
 1385 4900 WG311v1 802.11g Wireless PCI Adapter
 1385 4a00 WAG311 802.11a/g Wireless PCI Adapter
 1385 4b00 WG511T 108 Mbps Wireless PC Card (rev.A/B)
 1385 4d00 WG311T 108 Mbps Wireless PCI Adapter (rev.A2)
 1385 4f00 WG511U Double 108 Mbps Wireless PC Card
 1385 5a00 WG311T (rev.A3 v1h3/v1h4) 108
 Mbps Wireless PCI Adapter [AR2412]
 1385 5b00 WG511T 108 Mbps Wireless PC Card (rev.C)
 1385 5d00 WPN511 RangeMax Wireless PC Card
 1458 e911 GN-WIAG02
 1468 0403 U10H014 802.11g Cardbus Adapter
 1468 0408 ThinkPad 11b/g Wireless LAN Mini PCI Adapter
 14b7 0a10 8480-WD 802.11abg Cardbus Adapter
 14b7 0a60 8482-WD ORiNOCO 11a/b/g Wireless PCI Adapter
 14b7 aa30 8800-FC 802.11bg Cardbus Adapter
 14b7 aa40 8470-WD 802.11bg Cardbus Adapter
 14b9 cb21 CB21 802.11a/b/g Cardbus Adapter
 1668 1026 IBM HighRate 11 a/b/g Wireless CardBus Adapter
 168c 0013 AirPlus XtremeG DWL-G650 Wireless PCMCIA Adapter
 168c 1025 DWL-G650B2 Wireless CardBus Adapter
 168c 1027 Engenius NL-3054CB ARIES b/g CardBus Adapter
 168c 1042 Ubiquiti Networks SuperRange a/b/g Cardbus Adapter
 168c 1051 EZ Connect g 802.11g 108Mbps Wireless PCI Adapter
 168c 2026 Netgate 5354MP ARIES a(108Mb turbo)/b/g MiniPCI Adapter
 168c 2027 D-Link AirPlus DWL-G520 Wireless PCI Adapter (rev. A)
 168c
 2041 Engenius 5354MP Plus ARIES2 b/g MiniPCI Adapter
 168c 2042 Engenius 5354MP Plus ARIES2 a/b/g MiniPCI Adapter
 168c 2051 TRENDnet TEW-443PI Wireless PCI Adapter
 16a5 160a BWP712 802.11bg Wireless CardBus Adapter

16ab 7302 Trust Speedshare Turbo Pro Wireless PCI Adapter
 1737 0017 WPC55AG
 1737 0026 WMP55AG v1.1
 1737 0035 WPC55AG v1.2 802.11abg Cardbus Adapter
 1737 0036 WMP55AG v1.2 802.11abg PCI Adapter
 1799 3000 F6D3000 Dual-Band Wireless A+G Desktop Card
 1799 3010 F6D3010 Dual-Band Wireless A+G Notebook Card
 17cf 0042 Z-COMAX Highpower XG-622H (400mw) 802.11b/g mini-PCI Adapter
 185f 1012 CM9 Wireless a/b/g MiniPCI Adapter
 185f 2012 Wistron NeWeb WLAN a+b+g model CB9
 a727 6801 3CRXJK10075 OfficeConnect Wireless 108Mbps 11g XJACK PC Card
 001a AR2413/AR2414 Wireless Network Adapter [AR5005G(S) 802.11bg]
 1052 168c Sweex Wireless Lan PC Card 54Mbps
 1113 ee20 SMC Wireless CardBus Adapter 802.11g (SMCWCB-G EU)
 1113 ee24 SMC Wireless PCI
 Card WPCI-G
 1186 3a15 AirPlus G DWL-G630 Wireless Cardbus Adapter (rev.D1)
 1186 3a16 AirPlus G DWL-G510 Wireless PCI Adapter(rev.B)
 1186 3a1c WNA-1330 Notebook Adapter
 1186 3a1d WDA-1320 Desktop Adapter
 1186 3a23 AirPlus G DWL-G520+A Wireless PCI Adapter
 1186 3a24 AirPlus G DWL-G650+A Wireless Cardbus Adapter
 1186 3b08 AirPlus G DWL-G630 Wireless Cardbus Adapter (rev.C1)
 168c 001a Belkin FD7000
 168c 1052 TP-Link TL-WN510G Wireless CardBus Adapter
 168c 2052 Compex Wireless 802.11 b/g MiniPCI Adapter, Rev A1 [WLM54G]
 16ec 0122 Wireless PCI Adapter Model 5418
 1737 0053 WPC54G v7 802.11g Wireless-G Notebook Adapter
 1799 700c F5D7000 v5000 Wireless G Desktop Card
 1799 701d F5D7010 v5000 Wireless G Notebook Card
 17f9 0008 DX-WGNBC 802.11bg Wireless CardBus Adapter
 17f9 0018 DX-WGDTC 802.11bg Wireless PCI Adapter
 001b AR5413/AR5414 Wireless Network Adapter [AR5006X(S) 802.11abg]
 # Atheros AR5414 32-bit mini-PCI type IIIB
 0777 1107 UB5 802.11a
 Wireless Mini PCI Adapter
 0777 3002 XR2 802.11g Wireless Mini PCI Adapter
 0777 3005 XR5 802.11a Wireless Mini PCI Adapter
 0777 3009 XR9 900MHz Wireless Mini PCI Adapter
 1154 034e WLI-CB-AG108HP 802.11abg Wireless CardBus Adapter
 1186 3a19 D-Link AirPremier AG DWL-AG660 Wireless Cardbus Adapter
 1186 3a22 AirPremier AG DWL-AG530 Wireless PCI Adapter (rev.B)
 11ad 5001 WN5301A 802.11bg Wireless PCI Adapter
 1458 e901 GN-WI01HT Wireless a/b/g MiniPCI Adapter
 168c 001b Wireless LAN PCI LiteOn
 168c 1062 IPN-W100CB 802.11abg Wireless CardBus Adapter
 168c 2062 EnGenius EMP-8602 (400mw) or Compex WLM54AG (SuperAG)
 168c 2063 EnGenius EMP-8602 (400mw) or Compex WLM54AG

17f9 000b WL-711A 802.11abg Wireless CardBus Adapter
 17f9 000c WPIA-112AG 802.11abg Wireless PCI Adapter
 17f9 000d PC-686X 802.11abg Wireless Mini PCI Adapter
 185f 1600 DCMA-82 High Power WLAN 802.11a/b/g mini-PCI Module (Super A/G, eXtended Range, 400mW)
 1948 3aba RBTBJ-AW 802.11abg
 Wireless Cardbus Adapter
 a727 6804 Wireless 11a/b/g PC Card with XJACK(r) Antenna
 001c AR242x / AR542x Wireless Network Adapter (PCI-Express)
 0777 3006 SRX 802.11abg Wireless ExpressCard Adapter
 103c 137a AR5BXB63 (Foxconn) 802.11bg Mini PCIe NIC
 106b 0086 AirPort Extreme
 144f 7106 WLL3140 (Toshiba PA3501U-1MPC) 802.11bg Wireless Mini PCIe Card
 144f 7128 WLL3141 (Toshiba PA3613U-1MPC) 802.11bg Wireless Mini PCIe Card
 1468 0428 AR5BXB63 802.11bg NIC
 1468 042a AR5007EG 802.11bg NIC
 147b 1033 AirPace Wi-Fi
 168c 001c AR242x 802.11abg NIC (PCI Express)
 168c 3061 AR5006EGS 802.11bg NIC (2.4GHz, PCI Express)
 168c 3062 AR5006EXS 802.11abg NIC (2.4/5.0GHz, PCI Express)
 168c 3063 AR5006EX 802.11abg NIC (2.4/5.0GHz, PCI Express)
 168c 3065 AR5006EG 802.11bg NIC (2.4GHz, PCI Express)
 168c 3067 AR242x 802.11abg Wireless PCI Express Adapter (rev 01)
 1a3b 1026 AW-GE780 802.11bg Wireless Mini PCIe Card
 001d AR2417 Wireless Network Adapter [AR5007G
 802.11bg]
 1799 720b F5D7000 v8000 Wireless G Desktop Card
 1799 721b F5D7010 v8000 Wireless G Notebook Card
 # the name AR5005VL is used for some AR5513 based designs
 0020 AR5513 802.11abg Wireless NIC
 0308 3407 M-102 802.11g Wireless Cardbus Adapter
 1186 3a67 DWL-G650M Super G MIMO Wireless Notebook Adapter
 1186 3a68 DWL-G520M Wireless 108G MIMO Desktop Adapter
 187e 340e M-302 802.11g Wireless PCI Adapter
 1976 2003 TEW-601PC 802.11g Wireless CardBus Adapter
 0023 AR5416 Wireless Network Adapter [AR5008 802.11(a)bgn]
 0308 340b NWD-170N 802.11bgn Wireless CardBus Adapter
 1154 0365 Buffalo WLP-CB-AG300 802.11abgn Cardbus Adapter
 1154 0367 WLI-CB-AG301N 802.11abgn Wireless CardBus Adapter
 1186 3a6a DWA-642 802.11n RangeBooster N CardBus Adapter
 1186 3a6b DWA-547 802.11n RangeBooster N 650 DeskTop Adapter
 1186 3a6d DWA-552 802.11n Xtreme N Desktop Adapter (rev A1)
 1186 3a76 DWA-645 802.11n RangeBooster N 650 Notebook Adapter (rev A1)
 1737 0059
 WPC300N v2 Wireless-N Notebook Adapter
 1737 0069 WPC100 v1 802.11n RangePlus Wireless Notebook Adapter
 1737 0072 WMP110 v1 802.11n RangePlus Wireless PCI Adapter
 1799 8011 F5D8011 v1 802.11n N1 Wireless Notebook Card
 187e 3411 NWD-370N 802.11n Wireless PCI Adapter

1976 2008 TEW-621PC 802.11bgn Wireless CardBus Adapter
 0024 AR5418 Wireless Network Adapter [AR5008E 802.11(a)bgn] (PCI-Express)
 106b 0087 AirPort Extreme
 1186 3a70 DWA-556 Xtreme N PCI Express Desktop Adapter
 0027 AR9160 Wireless Network Adapter [AR9001 802.11(a)bgn]
 0777 4082 SR71-A 802.11abgn Wireless Mini PCI Adapter
 0029 AR922X Wireless Network Adapter
 0777 4005 SR71-15 802.11an Mini PCI Adapter
 1186 3a7a DWA-552 802.11n Xtreme N Desktop Adapter (rev A2)
 1186 3a7d DWA-552 802.11n Xtreme N Desktop Adapter (rev A3)
 168c 0029 AR922X Wireless Network Adapter
 168c 2096 Compex WLM200NX / Wistron DNMA-92
 002a AR928X Wireless Network Adapter (PCI-Express)
 0777 4f05 SR71-X 802.11abgn
 Wireless ExpressCard Adapter [AR9280]
 103c 3041 AR5BHB92-H 802.11abgn Wireless Half-size Mini PCIe Card [AR9280]
 103c 3042 AzureWave AW-NE773 802.11abgn Wireless Half-size Mini PCIe Card [AR9280]
 105b e006 T77H053.00 802.11bgn Wireless Mini PCIe Card [AR9281]
 105b e01f T77H047.31 802.11bgn Wireless Half-size Mini PCIe Card [AR9283]
 106b 008f AirPort Extreme
 11ad 6600 WN6600A 802.11bgn Wireless Mini PCIe Card [AR9281]
 144f 7141 WLL6080 802.11bgn Wireless Mini PCIe Card [AR9281]
 168c 0203 DW1525 802.11abgn WLAN PCIe Card [AR9280]
 1a32 0303 EM303 802.11bgn Wireless Mini PCIe Card [AR9281]
 1a32 0306 EM306 802.11bgn Wireless Half-size Mini PCIe Card [AR9283]
 1a3b 1067 AW-NE771 802.11bgn Wireless Mini PCIe Card [AR9281]
 1a3b 1071 AW-NE772 802.11abgn Wireless Mini PCIe Card [AR9280]
 1a3b 1081 AW-NE773 802.11abgn Wireless Half-size Mini PCIe Card [AR9280]
 002b AR9285 Wireless Network Adapter (PCI-Express)
 1028 0204 Wireless 1502 802.11bgn Half-size
 Mini PCIe Card
 1028 0205 Wireless 1702 802.11bgn Half-size Mini PCIe Card [AR9002WB-1NGCD]
 103c 303f U98Z062.10 802.11bgn Wireless Half-size Mini PCIe Card
 103c 3040 U98Z062.12 802.11bgn Wireless Half-size Mini PCIe Card
 105b e017 T77H126.00 802.11bgn Wireless Half-size Mini PCIe Card
 105b e023 T77H121.04 802.11bgn Wireless Half-size Mini PCIe Card
 105b e025 T77H121.05 802.11bgn Wireless Half-size Mini PCIe Card
 1113 e811 WN7811A (Toshiba PA3722U-1MPC) 802.11bgn Wireless Half-size Mini PCIe Card
 185f 30af DNXA-95 802.11bgn Wireless Half-size Mini PCIe Card
 1931 0023 Option GTM67x PCIe WiFi Adapter
 1a3b 1089 AW-NE785 / AW-NE785H 802.11bgn Wireless Full or Half-size Mini PCIe Card
 1a3b 2c37 AW-NB037H 802.11bgn Wireless Half-size Mini PCIe Card [AR9002WB-1NGCD]
 1b9a 0401 XW204E 802.11bgn Wireless Half-size Mini PCIe Card
 1b9a 0c03 WB214E 802.11bgn Wireless Half-size Mini PCIe Card [AR9002WB-1NGCD]
 002c AR2427 802.11bg Wireless Network Adapter
 (PCI-Express)
 002d AR9227 Wireless Network Adapter
 002e AR9287 Wireless Network Adapter (PCI-Express)

105b e034 T77H167.00
 0030 AR93xx Wireless Network Adapter
 103c 1627 AR9380/HB112 802.11abgn 3×3 Wi-Fi Adapter
 106b 009a AirPort Extreme
 1186 3a7e DWA-566 Wireless N 300 Dual Band PCIe Desktop Adapter
 1a56 2000 Killer Wireless-N 1102 Half-size Mini PCIe Card [AR9382]
 1a56 2001 Killer Wireless-N 1103 Half-size Mini PCIe Card [AR9380]
 0032 AR9485 Wireless Network Adapter
 1028 0208 Wireless 1506 WLAN Half Mini-Card
 103c 1838 AR9485/HB125 802.11bgn 1×1 Wi-Fi Adapter
 105b e044 Unex DHXA-225
 144d 410e AR9485WB-EG 802.11b/g/n mini-PCIe card on a series 3 laptop
 1a3b 1186 AW-NE186H
 0033 AR958x 802.11abgn Wireless Network Adapter
 168c a120 AR9582 802.11a/n WLAN Mini-PCIe Adapter
 0034 AR9462 Wireless Network Adapter
 1028 020b Wireless 1601 802.11abgn Adapter
 1028 0300 Wireless 1802 802.11abgn Adapter
 1a56 2003 Killer Wireless-N 1202 Half-size
 Mini PCIe Card
 0036 QCA9565 / AR9565 Wireless Network Adapter
 0037 AR9485 Wireless Network Adapter
 # Also used as Gigabyte GC-WB150 on a PCIe-to-mini-PCIe converter
 1a3b 2100 AW-NB100H 802.11n Wireless Mini PCIe Card
 003c QCA986x/988x 802.11ac Wireless Network Adapter
 003e QCA6174 802.11ac Wireless Network Adapter
 1a56 143a Killer 1435 Wireless-AC
 1a56 1525 Killer N1525 Wireless-AC
 0040 QCA9980/9990 802.11ac Wireless Network Adapter
 0041 QCA6164 802.11ac Wireless Network Adapter
 0042 QCA9377 802.11ac Wireless Network Adapter
 11ad 08a6 Qualcomm Atheros QCA9377 802.11ac Wireless Network Adapter
 0046 QCA9984 802.11ac Wave 2 Wireless Network Adapter
 0050 QCA9887 802.11ac Wireless Network Adapter
 0207 AR5210 Wireless Network Adapter [AR5000 802.11a]
 1014 AR5212 802.11abg NIC
 1014 058a ThinkPad 11a/b/g Wireless LAN Mini Express Adapter (AR5BxB6)
 9013 AR5002X Wireless Network Adapter
 ff19 AR5006X Wireless Network Adapter
 ff1b AR2425 Wireless Network
 Adapter [AR5007EG 802.11bg]
 ff1c AR5008 Wireless Network Adapter
 ff1d AR922x Wireless Network Adapter
 # Found in "AVM Fritz!Box FON WLAN 7270v3"
 168c ee1c AR9220-AC1A [AVM Fritz!Box FON WLAN 7270 v3]
 1695 EPoX Computer Co., Ltd.
 169c Netcell Corporation
 0044 Revolution Storage Processing Card

The right ID is 196d, but they got it nibble-swapped in 2202.
169d Club-3D VB (Wrong ID)
16a5 Tekram Technology Co.,Ltd.
16ab Global Sun Technology Inc
1100 GL24110P
1101 PLX9052 PCMCIA-to-PCI Wireless LAN
1102 PCMCIA-to-PCI Wireless Network Bridge
8501 WL-8305 Wireless LAN PCI Adapter
16ae SafeNet Inc
0001 SafeXcel 1140
000a SafeXcel 1841
1141 SafeXcel 1141
misused vendor ID 0001
0001 0001 SafeXcel 1141 v. 1.1
1841 SafeXcel 1842
16af SparkLAN Communications, Inc.
16b4 Aspex Semiconductor Ltd
16b8 Sonnet Technologies, Inc.
16be Creatix Polymedia GmbH
16c3 Synopsys, Inc.
abcd DWC_usb3 / PCIe bridge
abce DWC_usb3
abcf DWC_usb31
edda EPMockUp
16c6
Micrel-Kendin
8695 Centaur KS8695 ARM processor
8842 KSZ8842-PMQL 2-Port Ethernet Switch
16c8 Octasic Inc.
16c9 EONIC B.V. The Netherlands
16ca CENATEK Inc
0001 Rocket Drive DL
nee Innocore Gaming Ltd., nee Densitron Gaming Ltd., a division of Densitron Technologies
16cd Advantech Co. Ltd
0101 DirectPCI SRAM for DPX-11x series
0102 DirectPCI SRAM for DPX-S/C/E-series
0103 DirectPCI ROM for DPX-11x series
0104 DirectPCI ROM for DPX-S/C/E-series
0105 DirectPCI I/O for DPX-114/DPX-115
0106 DirectPCI I/O for DPX-116
0107 DirectPCI I/O for DPX-116U
0108 DirectPCI I/O for DPX-117
0109 DirectPCI I/O for DPX-112
010a DirectPCI I/O for DPX-C/E-series
010b DirectPCI I/O for DPX-S series
16ce Roland Corp.
16d5 Acromag, Inc.
0504 PMC-DX504 Reconfigurable FPGA with LVDS I/O

0520 PMC520 Serial Communication, 232 Octal
0521 PMC521 Serial Communication, 422/485 Octal
1020 PMC-AX1020 Reconfigurable FPGA with A/D & D/A
1065 PMC-AX1065 Reconfigurable FPGA
with A/D & D/A
2004 PMC-DX2004 Reconfigurable FPGA with LVDS I/O
2020 PMC-AX2020 Reconfigurable FPGA with A/D & D/A
2065 PMC-AX2065 Reconfigurable FPGA with A/D & D/A
3020 PMC-AX3020 Reconfigurable FPGA with A/D & D/A
3065 PMC-AX3065 Reconfigurable FPGA with A/D & D/A
4243 PMC424, APC424, AcPC424 Digital I/O and Counter Timer Module
4248 PMC464, APC464, AcPC464 Digital I/O and Counter Timer Module
424b PMC-DX2002 Reconfigurable FPGA with Differential I/O
4253 PMC-DX503 Reconfigurable FPGA with TTL and Differential I/O
4312 PMC-CX1002 Reconfigurable Conduction-Cooled FPGA Virtex-II with Differential I/O
4313 PMC-CX1003 Reconfigurable Conduction-Cooled FPGA Virtex-II with CMOS and Differential I/O
4322 PMC-CX2002 Reconfigurable Conduction-Cooled FPGA Virtex-II with Differential I/O
4323 PMC-CX2003 Reconfigurable Conduction-Cooled FPGA Virtex-II with CMOS and Differential I/O
4350 PMC-DX501 Reconfigurable Digital I/O Module
4353 PMC-DX2003 Reconfigurable FPGA
with TTL and Differential I/O
4357 PMC-DX502 Reconfigurable Differential I/O Module
4457 PMC730, APC730, AcPC730 Multifunction Module
4471 XMC730 Multi-function I/O module with front I/O
4473 XMC730CC Multi-function I/O module with rear I/O Conduction-cooled
464d PMC408 32-Channel Digital Input/Output Module
4850 PMC220-16 12-Bit Analog Output Module
4a42 PMC483, APC483, AcPC483 Counter Timer Module
4a50 PMC484, APC484, AcPC484 Counter Timer Module
4a56 PMC230 16-Bit Analog Output Module
4b47 PMC330, APC330, AcPC330 Analog Input Module, 16-bit A/D
4c40 PMC-LX40 Reconfigurable Virtex-4 FPGA with plug-in I/O
4c60 PMC-LX60 Reconfigurable Virtex-4 FPGA with plug-in I/O
4d4d PMC341, APC341, AcPC341 Analog Input Module, Simultaneous Sample & Hold
4d4e PMC482, APC482, AcPC482 Counter Timer Board
524d PMC-DX2001 Reconfigurable FPGA with TTL I/O
5335 PMC-SX35 Reconfigurable Virtex-4 FPGA with plug-in I/O
5456 PMC470 48-Channel Digital Input/Output Module
5601
PMC-VLX85 Reconfigurable Virtex-5 FPGA with plug-in I/O
5602 PMC-VLX110 Reconfigurable Virtex-5 FPGA with plug-in I/O
5603 PMC-VSX95 Reconfigurable Virtex-5 FPGA with plug-in I/O
5604 PMC-VLX155 Reconfigurable Virtex-5 FPGA with plug-in I/O
5605 PMC-VFX70 Reconfigurable Virtex-5 FPGA with plug-in I/O
5606 PMC-VLX155-1M Reconfigurable Virtex-5 FPGA with plug-in I/O
5701 PMC-SLX150: Reconfigurable Spartan-6 FPGA with plug-in I/O
5702 PMC-SLX150-1M: Reconfigurable Spartan-6 FPGA with plug-in I/O
5801 XMC-VLX85 Reconfigurable Virtex-5 FPGA with plug-in I/O

5802 XMC-VLX110 Reconfigurable Virtex-5 FPGA with plug-in I/O
 5803 XMC-VSX95 Reconfigurable Virtex-5 FPGA with plug-in I/O
 5804 XMC-VLX155 Reconfigurable Virtex-5 FPGA with plug-in I/O
 5807 XMC-SLX150: Reconfigurable Spartan-6 FPGA with plug-in I/O
 5808 XMC-SLX150-1M: Reconfigurable Spartan-6 FPGA with plug-in I/O
 5901 APCe8650 PCI Express IndustryPack Carrier Card
 6301 XMC Module with user-configurable
 Virtex-6 FPGA, 240k logic cells, SFP front I/O
 6302 XMC Module with user-configurable Virtex-6 FPGA, 365k logic cells, SFP front I/O
 6303 XMC Module with user-configurable Virtex-6 FPGA, 240k logic cells, no front I/O
 6304 XMC Module with user-configurable Virtex-6 FPGA, 365k logic cells, no front I/O
 7000 XMC-7K325F: User-configurable Kintex-7 FPGA, 325k logic cells plus SFP front I/O
 7001 XMC-7K410F: User-configurable Kintex-7 FPGA, 410k logic cells plus SFP front I/O
 7002 XMC-7K325AX: User-Configurable Kintex-7 FPGA, 325k logic cells with AXM Plug-In I/O
 7003 XMC-7K410AX: User-Configurable Kintex-7 FPGA, 410k logic cells with AXM Plug-In I/O
 7004 XMC-7K325CC: User-Configurable Kintex-7 FPGA, 325k logic cells, conduction-cooled
 7005 XMC-7K410CC: User-Configurable Kintex-7 FPGA, 410k logic cells, conduction-cooled
 7006 XMC-7A200: User-Configurable Artix-7 FPGA, 200k logic cells with Plug-In I/O
 7007 XMC-7A200CC: User-Configurable Conduction-Cooled Artix-7 FPGA, with
 200k logic cells
 7011 AP440-1: 32-Channel Isolated Digital Input Module
 7012 AP440-2: 32-Channel Isolated Digital Input Module
 7013 AP440-3: 32-Channel Isolated Digital Input Module
 7014 AP445: 32-Channel Isolated Digital Output Module
 7015 AP471 48-Channel TTL Level Digital Input/Output Module
 7016 AP470 48-Channel TTL Level Digital Input/Output Module
 7017 AP323 16-bit, 20 or 40 Channel Analog Input Module
 7018 AP408: 32-Channel Digital I/O Module
 7019 AP341 14-bit, 16-Channel Simultaneous Conversion Analog Input Module
 701a AP220-16 12-Bit, 16-Channel Analog Output Module
 701b AP231-16 16-Bit, 16-Channel Analog Output Module
 701c AP225 12-Bit, 16-Channel Analog Output Module with Waveform Memory
 701d AP235 16-Bit, 16-Channel Analog Output Module with Waveform Memory
 7021 APA7-201 Reconfigurable Artix-7 FPGA module 48 TTL channels
 7022 APA7-202 Reconfigurable Artix-7 FPGA module 24 RS485 channels
 7023 APA7-203 Reconfigurable Artix-7 FPGA module 24
 TTL & 12 RS485 channels
 7024 APA7-204 Reconfigurable Artix-7 FPGA module 24 LVDS channels
 7027 AP418 16-Channel High Voltage Digital Input/Output Module
 7029 AP342 14-bit, 12-Channel Isolated Simultaneous Conversion Analog Input Module
 702a AP226 12-Bit, 8-Channel Isolated Analog Output Module
 702b AP236 16-Bit, 8-Channel Isolated Analog Output Module
 7031 AP441-1: 32-Channel Isolated Digital Input Module
 7032 AP441-2: 32-Channel Isolated Digital Input Module
 7033 AP441-3: 32-Channel Isolated Digital Input Module
 7042 AP482 Counter Timer Module with TTL Level Input/Output
 7043 AP483 Counter Timer Module with TTL Level and RS422 Input/Output
 7044 AP484 Counter Timer Module with RS422 Input/Output

7051 APA7-501 Reconfigurable Artix-7 52,160 Cell FPGA module 48 TTL channels
 7052 APA7-502 Reconfigurable Artix-7 52,160 Cell FPGA module 24 RS485 channels
 7053 APA7-503 Reconfigurable Artix-7 52,160 Cell FPGA module 24 TTL & 12 RS485 channels
 7054 APA7-504 Reconfigurable
 Artix-7 52,160 Cell FPGA module 24 LVDS channels
 16da Advantech Co., Ltd.
 0011 INES GPIB-PCI
 16df PIKA Technologies Inc.
 16e2 Geotest-MTS
 16e3 European Space Agency
 1e0f LEON2FT Processor
 16e5 Intellon Corp.
 6000 INT6000 Ethernet-to-Powerline Bridge [HomePlug AV]
 6300 INT6300 Ethernet-to-Powerline Bridge [HomePlug AV]
 16ec U.S. Robotics
 00ed USR997900
 0116 USR997902 10/100/1000 Mbps PCI Network Card
 2f00 USR5660A (USR265660A, USR5660A-BP) 56K PCI Faxmodem
 3685 Wireless Access PCI Adapter Model 022415
 4320 USR997904 10/100/1000 64-bit NIC (Marvell Yukon)
 ab06 USR997901A 10/100 Cardbus NIC
 16ed Sycron N. V.
 1001 UMIO communication card
 16f2 ETAS GmbH
 0200 I/O board
 16f2 0010 ES53xx I/O board
 16f3 Jetway Information Co., Ltd.
 16f4 Vweb Corp
 8000 VW2010
 16f6 VideoTele.com, Inc.
 1702 Internet Machines Corporation (IMC)
 1705 Digital First, Inc.
 170b NetOctave
 0100 NSP2000-SSL crypto accelerator
 170c YottaYotta Inc.
 1719 EZChip Technologies
 1000
 NPA Access Network Processor Family
 # Seems to be a 2nd ID for Vitesse Semiconductor
 1725 Vitesse Semiconductor
 7174 VSC7174 PCI/PCI-X Serial ATA Host Bus Controller
 172a Accelerated Encryption
 13c8 AEP SureWare Runner 1000V3
 # nee Fujitsu Siemens Computers GmbH
 1734 Fujitsu Technology Solutions
 1735 Aten International Co. Ltd.
 1737 Linksys
 0029 WPG54G ver. 4 PCI Card

1032 Gigabit Network Adapter
1737 0015 EG1032 v2 Instant Gigabit Network Adapter
1737 0024 EG1032 v3 Instant Gigabit Network Adapter
1064 Gigabit Network Adapter
1737 0016 EG1064 v2 Instant Gigabit Network Adapter
ab08 21x4x DEC-Tulip compatible 10/100 Ethernet
ab09 21x4x DEC-Tulip compatible 10/100 Ethernet
173b Altima (nee Broadcom)
03e8 AC1000 Gigabit Ethernet
03e9 AC1001 Gigabit Ethernet
03ea AC9100 Gigabit Ethernet
173b 0001 AC1002
03eb AC1003 Gigabit Ethernet
1743 Peppercon AG
8139 ROL/F-100 Fast Ethernet Adapter with ROL
1745 ViXS Systems, Inc.
2020 XCode II Series
2100
XCode 2100 Series
1749 RLX Technologies
174b PC Partner Limited / Sapphire Technology
174d WellX Telecom SA
175c AudioScience Inc
175e Sanera Systems, Inc.
1760 TEDIA spol. s r. o.
0101 PCD-7004 Digital Bi-Directional Ports PCI Card
0102 PCD-7104 Digital Input & Output PCI Card
0121 PCT-7303A PC card with IRC counters
0122 PCT-7408A PC card with counters and timers
0123 PCT-7424 PCI card with standard counters
0214 PCT-7424C (F0) PC card with standard counters
0215 PCT-7424C (F1) PC card with standard counters
0216 PCT-7424E (F0) PC card with standard counters
0217 PCT-7424E (F1) PC card with standard counters
0303 PCD-7006C Digital Input & Output PCI Card
ff00 CTU CAN FD PCIe Card
1761 Pickering Interfaces Ltd
1771 InnoVISION Multimedia Ltd.
1775 General Electric
177d Cavium, Inc.
0001 Nitrox XL N1
0003 Nitrox XL N1 Lite
0004 Octeon (and older) FIPS
0005 Octeon CN38XX Network Processor Pass 3.x
0006 RoHS
0010 Nitrox XL NPX
0020

Octeon CN31XX Network Processor
 0030 Octeon CN30XX Network Processor
 0040 Octeon CN58XX Network Processor
 0050 Octeon CN57XX Network Processor (CN54XX/CN55XX/CN56XX)
 0070 Octeon CN50XX Network Processor
 0080 Octeon CN52XX Network Processor
 0090 Octeon II CN63XX Network Processor
 0091 Octeon II CN68XX Network Processor
 0092 Octeon II CN65XX Network Processor
 0093 Octeon II CN61XX Network Processor
 0094 Octeon Fusion CNF71XX Cell processor
 0095 Octeon III CN78XX Network Processor
 0096 Octeon III CN70XX Network Processor
 9700 Octeon III CN73XX Network Processor
 9702 CN23XX [LiquidIO II] Intelligent Adapter
 177d 0003 CN2350 [LiquidIO II] 2-port 10GbE Intelligent adapter
 # This was changed during the production phase to 10GbE adapter.
 177d 0004 CN2350 [LiquidIO II] 2-port 10GbE Intelligent adapter
 177d 0005 CN2360 [LiquidIO II] 2-port 10GbE Intelligent adapter
 177d 0006 CN2360 [LiquidIO II] 2-port 25GbE Intelligent adapter
 177d 0007 CN2350 [LiquidIO
 II] 2-port 25GbE Intelligent adapter
 177d 0008 CN2350 [LiquidIO II] 2-port 10GbE SFP+ Intelligent adapter
 177d 0009 CN2360 [LiquidIO II] 2-port 10GbE SFP+ Intelligent adapter
 177d 000a CN2350 [LiquidIO II] 2-port 10GBASE-T Intelligent adapter
 177d 000b CN2360 [LiquidIO II] 2-port 10GBASE-T Intelligent adapter
 9703 CN23XX [LiquidIO II] NVMe Controller
 9712 CN23XX [LiquidIO II] SRIOV Virtual Function
 177d 0003 CN2350 [LiquidIO II] 2-port 10GbE SRIOV Virtual Function
 177d 0004 CN2350 [LiquidIO II] 2-port 10GbE SRIOV Virtual Function
 177d 0005 CN2360 [LiquidIO II] 2-port 10GbE SRIOV Virtual Function
 177d 0006 CN2360 [LiquidIO II] 2-port 25GbE SRIOV Virtual Function
 177d 0007 CN2350 [LiquidIO II] 2-port 25GbE SRIOV Virtual Function
 9713 CN23XX [LiquidIO II] NVMe SRIOV Virtual Function
 9800 Octeon Fusion CNF75XX Processor
 a001 ThunderX MRML(Master RML Bridge to RSL devices)
 a002 THUNDERX PCC Bridge
 177d a102 CN88XX PCC Bridge
 a008 THUNDERX SMMU
 177d
 a108 CN88XX SMMU
 a009 THUNDERX Generic Interrupt Controller
 a00a THUNDERX GPIO Controller
 a00b THUNDERX MPI / SPI Controller
 a00c THUNDERX MIO-PTP Controller
 a00d THUNDERX MIX Network Controller
 a00e THUNDERX Reset Controller
 a00f THUNDERX UART Controller

a010 THUNDERX eMMC/SD Controller
a011 THUNDERX MIO-BOOT Controller
a012 THUNDERX TWSI / I2C Controller
a013 THUNDERX CCPI (Multi-node connect)
a014 THUNDERX Voltage Regulator Module
a015 THUNDERX PCIe Switch Logic Interface
a016 THUNDERX Key Memory
a017 THUNDERX GTI (Global System Timers)
a018 THUNDERX Random Number Generator
a019 THUNDERX DFA
a01a THUNDERX Zip Coprocessor
a01b THUNDERX xHCI USB Controller
a01c THUNDERX AHCI SATA Controller
177d a11c CN88XX AHCI SATA Controller
a01d THUNDERX RAID Coprocessor
a01e THUNDERX Network Interface Controller
a01f THUNDERX Traffic Network Switch
a020 THUNDERX PEM (PCI Express Interface)
a021 THUNDERX L2C (Level-2 Cache Controller)
a022
THUNDERX LMC (DRAM Controller)
a023 THUNDERX OCLA (On-Chip Logic Analyzer)
a024 THUNDERX OSM
a025 THUNDERX GSER (General Serializer/Deserializer)
a026 THUNDERX BGX (Common Ethernet Interface)
a027 THUNDERX IOBN
a029 THUNDERX NCSI (Network Controller Sideband Interface)
a02a ThunderX SGPIO (Serial GPIO controller for SATA disk lights)
a02b THUNDERX SMI / MDIO Controller
a02c THUNDERX DAP (Debug Access Port)
a02d THUNDERX PCIERC (PCIe Root Complex)
a02e ThunderX L2C-TAD (Level 2 cache tag and data)
a02f THUNDERX L2C-CBC
a030 THUNDERX L2C-MCI
a031 THUNDERX MIO-FUS (Fuse Access Controller)
a032 THUNDERX FUSF (Fuse Controller)
a033 THUNDERX Random Number Generator virtual function
a034 THUNDERX Network Interface Controller virtual function
a035 THUNDERX Parallel Bus
a036 ThunderX RAD (RAID acceleration engine) virtual function
a037 THUNDERX ZIP virtual function
a040 THUNDERX CPT Cryptographic Accelerator
a100 THUNDERX CN88XX 48 core SoC
a200
OCTEON TX CN81XX/CN80XX
a300 OCTEON TX CN83XX
af00 CN99xx [ThunderX2] Integrated PCI Host bridge
af84 CN99xx [ThunderX2] Integrated PCI Express RP Bridge

1787 Hightech Information System Ltd.
1789 Ennyah Technologies Corp.
also used by Struck Innovative Systeme for joint developments
1796 Research Centre Juelich
0001 SIS1100 [Gigabit link]
0002 HOTlink
0003 Counter Timer
0004 CAMAC Controller
0005 PROFIBUS
0006 AMCC HOTlink
0007 LVD Cable Bus
0008 100MHz, 64bit Sequence Generator based on VirtexII
0009 double 14bit-ADC
000a SIS1100 with N110 TDC
000b double 14bit-ADC with memory
000d Synchronisation Slave
000e SIS1100-eCMC
000f TDC (GPX)
0010 PCIe Counter Timer
0011 SIS1100-e single link
0012 SIS1100-e quad link
0013 4x2.5GHz SFP to 4 lane PCIe bridge
0014 SIS1100 with GPX piggy back
0015 SIS8100 [Gigabit link, MicroTCA]
0016 SIS1100e with 4 lanes
0017 Quad 14bit, 50MHz ADC with 2.5GHz SFP
0018 SIS8300 4-lane PCI Express, Micro
TCA for Physics ADC
0019 SIS SIS8300-Lx MTCA.4 Digitizer
001a 100MHz, 64bit Sequence Generator based on VirtexII
001c Quad 16bit, 150MHz ADC with 2.5GHz SFP
0030 100MHz, 64bit Sequence Generator based on Spartan6
0031 200MHz 64bit Sequence Generator based on Spartan7
nee Techwell, Inc.
1797 Intersil Techwell
5864 TW5864 multimedia video controller
6801 TW6802 multimedia video card
6802 TW6802 multimedia other device
6810 TW6816 multimedia video controller
6811 TW6816 multimedia video controller
6812 TW6816 multimedia video controller
6813 TW6816 multimedia video controller
port 5 of 8
6814 TW6816 multimedia video controller
port 6 of 8
6815 TW6816 multimedia video controller
port 7 of 8
6816 TW6816 multimedia video controller

channel 8 of 8
6817 TW6816 multimedia video controller
Example MuniPCI-E card: <http://www.commell.com.tw/product/surveillance/MPX-6864.htm>
6864 TW6864 multimedia video controller
1799 Belkin
6001 F5D6001 Wireless
PCI Card [Realtek RTL8180]
6020 F5D6020 v3000 Wireless PCMCIA Card [Realtek RTL8180]
6060 F5D6060 Wireless PDA Card
700f F5D7000 v7000 Wireless G Desktop Card [Realtek RTL8185]
701f F5D7010 v7000 Wireless G Notebook Card [Realtek RTL8185]
179a id Quantique
0001 Quantis PCI 16Mbps
179c Data Patterns
0557 DP-PCI-557 [PCI 1553B]
0566 DP-PCI-566 [Intelligent PCI 1553B]
1152 DP-cPCI-1152 (8-channel Isolated ADC Module)
5031 DP-CPCI-5031-Synchro Module
cPCI Carrier for Mezzanine Modules
5112 DP-cPCI-5112 [MM-Carrier]
5121 DP-CPCI-5121-IP Carrier
5211 DP-CPCI-5211-IP Carrier
5679 AGE Display Module
17a0 Genesys Logic, Inc
7163 GL9701 PCIe to PCI Bridge
8083 GL880 USB 1.1 UHCI controller
8084 GL880 USB 2.0 EHCI controller
9750 GL9750 SD Host Controller
17aa Lenovo
402b Intel 82599ES 10Gb 2-port Server Adapter X520-2
17ab Phillips Components
17af Hightech Information System Ltd.
17b3 Hawking Technologies
ab08 PN672TX 10/100 Ethernet
17b4 Indra Networks,
Inc.
0011 WebEnhance 100 GZIP Compression Card
0012 WebEnhance 200 GZIP Compression Card
0015 WebEnhance 300 GZIP Compression Card
0016 StorCompress 300 GZIP Compression Card
0017 StorSecure 300 GZIP Compression and AES Encryption Card
17c0 Wistron Corp.
17c2 Newisys, Inc.
nee Airgo Networks, Inc.
17cb Qualcomm
0001 AGN100 802.11 a/b/g True MIMO Wireless Card
1385 5c00 WGM511 Pre-N 802.11g Wireless CardBus Adapter
1737 0045 WMP54GX v1 802.11g Wireless-G PCI Adapter with SRX

0002 AGN300 802.11 a/b/g True MIMO Wireless Card
 1385 6d00 WPNT511 RangeMax 240 Mbps Wireless CardBus Adapter
 1737 0054 WPC54GX4 v1 802.11g Wireless-G Notebook Adapter with SRX400
 0400 Datacenter Technologies QDF2432 PCI Express Root Port
 0401 Datacenter Technologies QDF2400 PCI Express Root Port
 17cc NetChip Technology, Inc
 2280 USB 2.0
 17cd Cadence Design Systems, Inc.
 17cf Z-Com, Inc.
 17d3 Areca Technology Corp.
 1110 ARC-1110 4-Port PCI-X to SATA RAID Controller
 1120
 ARC-1120 8-Port PCI-X to SATA RAID Controller
 1130 ARC-1130 12-Port PCI-X to SATA RAID Controller
 1160 ARC-1160 16-Port PCI-X to SATA RAID Controller
 1170 ARC-1170 24-Port PCI-X to SATA RAID Controller
 1201 ARC-1200 2-Port PCI-Express to SATA II RAID Controller
 1203 ARC-1203 2/4/8 Port PCIe 2.0 to SATA 6Gb RAID Controller
 1210 ARC-1210 4-Port PCI-Express to SATA RAID Controller
 1214 ARC-12x4 PCIe 2.0 to SAS/SATA 6Gb RAID Controller
 17d3 1214 ARC-1214 4-Port PCIe 2.0 to SAS/SATA 6Gb RAID Controller
 17d3 1224 ARC-1224 8-Port PCIe 2.0 to SAS/SATA 6Gb RAID Controller
 17d3 1264 ARC-1264 12/16 Port PCIe 2.0 to SATA 6Gb RAID Controller
 17d3 1284 ARC-1284 24 Port PCIe 2.0 to SATA 6Gb RAID Controller
 1220 ARC-1220 8-Port PCI-Express to SATA RAID Controller
 1222 ARC-1222 8-Port PCI-Express to SAS/SATA II RAID Controller
 1230 ARC-1230 12-Port PCI-Express to SATA RAID Controller
 1260 ARC-1260 16-Port PCI-Express to SATA RAID Controller
 1280 ARC-1280/1280ML
 24-Port PCI-Express to SATA II RAID Controller
 17d3 1221 ARC-1221 8-Port PCI-Express to SATA RAID Controller
 1300 ARC-1300ix-16 16-Port PCI-Express to SAS Non-RAID Host Adapter
 1320 ARC-1320 8/16 Port PCIe 2.0 to SAS/SATA 6Gb Non-RAID Host Adapter
 1330 ARC-1330 16 Port PCIe 3.0 to SAS/SATA 12Gb Non-RAID Host Adapter
 1680 ARC-1680 series PCIe to SAS/SATA 3Gb RAID Controller
 17d3 1212 ARC-1212 4-Port PCIe to SAS/SATA II RAID Controller
 17d3 1222 ARC-1222 8-Port PCIe to SAS/SATA 3Gb RAID Controller
 17d3 1680 ARC-1680 8/12/16/24 Port PCIe to SAS/SATA 3Gb RAID Controller
 1880 ARC-188x series PCIe 2.0/3.0 to SAS/SATA 6/12Gb RAID Controller
 17d3 1213 ARC-1213 4-Port PCIe 2.0 to SAS/SATA 6Gb RAID Controller
 17d3 1215 ARC-1215 4-Port PCIe 3.0 to SAS/SATA 6Gb RAID Controller
 17d3 1216 ARC-1216 4-Port PCIe 3.0 to SAS/SATA 12Gb RAID Controller
 17d3 1223 ARC-1223 8-Port PCIe 2.0 to SAS/SATA 6Gb RAID Controller
 17d3 1225 ARC-1225 8-Port PCIe 3.0 to SAS/SATA 6Gb
 RAID Controller
 17d3 1226 ARC-1226 8-Port PCIe 3.0 to SAS/SATA 12Gb RAID Controller
 17d3 1880 ARC-1880 8/12/16/24 Port PCIe 2.0 to SAS/SATA 6Gb RAID Controller
 17d3 1882 ARC-1882 8/12/16/24 Port PCIe 3.0 to SAS/SATA 6Gb RAID Controller

17d3 1883 ARC-1883 8/12/16/24 Port PCIe 3.0 to SAS/SATA 12Gb RAID Controller
 1884 ARC-1884 series PCIe 3.0 to SAS/SATA 12/6Gb RAID Controller
 188a ARC-1886 series PCIe 4.0 to NVMe/SAS/SATA 16/12/6Gb RAID Controller
 # nee Neterion Inc., previously S2io Inc.
 17d5 Exar Corp.
 5731 Xframe 10-Gigabit Ethernet PCI-X
 5732 Xframe II 10-Gigabit Ethernet PCI-X 2.0
 5831 Xframe 10-Gigabit Ethernet PCI-X
 103c 12d5 PCI-X 133MHz 10GbE SR Fiber
 10a9 8020 Single Port 10-Gigabit Ethernet (PCI-X, Fiber)
 10a9 8024 Single Port 10-Gigabit Ethernet (PCI-X, Fiber)
 5832 Xframe II 10-Gigabit Ethernet PCI-X 2.0
 103c 1337 PCI-X 266MHz 10GigE SR [AD385A]
 10a9 8021 Single Port 10-Gigabit Ethernet II (PCI-X, Fiber)
 17d5 6020 Xframe II SR
 17d5
 6021 Xframe II SR, Low Profile
 17d5 6022 Xframe E SR
 17d5 6420 Xframe II LR
 17d5 6421 Xframe II LR, Low Profile
 17d5 6422 Xframe E LR
 17d5 6c20 Xframe II CX4
 17d5 6c21 Xframe II CX4, Low Profile
 17d5 6c22 Xframe E CX4
 5833 X3100 Series 10 Gigabit Ethernet PCIe
 17d5 6030 X3110 Single Port SR
 17d5 6031 X3120 Dual Port SR
 17d5 6430 X3110 Single Port LR
 17d5 6431 X3120 Dual Port LR
 17d5 7030 X3110 Single Port LRM
 17d5 7031 X3120 Dual Port LRM
 17d5 7430 X3110 Single Port 10GBase-T
 17d5 7431 X3120 Dual Port 10GBase-T
 17d5 7830 X3110 Single Port 10GBase-CR
 17d5 7831 X3120 Dual Port 10GBase-CR
 17db Cray Inc
 0101 XT Series [Seastar] 3D Toroidal Router
 17de KWorld Computer Co. Ltd.
 17df Dini Group
 1864 Virtex4 PCI Board w/ QL5064 Bridge [DN7000K10PCI/DN8000K10PCI/DN8000K10PSX/NOTUS]
 1865 Virtex4 ASIC Emulator [DN8000K10PCIe]
 1866 Virtex4 ASIC Emulator Cable Connection [DN8000K10PCI]
 1867 Virtex4 ASIC Emulator Cable Connection
 [DN8000K10PCIe]
 1868 Virtex4 ASIC Emulator [DN8000K10PCIe-8]
 1900 Virtex5 PCIe ASIC Emulator
 [DN9000K10PCIe8T/DN9002K10PCIe8T/DN9200K10PCIe8T/DN7006K10PCIe8T/DN7406K10PCIe8T]
 1901 Virtex5 PCIe ASIC Emulator Large BARs

[DN9000K10PCIe8T/DN9002K10PCIe8T/DN9200K10PCIe8T/DN7006K10PCIe8T/DN7406K10PCIe8T]

- 1902 Virtex5 PCIe ASIC Emulator Low Power [Interceptor]
- 1903 Spartan6 PCIe FPGA Accelerator Board [DNBFCS12PCIe]
- 1904 Virtex6 PCIe ASIC Emulation Board [DNDUALV6_PCIe4]
- 1905 Virtex6 PCIe ASIC Emulation Board [DNV6F6PCIe]
- 1906 Virtex6 PCIe ASIC Emulation Board [DN2076K10]
- 1907 Virtex6 PCIe ASIC Emulation Board [DNV6F2PCIe]
- 1908 Virtex6 PCIe ASIC Emulation Board Large BARs[DNV6F2PCIe]
- 1909 Kintex7 PCIe FPGA Accelerator Board [DNK7F5PCIe]
- 190a Virtex7 PCIe ASIC Emulation Board [DNV7F1A]
- 190b Stratix5 PCIe ASIC Emulation Board [DNS5GXF2]
- 190c Virtex7 PCIe ASIC Emulation Board [DNV7F2A]
- 190d Virtex7 PCIe ASIC Emulation Board [DNV7F4A]
- 190e Virtex7 PCIe ASIC Emulation Board [DNV7F2B]
- 190f KintexUS PCIe MainRef Design [DNPCIE_40G_KU_LL]
- 1910 VirtexUS ASIC Emulation Board [DNVUF4A]
- 1911 VirtexUS PCIe ASIC Emulation Board [DNVU_F2PCIe]
- 1912 KintexUS PCIe MainRef Design [DNPCIE_40G_KU_LL_QSFP]
- 1913 VirtexUS ASIC Emulation Board [DNVUF1A]
- 1914 VirtexUS ASIC Emulation Board [DNVUF2A]
- 1915 Arria10 PCIe MainRef Design [DNPCIE_80G_A10_LL]
- 1916 VirtexUS PCIe Accelerator Board [DNVUF2_HPC_PCIe]
- 1917 UltrascalePlus PCIe Accelerator Board [DNPCIE_400G_VU_LL]
- 1918 VirtexUS+ ASIC Emulation Board [DNVUPF4A]
- 1919 UltrascalePlus PCIe Accelerator Board [DNPCIE_400G_VUP_HBM_LL]
- 1a00 Virtex6 PCIe DMA Netlist Design
- 1a01 Virtex6 PCIe Darklite Design [DNPCIE_HXT_10G_LL]
- 1a02 Virtex7 PCIe DMA Netlist Design
- 1a03 Kintex7 PCIe Darklite Design [DNPCIE_K7_10G_LL]
- 1a05 Stratix5 PCIe Darklite Design [DNS5GX_F2]
- 1a06 VirtexUS PCIe DMA Netlist Design
- 1a07 KintexUS PCIe Darklite Design [DNPCIE_40G_KU_LL]
- 1a08 KintexUS PCIe Darklite Design [DNPCIE_40G_KU_LL_QSFP]
- 1a09 Arria10 PCIe Darklite Design [DNPCIE_80G_A10_LL]
- 1a0a VirtexUS PCIe Darklite Design [DNVUF2_HPC_PCIe]
- 1a0b UltrascalePlus PCIe Darklite Design [DNPCIE_400G_VU_LL]
- 1a0c KintexUS PCIe DRAM Packet Capture Design [DNPCIE_40G_KU_LL]
- 1a0d KintexUS PCIe DRAM Packet Capture Design [DNPCIE_40G_KU_LL_2QSFP]
- 1a0e UltrascalePlus PCIe Darklite Design [DNPCIE_400G_VUP_HBM_LL]
- 17e4 Sectra AB
 - 0001 KK671 Cardbus encryption board
 - 0002 KK672 Cardbus encryption board
- # nee Entropic Communications Inc.
- 17e6 MaxLinear
 - 0010 EN2010 [c.Link] MoCA Network Controller (Coax, PCI interface)
 - 0011 EN2010 [c.Link] MoCA Network Controller (Coax, MPEG interface)

0021 EN2210 [c.Link] MoCA Network Controller (Coax)
0025 EN2510 [c.Link] MoCA Network Controller (Coax, PCIe interface)
0027 EN2710 [c.Link] MoCA 2.0 Network Controller (Coax, PCIe interface)
3700 MoCA 2.0 Network Controller (Coax, PCIe interface)
3710 MoCA 2.5 Network Controller (Coax, PCIe interface)
17ee
Connect Components Ltd
17f2 Albatron Corp.
17f3 RDC Semiconductor, Inc.
1010 R1010 IDE Controller
1011 R1011 IDE Controller
1012 R1012 IDE Controller
1031 PCI/PCI-X to PCI-E Bridge
2012 M2012/R3308 VGA-compatible graphics adapter
6020 R6020 North Bridge
6021 R6021 Host Bridge
6030 R6030 ISA Bridge
6031 R6031 ISA Bridge
6040 R6040 MAC Controller
6060 R6060 USB 1.1 Controller
6061 R6061 USB 2.0 Controller
17f7 Topdek Semiconductor Inc.
17f9 Gemtek Technology Co., Ltd
17fc IOGEAR, Inc.
17fe InProComm Inc.
2120 IPN 2120 802.11b
1737 0020 WMP11 v4 802.11b Wireless-B PCI Adapter
2220 IPN 2220 802.11g
1468 0305 T60N871 802.11g Mini PCI Wireless Adapter
1737 0029 WPC54G v4 802.11g Wireless-G Notebook Adapter
17ff Benq Corporation
1800 Qualcomm Logic Inc.
1100 Nanospeed Trading Gateway
1803 ProdaSafe GmbH
1804 Ralink corp. (wrong ID)
3060 RT3060 Wireless 802.11n 1T/1R
1805 Euresys S.A.
1809 Lumanate, Inc.
180c IEI Integration Corp
1813
Ambient Technologies Inc
4000 HaM controllerless modem
16be 0001 V9x HAM Data Fax Modem
4100 HaM plus Data Fax Modem
16be 0002 V9x HAM 1394
1814 Ralink corp.
0101 Wireless PCI Adapter RT2400 / RT2460
1043 0127 WiFi-b add-on Card

1371 0010 Minitar MNW2BPCI Wireless PCI Card
1462 6828 PC11B2 (MS-6828) Wireless 11b PCI Card
0200 RT2500 802.11g PCI [PC54G2]
0201 RT2500 Wireless 802.11bg
1043 130f WL-130g
1186 3c00 DWL-G650X Wireless 11g CardBus Adapter
1371 001e CWC-854 Wireless-G CardBus Adapter
1371 001f CWM-854 Wireless-G Mini PCI Adapter
1371 0020 CWP-854 Wireless-G PCI Adapter
1458 e381 GN-WMKG 802.11b/g Wireless CardBus Adapter
1458 e931 GN-WIKG 802.11b/g mini-PCI Adapter
1462 6833 Unknown 802.11g mini-PCI Adapter
1462 6835 Wireless 11G CardBus CB54G2
1737 0032 WMP54G v4.0 PCI Adapter
1799 700a F5D7000 v2000/v3000 Wireless G Desktop Card
1799 701a F5D7010 v2000/v3000 Wireless G Notebook Card
1814 2560 RT2500 Wireless
802.11bg
182d 9073 WL-115 Wireless Network PCI Adapter
185f 22a0 CN-WF513 Wireless Cardbus Adapter
18eb 5312 WL531P IEEE 802.11g PCI Card-EU
1948 3c00 C54RC v1 Wireless 11g CardBus Adapter
1948 3c01 C54Ri v1 Wireless 11g PCI Adapter
0300 Wireless Adapter Canyon CN-WF511
0301 RT2561/RT61 802.11g PCI
1186 3c08 AirPlus G DWL-G630 Wireless Cardbus Adapter (rev.E1)
1186 3c09 DWL-G510 Rev C
13d1 abe3 miniPCI Pluscom 802.11 a/b/g
1458 e933 GN-WI01GS
1458 e934 GN-WP01GS
1462 b833 MP54G5 (MS-6833B)
1737 0055 WMP54G v4.1
1799 700e F5D7000 v6000 Wireless G Desktop Card
1799 701e F5D7010 v6000 Wireless G Notebook Card
17f9 0012 AWLC3026T 802.11g Wireless CardBus Adapter
1814 2561 EW-7108PCg/EW-7128g
0302 RT2561/RT61 rev B 802.11g
1186 3a71 DWA-510 Wireless G Desktop Adapter
1186 3c08 AirPlus G DWL-G630 Wireless Cardbus Adapter (rev.E2)
1186 3c09 AirPlus G DWL-G510 Wireless Network Adapter (Rev.C)
1462 b834 PC54G3 Wireless 11g PCI Card
1948
3c23 C54RC v2 Wireless 11g CardBus Adapter
1948 3c24 C54Ri v2 Wireless 11g PCI Adapter
0401 RT2600 802.11 MIMO
1737 0052 WPC54GR v1 802.11g Wireless-G Notebook Adapter with RangeBooster
17f9 0011 WPCR-137G 802.11bg Wireless CardBus Adapter
17f9 0016 WPIR-119GH 802.11bg Wireless Desktop Adapter

0601 RT2800 802.11n PCI
1799 801c F5D8011 v3 802.11n N1 Wireless Notebook Card
187e 3412 NWD-310N 802.11n Wireless PCI Adapter
0681 RT2890 Wireless 802.11n PCIe
1458 e939 GN-WS30N-RH 802.11bgn Mini PCIe Card
0701 RT2760 Wireless 802.11n 1T/2R
1737 0074 WMP110 v2 802.11n RangePlus Wireless PCI Adapter
0781 RT2790 Wireless 802.11n 1T/2R PCIe
1814 2790 RT2790 Wireless 802.11n 1T/2R PCIe
3060 RT3060 Wireless 802.11n 1T/1R
1186 3c04 DWA-525 Wireless N 150 Desktop Adapter (rev.A1)
3062 RT3062 Wireless 802.11n 2T/2R
3090 RT3090 Wireless 802.11n 1T/1R PCIe
13bd 1057 GN-WS32L-RH Half-size Mini PCIe Card
3091 RT3091 Wireless 802.11n 1T/2R PCIe
3092
RT3092 Wireless 802.11n 2T/2R PCIe
3290 RT3290 Wireless 802.11n 1T/1R PCIe
103c 18ec Ralink RT3290LE 802.11bgn 1x1 Wi-Fi and Bluetooth 4.0 Combo Adapter
3298 RT3290 Bluetooth
103c 18ec Ralink RT3290LE 802.11bgn 1x1 Wi-Fi and Bluetooth 4.0 Combo Adapter
3592 RT3592 Wireless 802.11abgn 2T/2R PCIe
359f RT3592 PCIe Wireless Network Adapter
5360 RT5360 Wireless 802.11n 1T/1R
1186 3c05 DWA-525 Wireless N 150 Desktop Adapter (rev.A2)
20f4 703a TEW-703PI N150 Wireless PCI Adapter
5362 RT5362 PCI 802.11n Wireless Network Adapter
5390 RT5390 Wireless 802.11n 1T/1R PCIe
103c 1636 U98Z077.00 Half-size Mini PCIe Card
5392 RT5392 PCIe Wireless Network Adapter
539b RT5390R 802.11bgn PCIe Wireless Network Adapter
539f RT5390 [802.11 b/g/n 1T1R G-band PCI Express Single Chip]
103c 1637 Pavilion DM1Z-3000 PCIe wireless card
5592 RT5592 PCIe Wireless Network Adapter
e932 RT2560F 802.11 b/g PCI
1815 Devolo AG
1820 InfiniCon Systems Inc.
1822 Twinhan Technology
Co. Ltd
4e35 Mantis DTV PCI Bridge Controller [Ver 1.0]
182d SiteCom Europe BV
HFC-based ISDN card
3069 ISDN PCI DC-105V2
9790 WL-121 Wireless Network Adapter 100g+ [Ver.3]
182e Raza Microelectronics, Inc.
0008 XLR516 Processor
Strange vendor ID used by BCM5785 when in RAID mode
182f Broadcom

HT1000 uses 3 IDs 1166:024a (Native SATA Mode), 1166:024b (PATA/IDE Mode), 182f:000b (RAID Mode)
depends on SATA BIOS setting
000b BCM5785 [HT1000] SATA (RAID Mode)
1830 Credence Systems Corporation
8000 CPIIn
8001 CPId
8002 CPIx
8003 CPIq
183b MikroM GmbH
08a7 MVC100 DVI
08a8 MVC101 SDI
08a9 MVC102 DVI+Audio
08b0 MVC200-DC
1846 Alcatel-Lucent
1849 ASRock Incorporation
184a Thales Computers
1100 MAX II cPLD
1850 Advantest Corporation
0048 EK220-66401 Computer Interface Card
1851 Microtune, Inc.
1852 Anritsu Corp.
1853 SMSC Automotive Infotainment System Group
1854 LG Electronics, Inc.
185b Compro Technology, Inc.
1489 VideoMate Vista T100
185f
Wistron NeWeb Corp.
1864 SilverBack
2110 ISNAP 2110
1867 Topspin Communications
5a44 MT23108 InfiniHost HCA
5a45 MT23108 InfiniHost HCA flash recovery
5a46 MT23108 InfiniHost HCA bridge
6278 MT25208 InfiniHost III Ex (Tavor compatibility mode)
6282 MT25208 InfiniHost III Ex
186c Humusoft, s.r.o.
0612 AD612 Data Acquisition Device
0614 MF614 Multifunction I/O Card
0622 AD622 Data Acquisition Device
0624 MF624 Multifunction I/O PCI Card
0625 MF625 3-phase Motor Driver
0634 MF634 Multifunction I/O PCIe Card
0644 MF644 Multifunction I/O Thb Card
186f WiNRADiO Communications
1876 L-3 Communications
a101 VignaWATCH PCI
a102 VignaWATCH PMC
a103 Vigna I/O

187e ZyXEL Communications Corporation
3403 ZyAir G-110 802.11g
340e M-302 802.11g XtremeMIMO
1885 Avvida Systems Inc.
1888 Varisys Ltd
0301 VMFX1 FPGA PMC module
0601 VSM2 dual PMC carrier
0710 VS14x series PowerPC PCI board
0720 VS24x series PowerPC PCI board
188a Ample Communications,
Inc
1890 Egenera, Inc.
1894 KNC One
1896 B&B Electronics Manufacturing Company, Inc.
4202 MIport 3PCIU2 2-port Serial
4204 MIport 3PCIU4 4-port Serial
4208 MIport 3PCIU8 8-port Serial
4211 MIport 3PCIOU1 1-port Isolated Serial
4212 MIport 3PCIOU2 2-port Isolated Serial
4214 MIport 3PCIOU4 4-port Isolated Serial
bb10 3PCI2 2-Port Serial
bb11 3PCIO1 1-Port Isolated Serial
1897 AMtek
18a1 Astute Networks Inc.
18a2 Stretch Inc.
0002 VRC6016 16-Channel PCIe DVR Card
18a3 AT&T
18ac DViCO Corporation
d500 FusionHDTV 5
d800 FusionHDTV 3 Gold
d810 FusionHDTV 3 Gold-Q
d820 FusionHDTV 3 Gold-T
db30 FusionHDTV DVB-T Pro
db40 FusionHDTV DVB-T Hybrid
db78 FusionHDTV DVB-T Dual Express
18b8 Ammasso
b001 AMSO 1100 iWARP/RDMA Gigabit Ethernet Coprocessor
formally Info-Tek Corp.
18bc GeCube Technologies, Inc.
18c3 Micronas Semiconductor Holding AG
0720 nGene PCI-Express Multimedia Controller
1461 032e Hybrid M779 PCI-E
Nee Octigabay System
18c8 Cray
Inc
18c9 ARVOO Engineering BV
18ca XGI Technology Inc. (eXtreme Graphics Innovation)
0020 Z7/Z9 (XG20 core)

0021 Z9s/Z9m (XG21 core)
0027 Z11/Z11M
0040 Volari V3XT/V5/V8
0047 Volari 8300 (chip: XP10, codename: XG47)
should be 182d
18d2 Sitecom Europe BV (Wrong ID)
Sitecom HFC-S based ISDN controller card DC-105v2
3069 DC-105v2 ISDN controller
18d4 Celestica
18d8 Dialogue Technology Corp.
18dd Artimi Inc
4c6f Artimi RTMI-100 UWB adapter
18df LeWiz Communications
18e6 MPL AG
0001 OSCI [Octal Serial Communication Interface]
18eb Advance Multimedia Internet Technology, Inc.
18ec Cesnet, z.s.p.o.
6d05 ML555
18ec 0100 NIC (ethernet interfaces)
18ec 0200 NIC (szedata2) 4x1G
18ec 0201 NIC (szedata2) 2x10G
18ec 0300 NIFIC (szedata2) 4x1G
18ec 0302 NIFIC (szedata2) 2x10G
18ec 4200 Flexible FlowMon (szedata2) 1x10G
18ec ff00 Testing design
18ec ff01 Boot design
c006 COMBO6
18ec d001 COMBO-4MTX
18ec d002 COMBO-4SFP
18ec d003 COMBO-4SFPRO
18ec
d004 COMBO-2XFP
c032 COMBO-LXT110
18ec 0100 NIC (ethernet interfaces)
18ec 0200 NIC (szedata2) 4x1G
18ec 0201 NIC (szedata2) 2x10G
18ec 0300 NIFIC (szedata2) 4x1G
18ec 0302 NIFIC (szedata2) 2x10G
18ec 4200 Flexible FlowMon (szedata2) 1x10G
18ec ff00 Testing design
18ec ff01 Boot design
c045 COMBO6E
c050 COMBO-PTM
c058 COMBO6X
18ec d001 COMBO-4MTX
18ec d002 COMBO-4SFP
18ec d003 COMBO-4SFPRO
18ec d004 COMBO-2XFP

c132 COMBO-LXT155
18ec 0100 NIC (ethernet interfaces)
18ec 0200 NIC (szedata2) 4x1G
18ec 0201 NIC (szedata2) 2x10G
18ec 0300 NIFIC (szedata2) 4x1G
18ec 0302 NIFIC (szedata2) 2x10G
18ec 4200 Flexible FlowMon (szedata2) 1x10G
18ec ff00 Testing design
18ec ff01 Boot design
c232 COMBO-FXT100
18ec 0100 NIC (ethernet interfaces)
18ec 0200 NIC (szedata2) 4x1G
18ec 0201 NIC (szedata2) 2x10G
18ec 0300 NIFIC (szedata2) 4x1G
18ec 0302 NIFIC (szedata2) 2x10G
18ec 4200 Flexible FlowMon (szedata2)
1x10G
18ec ff00 Testing design
18ec ff01 Boot design
18ee Chenming Mold Ind. Corp.
18f1 Spectrum GmbH
18f4 Napatech A/S
0031 NT20X Network Adapter
0051 NT20X Capture Card
0061 NT20E Capture Card
0064 NT20E Inline Card
0071 NT4E Capture Card
0074 NT4E Inline Card
0081 NT4E 4-port Expansion Card
0091 NT20X Capture Card [New Rev]
00a1 NT4E-STD Capture Card
00a4 NT4E-STD Inline Card
8 x 1 Gbps / 10 Gbps PCIe Optical Bypass Adapter
00b1 NTBPE Optical Bypass Adapter
00c5 NT20E2 Network Adapter 2x10Gb
00d5 NT40E2-4 Network Adapter 4x10Gb
00e5 NT40E2-1 Network Adapter 1x40Gb
4-Port Adapter for 1 GbE In-Line Bypass Applications
00f5 NT4E2-4T-BP Network Adapter 4x1Gb with Electrical Bypass
0105 NT4E2-4-PTP Network Adapter 4x1Gb
0115 NT20E2-PTP Network Adapter 2x10Gb
0125 NT4E2-4-PTP Network Adapter 4x1Gb
0135 NT20E2-PTP Network Adapter 2x10Gb
0145 NT40E3-4-PTP Network Adapter 4x10Gb
0155 NT100E3-1-PTP Network Adapter 1x100Gb
0165
NT80E3-2-PTP Network Adapter 2x40Gb
0175 NT20E3-2-PTP Network Adapter 2x10Gb

0185 NT40A01 Network Adapter
01a5 NT200A01 Network Adapter
01c5 NT200A02 Network Adapter
18f6 NextIO
1000 [Nexsis] Switch Virtual P2P PCIe Bridge
1001 [Texsis] Switch Virtual P2P PCIe Bridge
1050 [Nexsis] Switch Virtual P2P PCI Bridge
1051 [Texsis] Switch Virtual P2P PCI Bridge
2000 [Nexsis] Switch Integrated Mgmt. Endpoint
2001 [Texsis] Switch Integrated Mgmt. Endpoint
18f7 Commtech, Inc.
0001 ESCC-PCI-335 Serial PCI Adapter [Fastcom]
0002 422/4-PCI-335 Serial PCI Adapter [Fastcom]
0003 232/4-1M-PCI Serial PCI Adapter [Fastcom]
0004 422/2-PCI-335 Serial PCI Adapter [Fastcom]
0005 IGESCC-PCI-ISO/1 Serial PCI Adapter [Fastcom]
000a 232/4-PCI-335 Serial PCI Adapter [Fastcom]
000b 232/8-PCI-335 Serial PCI Adapter [Fastcom]
000f FSCC Serial PCI Adapter [Fastcom]
0010 GSCC Serial PCI Adapter [Fastcom]
0011 QSSB Serial PCI Adapter [Fastcom]
0014 SuperFSCC Serial PCI Adapter
[Fastcom]
0015 SuperFSCC-104-LVDS Serial PC/104+ Adapter [Fastcom]
0016 FSCC-232 RS-232 Serial PCI Adapter [Fastcom]
Software UARTs
0017 SuperFSCC-104 Serial PC/104+ Adapter [Fastcom]
Software UARTs
0018 SuperFSCC/4 Serial PCI Adapter [Fastcom]
Software UARTs
0019 SuperFSCC Serial PCI Adapter [Fastcom]
001a SuperFSCC-LVDS Serial PCI Adapter [Fastcom]
Software UARTs
001b FSCC/4 Serial PCI Adapter [Fastcom]
RS-644 Only
001c SuperFSCC/4-LVDS Serial PCI Adapter [Fastcom]
Software UARTs
001d FSCC Serial PCI Adapter [Fastcom]
001e SuperFSCC/4 Serial PCIe Adapter [Fastcom]
001f SuperFSCC/4 Serial cPCI Adapter [Fastcom]
0020 422/4-PCIe Serial PCIe Adapter [Fastcom]
0021 422/8-PCIe Serial PCIe Adapter [Fastcom]
RS-644 Only
0022 SuperFSCC/4-LVDS Serial PCIe Adapter [Fastcom]
Software UARTs
0023 SuperFSCC/4 Serial cPCI Adapter [Fastcom]
RS-644 Only, Software UARTs
0025 SuperFSCC/4-LVDS Serial PCI Adapter [Fastcom]

RS-644 Only, Software UARTs
0026
SuperFSCC-LVDS Serial PCI Adapter [Fastcom]

Software UARTs
0027 FSCC/4 Serial PCIe Adapter [Fastcom]
18fb Resilience Corporation
1904 Hangzhou Silan Microelectronics Co., Ltd.
2031 SC92031 PCI Fast Ethernet Adapter
8139 RTL8139D [Realtek] PCI 10/100BaseTX ethernet adaptor
1905 Micronas USA, Inc.
1912 Renesas Technology Corp.
0002 SH7780 PCI Controller (PCIC)
0011 SH7757 PCIe End-Point [PBI]
0012 SH7757 PCIe-PCI Bridge [PPB]
0013 SH7757 PCIe Switch [PS]
0014 uPD720201 USB 3.0 Host Controller
0015 uPD720202 USB 3.0 Host Controller
001a SH7758 PCIe-PCI Bridge [PPB]
001b SH7758 PCIe End-Point [PBI]
001d SH7758 PCIe Switch [PS]
1919 Soltek Computer Inc.
1923 Sangoma Technologies Corp.
0040 A200/Remora FXO/FXS Analog AFT card
0100 A104d QUAD T1/E1 AFT card
0300 A101 single-port T1/E1
0400 A104u Quad T1/E1 AFT
1924 Solarflare Communications
0703 SFC4000 rev A net [Solarstorm]
10b8 0102 SMC10GPCIe-10BT (A2) [TigerCard]
10b8 0103 SMC10GPCIe-10BT
(A3) [TigerCard]
10b8 0201 SMC10GPCIe-XFP (A1) [TigerCard]
1924 0101 SFE4001-A1
1924 0102 SFE4001-A2
1924 0103 SFE4001-A3
1924 0201 SFE4002-A1
1924 0301 SFE4003-A1
1924 0302 SFE4003-A2
1924 0303 SFE4003-A3
1924 0304 SFE4003-A4
1924 0500 SFE4005-A0
0710 SFC4000 rev B [Solarstorm]
10b8 0103 SMC10GPCIe-10BT (A3) [TigerCard]
10b8 0201 SMC10GPCIe-XFP (A1) [TigerCard]
1924 0102 SFE4001-A2
1924 0103 SFE4001-A3
1924 0201 SFE4002-A1
1924 0302 SFE4003-A2

1924 0303 SFE4003-A3
1924 0304 SFE4003-A4
1924 0500 SFE4005-A0
1924 5102 SFN4111T-A2
1924 5103 SFN4111T-R3
1924 5104 SFN4111T-R4
1924 5105 SFN4111T-R5
1924 5201 SFN4112F-R1
1924 5202 SFN4112F-R2
0803 SFC9020 10G Ethernet Controller
1014 0478 2-port 10GbE Low-Latency (R7)
1014 0479 2-port 10GbE OpenOnload (R7)
1014 04a7 Solarflare 10Gb Low-latency Dual-port HBA (R7)
1014 04a8 Solarflare 10Gb Dual-port HBA (R7)
103c 2132 Ethernet 10Gb 2-port 570FLR-SFP+
Adapter (R1)
103c 2136 Ethernet 10Gb 2-port 570SFP+ Adapter (R7)
1924 1201 SFA6902F-R1 SFP+ AOE Adapter
1924 6200 SFN5122F-R0 SFP+ Server Adapter
1924 6201 SFN5122F-R1 SFP+ Server Adapter
1924 6202 SFN5122F-R2 SFP+ Server Adapter
1924 6204 SFN5122F-R4 SFP+ Server Adapter
1924 6205 SFN5122F-R5 SFP+ Server Adapter
1924 6206 SFN5122F-R6 SFP+ Server Adapter
1924 6207 SFN5122F-R7 SFP+ Server Adapter
1924 6210 SFN5322F-R0 SFP+ Precision Time Synchronization Server Adapter
1924 6211 SFN5322F-R1 SFP+ Precision Time Synchronization Server Adapter
1924 6217 SFN5322F-R7 SFP+ Precision Time Synchronization Server Adapter
1924 6227 SFN6122F-R7 SFP+ Server Adapter
1924 6237 SFN6322F-R7 SFP+ Precision Time Synchronization Server Adapter
1924 6501 SFN5802K-R1 Mezzanine Adapter
1924 6511 SFN5814H-R1 Mezzanine Adapter
1924 6521 SFN5812H-R1 Mezzanine Adapter
1924 6562 SFN6832F-R2 SFP+ Mezzanine Adapter
1924 6a05 SFN5112F-R5 SFP+ Server Adapter
1924
6a06 SFN5112F-R6 SFP+ Server Adapter
1924 7206 SFN5162F-R6 SFP+ Server Adapter
1924 7207 SFN5162F-R7 SFP+ Server Adapter
1924 7a06 SFN5152F-R6 SFP+ Server Adapter
1924 7a07 SFN5152F-R7 SFP+ Server Adapter
0813 SFL9021 10GBASE-T Ethernet Controller
1924 6100 SFN5121T-R0 10GBASE-T Server Adapter
1924 6102 SFN5121T-R2 10GBASE-T Server Adapter
1924 6103 SFN5121T-R3 10GBASE-T Server Adapter
1924 6104 SFN5121T-R4 10GBASE-T Server Adapter
1924 6902 SFN5111T-R2 10GBASE-T Server Adapter
1924 6904 SFN5111T-R4 10GBASE-T Server Adapter

1924 7104 SFN5161T-R4 10GBASE-T Server Adapter
1924 7904 SFN5151T-R4 10GBASE-T Server Adapter
0903 SFC9120 10G Ethernet Controller
1014 04cc SFN7122F-R2 2x10GbE SFP+ Flareon Ultra
1924 8002 SFN7122F-R1 SFP+ Server Adapter
1924 8003 SFN7x41Q-R1 Flareon Ultra 7000 Series 10/40G Adapter
1924 8006 SFN7022F-R1 SFP+ Server Adapter
1924 8007 SFN7322F-R2 Precision Time SFP+ Server Adapter
1924 8009 SFN7x22F-R2
Flareon Ultra 7000 Series 10G Adapter
1924 800a SFN7x02F-R2 Flareon 7000 Series 10G Adapter
1924 800c SFN7x22F-R3 Flareon Ultra 7000 Series 10G Adapter
1924 800d SFN7x02F-R3 Flareon 7000 Series 10G Adapter
1924 8010 SFA7942Q-R1 QSFP+ AOE Adapter
1924 8015 SFA7942Q-A5-0-R1 QSFP+ AOE Adapter
0923 SFC9140 10/40G Ethernet Controller
1924 800b SFN7x42Q-R1 Flareon Ultra 7000 Series 10/40G Adapter
1924 800e SFN7x42Q-R2 Flareon Ultra 7000 Series 10/40G Adapter
1924 800f SFN7xx4F-R1 Flareon Ultra 7000 Series 10G Adapter
0a03 SFC9220 10/40G Ethernet Controller
1924 8011 SFN8022-R1 8000 Series 10G Adapter
1924 8012 SFN8522-R1 8000 Series 10G Adapter
1924 8013 SFN8042-R1 8000 Series 10/40G Adapter
1924 8014 SFN8542-R1 8000 Series 10/40G Adapter
1924 8016 SFN8022-R2 8000 Series 10G Adapter
1924 8017 SFN8522-R2 8000 Series 10G Adapter
1924 8018 SFN8042-R2 8000 Series 10/40G Adapter
1924 8019 SFN8542-R2 8000 Series 10/40G Adapter
1924 801a SFN8722-R1
8000 Series OCP 10G Adapter
1924 801b SFN8522-R3 8000 Series 10G Adapter
1924 801c SFN8042-R3 8000 Series 10/40G Adapter
1924 8021 SFN8041-R1 8000 Series 10/40G Adapter
0b03 XtremeScale SFC9250 10/25/40/50/100G Ethernet Controller
1924 801d x2522-R1 2000 Series 10/25G Adapter
1924 801e x2542-R1 2000 Series 40/100G Adapter
1924 8022 XtremeScale X2522 10G Network Adapter
1924 8024 XtremeScale X2562 OCP 3.0 Dual Port SFP28
1924 8027 XtremeScale X2541 PCIe Single Port QSFP28
1924 8028 XtremeScale X2522-25G Network Adapter
1924 802a XtremeScale X2542 PCIe Dual Port QSFP28
1924 802b XtremeScale X2552 OCP 2.0 Dual Port SFP28
1924 802c XtremeScale X2522-25G PCIe Dual Port SFP28
1924 802d XtremeScale X2562 OCP 3.0 Dual Port SFP28
1803 SFC9020 10G Ethernet Controller (Virtual Function)
1813 SFL9021 10GBASE-T Ethernet Controller (Virtual Function)
1903 SFC9120 10G Ethernet Controller (Virtual Function)
1923 SFC9140 10/40G Ethernet Controller

(Virtual Function)
1a03 SFC9220 10/40G Ethernet Controller (Virtual Function)
1b03 XtremeScale SFC9250 10/25/40/50/100G Ethernet Controller (Virtual Function)
6703 SFC4000 rev A iSCSI/Onload [Solarstorm]
10b8 0102 SMC10GPCIe-10BT (A2) [TigerCard]
10b8 0103 SMC10GPCIe-10BT (A3) [TigerCard]
10b8 0201 SMC10GPCIe-XFP (A1) [TigerCard]
1924 0101 SFE4001-A1
1924 0102 SFE4001-A2
1924 0103 SFE4001-A3
1924 0201 SFE4002-A1
1924 0301 SFE4003-A1
1924 0302 SFE4003-A2
1924 0303 SFE4003-A3
1924 0304 SFE4003-A4
1924 0500 SFE4005-A0
c101 EF1-21022T [EtherFabric]
192a BitMICRO Networks Inc.
0008 RAMPART
192e TransDimension
1931 Option N.V.
000c Qualcomm MSM6275 UMTS chip
1932 DiBcom
193c MAXIM Integrated Products
193d Hangzhou H3C Technologies Co., Ltd.
193f AHA Products Group
0001 AHA36x-PCIX
0360 AHA360-PCIE
0363 AHA363-PCIE
0364 AHA364-PCIE
0367 AHA367-PCIE
0370 AHA370-PCIE
0604 AHA604
0605 AHA605
3641 AHA3641
3642 AHA3642
6101
AHA6101
6102 AHA6102
1942 ClearSpeed Technology plc
e511 Advance X620 accelerator card
e521 Advance e620 accelerator card
1947 C-guys, Inc.
4743 CG200 Dual SD/SDIO Host controller device
1948 Alpha Networks Inc.
194a DapTechnology B.V.
1111 FireSpy3850
1112 FireSpy450b

1113 FireSpy450bT
1114 FireSpy850
1115 FireSpy850bT
1200 FireTrac 3460bT
1201 FireTrac 3460bT (fallback firmware)
1202 FireTrac 3460bT
1203 FireTrac 3460bT (fallback firmware)
nee Curtis, Inc.
1954 One Stop Systems, Inc.
1957 Freescale Semiconductor Inc
0012 MPC8548E
0013 MPC8548
0014 MPC8543E
0015 MPC8543
0018 MPC8547E
0019 MPC8545E
001a MPC8545
0020 MPC8568E
0021 MPC8568
0022 MPC8567E
0023 MPC8567
0030 MPC8533E
0031 MPC8533
0032 MPC8544E
0033 MPC8544
0040 MPC8572E
0041 MPC8572
0050 MPC8536E
0051 MPC8536
0052 MPC8535E
0053 MPC8535
0060 MPC8569
0061 MPC8569E
0070 P2020E
0071 P2020
0078 P2010E
0079 P2010
0080 MPC8349E
0081 MPC8349
0082
MPC8347E TBGA
0083 MPC8347 TBGA
0084 MPC8347E PBGA
110a 4074 SIMATIC NET CP 1628
0085 MPC8347 PBGA
110a 4046 SIMATIC NET CP 1623
0086 MPC8343E
0087 MPC8343

00b4 MPC8315E
00b6 MPC8314E
 1a56 1101 Killer Xeno Pro Gigabit Ethernet Controller
00c2 MPC8379E
00c3 MPC8379
00c4 MPC8378E
00c5 MPC8378
00c6 MPC8377E
00c7 MPC8377
0100 P1020E
0101 P1020
0102 P1021E
0103 P1021
0108 P1011E
0109 P1011
010a P1012E
010b P1012
0110 P1022E
0111 P1022
 1c7f 5200 EB5200
0118 P1013E
0119 P1013
0128 P1010
0400 P4080E
0401 P4080
0408 P4040E
0409 P4040
041f P3041
0440 T4240 with security
0441 T4240 without security
0446 T4160 with security
0447 T4160 without security
0830 T2080 with security
0831 T2080 without security
0838 T2081 with security
0839 T2081 without security
580c MPC5121e
7010 MPC8641 PCI Host Bridge
7011 MPC8641D PCI Host Bridge
7018 MPC8610
c006 MPC8308
 1a56 1201 Killer E2100 Gigabit
 Ethernet Controller
PCIe interface for emulator
fc02 RedStone
CFI device over PCIe
fc03 CFI
1958 Faster Technology, LLC.

1959 PA Semi, Inc
a000 PA6T Core
a001 PWRficient Host Bridge
a002 PWRficient PCI-Express Port
a003 PWRficient SMBus Controller
a004 PWRficient 16550 UART
a005 PWRficient Gigabit Ethernet
a006 PWRficient 10-Gigabit Ethernet
a007 PWRficient DMA Controller
a008 PWRficient LPC/Localbus Interface
a009 PWRficient L2 Cache
a00a PWRficient DDR2 Memory Controller
a00b PWRficient SERDES
a00c PWRficient System/Debug Controller
a00d PWRficient PCI-Express Internal Endpoint
1966 Orad Hi-Tec Systems
1975 DVG64 family
1977 DVG128 family
nee Atheros Communications, Inc. nee Attansic Technology Corp.
1969 Qualcomm Atheros
1026 AR8121/AR8113/AR8114 Gigabit or Fast Ethernet
1043 8304 P5KPL-CM Motherboard
1048 Attansic L1 Gigabit Ethernet
1043 8226 P5B-MX/WiFi-AP, P5KPL-VM Motherboard
1062 AR8132 Fast Ethernet
1063 AR8131 Gigabit Ethernet
Ethernet
1458 e000 GA-G31M-ES2L Motherboard
17c0 10d2 Medion Akoya E7214 Notebook PC [MD98410]
1066 Attansic L2c Gigabit Ethernet
1067 Attansic L1c Gigabit Ethernet
1073 AR8151 v1.0 Gigabit Ethernet
1083 AR8151 v2.0 Gigabit Ethernet
1090 AR8162 Fast Ethernet
1043 108d VivoBook X202E, X202EV
1091 AR8161 Gigabit Ethernet
1043 1477 N56VZ
10a0 QCA8172 Fast Ethernet
10a1 QCA8171 Gigabit Ethernet
2048 Attansic L2 Fast Ethernet
2060 AR8152 v1.1 Fast Ethernet
2062 AR8152 v2.0 Fast Ethernet
1043 8468 Eee PC 1015PX
E2200, E2201, E2205
e091 Killer E220x Gigabit Ethernet Controller
e0a1 Killer E2400 Gigabit Ethernet Controller
e0b1 Killer E2500 Gigabit Ethernet Controller
196a Sensory Networks Inc.

0101 NodalCore C-1000 Content Classification Accelerator
0102 NodalCore C-2000 Content Classification Accelerator
0105 NodalCore C-3000 Content Classification Accelerator
196d Club-3D BV
196e PNY
1971 AGEIA Technologies, Inc.
1011 Physics Processing
Unit [PhysX]
1043 0001 PhysX P1
nee Eberspaecher Electronics
1974 Star Electronics GmbH & Co. KG
0009 FlexCard PMC-II
0011 FlexCard PMC-II Ethernet
1976 TRENDnet
1977 Parsec
197b JMicron Technology Corp.
0250 JMC250 PCI Express Gigabit Ethernet Controller
0260 JMC260 PCI Express Fast Ethernet Controller
0368 JMB368 IDE controller
2360 JMB360 AHCI Controller
2361 JMB361 AHCI/IDE
1462 7235 P965 Neo MS-7235 mainboard
2362 JMB362 SATA Controller
1043 8460 P8P67 Deluxe Motherboard
2363 JMB363 SATA/IDE Controller
1043 81e4 P5B [JMB363]
1458 b000 Motherboard
1849 2363 Motherboard (one of many)
2364 JMB364 AHCI Controller
2365 JMB365 AHCI/IDE
2366 JMB366 AHCI/IDE
2368 JMB368 IDE controller
2369 JMB369 Serial ATA Controller
2380 IEEE 1394 Host Controller
2381 Standard SD Host Controller
2382 SD/MMC Host Controller
2383 MS Host Controller
2384 xD Host Controller
2386 Standard SD Host Controller
2387 SD/MMC Host Controller
2388
MS Host Controller
2389 xD Host Controller
2391 Standard SD Host Controller
2392 SD/MMC Host Controller
2393 MS Host Controller
2394 xD Host Controller
1982 Distant Early Warning Communications Inc

1600 OX16C954 HOST-A
16ff OX16C954 HOST-B
1987 Phison Electronics Corporation
5007 E7 NVMe Controller
5012 E12 NVMe Controller
5016 E16 PCIe4 NVMe Controller
1989 Montilio Inc.
0001 RapidFile Bridge
8001 RapidFile
198a Nallatech Ltd.
1993 Innominate Security Technologies AG
1999 A-Logics
a900 AM-7209 Video Processor
199a Pulse-LINK, Inc.
199d Xsigo Systems
8209 Virtual NIC Device
890a Virtual HBA Device
199f Auvitek
8501 AU85X1 PCI REV1.1
8521 AU8521 TV card
nee ServerEngines Corp.
19a2 Emulex Corporation
0120 x1 PCIe Gen2 Bridge[Pilot4]
0200 BladeEngine 10Gb PCI-E iSCSI adapter
0201 BladeEngine 10Gb PCIe Network Adapter
0211 BladeEngine2 10Gb Gen2 PCIe Network Adapter
0212 BladeEngine2 10Gb Gen2 PCIe iSCSI Adapter
0221 BladeEngine3
10Gb Gen2 PCIe Network Adapter
0222 BladeEngine3 10Gb Gen2 PCIe iSCSI Adapter
0700 OneConnect OCe10100/OCe10102 Series 10 GbE
103c 1747 NC550SFP DualPort 10GbE Server Adapter
103c 1749 NC550SFP Dual Port Server Adapter
103c 174a NC551m Dual Port FlexFabric 10Gb Adapter
103c 174b StorageWorks NC550 DualPort Converged Network Adapter
103c 3314 NC551i Dual Port FlexFabric 10Gb Adapter
0702 OneConnect 10Gb iSCSI Initiator
0704 OneConnect OCe10100/OCe10102 Series 10 GbE CNA
10df e602 OneConnect OCe10100 10Gb CNA
10df e630 OneConnect OCe10102-FM-E / OCe10102-FX-E for EMC VNX Symmetrix
0710 OneConnect 10Gb NIC (be3)
FC 5287 / FC 5284; CCIN 5287
1014 03d0 PCIe2 2-port 10GbE SR Adapter for POWER
FC 5288 / FC 5286; CCIN 5288
1014 03d1 PCIe2 2-port 10GbE SFP+ Copper Adapter for POWER
1014 0409 Integrated Multifunction Card with Dual 10GbE SR Optical + Dual 1GbE for Power 750/760
1014 040a Integrated Multifunction Card with Dual 10GbE SR Copper +

Dual 1GbE for Power 750/760
 103c 3315 NC553i 10Gb 2-port FlexFabric Converged Network Adapter
 103c 3340 NC552SFP 2-port 10Gb Server Adapter
 103c 3341 NC552m 10Gb 2-port FlexFabric Converged Network Adapter
 103c 3345 NC553m 10Gb 2-port FlexFabric Converged Network Adapter
 103c 337b NC554FLB 10Gb 2-port FlexFabric Converged Network Adapter
 10df e733 Flex System EN4054 4-port 10Gb Ethernet Mezzanine Adapter
 0712 OneConnect 10Gb iSCSI Initiator (be3)
 0714 OneConnect 10Gb FCoE Initiator (be3)
 103c 3315 NC553i 10Gb 2-port FlexFabric Converged Network Adapter
 103c 337b NC554FLB 10Gb 2-port FlexFabric Converged Network Adapter
 0800 ServerView iRMC HTI
 19a8 DAQDATA GmbH
 19ac Kasten Chase Applied Research
 0001 ACA2400 Crypto Accelerator
 19ae Progeny Systems Corporation
 0520 4135 HFT Interface Controller
 0521 Decimator
 19ba ZyXEL Communications Corp.
 2330 ZyWALL Turbo Card
 19c1 Exegy Inc.
 # nee NextNet Wireless
 19d1 Motorola Expedience
 19d4 Quixant Limited
 19da
 ZOTAC International (MCO) Ltd.
 19de Pico Computing
 19e2 Vector Informatik GmbH
 19e3 DDRdrive LLC
 5801 DDRdrive X1
 5808 DDRdrive X8
 dd52 DDRdrive X1-30
 19e5 Huawei Technologies Co., Ltd.
 # subvendor
 0123 ES3000 V3 NVMe PCIe SSD
 19e5 3022 NVMe SSD ES3600P V3 800GB 2.5" U.2
 19e5 3023 NVMe SSD ES3600P V3 1200GB 2.5" U.2
 19e5 3024 NVMe SSD ES3600P V3 1600GB 2.5" U.2
 19e5 3025 NVMe SSD ES3600P V3 2000GB 2.5" U.2
 19e5 3026 NVMe SSD ES3600P V3 3200GB 2.5" U.2
 19e5 3033 NVMe SSD ES3600C V3 1200GB HHHL AIC
 19e5 3034 NVMe SSD ES3600C V3 1600GB HHHL AIC
 19e5 3036 NVMe SSD ES3600C V3 3200GB HHHL AIC
 0200 Hi1822 Family (2*100GE)
 19e5 d139 Hi1822 SP572 (2*100GE)
 19e5 d13d Hi1822 SC371 (2*100GE)
 0202 Hi1822 Family (2*32G FC)
 19e5 d302 Hi1822 SP521 (2*32G FC)

19e5 d304 Hi1822 SP526 (2*32G FC)
0203 Hi1822 Family (2*16G FC)
19e5 d301 Hi1822 SP520 (2*16G FC)
19e5 d305 Hi1822 SP525 (2*16G FC)
0205 Hi1822 Family (2*100GE)
19e5 df27
Hi1822 MZ731 MEZZ (2*100GE)
0206 Hi1822 Family (2*25GE)
19e5 d138 Hi1822 SP582 (2*25GE)
19e5 d13a Hi1822 SC381 (2*25GE)
0210 Hi1822 Family (4*25GE)
19e5 df2e Hi1822 MZ532 MEZZ (4*25GE)
0211 Hi1822 Family (4*25GE)
19e5 d12f Hi1822 SP571 (4*25GE)
19e5 d137 Hi1822 SP581 (4*25GE)
19e5 d142 Hi1822 SP583 (4*25GE)
0212 Hi1822 Family (2*8G FC)
19e5 d303 Hi1822 SP522 (2*8G FC)
19e5 d306 Hi1822 SP523 (2*8G FC)
1710 iBMA Virtual Network Adapter
1711 Hi1710 [iBMC Intelligent Management system chip w/VGA support]
1822 Hi1822 Family (4*25GE)
19e5 d129 Hi1822 SP570 (4*25GE)
19e5 d136 Hi1822 SP580 (4*25GE)
19e5 d141 Hi1822 SP583 (4*25GE)
371e Hi1822 Family Virtual Bridge
375e Hi1822 Family Virtual Function
379e Hi1822 Family Virtual Function
a120 HiSilicon PCIe Root Port with Gen4
a121 HiSilicon PCI-PCI Bridge
a122 HiSilicon Embedded DMA Engine
a124 HiSilicon Internal SDI Function Engine
a125 HiSilicon SDI Network Controller
a126 HiSilicon
SDI NVMe Storage Controller
a127 HiSilicon SDI Accelerator
a12a HiSilicon Add-on PCI-PCI Bridge
a220 HNS GE Network Controller
a221 HNS GE/10GE/25GE Network Controller
19e5 0454 TM280
19e5 04cc TM210
19e5 d14a TM280 4*25G
19e5 d14b TM210 4*GE
a222 HNS GE/10GE/25GE RDMA Network Controller
a224 HNS GE/10GE/25GE/50GE RDMA Network Controller
a226 HNS GE/10GE/25GE/50GE/100GE RDMA Network Controller
a22a HiSilicon Network For SDI
a22e HNS Network Controller (Virtual Function)

a22f HNS RDMA Network Controller (Virtual Function)
a230 HiSilicon SAS 3.0 HBA
a235 HiSilicon AHCI HBA
a238 HiSilicon USB 3.0 Host Controller
a239 HiSilicon USB 2.0 2-port Host Controller
a23a HiSilicon USB 2.0 Host Controller
a23b HiSilicon USB 1.1 Host Controller
a250 HiSilicon ZIP Engine
a251 HiSilicon ZIP Engine(Virtual Function)
a255 HiSilicon SEC Engine
a256 HiSilicon SEC Engine(Virtual Function)
a258 HiSilicon HPRE Engine
a259 HiSilicon HPRE Engine(Virtual
Function)
a25a HiSilicon RDE Engine
a25b HiSilicon RDE Engine(Virtual Function)
19e7 NET (Network Equipment Technologies)
1001 STIX DSP Card
1002 STIX - 1 Port T1/E1 Card
1003 STIX - 2 Port T1/E1 Card
1004 STIX - 4 Port T1/E1 Card
1005 STIX - 4 Port FXS Card
19ee Netronome Systems, Inc.
19f1 BFG Tech
19ff Eclipse Electronic Systems, Inc.
1a03 ASPEED Technology, Inc.
1150 AST1150 PCI-to-PCI Bridge
2000 ASPEED Graphics Family
15d9 0832 X10SRL-F
1a05 deltaww
1a07 Kvaser AB
0006 CAN interface PC104+ HS/HS
0007 CAN interface PC1canx II HS or HS/HS
0008 CAN interface PCIEcan HS or HS/HS
0009 CAN interface PCI104 HS/HS
1a08 Sierra semiconductor
0000 SC15064
1a0e DekTec Digital Video B.V.
083f DTA-2111 VHF/UHF Modulator
1a17 Force10 Networks, Inc.
8002 PB-10GE-2P 10GbE Security Card
1a1d GFaI e.V.
1a17 Meta Networks MTP-1G IDPS NIC
1a1e 3Leaf Systems, Inc.
1a22 Ambric Inc.
1a29 Fortinet, Inc.
4338 CP8 Content Processor ASIC
4e36 NP6 Network

Processor
4e37 NP7 Network Processor
1a2b Ascom AG
0000 GESP v1.2
0001 GESP v1.3
0002 ECOMP v1.3
0005 ETP v1.4
000a ETP-104 v1.1
000e DSLP-104 v1.1
nee Metalink Ltd.
1a30 Lantiq
0680 MtW8171 [Hyperion II]
0700 Wave300 PSB8224 [Hyperion III]
0710 Wave300 PSB8231 [Hyperion III]
1a32 Quanta Microsystems, Inc
1a3b AzureWave
1112 AR9285 Wireless Network Adapter (PCI-Express)
1a41 Tiler Corp.
0001 TILE64 processor
0002 TILEPro processor
0200 TILE-Gx processor
0201 TILE-Gx Processor Virtual Function
2000 TILE-Gx PCI Express Root Port
1a4a SLAC National Accelerator Lab TID-AIR
1000 MCOR Power Supply Controller
1010 AMC EVR - Stockholm Timing Board
1020 Cluster On Board (COB) Ethernet Switch
2000 PGPCard - 4 Lane
2001 PGPCard - 8 Lane Plus EVR
2010 PCI-Express EVR
PC-260-101-03
2020 PGP-GEN3 PCIe
2030 AXI Stream DAQ PCIe card
1a51 Hectronic AB
1a55 Rohde & Schwarz DVS GmbH
0010 SDStationOEM
0011 SDStationOEM II
0020 Centaurus
0021
Centaurus II
0022 Centaurus II LT
0030 CLIPSTER-VPU 1.x (Hugo)
0040 Hydra Cinema (JPEG)
0050 CLIPSTER-VPU 2.x (DigiLab)
0060 CLIPSTER-DCI 2.x (HydraX)
0061 Atomix
0062 Atomix LT
0063 Atomix HDMI

0064 Atomix STAN
0065 Atomix HDMI STAN
0070 RED Rocket
0090 CinePlay
1a56 Bigfoot Networks, Inc.
1a57 Highly Reliable Systems
1a58 Razer USA Ltd.
1a5d Celoxica
1a5e Aprius Inc.
1a5f System TALKS Inc.
1a68 VirtenSys Limited
1a71 XenSource, Inc.
1a73 Violin Memory, Inc
0001 Mozart [Memory Appliance 1010]
1a76 Wavesat
1a77 Lightfleet Corporation
1a78 Virident Systems Inc.
0031 FlashMAX Drive
1a78 0034 FlashMAX PCIe SSD [rev 3]
1a78 0037 FlashMAX PCIe SSD [rev 3D]
1a78 0038 FlashMAX PCIe SSD [rev 4]
1a78 0039 FlashMAX PCIe SSD [rev 4D]
0040 FlashMAX II
0041 FlashMAX II
0042 FlashMAX II
0050 FlashMAX III
1a84 Commex Technologies
0001 Vulcan SP HT6210 10-Gigabit Ethernet (rev 02)
1a88 MEN Mikro Elektronik
4d45 Multifunction IP
core
1a8a StarBridge, Inc.
1a8c Verigy Pte. Ltd.
1100 E8001-66443 PCI Express CIC
1a8e DRS Technologies
2090 Model 2090 PCI Express
1aa8 Ciprico, Inc.
0009 RAIDCore Controller
000a RAIDCore Controller
1aae Global Velocity, Inc.
1ab4 Distributed Management Task Force, Inc. (DMTF)
1ab6 CalDigit, Inc.
6201 RAID Card
Parallels VM virtual devices
1ab8 Parallels, Inc.
4000 Virtual Machine Communication Interface
4005 Accelerated Virtual Video Adapter
4006 Memory Ballooning Controller

1ab9 Espia Srl
1ac1 Global Unichip Corp.
089a Coral Edge TPU
1ac8 Aeroflex Gaisler
1acc Point of View BV
1ad7 Spectracom Corporation
8000 TSync-PCIe Time Code Processor
9100 TPRO-PCI-66U Timecode Reader/Generator
1ade Spin Master Ltd.
1501 Swipetech barcode scanner
3038 PCIe Video Bridge
13c2 3016 TT-budget S2-4200 Twin
4254 0552 S952 v3
1ae0 Google, Inc.
0042 Compute Engine Virtual Ethernet [gVNIC]
1ae3 SANBlaze Technology, Inc.
1ae7 First Wise Media GmbH
0520
HFC-S PCI A [X-TENSIONS XC-520]
1ae8 Silicon Software GmbH
0a40 microEnable IV-BASE x1
0a41 microEnable IV-FULL x1
0a44 microEnable IV-FULL x4
0e44 microEnable IV-GigE x4
1ae9 Wilocity Ltd.
0101 Wil6200 PCI Express Upstream Port
0200 Wil6200 PCI Express Port
0201 Wil6200 Wireless PCI Express Port
0301 Wil6200 802.11ad Wireless Network Adapter
0302 Wil6200 802.11ad Wireless Network Adapter
0310 Wil6200 802.11ad Wireless Network Adapter
1aea Alcor Micro
6601 AU6601 PCI-E Flash card reader controller
6621 AU6621 PCI-E Flash card reader controller
6625 AU6625 PCI-E Flash card reader controller
1aec Wolfson Microelectronics
nee Fusion-io
1aed SanDisk
1003 ioDimm3 (v1.2)
1005 ioDimm3
1014 03c3 High IOPS SSD PCIe Adapter
103c 176f 1.28TB MLC PCIe ioDrive Duo
103c 1770 5.2TB MLC PCIe ioDrive Octal
103c 178b 160GB SLC PCIe ioDrive
103c 178c 320GB MLC PCIe ioDrive
103c 178d 320GB SLC PCIe ioDrive Duo
103c 178e 640GB MLC PCIe ioDrive

Duo
1006 ioXtreme
1007 ioXtreme Pro
1008 ioXtreme-2
2001 ioDrive2
3001 ioMemory FHHL
3002 ioMemory HHHH
3003 ioMemory Mezzanine
1aee Caustic Graphics Inc.
nee Qumranet, Inc.
1af4 Red Hat, Inc.
1000 Virtio network device
1001 Virtio block device
1002 Virtio memory balloon
1003 Virtio console
1004 Virtio SCSI
1005 Virtio RNG
1009 Virtio filesystem
virtio 1.0
1041 Virtio network device
virtio 1.0
1042 Virtio block device
virtio 1.0
1043 Virtio console
virtio 1.0
1044 Virtio RNG
virtio 1.0
1045 Virtio memory balloon
virtio 1.0
1048 Virtio SCSI
virtio 1.0
1049 Virtio filesystem
virtio 1.0
1050 Virtio GPU
virtio 1.0
1052 Virtio input
1110 Inter-VM shared memory
1af4 1100 QEMU Virtual Machine
1af5 Netezza Corp.
1afa J & W Electronics Co., Ltd.
1b03 Magnum Semiconductor, Inc,
6100 DXT/DXTPro Multiformat Broadcast HD/SD Encoder/Decoder/Transcoder
7000 D7 Multiformat Broadcast HD/SD Encoder/Decoder/Transcoder
1b08 MSC
Technologies GmbH
1b0a Pegatron
1b13 Jatou Corp
1b1a K&F Computing Research Co.

0e70 GRAPE
1b21 ASMedia Technology Inc.
0611 ASM1061 SATA IDE Controller
0612 ASM1062 Serial ATA Controller
1849 0612 Motherboard
1042 ASM1042 SuperSpeed USB Host Controller
1043 8488 P8B WS Motherboard
1849 1042 Motherboard
1080 ASM1083/1085 PCIe to PCI Bridge
1849 1080 Motherboard
1142 ASM1042A USB 3.0 Host Controller
1184 ASM1184e PCIe Switch Port
1849 1184 ASM1184e PCIe Switch
1242 ASM1142 USB 3.1 Host Controller
1343 ASM1143 USB 3.1 Host Controller
2142 ASM2142 USB 3.1 Host Controller
1b26 Netcope Technologies, a.s.
c132 COMBO-LXT155
c1c0 NFB-100G1-e0
c1c1 NFB-100G1-e1
c250 NFB-200G2-master
c251 NFB-200G2-slave
c2c0 NFB-100G2-e0
c2c1 NFB-100G2-e1
cb20 COMBO-20G
cb40 COMBO-40G
cb80 NFB-40G2
1b2c Opal-RT Technologies Inc.
1b36 Red Hat, Inc.
0001 QEMU PCI-PCI bridge
0002 QEMU PCI 16550A Adapter
1af4 1100 QEMU Virtual Machine
0003 QEMU
PCI Dual-port 16550A Adapter
1af4 1100 QEMU Virtual Machine
0004 QEMU PCI Quad-port 16550A Adapter
1af4 1100 QEMU Virtual Machine
0005 QEMU PCI Test Device
1af4 1100 QEMU Virtual Machine
0006 PCI Rocker Ethernet switch device
0007 PCI SD Card Host Controller Interface
0008 QEMU PCIe Host bridge
0009 QEMU PCI Expander bridge
000a PCI-PCI bridge (multiseat)
000b QEMU PCIe Expander bridge
000c QEMU PCIe Root port
000d QEMU XHCI Host Controller
0100 QXL paravirtual graphic card

1af4 1100 QEMU Virtual Machine
1b37 Signal Processing Devices Sweden AB
0001 ADQ214
0003 ADQ114
0005 ADQ112
000e ADQ108
000f ADQDSP
0014 ADQ412
0015 ADQ212
001b SDR14
001c ADQ1600
001e ADQ208
001f DSU
0020 ADQ14
0023 ADQ7
0026 ADQ8
2014 TX320
2019 S6000
now owned by HGST (a Western Digital subsidiary)
1b39 sTec, Inc.
0001 S1120 PCIe Accelerator SSD
1b3a Westar Display Technologies
7589 HRED J2000 - JPEG 2000 Video Codec Device
1b3e Teradata
Corp.
1fa8 BYNET BIC2SE/X
1b3e 00a3 BYNET BIC2SX
1b3e 00c3 BYNET BIC2SE
1b40 Schooner Information Technology, Inc.
also used by some PROXIM (14b7) devices erroneously
1b47 Numascale AS
0601 NumaChip N601
0602 NumaChip N602
1b4b Marvell Technology Group Ltd.
0640 88SE9128 SATA III 6Gb/s RAID Controller
9120 88SE9120 SATA 6Gb/s Controller
9123 88SE9123 PCIe SATA 6.0 Gb/s controller
dc93 600e DC-6xxe series SATA 6G controller
9125 88SE9125 PCIe SATA 6.0 Gb/s controller
9128 88SE9128 PCIe SATA 6 Gb/s RAID controller
9130 88SE9128 PCIe SATA 6 Gb/s RAID controller with HyperDuo
1043 8438 P8P67 Deluxe Motherboard
9172 88SE9172 SATA 6Gb/s Controller
9178 88SE9170 PCIe SATA 6Gb/s Controller
917a 88SE9172 SATA III 6Gb/s RAID Controller
9183 88SS9183 PCIe SSD Controller
9192 88SE9172 SATA III 6Gb/s RAID Controller
91a0 88SE912x SATA 6Gb/s Controller [IDE mode]

91a4 88SE912x IDE Controller
9220 88SE9220 PCIe 2.0 x2 2-port SATA 6 Gb/s RAID Controller
9230
88SE9230 PCIe SATA 6Gb/s Controller
1028 1fd6 BOSS-S1 Adapter
1028 1fdf BOSS-S1 Modular
1028 1fe2 BOSS-S1 Adapter
1028 2010 BOSS-S2 Adapter
1d49 0300 ThinkSystem M.2 with Mirroring Enablement Kit
9235 88SE9235 PCIe 2.0 x2 4-port SATA 6 Gb/s Controller
9445 88SE9445 PCIe 2.0 x4 4-Port SAS/SATA 6 Gbps RAID Controller
9480 88SE9480 SAS/SATA 6Gb/s RAID controller
9485 88SE9485 SAS/SATA 6Gb/s controller
1b55 NetUP Inc.
18f6 Dual DVB Universal CI card
18f7 Dual DVB Universal CI card rev 1.4
2a2c Dual DVB-S2-CI card
e2e4 Dual DVB-T/C-CI RF card
2xHDMI and 2xHD-SDI inputs
e5f4 MPEG2 and H264 Encoder-Transcoder
f1c4 Dual ASI-RX/TX-CI card
1b66 DELTACAST
0007 DELTA-3G-elp-d
1b6f Etron Technology, Inc.
7023 EJ168 USB 3.0 Host Controller
7052 EJ188/EJ198 USB 3.0 Host Controller
1849 7052 QC5000-ITX/PH
1b73 Fresco Logic
1000 FL1000G USB 3.0 Host Controller
1d5c 1000 Anker USB 3.0 Express Card
1009 FL1009 USB 3.0 Host Controller
1100
FL1100 USB 3.0 Host Controller
16b8 6e31 Allegro Pro USB 3.0 PCIe
1b74 OpenVox Communication Co. Ltd.
0115 D115P/D115E Single-port E1/T1 card
d130 D130P/D130E Single-port E1/T1 card (3rd GEN)
d210 D210P/D210E Dual-port E1/T1 card(2nd generation)
d230 D230 Dual-port E1/T1 card (2nd generation)
d410 D410/430 Quad-port E1/T1 card
d430 D410/430 Quad-port E1/T1 card
1b79 Absolute Analysis
1b85 OCZ Technology Group, Inc.
1041 RevoDrive 3 X2 PCI-Express SSD 240 GB (Marvell Controller)
6018 RD400/400A SSD
8788 RevoDrive Hybrid
1b94 Signatec / Dynamic Signals Corp
e400 PX14400 Dual Xilinx Virtex5 based Digitizer

1b96 Western Digital
1b9a XAVi Technologies Corp.
1baa QNAP Systems, Inc.
1bad ReFLEX CES
c001 XpressGXA10-LP1150
c002 XpressGXA10-LP1151
1bb0 SimpliVity Corporation
0002 OmniCube Accelerator OA-3000
0010 OmniCube Accelerator OA-3000-2
1bb1 Seagate Technology PLC
005d Nytro PCIe Flash Storage
1bb1 6501 Nytro XP6500-8A1536 1.5TB
2TB Nytro
PCIe controller
1bb1 6502 Nytro XP6500-8A2048
4TB Nytro PCIe controller
1bb1 6503 Nytro XP6500-8A4096
2GB DRAM variant of Nytro card
1bb1 6511 Nytro XH6550-2GB DRAM
8GB variant of Nytro PCIe controller
1bb1 6512 Nytro XH6550-8GB DRAM
1.5 TB Nytro PCIe controller
1bb1 6521 Nytro XP6500-8A1536 1.5TB
2TB Nytro PCIe controller
1bb1 6522 Nytro XP6500-8A2048
4TB Nytro PCIe controller
1bb1 6523 Nytro XP6500-8A4096
0100 Nytro Flash Storage
1bb1 0101 Nytro XF1440
1bb1 0103 Nytro 5000
1bb1 0105 Nytro 5020
1bb1 0106 Nytro 5020 TCG
Larkspur 2.5"
1bb1 0107 Nytro 5320
Larkspur 2.5" TCG
1bb1 0108 Nytro 5320 TCG
1bb1 0121 Nytro XM1440
1bb1 0123 Nytro 5000
Kiowa M.2
1bb1 0125 Nytro 5020
Kiowa M.2 TCG
1bb1 0126 Nytro 5020
Larkspur M.2 22110mm
1bb1 0127 Nytro 5320 M.2
Larkspur M.2 22110mm TCG
1bb1 0128 Nytro 5320 M.2 TCG
Larkspur M.2 2280mm
1bb1 0131 Nytro 5320 M.2

Larkspur M.2 2280mm TCG
1bb1 0132 Nytro 5320
M.2 TCG
Larkspur E1.S
1bb1 0141 Nytro 5320 E1.S
Larkspur E1.S TCG
1bb1 0142 Nytro 5320 E1.S TCG
Kersey 2.5"
1bb1 0151 Nytro 5520
Kersey 2.5" TCG
1bb1 0152 Nytro 5520 TCG
1bb1 01a1 Nytro XP7102
1bb3 Bluecherry
4304 BC-04120A MPEG4 4 port video encoder / decoder
4309 BC-08240A MPEG4 4 port video encoder / decoder
4310 BC-16480A MPEG4 16 port video encoder / decoder
4e04 BC-04120A 4 port MPEG4 video encoder / decoder
4e09 BC-08240A 8 port MPEG4 video encoder / decoder
4e10 BC-16480A 16 port MPEG4 video encoder / decoder
5304 BC-H04120A 4 port H.264 video and audio encoder / decoder
5308 BC-H08240A 8 port H.264 video and audio encoder / decoder
5310 BC-H16480A 16 port H.264 video and audio encoder / decoder
1bb5 Quantenna Communications, Inc.
1bbf Maxeler Technologies Ltd.
0003 MAX3
0004 MAX4
1bcf NEC Corporation
001c Vector Engine 1.0
1bd0 Astronics Corporation
1001 Mx5 PMC/XMC Databus Interface Card
1002 PM1553-5 (PC/104+ MIL-STD-1553
Interface Card)
1004 AB3000 Series Rugged Computer
1005 PE1000 (Multi-Protocol PCIe/104 Interface Card)
1101 OmniBus II PCIe Multi-Protocol Interface Card
1102 OmniBusBox II Multi-Protocol Interface Core
1103 OmniBus II cPCIe/PXIe Multi-Protocol Interface Card
1bd4 Inspur Electronic Information Industry Co., Ltd.
1bee IXXAT Automation GmbH
0003 CAN-IB200/PCIe
1bef Lantiq
0011 MIPS SoC PCI Express Port
1bf4 VTI Instruments Corporation
0001 SentinelEX
7011 RX0xxx
1bfd EeeTOP
1c09 CSP, Inc.
4254 10G-PCIE3-8D-2S

4255 10G-PCIE3-8D-Q
4256 10G-PCIE3-8D-2S
4258 10G-PCIE3-8E-2S Network Adapter
4260 10G-PCIE3-8E-4S Network Adapter
4261 10G-PCIE3-8E-4S Network Adapter
4262 10G-PCIE3-8E-4S Network Adapter
4263 10G-PCIE3-8E-4S Network Adapter
4264 10G-PCIE3-8E-2S Network Adapter
4265 10G-PCIE3-8E-2S Network Adapter
5000 25G-PCIE3-8A-2S Security Intelligent Adapter
5001 25G-PCIE3-8B-2S Security Intelligent Adapter
1c1c Symphony
0001 82C101
1c1f
SoftLab-NSK
0015 FD842
0019 FD722
001a FD788
001b FD720
001c FD922
001d Vega
1c28 Lite-On IT Corp. / Plextor
0122 M6e PCI Express SSD [Marvell 88SS9183]
previously Fiberblaze
1c2c Silicom Denmark
000a Capture
000f SmartNIC
00a0 FBC4G Capture 4x1Gb [Herculaneum]
00a1 FBC4XG Capture 4x10Gb [Ancona]
00a2 FBC8XG Capture 8x10Gb [Livorno]
00a3 FBC2XG Capture 2x10Gb [Genoa]
00a4 FBC4XGG3 Capture 4x10Gb [Livigno]
00a5 FBC2XLG Capture 2x40Gb [Livorno]
00a6 FBC1CG Capture 1x100Gb
00a9 FBC2XGHH Capture 2x10Gb [Latina]
00ad FBC2CGG3HL Capture 2x100Gb [Padua]
00af Capture slave device
00e0 PacketMover 2x100Gb [Savona]
00e1 PacketMover 2x100Gb [Tivoli]
00e3 PacketMover 2x10Gb [Tivoli]
00e5 PacketMover 2x10Gb [Corfu]
a000 FBC2CGG3 Capture 2x40Gb [Mango_02]
a001 FBC2CGG3 Capture 2x100Gb [Mango_02]
a003 FBC2CGG3 Capture 16x10Gb [Mango]
a007 FBC2CGG3 Capture 2x40Gb [Mango]
a008 FBC2CGG3 Capture 2x25Gb [Mango]
a009 FBC2CGG3 Capture 16x10Gb [Mango]
a00a

FBC2CGG3 Capture 8x10Gb [Mango]
a00e FB2CG Capture 2x100Gb [Savona]
a00f FB2CG Capture 2x40Gb [Savona]
a011 FB2CG Capture 2x25Gb [Savona]
a012 FB2CG Capture 8x10Gb [Savona]
Used on V120 VME Crate Controller
1c32 Highland Technology, Inc.
1c33 Daktronics, Inc
1c36 Annapurna Labs Ltd.
0001 Gigabit Ethernet Adapter
0002 SFP+ 10G Ethernet Adapter
1c3b Accensus, LLC
0200 Telas2
<http://www.accensusllc.com/accensustelas2.html>
0300 Telas 2.V
1c44 Enmotus Inc
8000 8000 Storage IO Controller
A Western Digital Subsidiary
1c58 HGST, Inc.
0003 Ultrastar SN100 Series NVMe SSD
1014 04f5 PCIe3 1.6TB NVMe Flash Adapter
1014 04f6 PCIe3 3.2TB NVMe Flash Adapter
1c58 0003 Ultrastar SN100/SN150 NVMe SSD
0023 Ultrastar SN200 Series NVMe SSD
1c58 8823 Ultrastar Memory (ME200)
1c5c SK hynix
1283 PC300 NVMe Solid State Drive 256GB
1284 PC300 NVMe Solid State Drive 512GB
1285 PC300 NVMe Solid State Drive 1TB
1327 BC501 NVMe Solid State Drive 512GB
1504
SC300 512GB M.2 2280 SATA Solid State Drive
1c5f Beijing Memblaze Technology Co. Ltd.
000d PBlaze5 520/526 AIC
003d PBlaze5 920/926 AIC
010d PBlaze5 520/526 U.2
013d PBlaze5 920/926 U.2
0540 PBlaze4 NVMe SSD
0550 PBlaze5 700/900
0555 PBlaze5 510/516
0557 PBlaze5 910/916
<http://www.nicevt.ru/> (in Russian)
1c63 Science and Research Centre of Computer Technology (JSC "NICEVT")
<http://www.radiotec.ru/catalog.php?cat=jr8&art=14109>
0008 K1927BB1Ya [EC8430] Angara Interconnection Network Adapter
1c7e TTTech Computertechnik AG
0200 zFAS Debug Port
1c7f Elektrobit Austria GmbH

5100 EB5100
1c8a TSF5 Corporation
0001 Hunter PCI Express
1c8c Mobiveil, Inc.
1cb0 Shannon Systems
d000 Venice NVMe SSD
1cb0 2f10 Venice-E Series U.2 SSD
1cb0 2f11 Venice Series U.2 SSD
1cb0 2f12 Venice-X Series U.2 SSD
1cb0 af10 Venice-E Series AIC SSD
1cb0 af11 Venice Series AIC SSD
1cb0 af12 Venice-X Series AIC SSD
1cb1 Collion UG & Co.KG
1cb5 Focusrite
Audio Engineering Ltd
0002 Clarett
1cb8 Dawning Information Industry Co., Ltd.
1cc1 ADATA Technology Co., Ltd.
8201 XPG SX8200 Pro PCIe Gen3x4 M.2 2280 Solid State Drive
1cc4 Union Memory (Shenzhen)
17ab NVMe 256G SSD device
1cc5 Embedded Intelligence, Inc.
0100 CAN-PCIe-02
1cc7 Radian Memory Systems Inc.
0200 RMS-200
0250 RMS-250
1ccf Zoom Corporation
0001 TAC-2 Thunderbolt Audio Converter
1cd2 SesKion GmbH
0301 Simulyzer-RT CompactPCI Serial DIO-1 card
0302 Simulyzer-RT CompactPCI Serial PSI5-ECU-1 card
0303 Simulyzer-RT CompactPCI Serial PSI5-SIM-1 card
0304 Simulyzer-RT CompactPCI Serial PWR-ANA-1 card
0305 Simulyzer-RT CompactPCI Serial CAN-1 card
supports 8x CAN (-FD) interfaces
0306 Simulyzer-RT CompactPCI Serial CAN-2 card (CAN-FD)
1cd7 Nanjing Magewell Electronics Co., Ltd.
0010 Pro Capture Endpoint
0014 PRO CAPTURE AIO 4K PLUS
0017 PRO CAPTURE AIO 4K
1cdd secunet Security Networks AG
1ce4 Exablaze
0001 ExaNIC X4
0002 ExaNIC X2
0003
ExaNIC X10
0004 ExaNIC X10-GM
0005 ExaNIC X40

0006 ExaNIC X10-HPT
0007 ExaNIC X40
0008 ExaNIC V5P
0009 ExaNIC X25
000a ExaNIC X100
000b ExaNIC V9P
0100 ExaDISK FX1
1cf0 Akitio
1cf7 Subspace Dynamics
1d00 Pure Storage
1d05 Tongfang Hongkong Limited
1d0f Amazon.com, Inc.
cd01 NVMe SSD Controller
ec20 Elastic Network Adapter (ENA)
efa0 Elastic Fabric Adapter (EFA)
1d17 Zhaoxin
070f ZX-100 PCI Express Root Port
0710 ZX-100/ZX-200 PCI Express Root Port
0711 ZX-100/ZX-200 PCI Express Root Port
0712 ZX-100/ZX-200 PCI Express Root Port
0713 ZX-100/ZX-200 PCI Express Root Port
0714 ZX-100/ZX-200 PCI Express Root Port
0715 ZX-100/ZX-200 PCI Express Root Port
0716 ZX-D PCI Express Root Port
0717 ZX-D/ZX-E PCI Express Root Port
0718 ZX-D/ZX-E PCI Express Root Port
0719 ZX-D/ZX-E PCI Express Root Port
071a ZX-D/ZX-E PCI Express Root Port
071b ZX-D/ZX-E PCI Express Root Port
071c ZX-D/ZX-E PCI Express Root Port
071d ZX-D/ZX-E PCI Express
Root Port
071e ZX-D/ZX-E PCI Express Root Port
071f ZX-200 Upstream Port of PCI Express Switch
0720 ZX-200 PCIE RC6 controller
0721 ZX-200 Downstream Port of PCI Express Switch
0722 ZX-200 PCIE P2C bridge
1000 ZX-D Standard Host Bridge
1001 ZX-D/ZX-E Miscellaneous Bus
1003 ZX-E Standard Host Bridge
3001 ZX-100 Standard Host Bridge
300a ZX-100 Miscellaneous Bus
3038 ZX-100/ZX-200/ZX-E Standard Universal PCI to USB Host Controller
3104 ZX-100/ZX-200/ZX-E Standard Enhanced PCI to USB Host Controller
31b0 ZX-100/ZX-D Standard Host Bridge
31b1 ZX-100/ZX-D Standard Host Bridge
31b2 ZX-100/ZX-D DRAM Controller
31b3 ZX-100/ZX-D Power Management Controller

31b4 ZX-100/ZX-D I/O APIC
31b5 ZX-100/ZX-D Scratch Device
31b7 ZX-100/ZX-D/ZX-E Standard Host Bridge
31b8 ZX-100/ZX-D PCI to PCI Bridge
3288 ZX-100/ZX-D/ZX-E High Definition Audio Controller
345b ZX-100/ZX-D/ZX-E Miscellaneous Bus
3a02 ZX-100 C-320 GPU
3a03 ZX-D C-860 GPU
3a04 ZX-E C-960
GPU
9002 ZX-100/ZX-200 EIDE Controller
9003 ZX-100/ZX-E EIDE Controller
9045 ZX-100/ZX-D/ZX-E RAID Accelerator 0
9046 ZX-D/ZX-E RAID Accelerator 1
9083 ZX-100/ZX-200/ZX-E StorX AHCI Controller
9084 ZX-100 StorX AHCI Controller
9100 ZX-200 Cross bus
9101 ZX-200 Traffic Controller
9141 ZX-100 High Definition Audio Controller
9142 ZX-D High Definition Audio Controller
9144 ZX-E High Definition Audio Controller
9180 ZX-200 Networking Gigabit Ethernet Adapter
9202 ZX-100 USB eXtensible Host Controller
9203 ZX-200 USB eXtensible Host Controller
9204 ZX-E USB eXtensible Host Controller
9286 ZX-D eMMC Host Controller
9300 ZX-D/ZX-E eSPI Host Controller
95d0 ZX-100 Universal SD Host Controller
f410 ZX-100/ZX-D/ZX-E PCI Com Port
1d18 RME
0001 Fireface UFX+
1d1d CNEX Labs
1f1f QEMU NVM Express LightNVM Controller
2807 8800 series NVMe SSD
CEM Solutions Pvt. Ltd.
1d21 Allo
1d22 Baidu Technology
1380 Cloud Storage Device
1d26 Kalray Inc.
0040
Turbocard2 Accelerator
0080 Open Network Interface Card 80G
00c0 Turbocard3 Accelerator
0140 Open Network Interface Card 40G
e004 AB01/EMB01 Development Board
1d37 NovaSparks
0013 PM3
0014 PM4

0015 PM4edge
0016 PM4edge User Device
1d40 Techman Electronics (Changshu) Co., Ltd.
1d44 DPT
a400 PM2x24/PM3224
1d49 Lenovo
1d4c Diamanti, Inc.
1d5c Fantasia Trading LLC
1d61 Technobox, Inc.
1d62 Nebbiolo Technologies
1d65 Imagine Communications Corp.
04de Taurus/McKinley
1d6a Aquantia Corp.
0001 AQC107 NBase-T/IEEE 802.3bz Ethernet Controller [AQtion]
07b1 AQC107 NBase-T/IEEE 802.3bz Ethernet Controller [AQtion]
08b1 AQC108 NBase-T/IEEE 802.3bz Ethernet Controller [AQtion]
11b1 AQC111 NBase-T/IEEE 802.3bz Ethernet Controller [AQtion]
12b1 AQC112 NBase-T/IEEE 802.3bz Ethernet Controller [AQtion]
87b1 AQC107 NBase-T/IEEE 802.3bz Ethernet Controller [AQtion]
d107 AQC107 NBase-T/IEEE 802.3bz Ethernet Controller [AQtion]
1043 8741 XG-C100C
d108 AQC108
NBase-T/IEEE 802.3bz Ethernet Controller [AQtion]
1d6c Atomic Rules LLC
1001 A5PL-E1
1002 A5PL-E7
1003 S5PEDS-AB
1004 KC705-K325
1005 ZC706-Z045
1006 KCU105-KU040
1007 XUSP3S-VU095 [Jasper]
1008 XUSPL4-VU065 [Mustang UltraScale]
1009 XUSPL4-VU3P [Mustang UltraScale+]
100a A10PL4-A10GX115
100b K35-2SFP
100c K35-4SFP
100d AR-ARKA-FX0 [Arkville 32B DPDK Data Mover]
1d6c 2001 DPDK-Aware Virtual Function [Arkville VF]
100e AR-ARKA-FX1 [Arkville 64B DPDK Data Mover]
1d6c 2001 DPDK-Aware Virtual Function [Arkville VF]
100f AR-ARKA-FX1 [Arkville 64B DPDK Data Mover for Versal]
1010 AR-ARKA-FX1 [Arkville 64B DPDK Data Mover for Agilex]
1011 AR-MAN-U50 [Manitou Class Accelerator for U50]
1012 AR-MAN-U200 [Manitou Class Accelerator for U200]
1013 AR-MAN-U250 [Manitou Class Accelerator for U250]
1014 AR-MAN-U280 [Manitou Class Accelerator for U280]
4200 A5PL-E1-10GETI [10 GbE Ethernet Traffic Instrument]
1d72 Xiaomi

1d78 DERA
1d7c Aerotech, Inc.
1d82
NETINT Technologies Inc.
0101 Codensity D400 SSD
0102 Codensity D408 PCIe Gen4 NVMe SSD
0202 Codensity T408 Video Encoding-Decoding Accelerator
1d87 Fuzhou Rockchip Electronics Co., Ltd
0100 RK3399 PCI Express Root Port
1808 RK1808 Neural Network Processor Card
1d8f Enyx
1d93 YADRO (KNS Group)
1d94 Chengdu Haiguang IC Design Co., Ltd.
1450 Root Complex
1451 I/O Memory Management Unit
1452 PCIe Dummy Host Bridge
1453 PCIE GPP Bridge
1454 Internal PCIe GPP Bridge 0 to Bus B
1455 PCIe Dummy Function
1456 PSPCCP Command DMA Processor
1458 10 Gb Ethernet Controller Port 0/Port1
1459 10 Gb Ethernet Controller Port 2/Port3
145a PCIe Dummy Function
145b PCIE Non-Transparent Bridge
145c USB3 XHCI
145d Switch upstream in PCIe
145e Switch downstream in PCIe
145f USB 3.0 Host controller
1460 Data Fabric: Device 18h; Function 0
1461 Data Fabric: Device 18h; Function 1
1462 Data Fabric: Device 18h; Function 2
1463 Data Fabric: Device 18h; Function
3
1464 Data Fabric: Device 18h; Function 4
1465 Data Fabric: Device 18h; Function 5
1466 Data Fabric: Device 18h; Function 6
1467 Data Fabric: Device 18h; Function 7
1468 NTBCCP
7901 FCH SATA Controller [AHCI mode]
7904 FCH SATA Controller [AHCI mode]
7906 FCH SD Flash Controller
790b FCH SMBus Controller
790e FCH LPC Bridge
1d95 Graphcore Ltd
0001 Colossus GC2 [C2]
0002 Colossus GC1 [S1]
1d9b Facebook, Inc.
0010 Networking DOM Engine

0011 IO Bridge
1da1 Teko Telecom S.r.l.
1da2 Sapphire Technology Limited
1da3 Habana Labs Ltd.
0001 HL-1000 AI Inference Accelerator [Goya]
PCIe accelerator card for Deep Learning training tasks
1000 HL-2000 AI Training Accelerator [Gaudi]
1dbb NGD Systems, Inc.
1dbf Guizhou Huaxintong Semiconductor Technology Co., Ltd
0401 StarDragon4800 PCI Express Root Port
1dc5 FADU Inc.
1dcd Liquid Inc.
1dd8 Pensando Systems Inc
1000 DSC Capri Upstream Port
1dd8 4000 Naples 100Gb 2-port QSFP28 x16 8GB
1dd8 4001
Naples 100Gb 2-port QSFP28 x16 4GB
1dd8 4002 Naples 25Gb 2-port SFP28 x8 4GB
1001 DSC Virtual Downstream Port
1dd8 4000 Naples 100Gb 2-port QSFP28 x16 8GB
1dd8 4001 Naples 100Gb 2-port QSFP28 x16 4GB
1dd8 4002 Naples 25Gb 2-port SFP28 x8 4GB
1002 DSC Ethernet Controller
1dd8 4000 Naples 100Gb 2-port QSFP28 x16 8GB
1dd8 4001 Naples 100Gb 2-port QSFP28 x16 4GB
1dd8 4002 Naples 25Gb 2-port SFP28 x8 4GB
1003 DSC Ethernet Controller VF
1dd8 4000 Naples 100Gb 2-port QSFP28 x16 8GB
1dd8 4001 Naples 100Gb 2-port QSFP28 x16 4GB
1dd8 4002 Naples 25Gb 2-port SFP28 x8 4GB
1004 DSC Management Controller
1dd8 4000 Naples 100Gb 2-port QSFP28 x16 8GB
1dd8 4001 Naples 100Gb 2-port QSFP28 x16 4GB
1dd8 4002 Naples 25Gb 2-port SFP28 x8 4GB
1007 DSC Storage Accelerator
1dd8 4000 Naples 100Gb 2-port QSFP28 x16 8GB
1dd8 4001 Naples 100Gb 2-port QSFP28 x16 4GB
1dd8 4002 Naples 25Gb 2-port SFP28 x8 4GB
1de0 Groq
0000 Q100 Tensor Streaming Processor
1de1
Tekram Technology Co.,Ltd.
0391 TRM-S1040 [DC-315 / DC-395 series]
2020 DC-390
690c 690c
dc29 DC290
1de5 Eideticom, Inc
1000 IO Memory Controller

2000 NoLoad Hardware Development Kit
1def Ampere Computing, LLC
e005 eMAG PCI Express Root Port 0
e006 eMAG PCI Express Root Port 1
e007 eMAG PCI Express Root Port 2
e008 eMAG PCI Express Root Port 3
e009 eMAG PCI Express Root Port 4
e00a eMAG PCI Express Root Port 5
e00b eMAG PCI Express Root Port 6
e00c eMAG PCI Express Root Port 7
1df3 Ethernity Networks
0201 ACE-NIC40 Programmable Network Accelerator
1df3 0001 ENA1040
1df3 0002 ENA1044
1df3 0003 ENA1044S
0202 ACE-NIC50 Programmable Network Accelerator
1df3 0001 ENA2050F
1df3 0002 ENA2050FS
0203 ACE-NIC100 Programmable Network Accelerator
1df3 0000 Maintenance Mode
1df3 0001 ENA2080F
1df3 0002 ENA2080FS
1df3 0003 ENA2100F
1df3 0004 ENA2040F
0204 ACE-NIC-NID Programmable Network Accelerator
1df3 0001 ENA1020Z
1df3
0002 ENA1020ZS
1df7 opencpi.org
0001 ml605
0002 alst4
0003 alst4x
1dfc JSC NT-COM
1181 TDM 8 Port E1/T1/J1 Adapter
1e0f KIOXIA Corporation
0007 NVMe SSD Controller Cx6
1e17 Arnold & Richter Cine Technik GmbH & Co. Betriebs KG
1e24 Squirrels Research Labs
0101 Acorn CLE-101
0215 Acorn CLE-215
021f Acorn CLE-215+
1525 Xilinx BCU-1525
VU33P FPGA Accelerator
1533 ForestKitten 33
JungleCat VU33P Module
1633 JCM33
JungleCat VU35P Module
1635 JCM35

1e26 Fujitsu Client Computing Limited
1e36 Shanghai Enflame Technology Co. Ltd
0001 T10 [CloudBlazer]
nee Thinci, Inc
1e38 Blaize, Inc
1e3d Burlywood, Inc
1e49 Yangtze Memory Technologies Co.,Ltd
1e4c GSI Technology
Associative Processing Unit chip
0010 Gemini [Lida]
1e4c 0120 SE120
1e57 Beijing Panyi Technology Co., Ltd
0100 The device has already been deleted.
0000 0100 PY8800 64GB Accelerator
1e6b Axiado Corp.
1e89 ID Quantique SA
0002 Quantis-PCIe-40M
0003 Quantis-PCIe-240M

aka SED Systems
1e94 Calian SED
nee Tumsan Oy
1fc0 Ascom (Finland) Oy
0300 E2200 Dual E1/Rawpipe Card
0301 C5400 SHDSL/E1 Card
nee PathScale, Inc
1fc1 QLogic, Corp.
000d IBA6110 InfiniBand HCA
0010 IBA6120 InfiniBand HCA
1fc9 Tehuti Networks Ltd.
3009 10-Giga TOE SmartNIC
3010 10-Giga TOE SmartNIC
0000 3002 10-Giga TOE Single Port XFP SmartNIC
0000 3004 10-Giga TOE Single Port SFP+ SmartNIC
0000 3008 10-Giga TOE Single Port CX4 SmartNIC
3014 10-Giga TOE SmartNIC 2-Port
0000 3003 10-Giga TOE Dual Port XFP Low Profile SmartNIC
0000 3005 10-Giga TOE Dual Port SFP+ Low Profile SmartNIC
0000 3014 10-Giga TOE Dual Port CX4 Low Profile SmartNIC
3110 10-Giga TOE Single Port SmartNIC
0000 3004 10-Giga TOE Single Port SFP+ SmartNIC
3114 10-Giga TOE Dual Port Low Profile SmartNIC
0000 3005 10-Giga TOE Dual Port SFP+ Low Profile SmartNIC
0000 3011 10-Giga TOE Dual Port SFP+/CX4 Low Profile SmartNIC
0000 3012 10-Giga TOE Dual Port CX4/SFP+
Low Profile SmartNIC
0000 3014 10-Giga TOE Dual Port CX4 Low Profile SmartNIC
3310 10-Giga TOE SFP+ Single Port SmartNIC

0000 3004 10-Giga TOE Single Port SFP+ SmartNIC
3314 10-Giga TOE Dual Port Low Profile SmartNIC
0000 3005 10-Giga TOE Dual Port SFP+ Low Profile SmartNIC
0000 3011 10-Giga TOE Dual Port SFP+/CX4 Low Profile SmartNIC
0000 3012 10-Giga TOE Dual Port CX4/SFP+ Low Profile SmartNIC
0000 3014 10-Giga TOE Dual Port CX4 Low Profile SmartNIC
4010 TN4010 Clean SROM
4020 TN9030 10GbE CX4 Ethernet Adapter
180c 2040 Mustang-200 10GbE Ethernet Adapter
4022 TN9310 10GbE SFP+ Ethernet Adapter
1043 8709 XG-C100F 10GbE SFP+ Ethernet Adapter
1186 4d00 DXE-810S 10GbE SFP+ Ethernet Adapter
1432 8103 10 Gigabit Ethernet SFP+ PCI Express Adapter
1fc9 3015 Ethernet Adapter
4024 TN9210 10GBase-T Ethernet Adapter
4025 TN9510 10GBase-T/NBASE-T Ethernet Adapter
105a 7203 SANLink3 NBase-T1
1186 2900 DXE-810T 10GBase-T Ethernet Adapter
1432
8102 10 Gigabit Ethernet PCI Express Adapter
1fc9 3015 Ethernet Adapter
4026 TN9610 10GbE SFP+ Ethernet Adapter
4c52 1000 LREC6860AF 10 Gigabit Ethernet Adapter
4027 TN9710P 10GBase-T/NBASE-T Ethernet Adapter
1154 0368 LGY-PCIE-MG
1432 8104 10 Gigabit Ethernet PCI Express Adapter
1546 4027 GE10-PCIE4XG202P 10Gbase-T/NBASE-T Ethernet Adapter
1baa 3310 PCIe Expansion Card
1fc9 3015 Ethernet Adapter
4c52 1001 LREC6860BT 10 Gigabit Ethernet Adapter
4527 TN9710Q 5GBase-T/NBASE-T Ethernet Adapter
1fcc StreamLabs
f416 MS416
fb01 MH4LM
1fce Cognio Inc.
0001 Spectrum Analyzer PC Card (SAGe)
1fd4 SUNIX Co., Ltd.
0001 Matrix multiport serial adapter
1999 Multiport serial controller
2000 Smart Link Ltd.
2800 SmartPCI2800 V.92 PCI Soft DFT
2001 Temporal Research Ltd
2003 Smart Link Ltd.
8800 LM-I56N
2004 Smart Link Ltd.
2048 Beijing SpaceControl Technology Co.Ltd
20f4 TRENDnet
2116 ZyDAS Technology Corp.

21c3 21st Century Computer Corp.
22b8
Flex-Logix Technologies
22a0 Flex Logix InferX X1 Inference Accelerator
22db Missing Link Electronics, Inc.
2304 Colorgraphic Communications Corp.
2348 Racore
2010 8142 100VG/AnyLAN
2646 Kingston Technology Company, Inc.
270b Xantel Corporation
270f Chaintech Computer Co. Ltd
2711 AVID Technology Inc.
2955 Connectix Virtual PC
6e61 OHCI USB 1.1 controller
2a15 3D Vision(???)
2bd8 ROPEX Industrie-Elektronik GmbH
3000 Hansol Electronics Inc.
3112 Satelco Ingenieria S.A.
3130 AUDIOTRAK
3142 Post Impression Systems.
31ab Zonet
1faa ZEW1602 802.11b/g Wireless Adapter
3388 Hint Corp
0013 HiNT HC4 PCI to ISDN bridge, Multimedia audio controller
0014 HiNT HC4 PCI to ISDN bridge, Network controller
0020 HB6 Universal PCI-PCI bridge (transparent mode)
0021 HB6 Universal PCI-PCI bridge (non-transparent mode)
1775 c200 C2K CompactPCI interface bridge
1775 ce90 CE9
4c53 1050 CT7 mainboard
4c53 1080 CT8 mainboard
4c53 1090 Cx9 mainboard
4c53 10a0 CA3/CR3
mainboard
4c53 3010 PPCI mezzanine (32-bit PMC)
4c53 3011 PPCI mezzanine (64-bit PMC)
4c53 4000 PMCCARR1 carrier board
0022 HiNT HB4 PCI-PCI Bridge (PCI6150)
0026 HB2 PCI-PCI Bridge
1014 AudioTrak Maya
1018 Audiotrak INCA88
1019 Miditrak 2120
101a E.Band [AudioTrak Inca88]
101b E.Band [AudioTrak Inca88]
8011 VXPro II Chipset
3388 8011 VXPro II Chipset CPU to PCI Bridge
8012 VXPro II Chipset
3388 8012 VXPro II Chipset PCI to ISA Bridge

8013 VXPro II IDE
3388 8013 VXPro II Chipset EIDE Controller
a103 Blackmagic Design DeckLink HD Pro
3411 Quantum Designs (H.K.) Inc
3442 Bihl+Wiedemann GmbH
1783 AS-i 3.0 cPCI Master
1922 AS-i 3.0 PCI Master
3475 Arastra Inc.
3513 ARCOM Control Systems Ltd
37d9 ITD Firm ltd.
1138 SCHD-PH-8 Phase detector
12-ch Relay Actuator Card
1140 VR-12-PCI
multiport serial board
1141 PCI-485(422)
1142 PCI-CAN2
3842 eVga.com. Corp.
38ef 4Links
3d3d 3DLabs
0001 GLINT 300SX
0002 GLINT 500TX
0000
0000 GLoria L
0003 GLINT Delta
0000 0000 GLoria XL
0004 Permedia
0005 Permedia
0006 GLINT MX
0000 0000 GLoria XL
1048 0a42 GLoria XXL
0007 3D Extreme
0008 GLINT Gamma G1
1048 0a42 GLoria XXL
0009 Permedia II 2D+3D
1040 0011 AccelStar II
1048 0a42 GLoria XXL
13e9 1000 6221L-4U
3d3d 0100 AccelStar II 3D Accelerator
3d3d 0111 Permedia 3:16
3d3d 0114 Santa Ana
3d3d 0116 Oxygen GVX1
3d3d 0119 Scirocco
3d3d 0120 Santa Ana PCL
3d3d 0125 Oxygen VX1
3d3d 0127 Permedia3 Create!
000a GLINT R3
3d3d 0121 Oxygen VX1
000c GLINT R3 [Oxygen VX1]

3d3d 0144 Oxygen VX1-4X AGP [Permedia 4]
000d GLint R4 rev A
000e GLINT Gamma G2
0011 GLint R4 rev B
0012 GLint R5 rev A
0013 GLint R5 rev B
0020 VP10 visual processor
0022 VP10 visual processor
0024 VP9 visual processor
002c Wildcat Realizm 100/200
0030 Wildcat Realizm 800
0032 Wildcat Realizm 500
0100 Permedia II 2D+3D
07a1 Wildcat III 6210
07a2 Sun XVR-500 Graphics
Accelerator
07a3 Wildcat IV 7210
1004 Permedia
3d04 Permedia
ffff Glint VGA
4005 Avance Logic Inc.
0300 ALS300 PCI Audio Device
0308 ALS300+ PCI Audio Device
0309 PCI Input Controller
1064 ALG-2064
2064 ALG-2064i
2128 ALG-2364A GUI Accelerator
2301 ALG-2301
2302 ALG-2302
2303 AVG-2302 GUI Accelerator
2364 ALG-2364A
2464 ALG-2464
2501 ALG-2564A/25128A
4000 ALS4000 Audio Chipset
4005 4000 ALS4000 Audio Chipset
4710 ALC200/200P
4033 Addtron Technology Co, Inc.
1360 RTL8139 Ethernet
4040 NetXen Incorporated
0001 NXB-10GXSR 10-Gigabit Ethernet PCIe Adapter with SR-XFP optical interface
103c 7047 NC510F PCIe 10-Gigabit Server Adapter
0002 NXB-10GCX4 10-Gigabit Ethernet PCIe Adapter with CX4 copper interface
103c 7048 NC510c PCIe 10-Gigabit Server Adapter
0003 NXB-4GCU Quad Gigabit Ethernet PCIe Adapter with 1000-BASE-T interface
0004 BladeCenter-H 10-Gigabit Ethernet High Speed Daughter Card
0005 NetXen Dual Port 10GbE Multifunction
Adapter for c-Class
103c 170e NC512m Dual Port 10GbE Multifunction BL-C Adapter

0024 XG Mgmt
0025 XG Mgmt
0100 NX3031 Multifunction 1/10-Gigabit Server Adapter
103c 171b NC522m Dual Port 10GbE Multifunction BL-c Adapter
103c 1740 NC375T PCI Express Quad Port Gigabit Server Adapter
103c 3251 NC375i 1G w/NC524SFP 10G Module
103c 705a NC375i Integrated Quad Port Multifunction Gigabit Server Adapter
103c 705b NC522SFP Dual Port 10GbE Server Adapter
152d 896b TG20 Dual Port 10GbE Server/Storage Adapter
4040 0124 NX3031 Quad Port Gigabit Server Adapter
4040 0126 Dual Port SFP+ 10GbE Server Adapter
4143 Digital Equipment Corp
4144 Alpha Data
0044 ADM-XRCIIPro
4150 ONA Electroerosion
0001 PCI32TLITE FILSTRUP1 PCI to VME Bridge Controller
0006 PCI32TLITE UART 16550 Opencores
0007 PCI32TLITE CAN Controller Opencores
415a Auzentech, Inc.
416c Aladdin Knowledge Systems
0100 AladdinCARD
0200 CPC
4254 DVBSky
4321 Tata Power Strategic Electronics
Division
4348 WCH.CN
2273 CH351 PCI Dual Serial Port Controller
3253 CH352 PCI Dual Serial Port Controller
3453 CH353 PCI Quad Serial Port Controller
5053 CH352 PCI Serial and Parallel Port Controller
7053 CH353 PCI Dual Serial and Parallel Ports Controller
7073 CH356 PCI Quad Serial and Parallel Ports Controller
7173 CH355 PCI Quad Serial Port Controller
434e CAST Navigation LLC
4444 Internext Compression Inc
0016 iTVC16 (CX23416) Video Decoder
0070 0003 WinTV PVR 250
0070 0009 WinTV PVR 150
0070 0801 WinTV PVR 150
0070 0807 WinTV PVR 150
0070 4001 WinTV PVR 250
0070 4009 WinTV PVR 250
0070 4801 WinTV PVR 250
0070 4803 WinTV PVR 250
0070 8003 WinTV PVR 150
0070 8801 WinTV PVR 150
0070 c801 WinTV PVR 150
0070 e807 WinTV PVR 500 (1st unit)

0070 e817 WinTV PVR 500 (2nd unit)
 0070 ff92 WiNTV PVR-550
 0270 0801 WinTV PVR 150
 104d 013d ENX-26 TV Encoder
 10fc d038 GV-MVP/RX2W (1st unit)
 10fc d039 GV-MVP/RX2W (2nd unit)
 12ab
 fff3 MPG600
 12ab ffff MPG600
 1461 c00a M113 PCI Analog TV (PAL/SECAM, Philips FQ1216MK3 tuner)
 1461 c00b M113 PCI Analog TV (PAL/SECAM+FM, Philips FM1216MK3 tuner)
 1461 c00c M113 PCI Analog TV (NTSC, JAPAN version, Philips FI1286MK2 tuner)
 1461 c010 M113 PCI Analog TV (NTSC, Philips FI1236MK3 tuner)
 1461 c011 M113 PCI Analog TV (NTSC+FM, Philips FM1236MK3 tuner)
 1461 c018 M113 PCI Analog TV (NTSC, Philips FQ1236MK5 tuner)
 1461 c019 UltraTV 1500 MCE, a.k.a. M113 PCI Analog TV (NTSC+FM, Philips FQ1236MK5 tuner)
 1461 c01a M113 PCI Analog TV (PAL/SECAM, Philips FQ1216MK5 tuner)
 1461 c01b M113 PCI Analog TV (PAL/SECAM+FM, Philips FM1216MK5 tuner)
 1461 c030 M113 PCI Analog TV (NTSC-J, Partsnic tuner)
 1461 c031 M113 PCI Analog TV (NTSC-J+FM, Partsnic tuner)
 1461 c032 M113 PCI Analog TV (PAL/SECAM, Partsnic tuner)
 1461 c033 M113 PCI Analog TV (PAL/SECAM+FM, Partsnic tuner)
 1461 c034 M113 PCI Analog TV (NTSC, Partsnic tuner)
 1461 c035 M113
 PCI Analog TV (NTSC+FM, Partsnic tuner)
 1461 c03f C115 PCI video capture card (no tuner)
 1461 c136 M104 mini-PCI Analog TV
 1461 c20a M755 AVerTV Video Capture (PAL/SECAM, Philips FQ1216MK3 tuner)
 1461 c218 M755 AVerTV Video Capture (NTSC, Philips FQ1236MK5 tuner)
 1461 c219 M755 AVerTV Video Capture (NTSC+FM, Philips FQ1236MK5 tuner)
 1461 c21a M755 AVerTV Video Capture (PAL/SECAM, Philips FQ1216MK5 tuner)
 1461 c21b M755 AVerTV Video Capture (PAL/SECAM+FM, Philips FM1216MK5 tuner)
 1461 c230 M755 AVerTV Video Capture (NTSC-J, Partsnic tuner)
 1461 c231 M755 AVerTV Video Capture (NTSC-J+FM, Partsnic tuner)
 1461 c232 M755 AVerTV Video Capture (PAL/SECAM, Partsnic tuner)
 1461 c233 M755 AVerTV Video Capture (PAL/SECAM+FM, Partsnic tuner)
 1461 c234 M755 AVerTV Video Capture (NTSC, Partsnic tuner)
 1461 c235 M755 AVerTV Video Capture (NTSC+FM, Partsnic tuner)
 1461 c337 E106 AVerMedia AVerTV Video Capture
 1461 c439 M116 AVerMedia AVerTV MCE 116 Plus
 (NTSC/PAL/SECAM+FM+REMOTE, Xceive 2028 tuner)
 1461 c5ff C755 AVerTV Video Capture card (no tuner)
 1461 c6ff C115 PCI video capture card (no tuner)
 1461 c739 M785 AVerMedia PCI Analog TV (NTSC/PAL/SECAM+FM, Xceive 2028 tuner)
 9005 0092 VideOh! AVC-2010
 9005 0093 VideOh! AVC-2410
 0803 iTVC15 (CX23415) Video Decoder
 0070 4000 WinTV PVR-350

0070 4001 WinTV PVR-250
0070 4800 WinTV PVR-350 (V1)
12ab 0000 MPG160
1461 a3ce M179
1461 a3cf M179
4468 Bridgeport machines
4594 Cogetec Informatique Inc
45fb Baldor Electric Company
4624 Budker Institute of Nuclear Physics
adc1 ADC200ME High speed ADC
de01 DL200ME High resolution delay line PCI based card
de02 DL200ME Middle resolution delay line PCI based card
Can't find any information on this company
4651 TXIC
4680 Umax Computer Corp
4843 Hercules Computer Technology Inc
4916 RedCreek Communications Inc
1960 RedCreek PCI adapter
4943 Growth Networks
494f ACCES I/O Products, Inc.
0508 PCI-IDO-16A
FET Output Card
0518 PCI-IDO-32A FET Output Card
0520 PCI-IDO-48 FET Output Card
0521 PCI-IDO-48A FET Output Card
0703 PCIe-RO-4 Electromechanical Relay Output Card
07d0 PCIe-IDO-24 FET Output Card
0920 PCI-IDI-48 Isolated Digital Input Card
0bd0 PCIe-IDI-24 Isolated Digital Input Card
0c50 PCI-DIO-24H 1x 8255 Digital Input / Output Card
0c51 PCI-DIO-24D 1x 8255 Digital Input / Output Card
0c52 PCIe-DIO-24 1x 8255 Digital Input / Output Card
0c53 PCIe-DIO-24H 8255 Digital Input / Output Card
0c57 mPCIe-DIO-24 8255 Digital Input / Output Card
0c60 PCI-DIO-48H 8255 Digital Input / Output Card
0c61 PCIe-DIO-48 8255 Digital Input / Output Card
0c62 P104-DIO-48 8255 Digital Input / Output Card
0c68 PCI-DIO-72 8255 Digital Input / Output Card
0c69 P104-DIO-96 8255 Digital Input / Output Card
0c70 PCI-DIO-96 8255 Digital Input / Output Card
0c78 PCI-DIO-120 8255 Digital Input / Output Card
0dc8 PCI-IDIO-16 Isolated Digital Input / FET Output Card
0e50
PCI-DIO-24S 8255 Digital Input / Output Card
0e51 PCI-DIO-24H(C) 8255 Digital Input / Output Card
0e52 PCI-DIO-24D(C) 8255 Digital Input / Output Card
0e53 PCIe-DIO-24S 8255 Digital Input / Output Card
0e54 PCIe-DIO-24HS 8255 Digital Input / Output Card

0e55 PCIe-DIO-24DC 8255 Digital Input / Output Card
0e56 PCIe-DIO-24DCS 8255 Digital Input / Output Card
0e57 mPCIe-DIO-24S 8255 Digital Input / Output Card
0e60 PCI-DIO-48S 2x 8255 Digital Input / Output Card
0e61 PCIe-DIO-48S 2x 8255 Digital Input / Output Card
0e62 P104-DIO-48S 2x 8255 Digital Input / Output Card
0f00 PCI-IIRO-8 Isolated Digital / Relay Output Card
0f01 LPCI-IIRO-8 Isolated Digital / Relay Output Card
0f02 PCIe-IIRO-8 Isolated Digital / Relay Output Card
0f08 PCI-IIRO-16 Isolated Digital / Relay Output Card
0f09 PCIe-IIRO-16 Isolated Digital / Relay Output Card
0fc0 PCIe-IDIO-12 Isolated Digital Input / FET Output Card
0fc1 PCIe-IDI-12 Isolated Digital Input Card
0fc2 PCIe-IDO-12
FET Output Card
0fd0 PCIe-IDIO-24 Isolated Digital Input / FET Output Card
1050 PCI-422/485-2 2x RS422/RS484 Card
1051 PCIe-COM-2SRJ 2x RS422/RS484 Card w/RJ45 Connectors
1052 104I-COM-2S 2x RS422/RS484 PCI/104 Board
1053 mPCIe-COM-2S 2x RS422/RS484 PCI Express Mini Card
1058 PCI-COM422/4 4x RS422 Card
1059 PCI-COM485/4 4x RS485 Card
105a PCIe-COM422-4 4x RS422 Card
105b PCIe-COM485-4 4x RS485 Card
105c PCIe-COM-4SRJ 4x RS422/RS485 Card w/RJ45 Connectors
105d 104I-COM-4S 4x RS422/RS484 PCI/104 Board
105e mPCIe-COM-4S 4x RS422/RS484 PCI Express Mini Card
1068 PCI-COM422/8 8x RS422 Card
1069 PCI-COM485/8 8x RS485 Card
106a PCIe-COM422-8 8x RS422 Card
106b PCIe-COM485-8 8x RS485 Card
106c 104I-COM-8S 8x RS422/RS485 PCI/104 Board
1088 PCI-COM232/1 1x RS232 Card
1090 PCI-COM232/2 2x RS232 Card
1091 PCIe-COM232-2RJ 2x RS232 Card w/RJ45 Connectors
1093 mPCIe-COM232-2 2x RS232 PCI Express Mini Card
1098 PCIe-COM232-4 4x RS232 Card
1099 PCIe-COM232-4RJ
4x RS232 Card w/RJ45 Connectors
109b mPCIe-COM232-4 4x RS232 PCI Express Mini Card
10a8 P104-COM232-8 8x RS232 PC-104+ Board
10a9 PCIe-COM232-8 8x RS232 Card
10c9 PCI-COM-1S 1x RS422/RS485 Card
10d0 PCI-COM2S 2x RS422/RS485 Card
10d1 PCIe-COM-2SMRJ 2x RS232/RS422/RS485 Card w/RJ45 Connectors
10d2 104I-COM-2SM 2x RS232/RS422/RS485 PCI/104 Board
10d3 mPCIe-COM-2SM 2x RS232/RS422/RS485 PCI Express Mini Card
10d8 PCI-COM-4SM 4x RS232/RS422/RS485 Card

10d9 PCIe-COM-4SM 4x RS232/RS422/RS485 Card
 10da PCIe-COM-4SMRJ 4x RS232/RS422/RS485 Card w/RJ45 Connectors
 10db 104I-COM-4SM 4x RS232/RS422/RS485 PCI/104 Board
 10dc mPCIe-COM-4SM 4x RS232/RS422/RS485 PCI Express Mini Card
 10e8 PCI-COM-8SM 8x RS232/RS422/RS485 Card
 10e9 PCIe-COM-8SM 8x RS232/RS422/RS485 Card
 10ea 104I-COM-8SM 8x RS232/RS422/RS485 PCI-104 Board
 1108 mPCIe-ICM485-1 1x Isolated RS485 PCI Express Mini Card
 1110 mPCIe-ICM422-2 2x Isolated RS422 PCI Express Mini Card
 1111 mPCIe-ICM485-2
 2x Isolated RS485 PCI Express Mini Card
 1118 mPCIe-ICM422-4 4x Isolated RS422 PCI Express Mini Card
 1119 mPCIe-ICM485-4 4x Isolated RS485 PCI Express Mini Card
 1148 PCI-ICM-1S 1x Isolated RS422/RS485 Card
 1150 PCI-ICM-2S 2x Isolated RS422/RS485 Card
 1152 PCIe-ICM-2S 2x Isolated RS422/RS485 Card
 1158 PCI-ICM422/4 4x Isolated RS422 Card
 1159 PCI-ICM485/4 4x Isolated RS485 Card
 115a PCIe-ICM-4S 4x Isolated RS422/RS485 Card
 1190 PCIe-ICM232-2 2x Isolated RS232 Card
 1191 mPCIe-ICM232-2 2x Isolated RS232 PCI Express Mini Card
 1198 PCIe-ICM232-4 4x Isolated RS232 Card
 1199 mPCIe-ICM232-4 4x Isolated RS422 PCI Express Mini Card
 11d0 PCIe-ICM-2SM 2x Isolated RS232/RS422/RS485 Card
 11d8 PCIe-ICM-4SM 4x Isolated RS232/RS422/RS485 Card
 1250 PCI-WDG-2S Watchdog and 2x Serial Card
 12d0 PCI-WDG-IMPAC
 2230 PCI-QUAD-8 8x Quadrature Input Card
 2231 PCI-QUAD-4 4x Quadrature Input Card
 22c0 PCI-WDG-CSM Watchdog Card
 25c0 P104-WDG-E Watchdog PC/104+ Board
 2c50 PCI-DIO-96CT
 96x Digital Input / Output Card
 2c58 PCI-DIO-96C3 96x Digital Input / Output Card w/3x 8254 Counter Card
 2ee0 PCIe-DIO24S-CTR12 24x Digital Input / Output Card w/4x 8254 Counter Card
 2fc0 P104-WDG-CSM Watchdog PC/104+ Board
 2fc1 P104-WDG-CSMA Advanced Watchdog PC/104+ Board
 5ed0 PCI-DAC
 6c90 PCI-DA12-2 2x 12-bit Analog Output Card
 6c98 PCI-DA12-4 4x 12-bit Analog Output Card
 6ca0 PCI-DA12-6 6x 12-bit Analog Output Card
 6ca8 PCI-DA12-8 8x 12-bit Analog Output Card
 6ca9 PCI-DA12-8V
 6cb0 PCI-DA12-16 16x 12-bit Analog Output Card
 6cb1 PCI-DA12-16V
 8ef0 P104-FAS16-16
 aca8 PCI-AI12-16 12-bit 100kHz Analog Input Card
 aca9 PCI-AI12-16A 12-bit 100kHz Analog Input w/FIFO Card

eca8 PCI-AIO12-16 12-bit 100kHz Analog Input w/2x Analog Output and FIFO Card
ecaa PCI-A12-16A 12-bit 100kHz Analog Input w/2x Analog Output and FIFO Card
ece8 LPCI-A16-16A 16-bit 500kHz Analog Input low-profile Card
ece9 LPCI-AIO16A 16-bit 500kHz Analog Input low-profile Card
4978

Axil Computer Inc

4a14 NetVin

5000 NV5000SC

4a14 5000 RT8029-Based Ethernet Adapter

4b10 Buslogic Inc.

4c48 LUNG HWA Electronics

4c52 LR-Link

4c53 SBS Technologies

0000 PLUSTEST device

4c53 3000 PLUSTEST card (PC104+)

4c53 3001 PLUSTEST card (PMC)

0001 PLUSTEST-MM device

4c53 3002 PLUSTEST-MM card (PMC)

4ca1 Seanix Technology Inc

4d51 MediaQ Inc.

0200 MQ-200

4d54 Microtechnica Co Ltd

4d56 MATRIX VISION GmbH

0000 [mvHYPERION-CLe/CLb] CameraLink PCI Express x1 Frame Grabber

0001 [mvHYPERION-CLf/CLm] CameraLink PCI Express x4 Frame Grabber

0010 [mvHYPERION-16R16/-32R16] 16 Video Channel PCI Express x4 Frame Grabber

0020 [mvHYPERION-HD-SDI] HD-SDI PCI Express x4 Frame Grabber

0030 [mvHYPERION-HD-SDI-Merger] HD-SDI PCI Express x4 Frame Grabber

4ddc ILC Data Device Corp

0100 DD-42924I5-300 (ARINC 429 Data Bus)

0300 SB-3620 Motion Feedback Device

0340 SB-3623 Motion Feedback Device

0400 SB-3622 Motion Feedback Device

0500 SB-3621 Motion

Feedback Device

0510 SB-3624 Motion Feedback Device

0801 BU-65570I1 MIL-STD-1553 Test and Simulation

0802 BU-65570I2 MIL-STD-1553 Test and Simulation

0811 BU-65572I1 MIL-STD-1553 Test and Simulation

0812 BU-65572I2 MIL-STD-1553 Test and Simulation

0881 BU-65570T1 MIL-STD-1553 Test and Simulation

0882 BU-65570T2 MIL-STD-1553 Test and Simulation

0891 BU-65572T1 MIL-STD-1553 Test and Simulation

0892 BU-65572T2 MIL-STD-1553 Test and Simulation

0901 BU-65565C1 MIL-STD-1553 Data Bus

0902 BU-65565C2 MIL-STD-1553 Data Bus

0903 BU-65565C3 MIL-STD-1553 Data Bus

0904 BU-65565C4 MIL-STD-1553 Data Bus

0b01 BU-65569I1 MIL-STD-1553 Data Bus
0b02 BU-65569I2 MIL-STD-1553 Data Bus
0b03 BU-65569I3 MIL-STD-1553 Data Bus
0b04 BU-65569I4 MIL-STD-1553 Data Bus
0d01 SB-3641 Motion Feedback Device
0d10 SB-365x Motion Feedback Device
2f00 SB-3642 Motion Feedback Device
3000 SB-3644 Motion Feedback Device
5045 University of Toronto
4243 BLASTbus PCI Interface Card v1
5046
GemTek Technology Corporation
1001 PCI Radio
5053 Voyetra Technologies
2010 Daytona Audio Adapter
50b2 TerraTec Electronic GmbH
5136 S S Technologies
5143 Qualcomm Inc
5145 Ensoniq (Old)
3031 Concert AudioPCI
5168 Animation Technologies Inc.
0300 FlyDVB-S
0301 FlyDVB-T
5301 Alliance Semiconductor Corp.
0001 ProMotion aT3D
5333 S3 Graphics Ltd.
0551 Plato/PX (system)
5631 86c325 [ViRGE]
8800 86c866 [Vision 866]
8801 86c964 [Vision 964]
8810 86c764_0 [Trio 32 vers 0]
8811 86c764/765 [Trio32/64/64V+]
8812 86cM65 [Aurora64V+]
8813 86c764_3 [Trio 32/64 vers 3]
8814 86c767 [Trio 64UV+]
8815 86cM65 [Aurora 128]
883d 86c988 [ViRGE/VX]
8870 FireGL
8880 86c868 [Vision 868 VRAM] vers 0
8881 86c868 [Vision 868 VRAM] vers 1
8882 86c868 [Vision 868 VRAM] vers 2
8883 86c868 [Vision 868 VRAM] vers 3
88b0 86c928 [Vision 928 VRAM] vers 0
88b1 86c928 [Vision 928 VRAM] vers 1
88b2 86c928 [Vision 928 VRAM] vers 2
88b3 86c928 [Vision 928 VRAM]
vers 3
88c0 86c864 [Vision 864 DRAM] vers 0

88c1 86c864 [Vision 864 DRAM] vers 1
88c2 86c864 [Vision 864-P DRAM] vers 2
88c3 86c864 [Vision 864-P DRAM] vers 3
88d0 86c964 [Vision 964 VRAM] vers 0
88d1 86c964 [Vision 964 VRAM] vers 1
88d2 86c964 [Vision 964-P VRAM] vers 2
88d3 86c964 [Vision 964-P VRAM] vers 3
88f0 86c968 [Vision 968 VRAM] rev 0
88f1 86c968 [Vision 968 VRAM] rev 1
88f2 86c968 [Vision 968 VRAM] rev 2
88f3 86c968 [Vision 968 VRAM] rev 3
8900 86c755 [Trio 64V2/DX]
5333 8900 86C775 Trio64V2/DX
8901 86c775/86c785 [Trio 64V2/DX or /GX]
5333 8901 86C775 Trio64V2/DX, 86C785 Trio64V2/GX
8902 Plato/PX
8903 Trio 3D business multimedia
8904 86c365, 86c366 [Trio 3D]
1014 00db Integrated Trio3D
4843 314a Terminator 128/3D GLH
5333 8904 86C365 Trio3D AGP
8905 Trio 64V+ family
8906 Trio 64V+ family
8907 Trio 64V+ family
8908 Trio 64V+ family
8909 Trio 64V+ family
890a Trio 64V+ family
890b Trio 64V+ family
890c Trio 64V+
family
890d Trio 64V+ family
890e Trio 64V+ family
890f Trio 64V+ family
8a01 86c375 [ViRGE/DX] or 86c385 [ViRGE/GX]
0e11 b032 ViRGE/GX
10b4 1617 Nitro 3D
10b4 1717 Nitro 3D
5333 8a01 ViRGE/DX
8a10 ViRGE/GX2
1092 8a10 Stealth 3D 4000
8a13 86c360 [Trio 3D/1X], 86c362, 86c368 [Trio 3D/2X]
5333 8a13 Trio3D/2X
8a20 86c794 [Savage 3D]
5333 8a20 86C391 Savage3D
8a21 86c390 [Savage 3D/MV]
5333 8a21 86C390 Savage3D/MV
8a22 Savage 4
1033 8068 Savage 4

1033 8069 Savage 4
1033 8110 Savage 4 LT
105d 0018 SR9 8Mb SDRAM
105d 002a SR9 Pro 16Mb SDRAM
105d 003a SR9 Pro 32Mb SDRAM
105d 092f SR9 Pro+ 16Mb SGRAM
1092 4207 Stealth III S540
1092 4800 Stealth III S540
1092 4807 SpeedStar A90
1092 4808 Stealth III S540
1092 4809 Stealth III S540
1092 480e Stealth III S540
1092 4904 Stealth III S520
1092 4905 SpeedStar A200
1092 4a09 Stealth III S540
1092 4a0b Stealth III S540 Xtreme
1092 4a0f Stealth III S540
1092
4e01 Stealth III S540
1102 101d 3d Blaster Savage 4
1102 101e 3d Blaster Savage 4
5333 8100 86C394-397 Savage4 SDRAM 100
5333 8110 86C394-397 Savage4 SDRAM 110
5333 8125 86C394-397 Savage4 SDRAM 125
5333 8143 86C394-397 Savage4 SDRAM 143
5333 8a22 86C394-397 Savage4
5333 8a2e 86C394-397 Savage4 32bit
5333 9125 86C394-397 Savage4 SGRAM 125
5333 9143 86C394-397 Savage4 SGRAM 143
8a23 Savage 4
8a25 ProSavage PM133
0303 0303 D9840-60001 [Brio BA410 Motherboard]
8a26 ProSavage KM133
8c00 ViRGE/M3
8c01 ViRGE/MX
1179 0001 ViRGE/MX
8c02 ViRGE/MX+
8c03 ViRGE/MX+MV
8c10 86C270-294 [SavageMX-MV]
8c11 82C270-294 [SavageMX]
8c12 86C270-294 [SavageIX-MV]
1014 017f ThinkPad T20/T22
1179 0001 86C584 SuperSavage/IXC Toshiba
8c13 86C270-294 [SavageIX]
1179 0001 Magnia Z310
8c22 SuperSavage MX/128
8c24 SuperSavage MX/64
8c26 SuperSavage MX/64C

8c2a SuperSavage IX/128 SDR
8c2b SuperSavage IX/128 DDR
8c2c SuperSavage IX/64
SDR
8c2d SuperSavage IX/64 DDR
8c2e SuperSavage IX/C SDR
1014 01fc ThinkPad T23
8c2f SuperSavage IX/C DDR
8d01 86C380 [ProSavageDDR K4M266]
8d02 VT8636A [ProSavage KN133] AGP4X VGA Controller (TwisterK)
8d03 VT8751 [ProSavageDDR P4M266]
8d04 VT8375 [ProSavage8 KM266/KL266]
8e00 DeltaChrome
8e26 ProSavage
8e40 2300E Graphics Processor
8e48 Matrix [Chrome S25 / S27]
5333 0130 Chrome S27 256M DDR2
9043 Chrome 430 GT
9045 Chrome 430 ULP / 435 ULP / 440 GTX
9060 Chrome 530 GT
9102 86C410 [Savage 2000]
1092 5932 Viper II Z200
1092 5934 Viper II Z200
1092 5952 Viper II Z200
1092 5954 Viper II Z200
1092 5a35 Viper II Z200
1092 5a37 Viper II Z200
1092 5a55 Viper II Z200
1092 5a57 Viper II Z200
ca00 SonicVibes
5431 AuzenTech, Inc.
544c Teralogic Inc
0350 TL880-based HDTV/ATSC tuner
544d TBS Technologies
6178 DVB Tuner PCIe Card
544d 6904 TBS6904 DVB-S2 Quad Tuner PCIe Card
544d 6905 TBS6905 DVB-S2 Quad Tuner PCIe Card
6205
0001 TBS6205 DVB-T2/T/C Quad TV Tuner PCIe Card
6209 0001 TBS6209 DVB-T2/C2/T/C/ISDB-T OctaTV Tuner
5452 SCANLAB AG
3443 RTC4
5455 Technische Universitaet Berlin
4458 S5933
5456 GoTView
5519 Cnet Technologies, Inc.
5544 Dunord Technologies
0001 I-30xx Scanner Interface

5555 Genroco, Inc
0003 TURBOstor HFP-832 [HiPPI NIC]
3b00 Epiphan DVI2PCIE video capture card
5646 Vector Fabrics BV
5654 VoiceTronix Pty Ltd
5678 Dawicontrol Computersysteme GmbH
5700 Netpower
alternately Extreme Engineering Solutions, Inc.
5845 X-ES, Inc.
584d AuzenTech Co., Ltd.
5851 Exacq Technologies
8008 tDVR8008 8-port video capture card
8016 tDVR8016 16-chan video capture card
8032 tDVR8032 32-chan video capture card
5853 XenSource, Inc.
0001 Xen Platform Device
c000 Citrix XenServer PCI Device for Windows Update
Virtual device surfaced in guests to provide HID events.
c110 Virtualized HID
Device surfaced in guests to provide 2d graphics capabilities
c147 Virtualized
Graphics Device
c200 XCP-ng Project PCI Device for Windows Update
5854 GoTView
5ace Beholder International Ltd.
6205 TBS Technologies (wrong ID)
6209 TBS Technologies (wrong ID)
631c SmartInfra Ltd
1652 PXI-1652 Signal Generator
2504 PXI-2504 Signal Interrogator
6356 UltraStor
6374 c't Magazin fuer Computertechnik
6773 GPPCI
6409 Logitech Corp.
6549 Teradici Corp.
1200 TERA1200 PC-over-IP Host
6666 Decision Computer International Co.
0001 PCCOM4
0002 PCCOM8
0004 PCCOM2
0101 PCI 8255/8254 I/O Card
0200 12-bit AD/DA Card
0201 14-bit AD/DA Card
1011 Industrial Card
1021 8 photo couple 8 relay Card
1022 4 photo couple 4 relay Card
1025 16 photo couple 16 relay Card
4000 WatchDog Card

6688 Zycoo Co., Ltd
1200 CooVox TDM Analog Module
1400 CooVOX TDM GSM Module
1600 CooVOX TDM E1/T1 Module
1800 CooVOX TDM BRI Module
nee Qumranet
6900 Red Hat, Inc.
7063 pcHDTV
2000 HD-2000
3000 HD-3000
5500 HD5500 HDTV
7284 HT OMEGA Inc.
7357
IOxOS Technologies SA
7910 7910 [Althea]
7401 EndRun Technologies
e100 PTP3100 PCIe PTP Slave Clock
7470 TP-LINK Technologies Co., Ltd.
7604 O.N. Electronic Co Ltd.
7bde MIDAC Corporation
7fed PowerTV
8008 Quancom Electronic GmbH
0010 WDOG1 [PCI-Watchdog 1]
0011 PWDOG2 [PCI-Watchdog 2]
0015 Clock77/PCI & Clock77/PCIe (DCF-77 receiver)
Wrong ID used in subsystem ID of AsusTek PCI-USB2 PCI card.
807d Asustek Computer, Inc.
8086 Intel Corporation
0007 82379AB
0008 Extended Express System Support Controller
0039 21145 Fast Ethernet
0040 Core Processor DRAM Controller
0041 Core Processor PCI Express x16 Root Port
0042 Core Processor Integrated Graphics Controller
0043 Core Processor Secondary PCI Express Root Port
0044 Core Processor DRAM Controller
1025 0347 Aspire 7740G
1025 0487 TravelMate 5742
1028 040a Latitude E6410
144d c06a R730 Laptop
17c0 10d2 Medion Akoya E7214 Notebook PC [MD98410]
e4bf 50c1 PC1-GROOVE
0045 Core Processor
PCI Express x16 Root Port
17c0 10d2 Medion Akoya E7214 Notebook PC [MD98410]
0046 Core Processor Integrated Graphics Controller
1028 040a Latitude E6410
144d c06a R730 Laptop

17c0 10d9 Medion Akoya E7214 Notebook PC [MD98410]
e4bf 50c1 PC1-GROOVE
0047 Core Processor Secondary PCI Express Root Port
0048 Core Processor DRAM Controller
0049 Core Processor PCI Express x16 Root Port
004a Core Processor Integrated Graphics Controller
004b Core Processor Secondary PCI Express Root Port
0050 Core Processor Thermal Management Controller
0069 Core Processor DRAM Controller
0082 Centrino Advanced-N 6205 [Taylor Peak]
8086 1301 Centrino Advanced-N 6205 AGN
8086 1306 Centrino Advanced-N 6205 ABG
8086 1307 Centrino Advanced-N 6205 BG
8086 1321 Centrino Advanced-N 6205 AGN
8086 1326 Centrino Advanced-N 6205 ABG
0083 Centrino Wireless-N 1000 [Condor Peak]
8086 1205 Centrino Wireless-N 1000 BGN
8086 1206 Centrino Wireless-N 1000 BG
8086 1225 Centrino
Wireless-N 1000 BGN
8086 1226 Centrino Wireless-N 1000 BG
8086 1305 Centrino Wireless-N 1000 BGN
8086 1306 Centrino Wireless-N 1000 BG
8086 1325 Centrino Wireless-N 1000 BGN
8086 1326 Centrino Wireless-N 1000 BG
0084 Centrino Wireless-N 1000 [Condor Peak]
8086 1215 Centrino Wireless-N 1000 BGN
8086 1216 Centrino Wireless-N 1000 BG
8086 1315 Centrino Wireless-N 1000 BGN
8086 1316 Centrino Wireless-N 1000 BG
0085 Centrino Advanced-N 6205 [Taylor Peak]
8086 1311 Centrino Advanced-N 6205 (802.11a/b/g/n)
8086 1316 Centrino Advanced-N 6205 ABG
0087 Centrino Advanced-N + WiMAX 6250 [Kilmer Peak]
8086 1301 Centrino Advanced-N + WiMAX 6250 2x2 AGN
8086 1306 Centrino Advanced-N + WiMAX 6250 2x2 ABG
8086 1321 Centrino Advanced-N + WiMAX 6250 2x2 AGN
8086 1326 Centrino Advanced-N + WiMAX 6250 2x2 ABG
0089 Centrino Advanced-N + WiMAX 6250 [Kilmer Peak]
8086 1311 Centrino Advanced-N + WiMAX 6250 2x2 AGN
8086 1316 Centrino Advanced-N +
WiMAX 6250 2x2 ABG
008a Centrino Wireless-N 1030 [Rainbow Peak]
8086 5305 Centrino Wireless-N 1030 BGN
8086 5307 Centrino Wireless-N 1030 BG
8086 5325 Centrino Wireless-N 1030 BGN
8086 5327 Centrino Wireless-N 1030 BG
008b Centrino Wireless-N 1030 [Rainbow Peak]

8086 5315 Centrino Wireless-N 1030 BGN
8086 5317 Centrino Wireless-N 1030 BG
0090 Centrino Advanced-N 6230 [Rainbow Peak]
8086 5211 Centrino Advanced-N 6230 AGN
8086 5215 Centrino Advanced-N 6230 BGN
8086 5216 Centrino Advanced-N 6230 ABG
0091 Centrino Advanced-N 6230 [Rainbow Peak]
8086 5201 Centrino Advanced-N 6230 AGN
8086 5205 Centrino Advanced-N 6230 BGN
8086 5206 Centrino Advanced-N 6230 ABG
8086 5207 Centrino Advanced-N 6230 BG
8086 5221 Centrino Advanced-N 6230 AGN
8086 5225 Centrino Advanced-N 6230 BGN
8086 5226 Centrino Advanced-N 6230 ABG
0100 2nd Generation Core Processor Family DRAM Controller
1028 04aa XPS 8300
1043 844d P8P67/P8H67 Series Motherboard
0101
Xeon E3-1200/2nd Generation Core Processor Family PCI Express Root Port
1028 04b2 Vostro 3350
106b 00dc MacBookPro8,2 [Core i7, 15", 2011]
144d c652 NP300E5C series laptop
0102 2nd Generation Core Processor Family Integrated Graphics Controller
1028 04aa XPS 8300
1043 0102 P8H67 Series Motherboard
0104 2nd Generation Core Processor Family DRAM Controller
1028 04a3 Precision M4600
1028 04b2 Vostro 3350
1028 04da Vostro 3750
106b 00dc MacBookPro8,2 [Core i7, 15", 2011]
144d c652 NP300E5C series laptop
17aa 21cf ThinkPad T520
0105 Xeon E3-1200/2nd Generation Core Processor Family PCI Express Root Port
106b 00dc MacBookPro8,2 [Core i7, 15", 2011]
0106 2nd Generation Core Processor Family Integrated Graphics Controller
0108 Xeon E3-1200 Processor Family DRAM Controller
0109 Xeon E3-1200/2nd Generation Core Processor Family PCI Express Root Port
010a Xeon E3-1200 Processor Family Integrated Graphics Controller
010b Xeon E3-1200/2nd
Generation Core Processor Family Integrated Graphics Controller
010c Xeon E3-1200/2nd Generation Core Processor Family DRAM Controller
010d Xeon E3-1200/2nd Generation Core Processor Family PCI Express Root Port
010e Xeon E3-1200/2nd Generation Core Processor Family Integrated Graphics Controller
0112 2nd Generation Core Processor Family Integrated Graphics Controller
0116 2nd Generation Core Processor Family Integrated Graphics Controller
1028 04da Vostro 3750
144d c652 integrated HD 3000 graphics controller on NP300E5C series laptop
0122 2nd Generation Core Processor Family Integrated Graphics Controller

0126 2nd Generation Core Processor Family Integrated Graphics Controller
1028 04cc Vostro 3350
17aa 21ce ThinkPad T420
17aa 21cf ThinkPad T520
0150 Xeon E3-1200 v2/3rd Gen Core processor DRAM Controller
1043 84ca P8 series motherboard
1458 d000 Ivy Bridge GT1 [HD Graphics]
15d9 0624 X9SCM-F Motherboard
1849 0150 Motherboard
0151 Xeon E3-1200
v2/3rd Gen Core processor PCI Express Root Port
1043 1477 N56VZ
1043 844d P8 series motherboard
1043 84ca P8H77-I Motherboard
8086 2010 Server Board S1200BTS
0152 Xeon E3-1200 v2/3rd Gen Core processor Graphics Controller
1043 84ca P8H77-I Motherboard
0153 3rd Gen Core Processor Thermal Subsystem
1043 1517 Zenbook Prime UX31A
0154 3rd Gen Core processor DRAM Controller
1025 0806 Aspire E1-470G
1025 0813 Aspire R7-571
103c 17f6 ProBook 4540s
1043 108d VivoBook X202EV
1043 1477 N56VZ
1043 1517 Zenbook Prime UX31A
10cf 16bf LIFEBOOK E752
0155 Xeon E3-1200 v2/3rd Gen Core processor PCI Express Root Port
8086 2010 Server Board S1200BTS
0156 3rd Gen Core processor Graphics Controller
1043 108d VivoBook X202EV
0158 Xeon E3-1200 v2/Ivy Bridge DRAM Controller
1043 844d P8 series motherboard
8086 2010 Server Board S1200BT Family
0159 Xeon E3-1200 v2/3rd Gen Core processor PCI Express Root Port
015a Xeon E3-1200 v2/Ivy Bridge
Graphics Controller
015c Xeon E3-1200 v2/3rd Gen Core processor DRAM Controller
015d Xeon E3-1200 v2/3rd Gen Core processor PCI Express Root Port
1043 844d P8 series motherboard
015e Xeon E3-1200 v2/3rd Gen Core processor Graphics Controller
0162 Xeon E3-1200 v2/3rd Gen Core processor Graphics Controller
1043 84ca P8 series motherboard
1849 0162 Motherboard
0166 3rd Gen Core processor Graphics Controller
1043 1517 Zenbook Prime UX31A
1043 2103 N56VZ
10cf 16c1 LIFEBOOK E752

016a Xeon E3-1200 v2/3rd Gen Core processor Graphics Controller
 1043 844d P8B WS Motherboard
 0172 Xeon E3-1200 v2/3rd Gen Core processor Graphics Controller
 0176 3rd Gen Core processor Graphics Controller
 02a4 Comet Lake SPI (flash) Controller
 02a6 Comet Lake North Peak
 02d3 Comet Lake SATA AHCI Controller
 02e0 Comet Lake Management Engine Interface
 02e8 Serial IO I2C Host Controller
 02e9 Comet Lake Serial IO I2C Host Controller
 02f0 Wireless-AC 9462
 02f9 Comet Lake
 Thermal Subsystem
 02fc Comet Lake Integrated Sensor Solution
 0309 80303 I/O Processor PCI-to-PCI Bridge
 030d 80312 I/O Companion Chip PCI-to-PCI Bridge
 0326 6700/6702PXH I/OxAPIC Interrupt Controller A
 103c 3208 ProLiant DL140 G2
 1775 1100 CR11/VR11 Single Board Computer
 0327 6700PXH I/OxAPIC Interrupt Controller B
 103c 3208 ProLiant DL140 G2
 1775 1100 CR11/VR11 Single Board Computer
 0329 6700PXH PCI Express-to-PCI Bridge A
 032a 6700PXH PCI Express-to-PCI Bridge B
 032c 6702PXH PCI Express-to-PCI Bridge A
 0330 80332 [Dobson] I/O processor (A-Segment Bridge)
 0331 80332 [Dobson] I/O processor (A-Segment IOAPIC)
 0332 80332 [Dobson] I/O processor (B-Segment Bridge)
 0333 80332 [Dobson] I/O processor (B-Segment IOAPIC)
 0334 80332 [Dobson] I/O processor (ATU)
 0335 80331 [Lindsay] I/O processor (PCI-X Bridge)
 0336 80331 [Lindsay] I/O processor (ATU)
 0340 41210 [Lanai] Serial to Parallel PCI Bridge (A-Segment Bridge)
 0341 41210 [Lanai] Serial to Parallel
 PCI Bridge (B-Segment Bridge)
 0370 80333 Segment-A PCIe Express to PCI-X bridge
 0371 80333 A-Bus IOAPIC
 0372 80333 Segment-B PCIe Express to PCI-X bridge
 0373 80333 B-Bus IOAPIC
 0374 80333 Address Translation Unit
 0402 Xeon E3-1200 v3/4th Gen Core Processor Integrated Graphics Controller
 0406 Haswell Integrated Graphics Controller
 040a Xeon E3-1200 v3 Processor Integrated Graphics Controller
 0412 Xeon E3-1200 v3/4th Gen Core Processor Integrated Graphics Controller
 17aa 309f ThinkCentre M83
 0416 4th Gen Core Processor Integrated Graphics Controller
 17aa 220e ThinkPad T440p
 041a Xeon E3-1200 v3 Processor Integrated Graphics Controller

041e 4th Generation Core Processor Family Integrated Graphics Controller
 0434 DH89XXCC Series QAT
 0435 DH895XCC Series QAT
 0436 DH8900CC Null Device
 0438 DH8900CC Series Gigabit Network Connection
 043a DH8900CC Series Gigabit Fiber Network Connection
 043c DH8900CC Series Gigabit Backplane Network Connection
 0440
 DH8900CC Series Gigabit SFP Network Connection
 0442 DH89XXCC Series QAT Virtual Function
 0443 DH895XCC Series QAT Virtual Function
 0482 82375EB/SB PCI to EISA Bridge
 0483 82424TX/ZX [Saturn] CPU to PCI bridge
 0484 82378ZB/IB, 82379AB (SIO, SIO.A) PCI to ISA Bridge
 0486 82425EX/ZX [Aries] PCIsset with ISA bridge
 04a3 82434LX/NX [Mercury/Neptune] Processor to PCI bridge
 04d0 82437FX [Triton FX]
 0500 E8870 Processor bus control
 0501 E8870 Memory controller
 # and registers common to both SPs
 0502 E8870 Scalability Port 0
 # and global performance monitoring
 0503 E8870 Scalability Port 1
 0510 E8870IO Hub Interface Port 0 registers (8-bit compatibility port)
 0511 E8870IO Hub Interface Port 1 registers
 0512 E8870IO Hub Interface Port 2 registers
 0513 E8870IO Hub Interface Port 3 registers
 0514 E8870IO Hub Interface Port 4 registers
 0515 E8870IO General SIOH registers
 0516 E8870IO RAS registers
 0530 E8870SP Scalability Port 0 registers
 0531 E8870SP
 Scalability Port 1 registers
 0532 E8870SP Scalability Port 2 registers
 0533 E8870SP Scalability Port 3 registers
 0534 E8870SP Scalability Port 4 registers
 0535 E8870SP Scalability Port 5 registers
 # (bi-interleave 0) and global registers that are neither per-port nor per-interleave
 0536 E8870SP Interleave registers 0 and 1
 # (bi-interleave 1)
 0537 E8870SP Interleave registers 2 and 3
 0600 RAID Controller
 8086 0136 SRCU31L
 8086 01af SRCZCR
 8086 01c1 ICP Vortex GDT8546RZ
 8086 01f7 SCR32
 # uninitialized SRCU32 RAID Controller
 061f 80303 I/O Processor

068d Comet Lake LPC Controller
06a3 Comet Lake PCH SMBus Controller
06a4 Comet Lake PCH SPI Controller
06a8 Comet Lake PCH Serial IO UART Host Controller #0
06a9 Comet Lake PCH Serial IO UART Host Controller #1
06aa Comet Lake PCH Serial IO SPI Controller #0
06ab Comet Lake PCH Serial IO SPI Controller #1
06ac Comet Lake PCI Express Root Port #21
06b0 Comet Lake PCI Express Root Port #9
06c0 Comet
Lake PCI Express Root Port #17
06c8 Comet Lake PCH cAVS
06e0 Comet Lake HECI Controller
06e8 Comet Lake PCH Serial IO I2C Controller #0
06e9 Comet Lake PCH Serial IO I2C Controller #1
06ea Comet Lake PCH Serial IO I2C Controller #2
06eb Comet Lake PCH Serial IO I2C Controller #3
06ed Comet Lake USB 3.1 xHCI Host Controller
06ef Comet Lake PCH Shared SRAM
06f0 Wi-Fi 6 AX201
06f9 Comet Lake PCH Thermal Controller
06fb Comet Lake PCH Serial IO SPI Controller #2
0700 CE Media Processor A/V Bridge
0701 CE Media Processor NAND Flash Controller
0703 CE Media Processor Media Control Unit 1
0704 CE Media Processor Video Capture Interface
0707 CE Media Processor SPI Slave
0708 CE Media Processor 4100
0800 Moorestown SPI Ctrl 0
0801 Moorestown SPI Ctrl 1
0802 Moorestown I2C 0
0803 Moorestown I2C 1
0804 Moorestown I2C 2
0805 Moorestown Keyboard Ctrl
0806 Moorestown USB Ctrl
0807 Moorestown SD Host Ctrl 0
0808 Moorestown SD Host Ctrl 1
0809
Moorestown NAND Ctrl
080a Moorestown Audio Ctrl
080b Moorestown ISP
080c Moorestown Security Controller
080d Moorestown External Displays
080e Moorestown SCU IPC
080f Moorestown GPIO Controller
0810 Moorestown Power Management Unit
0811 Moorestown OTG Ctrl
0812 Moorestown SPI Ctrl 2

0813 Moorestown SC DMA
0814 Moorestown LPE DMA
0815 Moorestown SSP0
0817 Medfield Serial IO I2C Controller #3
0818 Medfield Serial IO I2C Controller #4
0819 Medfield Serial IO I2C Controller #5
081a Medfield GPIO Controller [Core]
081b Medfield Serial IO HSUART Controller #1
081c Medfield Serial IO HSUART Controller #2
081d Medfield Serial IO HSUART Controller #3
081e Medfield Serial IO HSUART DMA Controller
081f Medfield GPIO Controller [AON]
0820 Medfield SD Host Controller
0821 Medfield SDIO Controller #1
0822 Medfield SDIO Controller #2
0823 Medfield eMMC Controller #0
0824 Medfield eMMC Controller #1
0827 Medfield Serial IO DMA Controller
0828 Medfield
Power Management Unit
0829 Medfield USB Device Controller (OTG)
082a Medfield SCU IPC
082c Medfield Serial IO I2C Controller #0
082d Medfield Serial IO I2C Controller #1
082e Medfield Serial IO I2C Controller #2
0885 Centrino Wireless-N + WiMAX 6150
8086 1305 Centrino Wireless-N + WiMAX 6150 BGN
8086 1307 Centrino Wireless-N + WiMAX 6150 BG
8086 1325 Centrino Wireless-N + WiMAX 6150 BGN
8086 1327 Centrino Wireless-N + WiMAX 6150 BG
0886 Centrino Wireless-N + WiMAX 6150
8086 1315 Centrino Wireless-N + WiMAX 6150 BGN
8086 1317 Centrino Wireless-N + WiMAX 6150 BG
0887 Centrino Wireless-N 2230
8086 4062 Centrino Wireless-N 2230 BGN
8086 4462 Centrino Wireless-N 2230 BGN
0888 Centrino Wireless-N 2230
8086 4262 Centrino Wireless-N 2230 BGN
088e Centrino Advanced-N 6235
8086 4060 Centrino Advanced-N 6235 AGN
8086 4460 Centrino Advanced-N 6235 AGN
088f Centrino Advanced-N 6235
8086 4260 Centrino Advanced-N 6235 AGN
0890 Centrino
Wireless-N 2200
8086 4022 Centrino Wireless-N 2200 BGN
8086 4422 Centrino Wireless-N 2200 BGN
8086 4822 Centrino Wireless-N 2200 BGN

0891 Centrino Wireless-N 2200
8086 4222 Centrino Wireless-N 2200 BGN
0892 Centrino Wireless-N 135
8086 0062 Centrino Wireless-N 135 BGN
8086 0462 Centrino Wireless-N 135 BGN
0893 Centrino Wireless-N 135
8086 0262 Centrino Wireless-N 135 BGN
0894 Centrino Wireless-N 105
8086 0022 Centrino Wireless-N 105 BGN
8086 0422 Centrino Wireless-N 105 BGN
8086 0822 Centrino Wireless-N 105 BGN
0895 Centrino Wireless-N 105
8086 0222 Centrino Wireless-N 105 BGN
0896 Centrino Wireless-N 130
8086 5005 Centrino Wireless-N 130 BGN
8086 5007 Centrino Wireless-N 130 BG
8086 5025 Centrino Wireless-N 130 BGN
8086 5027 Centrino Wireless-N 130 BG
0897 Centrino Wireless-N 130
8086 5015 Centrino Wireless-N 130 BGN
8086 5017 Centrino Wireless-N 130 BG
08a7 Quark SoC X1000 SDIO / eMMC Controller
08ae Centrino Wireless-N
100
8086 1005 Centrino Wireless-N 100 BGN
8086 1007 Centrino Wireless-N 100 BG
8086 1025 Centrino Wireless-N 100 BGN
8086 1027 Centrino Wireless-N 100 BG
08af Centrino Wireless-N 100
8086 1015 Centrino Wireless-N 100 BGN
8086 1017 Centrino Wireless-N 100 BG
08b1 Wireless 7260
Wilkins Peak 2
8086 4020 Dual Band Wireless-N 7260
Wilkins Peak 2
8086 402a Dual Band Wireless-N 7260
Wilkins Peak 2
8086 4060 Dual Band Wireless-N 7260
Wilkins Peak 2
8086 4062 Wireless-N 7260
Wilkins Peak 2
8086 406a Dual Band Wireless-N 7260
Wilkins Peak 2
8086 4070 Dual Band Wireless-AC 7260
Wilkins Peak 2
8086 4072 Dual Band Wireless-AC 7260
Wilkins Peak 2
8086 4160 Dual Band Wireless-N 7260

Wilkins Peak 2
8086 4162 Wireless-N 7260

Wilkins Peak 2
8086 4170 Dual Band Wireless-AC 7260

Wilkins Peak 2
8086 4420 Dual Band Wireless-N 7260

Wilkins Peak 2
8086 4460 Dual Band Wireless-N 7260

Wilkins Peak 2
8086 4462 Wireless-N
7260

Wilkins Peak 2
8086 446a Dual Band Wireless-N 7260

Wilkins Peak 2
8086 4470 Dual Band Wireless-AC 7260

Wilkins Peak 2
8086 4472 Dual Band Wireless-AC 7260

Wilkins Peak 2
8086 4560 Dual Band Wireless-N 7260

Wilkins Peak 2
8086 4570 Dual Band Wireless-AC 7260

Wilkins Peak 2
8086 486e Dual Band Wireless-AC 7260

Wilkins Peak 2
8086 4870 Dual Band Wireless-AC 7260

Wilkins Peak 2
8086 4a6c Dual Band Wireless-AC 7260

Wilkins Peak 2
8086 4a6e Dual Band Wireless-AC 7260

Wilkins Peak 2
8086 4a70 Dual Band Wireless-AC 7260

Wilkins Peak 2
8086 4c60 Dual Band Wireless-AC 7260

Wilkins Peak 2
8086 4c70 Dual Band Wireless-AC 7260

Wilkins Peak 2
8086 5070 Dual Band Wireless-AC 7260

Wilkins Peak 2
8086 5072 Dual Band Wireless-AC 7260

Wilkins Peak 2
8086 5170 Dual Band Wireless-AC 7260

Wilkins Peak 2
8086 5770 Dual Band Wireless-AC 7260

Wilkins Peak 2
8086 c020 Dual Band Wireless-N 7260

Wilkins Peak 2
8086 c02a

Dual Band Wireless-N 7260
Wilkins Peak 2
8086 c060 Dual Band Wireless-N 7260
Wilkins Peak 2
8086 c062 Wireless-N 7260
Wilkins Peak 2
8086 c06a Dual Band Wireless-N 7260
Wilkins Peak 2
8086 c070 Dual Band Wireless-AC 7260
Wilkins Peak 2
8086 c072 Dual Band Wireless-AC 7260
Wilkins Peak 2
8086 c160 Dual Band Wireless-N 7260
Wilkins Peak 2
8086 c162 Wireless-N 7260
Wilkins Peak 2
8086 c170 Dual Band Wireless-AC 7260
Wilkins Peak 2
8086 c360 Dual Band Wireless-N 7260
Wilkins Peak 2
8086 c420 Dual Band Wireless-N 7260
Wilkins Peak 2
8086 c460 Dual Band Wireless-N 7260
Wilkins Peak 2
8086 c462 Wireless-N 7260
Wilkins Peak 2
8086 c470 Dual Band Wireless-AC 7260
Wilkins Peak 2
8086 c472 Dual Band Wireless-AC 7260
Wilkins Peak 2
8086 c560 Dual Band Wireless-N 7260
Wilkins Peak 2
8086 c570 Dual Band Wireless-AC 7260
Wilkins Peak 2
8086 c760 Dual Band Wireless-N 7260
Wilkins Peak 2
8086 c770 Dual Band Wireless-AC
7260
Wilkins Peak 2
8086 cc60 Dual Band Wireless-AC 7260
Wilkins Peak 2
8086 cc70 Dual Band Wireless-AC 7260
08b2 Wireless 7260
Wilkins Peak 2
8086 4220 Dual Band Wireless-N 7260
Wilkins Peak 2
8086 4260 Dual Band Wireless-N 7260
Wilkins Peak 2

8086 4262 Wireless-N 7260
Wilkins Peak 2
8086 426a Dual Band Wireless-N 7260
Wilkins Peak 2
8086 4270 Wireless-N 7260
Wilkins Peak 2
8086 4272 Dual Band Wireless-AC 7260
Wilkins Peak 2
8086 4360 Dual Band Wireless-N 7260
Wilkins Peak 2
8086 4370 Dual Band Wireless-AC 7260
Wilkins Peak 2
8086 c220 Dual Band Wireless-N 7260
Wilkins Peak 2
8086 c260 Dual Band Wireless-N 7260
Wilkins Peak 2
8086 c262 Wireless-N 7260
Wilkins Peak 2
8086 c26a Dual Band Wireless-N 7260
Wilkins Peak 2
8086 c270 Dual Band Wireless-AC 7260
Wilkins Peak 2
8086 c272 Dual Band Wireless-AC 7260
Wilkins Peak 2
8086 c370 Dual Band Wireless-AC 7260
08b3 Wireless 3160
Wilkins Peak
1
8086 0060 Dual Band Wireless-N 3160
Wilkins Peak 1
8086 0062 Wireless-N 3160
Wilkins Peak 1
8086 0070 Dual Band Wireless-AC 3160
Wilkins Peak 1
8086 0072 Dual Band Wireless-AC 3160
Wilkins Peak 1
8086 0170 Dual Band Wireless-AC 3160
Wilkins Peak 1
8086 0172 Dual Band Wireless-AC 3160
Wilkins Peak 1
8086 0260 Dual Band Wireless-N 3160
Wilkins Peak 1
8086 0470 Dual Band Wireless-AC 3160
Wilkins Peak 1
8086 0472 Dual Band Wireless-AC 3160
Wilkins Peak 1
8086 1070 Dual Band Wireless-AC 3160
Wilkins Peak 1

8086 1170 Dual Band Wireless-AC 3160
Wilkins Peak 1
8086 8060 Dual Band Wireless N-3160
Wilkins Peak 1
8086 8062 Wireless N-3160
Wilkins Peak 1
8086 8070 Dual Band Wireless AC 3160
Wilkins Peak 1
8086 8072 Dual Band Wireless AC 3160
Wilkins Peak 1
8086 8170 Dual Band Wireless AC 3160
Wilkins Peak 1
8086 8172 Dual Band Wireless AC 3160
Wilkins Peak 1
8086 8470 Dual Band Wireless AC 3160
Wilkins Peak
1
8086 8570 Dual Band Wireless AC 3160
08b4 Wireless 3160
Wilkins Peak 1
8086 0270 Dual Band Wireless-AC 3160
Wilkins Peak 1
8086 0272 Dual Band Wireless-AC 3160
Wilkins Peak 1
8086 0370 Dual Band Wireless-AC 3160
Wilkins Peak 1
8086 8260 Dual Band Wireless AC 3160
Wilkins Peak 1
8086 8270 Dual Band Wireless AC 3160
Wilkins Peak 1
8086 8272 Dual Band Wireless AC 3160
Wilkins Peak 1
8086 8370 Dual Band Wireless AC 3160
PowerVR SGX 545
08cf Atom Processor Z2760 Integrated Graphics Controller
0934 Quark SoC X1000 I2C Controller and GPIO Controller
0935 Quark SoC X1000 SPI Controller
0936 Quark SoC X1000 HS-UART
0937 Quark SoC X1000 10/100 Ethernet MAC
0939 Quark SoC X1000 USB EHCI Host Controller / USB 2.0 Device
093a Quark SoC X1000 USB OHCI Host Controller
0953 PCIe Data Center SSD
8086 3702 DC P3700 SSD
8086 3703 DC P3700 SSD [2.5" SFF]
8086 3704 DC P3500 SSD [Add-in Card]
8086 3705 DC P3500 SSD [2.5" SFF]
8086 3709

DC P3600 SSD [Add-in Card]
8086 370a DC P3600 SSD [2.5" SFF]
8086 370d SSD 750 Series [Add-in Card]
8086 370e SSD 750 Series [2.5" SFF]
0958 Quark SoC X1000 Host Bridge
095a Wireless 7265
Stone Peak 2 AC
8086 1010 Dual Band Wireless-AC 7265
Stone Peak 2 AGN
8086 5000 Dual Band Wireless-N 7265
Stone Peak 2 BGN
8086 5002 Wireless-N 7265
Stone Peak 2 AGN
8086 500a Dual Band Wireless-N 7265
Stone Peak 2 AC
8086 5010 Dual Band Wireless-AC 7265
Stone Peak 2 AC
8086 5012 Dual Band Wireless-AC 7265
Stone Peak 2 AGN
8086 5020 Dual Band Wireless-N 7265
Stone Peak 2 AGN
8086 502a Dual Band Wireless-N 7265
Maple Peak AC
8086 5090 Dual Band Wireless-AC 7265
Stone Peak 2 AGN
8086 5100 Dual Band Wireless-AC 7265
Stone Peak 2 BGN
8086 5102 Wireless-N 7265
Stone Peak 2 AGN
8086 510a Dual Band Wireless-AC 7265
Stone Peak 2 AC
8086 5110 Dual Band Wireless-AC 7265
Stone Peak 2 AC
8086 5112 Dual Band Wireless-AC 7265
Maple
Peak AC
8086 5190 Dual Band Wireless-AC 7265
Stone Peak 2 AGN
8086 5400 Dual Band Wireless-AC 7265
Stone Peak 2 AC
8086 5410 Dual Band Wireless-AC 7265
Stone Peak 2 AC
8086 5412 Dual Band Wireless-AC 7265
Stone Peak 2 AGN
8086 5420 Dual Band Wireless-N 7265
Maple Peak AC
8086 5490 Dual Band Wireless-AC 7265
Stone Peak 2 AC

8086 5510 Dual Band Wireless-AC 7265
Maple Peak AC
8086 5590 Dual Band Wireless-AC 7265
Stone Peak 2 AGN
8086 9000 Dual Band Wireless-AC 7265
Stone Peak 2 AGN
8086 900a Dual Band Wireless-AC 7265
Stone Peak 2 AC
8086 9010 Dual Band Wireless-AC 7265
Stone Peak 2 AC
8086 9012 Dual Band Wireless-AC 7265
Stone Peak 2 AC
8086 9110 Dual Band Wireless-AC 7265
Stone Peak 2 AC
8086 9112 Dual Band Wireless-AC 7265
Stone Peak 2 AC
8086 9210 Dual Band Wireless-AC 7265
Stone Peak 2 AC
8086 9310 Dual Band Wireless-AC 7265
Stone Peak 2 AGN
8086 9400 Dual Band Wireless-AC 7265
Stone Peak 2 AC
8086
9410 Dual Band Wireless-AC 7265
Stone Peak 2 AC
8086 9510 Dual Band Wireless-AC 7265
095b Wireless 7265
Stone Peak 2 AGN
8086 5200 Dual Band Wireless-N 7265
Stone Peak 2 BGN
8086 5202 Wireless-N 7265
Stone Peak 2 AGN
8086 520a Dual Band Wireless-N 7265
Stone Peak 2 AC
8086 5210 Dual Band Wireless-AC 7265
Stone Peak 2 AC
8086 5212 Dual Band Wireless-AC 7265
Maple Peak AC
8086 5290 Dual Band Wireless-AC 7265
Stone Peak 2 BGN
8086 5302 Wireless-N 7265
Stone Peak 2 AC
8086 5310 Dual Band Wireless-AC 7265
Stone Peak 2 AGN
8086 9200 Dual Band Wireless-AC 7265
095e Quark SoC X1000 Legacy Bridge
0960 80960RP (i960RP) Microprocessor/Bridge
0962 80960RM (i960RM) Bridge

0964 80960RP (i960RP) Microprocessor/Bridge
0a03 Haswell-ULT Thermal Subsystem
0a04 Haswell-ULT DRAM Controller
17aa 2214 ThinkPad X240
0a06 Haswell-ULT Integrated Graphics Controller
0a0c Haswell-ULT HD Audio Controller
17aa 2214 ThinkPad X240
0a16
Haswell-ULT Integrated Graphics Controller
17aa 2214 ThinkPad X240
0a22 Haswell-ULT Integrated Graphics Controller
0a26 Haswell-ULT Integrated Graphics Controller
0a2a Haswell-ULT Integrated Graphics Controller
0a2e Haswell-ULT Integrated Graphics Controller
0a53 DC P3520 SSD
0a54 NVMe Datacenter SSD [3DNAND, Beta Rock Controller]
1028 1fe1 Express Flash NVMe 1TB 2.5" U.2 (P4500)
1028 1fe2 Express Flash NVMe 2TB 2.5" U.2 (P4500)
1028 1fe3 Express Flash NVMe 4TB 2.5" U.2 (P4500)
1028 1fe4 Express Flash NVMe 4TB HHHL AIC (P4500)
1028 1fee Express Flash NVMe 1.6TB 2.5" U.2 (P4610)
1028 1fef Express Flash NVMe 3.2TB 2.5" U.2 (P4610)
1028 1ff0 Express Flash NVMe 6.4TB 2.5" U.2 (P4610)
1028 1fff Express Flash NVMe 8.0TB 2.5" U.2 (P4510)
1028 2003 Express Flash NVMe 1.0 TB 2.5" U.2 (P4510)
1028 2004 Express Flash NVMe 2.0TB 2.5" U.2 (P4510)
1028 2005 Express Flash NVMe 4.0TB 2.5" U.2 (P4510)
108e 4870 NVMe PCIe 3.0 SSD 6.4TB AIC (P4608)
108e
4871 NVMe PCIe 3.0 SSD 6.4TB 2.5-inch (P4600)
108e 4879 NVMe PCIe 3.0 SSD v2 6.4TB AIC (P4618)
108e 487a NVMe PCIe 3.0 SSD v2 6.4TB 2.5-inch (P4610)
1137 0227 NVMe Datacenter SSD [3DNAND] 1.6TB 2.5" U.2 (P4600)
1137 0228 NVMe Datacenter SSD [3DNAND] 2.0TB 2.5" U.2 (P4600)
1137 0229 NVMe Datacenter SSD [3DNAND] 3.2TB 2.5" U.2 (P4600)
1137 022b NVMe Datacenter SSD [3DNAND] 1.0TB 2.5" U.2 (P4500)
1137 022c NVMe Datacenter SSD [3DNAND] 2.0TB 2.5" U.2 (P4500)
1137 022d NVMe Datacenter SSD [3DNAND] 4.0TB 2.5" U.2 (P4500)
1137 0231 NVMe Datacenter SSD [3DNAND] 0.5TB 2.5" U.2 (P4501)
1137 0232 NVMe Datacenter SSD [3DNAND] 1.0TB 2.5" U.2 (P4501)
1137 0233 NVMe Datacenter SSD [3DNAND] 2.0TB 2.5" U.2 (P4501)
1137 0258 NVMe Datacenter SSD [3DNAND] 1.6TB 2.5" U.2 (P4610)
1137 025a NVMe Datacenter SSD [3DNAND] 3.2TB 2.5" U.2 (P4610)
1137 025b NVMe Datacenter SSD [3DNAND] 1.0TB 2.5" U.2 (P4510)
1137 025c NVMe Datacenter SSD [3DNAND] 2.0TB 2.5" U.2 (P4510)
1137
025d NVMe Datacenter SSD [3DNAND] 4.0TB 2.5" U.2 (P4510)
1137 025e NVMe Datacenter SSD [3DNAND] 8.0TB 2.5" U.2 (P4510)

1590 025d NVMe Datacenter SSD [3DNAND] 1.0TB 2.5" U.2 (P4500)
1590 025e NVMe Datacenter SSD [3DNAND] 2.0TB 2.5" U.2 (P4500)
1590 025f NVMe Datacenter SSD [3DNAND] 4.0TB 2.5" U.2 (P4500)
1590 0262 NVMe Datacenter SSD [3DNAND] 1.6TB 2.5" U.2 (P4600)
1590 0264 NVMe Datacenter SSD [3DNAND] 3.2TB 2.5" U.2 (P4600)
1590 0265 NVMe Datacenter SSD [3DNAND] 6.4TB 2.5" U.2 (P4600)
1590 026c NVMe Datacenter SSD [3DNAND] 4.0TB AIC (P4500)
1d49 4702 Thinksystem Intel P4500 NVMe U.2
1d49 4704 Thinksystem Intel P4500 NVMe AIC
1d49 4712 Thinksystem Intel P4600 NVMe U.2
1d49 4714 Thinksystem Intel P4600 NVMe AIC
1d49 4802 Thinksystem U.2 P4510 NVMe SSD
1d49 4812 Thinksystem U.2 P4610 NVMe SSD
8086 4308 Intel SSD D5-P4320 and D5-P4326
8086 4702 NVMe Datacenter SSD [3DNAND] SE 2.5" U.2 (P4500)
8086 4704 NVMe Datacenter SSD [3DNAND]
SE AIC (P4500)
8086 4712 NVMe Datacenter SSD [3DNAND] ME 2.5" U.2 (P4600)
8086 4714 NVMe Datacenter SSD [3DNAND] ME AIC (P4600)
8086 4802 NVMe Datacenter SSD [3DNAND] SE 2.5" U.2 (P4510)
8086 4804 NVMe Datacenter SSD [3DNAND] SE AIC (P4510)
8086 4805 NVMe Datacenter SSD [3DNAND] SE M.2 (P4511)
8086 4812 NVMe Datacenter SSD [3DNAND] ME 2.5" U.2 (P4610)
8086 4814 NVMe Datacenter SSD [3DNAND] ME AIC (P4610)
0a55 NVMe DC SSD [3DNAND, Beta Rock Controller]
1028 1fe5 Express Flash NVMe 1.6TB 2.5" U.2 (P4600)
1028 1fe6 Express Flash NVMe 2TB 2.5" U.2 (P4600)
1028 1fe7 Express Flash NVMe 3.2TB 2.5" U.2 (P4600)
1028 1fe8 Express Flash NVMe 2.0TB HHHL AIC (P4600)
1028 1fe9 Express Flash NVMe 4.0TB HHHL AIC (P4600)
0be0 Atom Processor D2xxx/N2xxx Integrated Graphics Controller
0be1 Atom Processor D2xxx/N2xxx Integrated Graphics Controller
105b 0d7c D270S/D250S Motherboard
0be2 Atom Processor D2xxx/N2xxx Integrated Graphics Controller
0be3 Atom
Processor D2xxx/N2xxx Integrated Graphics Controller
0be4 Atom Processor D2xxx/N2xxx Integrated Graphics Controller
0be5 Atom Processor D2xxx/N2xxx Integrated Graphics Controller
0be6 Atom Processor D2xxx/N2xxx Integrated Graphics Controller
0be7 Atom Processor D2xxx/N2xxx Integrated Graphics Controller
0be8 Atom Processor D2xxx/N2xxx Integrated Graphics Controller
0be9 Atom Processor D2xxx/N2xxx Integrated Graphics Controller
0bea Atom Processor D2xxx/N2xxx Integrated Graphics Controller
0beb Atom Processor D2xxx/N2xxx Integrated Graphics Controller
0bec Atom Processor D2xxx/N2xxx Integrated Graphics Controller
0bed Atom Processor D2xxx/N2xxx Integrated Graphics Controller
0bee Atom Processor D2xxx/N2xxx Integrated Graphics Controller
0bef Atom Processor D2xxx/N2xxx Integrated Graphics Controller

0bf0 Atom Processor D2xxx/N2xxx DRAM Controller
0bf1 Atom Processor D2xxx/N2xxx DRAM Controller
0bf2 Atom Processor D2xxx/N2xxx DRAM Controller
0bf3 Atom Processor
D2xxx/N2xxx DRAM Controller
0bf4 Atom Processor D2xxx/N2xxx DRAM Controller
0bf5 Atom Processor D2xxx/N2xxx DRAM Controller
105b 0d7c D270S/D250S Motherboard
0bf6 Atom Processor D2xxx/N2xxx DRAM Controller
0bf7 Atom Processor D2xxx/N2xxx DRAM Controller
0c00 4th Gen Core Processor DRAM Controller
17aa 309f ThinkCentre M83
0c01 Xeon E3-1200 v3/4th Gen Core Processor PCI Express x16 Controller
0c04 Xeon E3-1200 v3/4th Gen Core Processor DRAM Controller
103c 1909 ZBook 15
17aa 220e ThinkPad T440p
0c05 Xeon E3-1200 v3/4th Gen Core Processor PCI Express x8 Controller
0c08 Xeon E3-1200 v3 Processor DRAM Controller
0c09 Xeon E3-1200 v3/4th Gen Core Processor PCI Express x4 Controller
0c0c Xeon E3-1200 v3/4th Gen Core Processor HD Audio Controller
17aa 220e ThinkPad T440p
17aa 309f ThinkCentre M83
0c46 Atom Processor S1200 PCI Express Root Port 1
0c47 Atom Processor S1200 PCI Express Root Port 2
0c48 Atom Processor S1200 PCI Express Root Port
3
0c49 Atom Processor S1200 PCI Express Root Port 4
0c4e Atom Processor S1200 NTB Primary
0c50 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D QuickData Technology Device
0c51 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D QuickData Technology Device
0c52 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D QuickData Technology Device
0c53 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D QuickData Technology Device
0c54 Atom Processor S1200 Internal
0c55 Atom Processor S1200 DFX 1
0c56 Atom Processor S1200 DFX 2
0c59 Atom Processor S1200 SMBus 2.0 Controller 0
0c5a Atom Processor S1200 SMBus 2.0 Controller 1
0c5b Atom Processor S1200 SMBus Controller 2
0c5c Atom Processor S1200 SMBus Controller 3
0c5d Atom Processor S1200 SMBus Controller 4
0c5e Atom Processor S1200 SMBus Controller 5
0c5f Atom Processor S1200 UART
0c60 Atom Processor S1200 Integrated Legacy Bus
0c70 Atom Processor S1200 Internal
0c71 Atom Processor S1200 Internal
0c72 Atom Processor S1200 Internal
0c73 Atom Processor

S1200 Internal
0c74 Atom Processor S1200 Internal
0c75 Atom Processor S1200 Internal
0c76 Atom Processor S1200 Internal
0c77 Atom Processor S1200 Internal
0c78 Atom Processor S1200 Internal
0c79 Atom Processor S1200 Internal
0c7a Atom Processor S1200 Internal
0c7b Atom Processor S1200 Internal
0c7c Atom Processor S1200 Internal
0c7d Atom Processor S1200 Internal
0c7e Atom Processor S1200 Internal
0c7f Atom Processor S1200 Internal
0cf8 Ethernet Controller X710 Intel(R) FPGA Programmable Acceleration Card N3000 for Networking
8086 0000 Ethernet Controller X710 Intel(R) FPGA Programmable Acceleration Card N3000 for Networking
8086 0001 Ethernet Controller X710 Intel(R) FPGA Programmable Acceleration Card N3000 for Networking
0d00 Crystal Well DRAM Controller
0d01 Crystal Well PCI Express x16 Controller
0d04 Crystal Well DRAM Controller
0d05 Crystal Well PCI Express x8 Controller
0d09 Crystal Well PCI Express x4 Controller
0d0c Crystal Well
HD Audio Controller
0d16 Crystal Well Integrated Graphics Controller
0d26 Crystal Well Integrated Graphics Controller
0d36 Crystal Well Integrated Graphics Controller
0d4c Ethernet Connection (11) I219-LM
0d4d Ethernet Connection (11) I219-V
0d4e Ethernet Connection (10) I219-LM
0d4f Ethernet Connection (10) I219-V
0d53 Ethernet Connection (12) I219-LM
0d55 Ethernet Connection (12) I219-V
0d58 Ethernet Controller XXV710 Intel(R) FPGA Programmable Acceleration Card N3000 for Networking
8086 0000 Ethernet Controller XXV710 Intel(R) FPGA Programmable Acceleration Card N3000 for Networking
8086 0001 Ethernet Controller XXV710 Intel(R) FPGA Programmable Acceleration Card N3000 for Networking
0e00 Xeon E7 v2/Xeon E5 v2/Core i7 DMI2
1028 04f7 Xeon E5 v2 on PowerEdge R320 server
15d9 066b X9SRL-F
0e01 Xeon E7 v2/Xeon E5 v2/Core i7 PCI Express Root Port in DMI2 Mode
0e02 Xeon E7 v2/Xeon E5 v2/Core i7 PCI Express Root Port 1a
1028 04f7 Xeon E5 v2 on PowerEdge
R320 server
0e03 Xeon E7 v2/Xeon E5 v2/Core i7 PCI Express Root Port 1b
0e04 Xeon E7 v2/Xeon E5 v2/Core i7 PCI Express Root Port 2a
0e05 Xeon E7 v2/Xeon E5 v2/Core i7 PCI Express Root Port 2b
0e06 Xeon E7 v2/Xeon E5 v2/Core i7 PCI Express Root Port 2c
0e07 Xeon E7 v2/Xeon E5 v2/Core i7 PCI Express Root Port 2d
0e08 Xeon E7 v2/Xeon E5 v2/Core i7 PCI Express Root Port 3a

1028 04f7 Xeon E5 v2 on PowerEdge R320 server
0e09 Xeon E7 v2/Xeon E5 v2/Core i7 PCI Express Root Port 3b
0e0a Xeon E7 v2/Xeon E5 v2/Core i7 PCI Express Root Port 3c
0e0b Xeon E7 v2/Xeon E5 v2/Core i7 PCI Express Root Port 3d
0e10 Xeon E7 v2/Xeon E5 v2/Core i7 IIO Configuration Registers
0e13 Xeon E7 v2/Xeon E5 v2/Core i7 IIO Configuration Registers
0e17 Xeon E7 v2/Xeon E5 v2/Core i7 IIO Configuration Registers
0e18 Xeon E7 v2/Xeon E5 v2/Core i7 IIO Configuration Registers
0e1c Xeon E7 v2/Xeon E5 v2/Core i7 IIO Configuration Registers
0e1d Xeon E7 v2/Xeon E5 v2/Core i7 R2PCIe
0e1e
Xeon E7 v2/Xeon E5 v2/Core i7 UBOX Registers
0e1f Xeon E7 v2/Xeon E5 v2/Core i7 UBOX Registers
0e20 Xeon E7 v2/Xeon E5 v2/Core i7 Crystal Beach DMA Channel 0
1028 04f7 Xeon E5 v2 on PowerEdge R320 server
15d9 066b X9SRL-F
0e21 Xeon E7 v2/Xeon E5 v2/Core i7 Crystal Beach DMA Channel 1
1028 04f7 Xeon E5 v2 on PowerEdge R320 server
15d9 066b X9SRL-F
0e22 Xeon E7 v2/Xeon E5 v2/Core i7 Crystal Beach DMA Channel 2
1028 04f7 Xeon E5 v2 on PowerEdge R320 server
15d9 066b X9SRL-F
0e23 Xeon E7 v2/Xeon E5 v2/Core i7 Crystal Beach DMA Channel 3
1028 04f7 Xeon E5 v2 on PowerEdge R320 server
15d9 066b X9SRL-F
0e24 Xeon E7 v2/Xeon E5 v2/Core i7 Crystal Beach DMA Channel 4
1028 04f7 Xeon E5 v2 on PowerEdge R320 server
15d9 066b X9SRL-F
0e25 Xeon E7 v2/Xeon E5 v2/Core i7 Crystal Beach DMA Channel 5
1028 04f7 Xeon E5 v2 on PowerEdge R320 server
15d9 066b X9SRL-F
0e26 Xeon E7 v2/Xeon E5 v2/Core i7 Crystal Beach DMA Channel 6
1028 04f7 Xeon E5 v2 on
PowerEdge R320 server
15d9 066b X9SRL-F
0e27 Xeon E7 v2/Xeon E5 v2/Core i7 Crystal Beach DMA Channel 7
1028 04f7 Xeon E5 v2 on PowerEdge R320 server
15d9 066b X9SRL-F
0e28 Xeon E7 v2/Xeon E5 v2/Core i7 VTd/Memory Map/Misc
1028 04f7 Xeon E5 v2 on PowerEdge R320 server
15d9 066b X9SRL-F
0e29 Xeon E7 v2/Xeon E5 v2/Core i7 Memory Hotplug
0e2a Xeon E7 v2/Xeon E5 v2/Core i7 IIO RAS
1028 04f7 Xeon E5 v2 on PowerEdge R320 server
15d9 066b X9SRL-F
0e2c Xeon E7 v2/Xeon E5 v2/Core i7 IOAPIC
15d9 066b X9SRL-F
0e2e Xeon E7 v2/Xeon E5 v2/Core i7 CBDMA

0e2f Xeon E7 v2/Xeon E5 v2/Core i7 CBDMA
0e30 Xeon E7 v2/Xeon E5 v2/Core i7 Home Agent 0
1028 04f7 Xeon E5 v2 on PowerEdge R320 server
0e32 Xeon E7 v2/Xeon E5 v2/Core i7 QPI Link 0
0e33 Xeon E7 v2/Xeon E5 v2/Core i7 QPI Link 1
0e34 Xeon E7 v2/Xeon E5 v2/Core i7 R2PCIe
1028 04f7 Xeon E5 v2 on PowerEdge R320 server
0e36 Xeon E7 v2/Xeon E5 v2/Core i7 QPI Ring Performance Ring Monitoring
1028 04f7 Xeon
E5 v2 on PowerEdge R320 server
0e37 Xeon E7 v2/Xeon E5 v2/Core i7 QPI Ring Performance Ring Monitoring
0e38 Xeon E7 v2/Xeon E5 v2/Core i7 Home Agent 1
0e3a Xeon E7 v2/Xeon E5 v2/Core i7 QPI Link 2
0e3e Xeon E7 v2/Xeon E5 v2/Core i7 QPI Ring Performance Ring Monitoring
0e3f Xeon E7 v2/Xeon E5 v2/Core i7 QPI Ring Performance Ring Monitoring
0e40 Xeon E7 v2/Xeon E5 v2/Core i7 QPI Link 2
0e41 Xeon E7 v2/Xeon E5 v2/Core i7 QPI Ring Registers
0e43 Xeon E7 v2/Xeon E5 v2/Core i7 QPI Link Reut 2
0e44 Xeon E7 v2/Xeon E5 v2/Core i7 QPI Link Reut 2
0e45 Xeon E7 v2/Xeon E5 v2/Core i7 QPI Link Agent Register
0e47 Xeon E7 v2/Xeon E5 v2/Core i7 QPI Link Agent Register
0e60 Xeon E7 v2/Xeon E5 v2/Core i7 Home Agent 1
0e68 Xeon E7 v2/Xeon E5 v2/Core i7 Integrated Memory Controller 1 Target Address/Thermal Registers
0e6a Xeon E7 v2/Xeon E5 v2/Core i7 Integrated Memory Controller 1 Channel Target Address Decoder Registers
0e6b Xeon E7 v2/Xeon E5 v2/Core i7 Integrated Memory
Controller 1 Channel Target Address Decoder Registers
0e6c Xeon E7 v2/Xeon E5 v2/Core i7 Integrated Memory Controller 1 Channel Target Address Decoder Registers
0e6d Xeon E7 v2/Xeon E5 v2/Core i7 Integrated Memory Controller 1 Channel Target Address Decoder Registers
0e71 Xeon E7 v2/Xeon E5 v2/Core i7 Integrated Memory Controller 0 RAS Registers
0e74 Xeon E7 v2/Xeon E5 v2/Core i7 R2PCIe
0e75 Xeon E7 v2/Xeon E5 v2/Core i7 R2PCIe
0e77 Xeon E7 v2/Xeon E5 v2/Core i7 QPI Ring Registers
0e79 Xeon E7 v2/Xeon E5 v2/Core i7 Integrated Memory Controller 1 RAS Registers
0e7d Xeon E7 v2/Xeon E5 v2/Core i7 UBOX Registers
0e7f Xeon E7 v2/Xeon E5 v2/Core i7 QPI Ring Registers
0e80 Xeon E7 v2/Xeon E5 v2/Core i7 QPI Link 0
0e81 Xeon E7 v2/Xeon E5 v2/Core i7 QPI Ring Registers
1028 04f7 Xeon E5 v2 on PowerEdge R320 server
0e83 Xeon E7 v2/Xeon E5 v2/Core i7 QPI Link Reut 0
0e84 Xeon E7 v2/Xeon E5 v2/Core i7 QPI Link Reut 0
0e85 Xeon E7 v2/Xeon E5 v2/Core i7 QPI Link Agent
Register
0e87 Xeon E7 v2/Xeon E5 v2/Core i7 QPI Registers
0e90 Xeon E7 v2/Xeon E5 v2/Core i7 QPI Link 1
0e93 Xeon E7 v2/Xeon E5 v2/Core i7 QPI Link 1
0e94 Xeon E7 v2/Xeon E5 v2/Core i7 QPI Link Reut 1
0e95 Xeon E7 v2/Xeon E5 v2/Core i7 QPI Link Agent Register
0ea0 Xeon E7 v2/Xeon E5 v2/Core i7 Home Agent 0

1028 04f7 Xeon E5 v2 on PowerEdge R320 server

0ea8 Xeon E7 v2/Xeon E5 v2/Core i7 Integrated Memory Controller 0 Target Address/Thermal Registers
0eaa Xeon E7 v2/Xeon E5 v2/Core i7 Integrated Memory Controller 0 Channel Target Address Decoder Registers
0eab Xeon E7 v2/Xeon E5 v2/Core i7 Integrated Memory Controller 0 Channel Target Address Decoder Registers
0eac Xeon E7 v2/Xeon E5 v2/Core i7 Integrated Memory Controller 0 Channel Target Address Decoder Registers
0ead Xeon E7 v2/Xeon E5 v2/Core i7 Integrated Memory Controller 0 Channel Target Address Decoder Registers
0eae Xeon E7 v2/Xeon E5 v2/Core i7 DDRIO Registers
0eaf Xeon E7 v2/Xeon E5 v2/Core i7 DDRIO

Registers

0eb0 Xeon E7 v2/Xeon E5 v2/Core i7 Integrated Memory Controller 1 Channel 0-3 Thermal Control 0
0eb1 Xeon E7 v2/Xeon E5 v2/Core i7 Integrated Memory Controller 1 Channel 0-3 Thermal Control 1
0eb2 Xeon E7 v2/Xeon E5 v2/Core i7 Integrated Memory Controller 1 Channel 0-3 ERROR Registers 0
0eb3 Xeon E7 v2/Xeon E5 v2/Core i7 Integrated Memory Controller 1 Channel 0-3 ERROR Registers 1
0eb4 Xeon E7 v2/Xeon E5 v2/Core i7 Integrated Memory Controller 1 Channel 0-3 Thermal Control 2
0eb5 Xeon E7 v2/Xeon E5 v2/Core i7 Integrated Memory Controller 1 Channel 0-3 Thermal Control 3
0eb6 Xeon E7 v2/Xeon E5 v2/Core i7 Integrated Memory Controller 1 Channel 0-3 ERROR Registers 2
0eb7 Xeon E7 v2/Xeon E5 v2/Core i7 Integrated Memory Controller 1 Channel 0-3 ERROR Registers 3
0ebc Xeon E7 v2/Xeon E5 v2/Core i7 DDRIO Registers
0ebe Xeon E7 v2/Xeon E5 v2/Core i7 DDRIO Registers
0ebf Xeon E7 v2/Xeon E5 v2/Core i7 DDRIO Registers

0ec0 Xeon E7 v2/Xeon E5 v2/Core i7 Power Control

Unit 0

0ec1 Xeon E7 v2/Xeon E5 v2/Core i7 Power Control Unit 1
0ec2 Xeon E7 v2/Xeon E5 v2/Core i7 Power Control Unit 2
0ec3 Xeon E7 v2/Xeon E5 v2/Core i7 Power Control Unit 3
0ec4 Xeon E7 v2/Xeon E5 v2/Core i7 Power Control Unit 4
0ec8 Xeon E7 v2/Xeon E5 v2/Core i7 System Address Decoder
0ec9 Xeon E7 v2/Xeon E5 v2/Core i7 Broadcast Registers
0eca Xeon E7 v2/Xeon E5 v2/Core i7 Broadcast Registers
0ed8 Xeon E7 v2/Xeon E5 v2/Core i7 DDRIO
0ed9 Xeon E7 v2/Xeon E5 v2/Core i7 DDRIO
0edc Xeon E7 v2/Xeon E5 v2/Core i7 DDRIO
0edd Xeon E7 v2/Xeon E5 v2/Core i7 DDRIO
0ede Xeon E7 v2/Xeon E5 v2/Core i7 DDRIO
0edf Xeon E7 v2/Xeon E5 v2/Core i7 DDRIO

0ee0 Xeon E7 v2/Xeon E5 v2/Core i7 Unicast Registers
0ee1 Xeon E7 v2/Xeon E5 v2/Core i7 Unicast Registers
0ee2 Xeon E7 v2/Xeon E5 v2/Core i7 Unicast Registers
0ee3 Xeon E7 v2/Xeon E5 v2/Core i7 Unicast Registers
0ee4 Xeon E7 v2/Xeon E5 v2/Core i7 Unicast Registers
0ee5 Xeon E7 v2/Xeon E5 v2/Core i7 Unicast Registers
0ee6

Xeon E7 v2/Xeon E5 v2/Core i7 Unicast Registers

0ee7 Xeon E7 v2/Xeon E5 v2/Core i7 Unicast Registers
0ee8 Xeon E7 v2/Xeon E5 v2/Core i7 Unicast Registers
0ee9 Xeon E7 v2/Xeon E5 v2/Core i7 Unicast Registers
0eea Xeon E7 v2/Xeon E5 v2/Core i7 Unicast Registers
0eeb Xeon E7 v2/Xeon E5 v2/Core i7 Unicast Registers

0eec Xeon E7 v2/Xeon E5 v2/Core i7 Unicast Registers
 0eed Xeon E7 v2/Xeon E5 v2/Core i7 Unicast Registers
 0eee Xeon E7 v2/Xeon E5 v2/Core i7 Unicast Registers
 0ef0 Xeon E7 v2/Xeon E5 v2/Core i7 Integrated Memory Controller 0 Channel 0-3 Thermal Control 0
 0ef1 Xeon E7 v2/Xeon E5 v2/Core i7 Integrated Memory Controller 0 Channel 0-3 Thermal Control 1
 0ef2 Xeon E7 v2/Xeon E5 v2/Core i7 Integrated Memory Controller 0 Channel 0-3 ERROR Registers 0
 0ef3 Xeon E7 v2/Xeon E5 v2/Core i7 Integrated Memory Controller 0 Channel 0-3 ERROR Registers 1
 0ef4 Xeon E7 v2/Xeon E5 v2/Core i7 Integrated Memory Controller 0 Channel 0-3 Thermal Control 2
 0ef5
 Xeon E7 v2/Xeon E5 v2/Core i7 Integrated Memory Controller 0 Channel 0-3 Thermal Control 3
 0ef6 Xeon E7 v2/Xeon E5 v2/Core i7 Integrated Memory Controller 0 Channel 0-3 ERROR Registers 2
 0ef7 Xeon E7 v2/Xeon E5 v2/Core i7 Integrated Memory Controller 0 Channel 0-3 ERROR Registers 3
 0ef8 Xeon E7 v2/Xeon E5 v2/Core i7 DDRIO
 0ef9 Xeon E7 v2/Xeon E5 v2/Core i7 DDRIO
 0efa Xeon E7 v2/Xeon E5 v2/Core i7 DDRIO
 0efb Xeon E7 v2/Xeon E5 v2/Core i7 DDRIO
 0efc Xeon E7 v2/Xeon E5 v2/Core i7 DDRIO
 0efd Xeon E7 v2/Xeon E5 v2/Core i7 DDRIO
 0f00 Atom Processor Z36xxx/Z37xxx Series SoC Transaction Register
 0f04 Atom Processor Z36xxx/Z37xxx Series High Definition Audio Controller
 0f06 Atom Processor Z36xxx/Z37xxx Series LPIO1 DMA Controller
 0f08 Atom Processor Z36xxx/Z37xxx Series LPIO1 PWM Controller
 0f09 Atom Processor Z36xxx/Z37xxx Series LPIO1 PWM Controller
 0f0a Atom Processor Z36xxx/Z37xxx Series LPIO1 HSUART Controller #1
 0f0c Atom Processor Z36xxx/Z37xxx Series LPIO1
 HSUART Controller #2
 0f0e Atom Processor Z36xxx/Z37xxx Series LPIO1 SPI Controller
 0f12 Atom Processor E3800 Series SMBus Controller
 0f14 Atom Processor Z36xxx/Z37xxx Series SDIO Controller
 0f15 Atom Processor Z36xxx/Z37xxx Series SDIO Controller
 0f16 Atom Processor Z36xxx/Z37xxx Series SDIO Controller
 0f18 Atom Processor Z36xxx/Z37xxx Series Trusted Execution Engine
 0f1c Atom Processor Z36xxx/Z37xxx Series Power Control Unit
 0f20 Atom Processor E3800 Series SATA IDE Controller
 0f21 Atom Processor E3800 Series SATA IDE Controller
 0f22 Atom Processor E3800 Series SATA AHCI Controller
 0f23 Atom Processor E3800 Series SATA AHCI Controller
 0f28 Atom Processor Z36xxx/Z37xxx Series LPE Audio Controller
 0f31 Atom Processor Z36xxx/Z37xxx Series Graphics & Display
 0f34 Atom Processor Z36xxx/Z37xxx Series USB EHCI
 0f35 Atom Processor Z36xxx/Z37xxx, Celeron N2000 Series USB xHCI
 1025 0936 Aspire ES1
 0f37 Atom Processor Z36xxx/Z37xxx Series OTG USB Device
 0f38
 Atom Processor Z36xxx/Z37xxx Series Camera ISP
 0f40 Atom Processor Z36xxx/Z37xxx Series LPIO2 DMA Controller
 0f41 Atom Processor Z36xxx/Z37xxx Series LPIO2 I2C Controller #1
 0f42 Atom Processor Z36xxx/Z37xxx Series LPIO2 I2C Controller #2

0f43 Atom Processor Z36xxx/Z37xxx Series LPIO2 I2C Controller #3
0f44 Atom Processor Z36xxx/Z37xxx Series LPIO2 I2C Controller #4
0f45 Atom Processor Z36xxx/Z37xxx Series LPIO2 I2C Controller #5
0f46 Atom Processor Z36xxx/Z37xxx Series LPIO2 I2C Controller #6
0f47 Atom Processor Z36xxx/Z37xxx Series LPIO2 I2C Controller #7
0f48 Atom Processor E3800 Series PCI Express Root Port 1
0f4a Atom Processor E3800 Series PCI Express Root Port 2
0f4c Atom Processor E3800 Series PCI Express Root Port 3
0f4e Atom Processor E3800 Series PCI Express Root Port 4
0f50 Atom Processor E3800 Series eMMC 4.5 Controller
1000 82542 Gigabit Ethernet Controller (Fiber)
0e11 b0df NC6132 Gigabit Ethernet Adapter (1000-SX)
0e11 b0e0 NC6133 Gigabit
Ethernet Adapter (1000-LX)
0e11 b123 NC6134 Gigabit Ethernet Adapter (1000-LX)
1014 0119 Netfinity Gigabit Ethernet SX Adapter
8086 1000 PRO/1000 Gigabit Server Adapter
1001 82543GC Gigabit Ethernet Controller (Fiber)
0e11 004a NC6136 Gigabit Server Adapter
1014 01ea Netfinity Gigabit Ethernet SX Adapter
8086 1002 PRO/1000 F Server Adapter
8086 1003 PRO/1000 F Server Adapter
1002 Pro 100 LAN+Modem 56 Cardbus II
8086 200e Pro 100 LAN+Modem 56 Cardbus II
8086 2013 Pro 100 SR Mobile Combo Adapter
8086 2017 Pro 100 S Combo Mobile Adapter
1004 82543GC Gigabit Ethernet Controller (Copper)
0e11 0049 NC7132 Gigabit Upgrade Module
0e11 b1a4 NC7131 Gigabit Server Adapter
1014 10f2 Gigabit Ethernet Server Adapter
8086 1004 PRO/1000 T Server Adapter
8086 2004 PRO/1000 T Server Adapter
1008 82544EI Gigabit Ethernet Controller (Copper)
1014 0269 iSeries 1000/100/10 Ethernet Adapter
1028 011b PowerEdge 1650/2550
1028 011c PRO/1000 XT Network
Connection
8086 1107 PRO/1000 XT Server Adapter
8086 2107 PRO/1000 XT Server Adapter
8086 2110 PRO/1000 XT Desktop Adapter
8086 3108 PRO/1000 XT Network Connection
1009 82544EI Gigabit Ethernet Controller (Fiber)
1014 0268 iSeries Gigabit Ethernet Adapter
8086 1109 PRO/1000 XF Server Adapter
8086 2109 PRO/1000 XF Server Adapter
100a 82540EM Gigabit Ethernet Controller
100c 82544GC Gigabit Ethernet Controller (Copper)
8086 1112 PRO/1000 T Desktop Adapter

8086 2112 PRO/1000 T Desktop Adapter
100d 82544GC Gigabit Ethernet Controller (LOM)
1028 0123 PRO/1000 XT Network Connection
1079 891f 82544GC Based Network Connection
4c53 1080 CT8 mainboard
8086 110d 82544GC Based Network Connection
100e 82540EM Gigabit Ethernet Controller
1014 0265 PRO/1000 MT Network Connection
1014 0267 PRO/1000 MT Network Connection
1014 026a PRO/1000 MT Network Connection
1028 002e Optiplex GX260
1028 0134 PowerEdge 600SC
1028 0151 Optiplex
GX270
107b 8920 PRO/1000 MT Desktop Adapter
1af4 1100 QEMU Virtual Machine
8086 001e PRO/1000 MT Desktop Adapter
8086 002e PRO/1000 MT Desktop Adapter
8086 1376 PRO/1000 GT Desktop Adapter
8086 1476 PRO/1000 GT Desktop Adapter
100f 82545EM Gigabit Ethernet Controller (Copper)
1014 0269 iSeries 1000/100/10 Ethernet Adapter
1014 028e PRO/1000 MT Network Connection
15ad 0750 PRO/1000 MT Single Port Adapter
8086 1000 PRO/1000 MT Network Connection
8086 1001 PRO/1000 MT Server Adapter
1010 82546EB Gigabit Ethernet Controller (Copper)
0e11 00db NC7170 Gigabit Server Adapter
1014 027c PRO/1000 MT Dual Port Network Adapter
15ad 0760 PRO/1000 MT Dual Port Adapter
18fb 7872 RESlink-X
1fc1 0026 Niagara 2260 Bypass Card
4c53 1080 CT8 mainboard
4c53 10a0 CA3/CR3 mainboard
8086 1011 PRO/1000 MT Dual Port Server Adapter
8086 1012 PRO/1000 MT Dual Port Server Adapter
8086 101a PRO/1000 MT Dual Port Network Connection
8086 3424 SE7501HG2
Mainboard
1011 82545EM Gigabit Ethernet Controller (Fiber)
1014 0268 iSeries Gigabit Ethernet Adapter
8086 1002 PRO/1000 MF Server Adapter
8086 1003 PRO/1000 MF Server Adapter (LX)
1012 82546EB Gigabit Ethernet Controller (Fiber)
0e11 00dc NC6170 Gigabit Server Adapter
8086 1012 PRO/1000 MF Dual Port Server Adapter
1013 82541EI Gigabit Ethernet Controller
8086 0013 PRO/1000 MT Network Connection

8086 1013 PRO/1000 MT Network Connection
8086 1113 PRO/1000 MT Desktop Adapter
1014 82541ER Gigabit Ethernet Controller
8086 0014 PRO/1000 MT Desktop Connection
8086 1014 PRO/1000 MT Network Connection
1015 82540EM Gigabit Ethernet Controller (LOM)
8086 1015 PRO/1000 MT Mobile Connection
1016 82540EP Gigabit Ethernet Controller (Mobile)
1014 052c PRO/1000 MT Mobile Connection
1179 0001 PRO/1000 MT Mobile Connection
8086 1016 PRO/1000 MT Mobile Connection
1017 82540EP Gigabit Ethernet Controller
8086 1017 PRO/1000 MT Desktop Connection
1018
82541EI Gigabit Ethernet Controller
8086 1018 PRO/1000 MT Mobile Connection
1019 82547EI Gigabit Ethernet Controller
1458 1019 GA-8IPE1000 Pro2 motherboard (865PE)
1458 e000 Intel Gigabit Ethernet (Kenai II)
8086 1019 PRO/1000 CT Desktop Connection
8086 301f D865PERL mainboard
8086 3025 D875PBZ motherboard
8086 302c D865GBF Mainboard
8086 3427 S875WP1-E mainboard
101a 82547EI Gigabit Ethernet Controller (Mobile)
8086 101a PRO/1000 CT Mobile Connection
101d 82546EB Gigabit Ethernet Controller
8086 1000 PRO/1000 MT Quad Port Server Adapter
101e 82540EP Gigabit Ethernet Controller (Mobile)
1014 0549 Thinkpad
1179 0001 PRO/1000 MT Mobile Connection
8086 101e PRO/1000 MT Mobile Connection
101f Ethernet Controller V710 for 5GBASE-T
1026 82545GM Gigabit Ethernet Controller
1028 0168 Precision Workstation 670 Mainboard
1028 0169 Precision 470
8086 1000 PRO/1000 MT Server Connection
8086 1001 PRO/1000 MT Server Adapter
8086
1002 PRO/1000 MT Server Adapter
8086 1003 PRO/1000 GT Server Adapter
8086 1026 PRO/1000 MT Server Connection
1027 82545GM Gigabit Ethernet Controller
103c 3103 NC310F PCI-X Gigabit Server Adapter
8086 1001 PRO/1000 MF Server Adapter(LX)
8086 1002 PRO/1000 MF Server Adapter(LX)
8086 1003 PRO/1000 MF Server Adapter(LX)
8086 1027 PRO/1000 MF Server Adapter

1028 82545GM Gigabit Ethernet Controller
8086 1028 PRO/1000 MB Server Connection
1029 82559 Ethernet Controller
1030 82559 InBusiness 10/100
1031 82801CAM (ICH3) PRO/100 VE (LOM) Ethernet Controller
1014 0209 ThinkPad A/T/X Series
104d 80e7 Vaio PCG-GR214EP/GR214MP/GR215MP/GR314MP/GR315MP
104d 813c Vaio PCG-GRV616G
107b 5350 EtherExpress PRO/100 VE
1179 0001 EtherExpress PRO/100 VE
144d c000 EtherExpress PRO/100 VE
144d c001 EtherExpress PRO/100 VE
144d c003 EtherExpress PRO/100 VE
144d c006 vpr Matrix 170B4
1032 82801CAM (ICH3) PRO/100 VE Ethernet Controller
1033 82801CAM
(ICH3) PRO/100 VM (LOM) Ethernet Controller
1034 82801CAM (ICH3) PRO/100 VM Ethernet Controller
1035 82801CAM (ICH3)/82562EH (LOM) Ethernet Controller
1036 82801CAM (ICH3) 82562EH Ethernet Controller
1037 82801CAM (ICH3) Chipset Ethernet Controller
1038 82801CAM (ICH3) PRO/100 VM (KM) Ethernet Controller
0e11 0098 Evo N600c
1039 82801DB PRO/100 VE (LOM) Ethernet Controller
1014 0267 NetVista A30p
114a 0582 PC8 onboard ethernet ETH1
103a 82801DB PRO/100 VE (CNR) Ethernet Controller
103b 82801DB PRO/100 VM (LOM) Ethernet Controller
103c 82801DB PRO/100 VM (CNR) Ethernet Controller
103d 82801DB PRO/100 VE (MOB) Ethernet Controller
1014 0522 ThinkPad R40
1028 2002 Latitude D500
8086 103d 82562EZ 10/100 Ethernet Controller
103e 82801DB PRO/100 VM (MOB) Ethernet Controller
1040 536EP Data Fax Modem
16be 1040 V.9X DSP Data Fax Modem
1043 PRO/Wireless LAN 2100 3B Mini PCI Adapter
103c 08b0 tc1100 tablet
8086 2522 Samsung X10/P30 integrated
WLAN
8086 2527 MIM2000/Centrino
8086 2561 Dell Latitude D800
8086 2581 Toshiba Satellite M10
1048 82597EX 10GbE Ethernet Controller
8086 a01f PRO/10GbE LR Server Adapter
8086 a11f PRO/10GbE LR Server Adapter
1049 82566MM Gigabit Network Connection
103c 30c1 Compaq 6910p

17aa 20b9 ThinkPad T61/R61
104a 82566DM Gigabit Network Connection
104b 82566DC Gigabit Network Connection
104c 82562V 10/100 Network Connection
104d 82566MC Gigabit Network Connection
104e Ethernet Controller X710 for 10 Gigabit SFP+
104f Ethernet Controller X710 for 10 Gigabit backplane
1050 82562EZ 10/100 Ethernet Controller
1014 0287 ThinkCentre S50
1028 019d Dimension 3000
1462 728c 865PE Neo2 (MS-6728)
1462 758c MS-6758 (875P Neo)
8086 3020 D865PERL mainboard
8086 302f Desktop Board D865GBF
8086 3427 S875WP1-E mainboard
1051 82801EB/ER (ICH5/ICH5R) integrated LAN Controller
1052 PRO/100 VM Network Connection
1053 PRO/100 VM Network Connection
1054
PRO/100 VE Network Connection
1055 PRO/100 VM Network Connection
1056 PRO/100 VE Network Connection
1057 PRO/100 VE Network Connection
1059 82551QM Ethernet Controller
105b 82546GB Gigabit Ethernet Controller (Copper)
105e 82571EB/82571GB Gigabit Ethernet Controller D0/D1 (copper applications)
103c 7044 NC360T PCI Express Dual Port Gigabit Server Adapter
103c 704e Dual Port 1000Base-T (PCIe) [AD337A]
1775 1100 CR11/VR11 Single Board Computer
1775 6003 Telum GE-QT
18df 1214 2x 1GbE, PCIe x1, dual Intel 82571EB chips
8086 005e PRO/1000 PT Dual Port Server Connection
8086 105e PRO/1000 PT Dual Port Network Connection
8086 10d5 82571PT Gigabit PT Quad Port Server ExpressModule
8086 115e PRO/1000 PT Dual Port Server Adapter
8086 125e PRO/1000 PT Dual Port Server Adapter
8086 135e PRO/1000 PT Dual Port Server Adapter
105f 82571EB Gigabit Ethernet Controller
103c 704f Dual Port 1000Base-SX (PCIe) [AD338A]
8086 005a PRO/1000 PF Dual Port
Server Adapter
8086 115f PRO/1000 PF Dual Port Server Adapter
8086 125f PRO/1000 PF Dual Port Server Adapter
8086 135f PRO/1000 PF Dual Port Server Adapter
1060 82571EB Gigabit Ethernet Controller
8086 0060 PRO/1000 PB Dual Port Server Connection
8086 1060 PRO/1000 PB Dual Port Server Connection
1064 82562ET/EZ/GT/GZ - PRO/100 VE (LOM) Ethernet Controller

1043 80f8 P5GD1-VW Mainboard
1065 82562ET/EZ/GT/GZ - PRO/100 VE Ethernet Controller
1066 82562 EM/EX/GX - PRO/100 VM (LOM) Ethernet Controller
1067 82562 EM/EX/GX - PRO/100 VM Ethernet Controller
1068 82562ET/EZ/GT/GZ - PRO/100 VE (LOM) Ethernet Controller Mobile
103c 30d5 530 Laptop
1069 82562EM/EX/GX - PRO/100 VM (LOM) Ethernet Controller Mobile
106a 82562G - PRO/100 VE (LOM) Ethernet Controller
106b 82562G - PRO/100 VE Ethernet Controller Mobile
1075 82547GI Gigabit Ethernet Controller
1028 0165 PowerEdge 750
8086 0075 PRO/1000 CT Network Connection
8086 1075 PRO/1000 CT Network
Connection
1076 82541GI Gigabit Ethernet Controller
1028 0165 PRO/1000 MT Network Connection
1028 016d PRO/1000 MT Network Connection
1028 019a PRO/1000 MT Network Connection
1028 106d PRO/1000 MT Network Connection
8086 0076 PRO/1000 MT Network Connection
8086 1076 PRO/1000 MT Network Connection
8086 1176 PRO/1000 MT Desktop Adapter
8086 1276 PRO/1000 MT Network Adapter
1077 82541GI Gigabit Ethernet Controller
1179 0001 PRO/1000 MT Mobile Connection
8086 0077 PRO/1000 MT Mobile Connection
8086 1077 PRO/1000 MT Mobile Connection
1078 82541ER Gigabit Ethernet Controller
8086 1078 82541ER-based Network Connection
1079 82546GB Gigabit Ethernet Controller
103c 12a6 Dual Port 1000Base-T [A9900A]
103c 12cf Core Dual Port 1000Base-T [AB352A]
1775 10d0 V5D Single Board Computer Gigabit Ethernet
1775 ce90 CE9
1fc1 0027 Niagara 2261 Failover NIC
4c53 1090 Cx9 / Vx9 mainboard
4c53 10b0 CL9 mainboard
8086 0079 PRO/1000 MT Dual Port
Network Connection
8086 1079 PRO/1000 MT Dual Port Network Connection
8086 1179 PRO/1000 MT Dual Port Server Adapter
8086 117a PRO/1000 MT Dual Port Server Adapter
107a 82546GB Gigabit Ethernet Controller
103c 12a8 Dual Port 1000base-SX [A9899A]
8086 107a PRO/1000 MF Dual Port Server Adapter
8086 127a PRO/1000 MF Dual Port Server Adapter
107b 82546GB Gigabit Ethernet Controller
8086 007b PRO/1000 MB Dual Port Server Connection

8086 107b PRO/1000 MB Dual Port Server Connection
107c 82541PI Gigabit Ethernet Controller
8086 1376 PRO/1000 GT Desktop Adapter
8086 1476 PRO/1000 GT Desktop Adapter
107d 82572EI Gigabit Ethernet Controller (Copper)
8086 1082 PRO/1000 PT Server Adapter
8086 1084 PRO/1000 PT Server Adapter
8086 1092 PRO/1000 PT Server Adapter
107e 82572EI Gigabit Ethernet Controller (Fiber)
8086 1084 PRO/1000 PF Server Adapter
8086 1085 PRO/1000 PF Server Adapter
8086 1094 PRO/1000 PF Server Adapter
107f 82572EI Gigabit
Ethernet Controller
1080 FA82537EP 56K V.92 Data/Fax Modem PCI
1081 631xESB/632xESB LAN Controller Copper
1082 631xESB/632xESB LAN Controller fiber
1083 631xESB/632xESB LAN Controller SERDES
1084 631xESB/632xESB IDE Redirection
1085 631xESB/632xESB Serial Port Redirection
1086 631xESB/632xESB IPMI/KCS0
1087 631xESB/632xESB UHCI Redirection
1089 631xESB/632xESB BT
108a 82546GB Gigabit Ethernet Controller
8086 108a PRO/1000 P Dual Port Server Adapter
8086 118a PRO/1000 P Dual Port Server Adapter
108b 82573V Gigabit Ethernet Controller (Copper)
1462 176c on board on MSI 945P - NEO (MS-7176)
108c 82573E Gigabit Ethernet Controller (Copper)
108e 82573E KCS (Active Management)
108f Active Management Technology - SOL
1091 PRO/100 VM Network Connection
1092 PRO/100 VE Network Connection
1071 8209 Medion MIM 2240 Notebook PC [MD98100]
1093 PRO/100 VM Network Connection
1094 PRO/100 VE Network Connection
1095 PRO/100 VE Network Connection
1096
80003ES2LAN Gigabit Ethernet Controller (Copper)
15d9 1096 Motherboard
15d9 8680 X7DVL-E-O motherboard
8086 3476 S5000PSLSATA Server Board
1097 631xESB/632xESB DPT LAN Controller (Fiber)
1098 80003ES2LAN Gigabit Ethernet Controller (Serdes)
1099 82546GB Gigabit Ethernet Controller (Copper)
8086 1099 PRO/1000 GT Quad Port Server Adapter
109a 82573L Gigabit Ethernet Controller
1179 ff10 PRO/1000 PL

17aa 2001 ThinkPad T60
17aa 207e ThinkPad X60/X60s
8086 109a PRO/1000 PL Network Connection
8086 309c Desktop Board D945GTP
8086 30a5 Desktop Board D975XBX
109b 82546GB PRO/1000 GF Quad Port Server Adapter
109e 82597EX 10GbE Ethernet Controller
8086 a01f PRO/10GbE CX4 Server Adapter
8086 a11f PRO/10GbE CX4 Server Adapter
10a0 82571EB PRO/1000 AT Quad Port Bypass Adapter
10a1 82571EB PRO/1000 AF Quad Port Bypass Adapter
10a4 82571EB Gigabit Ethernet Controller
8086 10a4 PRO/1000 PT Quad Port Server Adapter
8086 11a4 PRO/1000 PT Quad
Port Server Adapter
10a5 82571EB Gigabit Ethernet Controller (Fiber)
8086 10a5 PRO/1000 PF Quad Port Server Adapter
8086 10a6 PRO/1000 PF Quad Port Server Adapter
10a6 82599EB 10-Gigabit Dummy Function
10a7 82575EB Gigabit Network Connection
8086 10a8 82575EB Gigabit Riser Card
10a9 82575EB Gigabit Backplane Connection
10b0 82573L PRO/1000 PL Network Connection
10b2 82573V PRO/1000 PM Network Connection
10b3 82573E PRO/1000 PM Network Connection
10b4 82573L PRO/1000 PL Network Connection
10b5 82546GB Gigabit Ethernet Controller (Copper)
103c 3109 NC340T PCI-X Quad-port Gigabit Server Adapter
8086 1099 PRO/1000 GT Quad Port Server Adapter
8086 1199 PRO/1000 GT Quad Port Server Adapter
10b6 82598 10GbE PCI-Express Ethernet Controller
10b9 82572EI Gigabit Ethernet Controller (Copper)
103c 704a 110T PCIe Gigabit Server Adapter
8086 1083 PRO/1000 PT Desktop Adapter
8086 1093 PRO/1000 PT Desktop Adapter
10ba 80003ES2LAN Gigabit Ethernet Controller
(Copper)
10bb 80003ES2LAN Gigabit Ethernet Controller (Serdes)
10bc 82571EB/82571GB Gigabit Ethernet Controller (Copper)
1014 0368 4-Port 10/100/1000 Base-TX PCI Express Adapter for POWER
103c 704b NC364T PCI Express Quad Port Gigabit Server Adapter
375-3481-01 REV:50
108e 11bc Quad Port Adapter
8086 10bc PRO/1000 PT Quad Port LP Server Adapter
8086 11bc PRO/1000 PT Quad Port LP Server Adapter (Kirkwood Low Profile)
10bd 82566DM-2 Gigabit Network Connection
1028 0211 OptiPlex 755
10bf 82567LF Gigabit Network Connection

10c0 82562V-2 10/100 Network Connection
1028 020d Inspiron 530
10c2 82562G-2 10/100 Network Connection
10c3 82562GT-2 10/100 Network Connection
10c4 82562GT 10/100 Network Connection
10c5 82562G 10/100 Network Connection
10c6 82598EB 10-Gigabit AF Dual Port Network Connection
8086 a05f 10-Gigabit XF SR Dual Port Server Adapter
8086 a15f 10-Gigabit XF SR Dual Port Server Adapter
10c7 82598EB 10-Gigabit AF Network
Connection
1014 037f 10-Gigabit XF SR Server Adapter
1014 0380 10-Gigabit XF LR Server Adapter
8086 a05f 10-Gigabit XF SR Server Adapter
8086 a15f 10-Gigabit XF SR Server Adapter
8086 a16f 10-Gigabit XF SR Server Adapter
10c8 82598EB 10-Gigabit AT Network Connection
8086 a10c 10-Gigabit AT Server Adapter
8086 a11c 10-Gigabit AT Server Adapter
8086 a12c 10-Gigabit AT Server Adapter
10c9 82576 Gigabit Network Connection
103c 31ef NC362i Integrated Dual port Gigabit Server Adapter
103c 323f NC362i Integrated Dual port Gigabit Server Adapter
10a9 8028 UV-BaseIO dual-port GbE
13a3 0037 DS4100 Secure Multi-Gigabit Server Adapter with Compression
15d9 a811 H8DGU
8086 a01c Gigabit ET Dual Port Server Adapter
8086 a03c Gigabit ET Dual Port Server Adapter
8086 a04c Gigabit ET Dual Port Server Adapter
10ca 82576 Virtual Function
10cb 82567V Gigabit Network Connection
10cc 82567LM-2 Gigabit Network Connection
10cd 82567LF-2 Gigabit Network
Connection
10ce 82567V-2 Gigabit Network Connection
10d3 82574L Gigabit Network Connection
103c 1785 NC112i 1-port Ethernet Server Adapter
103c 3250 NC112T PCI Express single Port Gigabit Server Adapter
1043 8369 Motherboard
1093 76e9 PCIe-8233 Ethernet Adapter
10a9 8029 Prism XL Single Port Gigabit Ethernet
15d9 0605 X8SIL
15d9 060a X7SPA-H/X7SPA-HF Motherboard
15d9 060d C7SIM-Q Motherboard
8086 0001 Gigabit CT2 Desktop Adapter
8086 3578 Server Board S1200BTLR
8086 357a Server Board S1200BTS
8086 a01f Gigabit CT Desktop Adapter

e4bf 50c1 PC1-GROOVE
e4bf 50c2 PC2-LIMBO
10d4 Matrox Concord GE (customized Intel 82574)
10d5 82571PT Gigabit PT Quad Port Server ExpressModule
10d6 82575GB Gigabit Network Connection
8086 10d6 Gigabit VT Quad Port Server Adapter
8086 145a Gigabit VT Quad Port Server Adapter
8086 147a Gigabit VT Quad Port Server Adapter
10d8 82599EB 10 Gigabit Unprogrammed
10d9 82571EB Dual Port Gigabit Mezzanine
Adapter
103c 1716 NC360m Dual Port 1GbE BL-c Adapter
10da 82571EB Quad Port Gigabit Mezzanine Adapter
103c 1717 NC364m Quad Port 1GbE BL-c Adapter
10db 82598EB 10-Gigabit Dual Port Network Connection
10dd 82598EB 10-Gigabit AT CX4 Network Connection
10de 82567LM-3 Gigabit Network Connection
10df 82567LF-3 Gigabit Network Connection
10e1 82598EB 10-Gigabit AF Dual Port Network Connection
8086 a15f 10-Gigabit SR Dual Port Express Module
10e2 82575GB Gigabit Network Connection
8086 10e2 Gigabit VT Quad Port Server Adapter
10e5 82567LM-4 Gigabit Network Connection
10e6 82576 Gigabit Network Connection
8086 a01f Gigabit EF Dual Port Server Adapter
8086 a02f Gigabit EF Dual Port Server Adapter
10e7 82576 Gigabit Network Connection
103c 31ff NC362i Integrated Dual Port BL-c Gigabit Server Adapter
10e8 82576 Gigabit Network Connection
8086 a02b Gigabit ET Quad Port Server Adapter
8086 a02c Gigabit ET Quad Port Server Adapter
10ea 82577LM Gigabit
Network Connection
1028 040a Latitude E6410
1028 040b Latitude E6510
e4bf 50c1 PC1-GROOVE
10eb 82577LC Gigabit Network Connection
10ec 82598EB 10-Gigabit AT CX4 Network Connection
8086 a01f 10-Gigabit CX4 Dual Port Server Adapter
8086 a11f 10-Gigabit CX4 Dual Port Server Adapter
10ed 82599 Ethernet Controller Virtual Function
10ef 82578DM Gigabit Network Connection
1028 02da OptiPlex 980
15d9 060d C7SIM-Q Motherboard
10f0 82578DC Gigabit Network Connection
10f1 82598EB 10-Gigabit AF Dual Port Network Connection
8086 a20f 10-Gigabit AF DA Dual Port Server Adapter
8086 a21f 10-Gigabit AF DA Dual Port Server Adapter

10f4 82598EB 10-Gigabit AF Network Connection
8086 106f 10-Gigabit XF LR Server Adapter
8086 a06f 10-Gigabit XF LR Server Adapter
10f5 82567LM Gigabit Network Connection
17aa 20ee ThinkPad T400
10f6 82574L Gigabit Network Connection
10f7 10 Gigabit BR KX4 Dual Port Network Connection
108e 7b12 Sun Dual 10GbE PCIe
2.0 FEM
8086 000d Ethernet Mezzanine Adapter X520-KX4-2
10f8 82599 10 Gigabit Dual Port Backplane Connection
1028 1f63 10GbE 2P X520k bNDC
103c 17d2 Ethernet 10Gb 2-port 560M Adapter
103c 18d0 Ethernet 10Gb 2-port 560FLB Adapter
1059 0111 T4007 10GbE interface
1059 0130 T4009 10GbE interface
8086 000c Ethernet X520 10GbE Dual Port KX4-KR Mezz
10f9 82599 10 Gigabit Dual Port Network Connection
10fb 82599ES 10-Gigabit SFI/SFP+ Network Connection
1028 1f72 Ethernet 10G 4P X520/I350 rNDC
103c 17d0 Ethernet 10Gb 2-port 560FLR-SFP+ Adapter
103c 17d2 Ethernet 10Gb 2-port 560M Adapter
103c 17d3 Ethernet 10Gb 2-port 560SFP+ Adapter
103c 211b Ethernet 10Gb 1-port P560FLR-SFP+ Adapter
103c 2147 Ethernet 10Gb 1-port 561i Adapter
103c 2159 Ethernet 10Gb 2-port 562i Adapter
108e 7b11 Ethernet Server Adapter X520-2
1170 004c 82599 DP 10G Mezzanine Adapter
15d9 0611 AOC-STGN-I2S [REV 1.01]
1734 11a9 10 Gigabit Dual Port Network Connection
17aa
1071 ThinkServer X520-2 AnyFabric
17aa 4007 82599ES 10-Gigabit SFI/SFP+ Network Connection
17aa 402b 82599ES 10Gb 2-port Server Adapter X520-DA2
17aa 402f FPGA Card XC7VX690T-3FFG1157E
18d4 0c09 82599ES 10Gb 2-port SFP+ OCP Mezz Card MOP81-I-10GS2
193d 1004 560F-B
1bd4 001b 10G SFP+ DP ER102Fi4 Rack Adapter
1bd4 002f 10G SFP+ DP EP102Fi4A Adapter
1bd4 0032 10G SFP+ DP EP102Fi4 Adapter
8086 0002 Ethernet Server Adapter X520-DA2
8086 0003 Ethernet Server Adapter X520-2
8086 0006 Ethernet Server Adapter X520-1
8086 0008 Ethernet OCP Server Adapter X520-2
8086 000a Ethernet Server Adapter X520-1
8086 000c Ethernet Server Adapter X520-2
8086 10a6 82599ES 10Gb 2 port Server Adapter X520-DA2
8086 7a11 Ethernet Server Adapter X520-2

8086 7a12 Ethernet Server Adapter X520-2
10fc 82599 10 Gigabit Dual Port Network Connection
10fe 82552 10/100 Network Connection
1107 PRO/1000 MF Server Adapter (LX)
1130 82815 815 Chipset Host Bridge
and Memory Controller Hub
1025 1016 Travelmate 612 TX
1043 8027 TUSL2-C Mainboard
104d 80df Vaio PCG-FX403
8086 4532 Desktop Board D815EEA2/D815EFV
8086 4557 D815EGEW Mainboard
1131 82815 815 Chipset AGP Bridge
1132 82815 Chipset Graphics Controller (CGC)
1025 1016 Travelmate 612 TX
103c 2001 e-pc 40
104d 80df Vaio PCG-FX403
8086 4532 Desktop Board D815EEA2/D815EFV
8086 4541 D815EEA Motherboard
8086 4557 D815EGEW Mainboard
1161 82806AA PCI64 Hub Advanced Programmable Interrupt Controller
8086 1161 82806AA PCI64 Hub APIC
1162 Xscale 80200 Big Endian Companion Chip
1190 Merrifield SD/SDIO/eMMC Controller
1191 Merrifield Serial IO HSUART Controller
1192 Merrifield Serial IO HSUART DMA Controller
1194 Merrifield Serial IO SPI Controller
1195 Merrifield Serial IO I2C Controller
1196 Merrifield Serial IO I2C Controller
1199 Merrifield GPIO Controller
119e Merrifield USB Device Controller (OTG)
11a0 Merrifield SCU IPC
11a1 Merrifield
Power Management Unit
11a2 Merrifield Serial IO DMA Controller
11a5 Merrifield Serial IO PWM Controller
11c3 Quark SoC X1000 PCIe Root Port 0
11c4 Quark SoC X1000 PCIe Root Port 1
1200 IXP1200 Network Processor
172a 0000 AEP SSL Accelerator
1209 8255xER/82551IT Fast Ethernet Controller
140b 0610 PMC610 quad Ethernet board
1af4 1100 QEMU Virtual Machine
4c53 1050 CT7 mainboard
4c53 1051 CE7 mainboard
4c53 1070 PC6 mainboard
1221 82092AA PCI to PCMCIA Bridge
1222 82092AA IDE Controller
1223 SAA7116

1225 82452KX/GX [Orion]
1226 82596 PRO/10 PCI
1227 82865 EtherExpress PRO/100A
1228 82556 EtherExpress PRO/100 Smart
1229 82557/8/9/0/1 Ethernet Pro 100
0e11 3001 82559 Fast Ethernet LOM with Alert on LAN*
0e11 3002 82559 Fast Ethernet LOM with Alert on LAN*
0e11 3003 82559 Fast Ethernet LOM with Alert on LAN*
0e11 3004 82559 Fast Ethernet LOM with Alert on LAN*
0e11 3005 82559 Fast Ethernet LOM with Alert on LAN*
0e11 3006 82559
Fast Ethernet LOM with Alert on LAN*
0e11 3007 82559 Fast Ethernet LOM with Alert on LAN*
0e11 b01e NC3120 Fast Ethernet NIC
0e11 b01f NC3122 Fast Ethernet NIC (dual port)
0e11 b02f NC1120 Ethernet NIC
0e11 b04a Netelligent 10/100TX NIC with Wake on LAN
0e11 b0c6 NC3161 Fast Ethernet NIC (embedded, WOL)
0e11 b0c7 NC3160 Fast Ethernet NIC (embedded)
0e11 b0d7 NC3121 Fast Ethernet NIC (WOL)
0e11 b0dd NC3131 Fast Ethernet NIC (dual port)
0e11 b0de NC3132 Fast Ethernet Module (dual port)
0e11 b0e1 NC3133 Fast Ethernet Module (100-FX)
0e11 b134 NC3163 Fast Ethernet NIC (embedded, WOL)
0e11 b13c NC3162 Fast Ethernet NIC (embedded)
0e11 b144 NC3123 Fast Ethernet NIC (WOL)
0e11 b163 NC3134 Fast Ethernet NIC (dual port)
0e11 b164 NC3135 Fast Ethernet Upgrade Module (dual port)
0e11 b1a4 NC7131 Gigabit Server Adapter
1014 005c 82558B Ethernet Pro 10/100
1014 01bc 82559 Fast Ethernet LAN On Motherboard
1014 01f1 10/100 Ethernet Server
Adapter
1014 01f2 10/100 Ethernet Server Adapter
1014 0207 Ethernet Pro/100 S
1014 0232 10/100 Dual Port Server Adapter
1014 023a ThinkPad R30
1014 105c Netfinity 10/100
1014 2205 ThinkPad A22p
1014 305c 10/100 EtherJet Management Adapter
1014 405c 10/100 EtherJet Adapter with Alert on LAN
1014 505c 10/100 EtherJet Secure Management Adapter
1014 605c 10/100 EtherJet Secure Management Adapter
1014 705c 10/100 Netfinity 10/100 Ethernet Security Adapter
1014 805c 10/100 Netfinity 10/100 Ethernet Security Adapter
1028 009b 10/100 Ethernet Server Adapter
1028 00ce 10/100 Ethernet Server Adapter
1033 8000 PC-9821X-B06

1033 8016 PK-UG-X006
1033 801f PK-UG-X006
1033 8026 PK-UG-X006
1033 8063 82559-based Fast Ethernet Adapter
1033 8064 82559-based Fast Ethernet Adapter
103c 10c0 NetServer 10/100TX
103c 10c3 NetServer 10/100TX
103c 10ca NetServer 10/100TX
103c 10cb NetServer 10/100TX
103c 10e3 NetServer 10/100TX
103c
10e4 NetServer 10/100TX
103c 1200 NetServer 10/100TX
108e 10cf EtherExpress PRO/100(B)
10c3 1100 SmartEther100 SC1100
10cf 1115 8255x-based Ethernet Adapter (10/100)
10cf 1143 8255x-based Ethernet Adapter (10/100)
110a 008b 82551QM Fast Ethernet Multifunction PCI/CardBus Controller
114a 0582 PC8 onboard ethernet ETH2
1179 0001 8255x-based Ethernet Adapter (10/100)
1179 0002 PCI FastEther LAN on Docker
1179 0003 8255x-based Fast Ethernet
1259 2560 AT-2560 100
1259 2561 AT-2560 100 FX Ethernet Adapter
1266 0001 NE10/100 Adapter
13e9 1000 6221L-4U
144d 2501 SEM-2000 MiniPCI LAN Adapter
144d 2502 SEM-2100IL MiniPCI LAN Adapter
1668 1100 EtherExpress PRO/100B (TX) (MiniPCI Ethernet+Modem)
1775 1100 CR11/VR11 Single Board Computer
1775 ce90 CE9
1af4 1100 QEMU Virtual Machine
4c53 1080 CT8 mainboard
4c53 10e0 PSL09 PrPMC
8086 0001 EtherExpress PRO/100B (TX)
8086 0002 EtherExpress PRO/100B (T4)
8086 0003 EtherExpress PRO/10+
8086
0004 EtherExpress PRO/100 WfM
8086 0005 82557 10/100
8086 0006 82557 10/100 with Wake on LAN
8086 0007 82558 10/100 Adapter
8086 0008 82558 10/100 with Wake on LAN
8086 0009 82558B PRO/100+ PCI (TP)
8086 000a EtherExpress PRO/100+ Management Adapter
8086 000b EtherExpress PRO/100+
8086 000c EtherExpress PRO/100+ Management Adapter
8086 000d EtherExpress PRO/100+ Alert On LAN II* Adapter

8086 000e EtherExpress PRO/100+ Management Adapter with Alert On LAN*
8086 000f EtherExpress PRO/100 Desktop Adapter
8086 0010 EtherExpress PRO/100 S Management Adapter
8086 0011 EtherExpress PRO/100 S Management Adapter
8086 0012 EtherExpress PRO/100 S Advanced Management Adapter (D)
8086 0013 EtherExpress PRO/100 S Advanced Management Adapter (E)
8086 0030 EtherExpress PRO/100 Management Adapter with Alert On LAN* GC
8086 0031 EtherExpress PRO/100 Desktop Adapter
8086 0040 EtherExpress PRO/100 S Desktop Adapter
8086 0041 EtherExpress
PRO/100 S Desktop Adapter
8086 0042 EtherExpress PRO/100 Desktop Adapter
8086 0050 EtherExpress PRO/100 S Desktop Adapter
8086 1009 EtherExpress PRO/100+ Server Adapter
8086 100c EtherExpress PRO/100+ Server Adapter (PILA8470B)
8086 1012 EtherExpress PRO/100 S Server Adapter (D)
8086 1013 EtherExpress PRO/100 S Server Adapter (E)
8086 1015 EtherExpress PRO/100 S Dual Port Server Adapter
8086 1017 EtherExpress PRO/100+ Dual Port Server Adapter
8086 1030 EtherExpress PRO/100+ Management Adapter with Alert On LAN* G Server
8086 1040 EtherExpress PRO/100 S Server Adapter
8086 1041 EtherExpress PRO/100 S Server Adapter
8086 1042 EtherExpress PRO/100 Server Adapter
8086 1050 EtherExpress PRO/100 S Server Adapter
8086 1051 EtherExpress PRO/100 Server Adapter
8086 1052 EtherExpress PRO/100 Server Adapter
8086 10f0 EtherExpress PRO/100+ Dual Port Adapter
8086 1229 82557/8/9 [Ethernet Pro 100]
8086 2009 EtherExpress PRO/100 S Mobile Adapter
8086
200d EtherExpress PRO/100 Cardbus
8086 200e EtherExpress PRO/100 LAN+V90 Cardbus Modem
8086 200f EtherExpress PRO/100 SR Mobile Adapter
8086 2010 EtherExpress PRO/100 S Mobile Combo Adapter
8086 2013 EtherExpress PRO/100 SR Mobile Combo Adapter
8086 2016 EtherExpress PRO/100 S Mobile Adapter
8086 2017 EtherExpress PRO/100 S Combo Mobile Adapter
8086 2018 EtherExpress PRO/100 SR Mobile Adapter
8086 2019 EtherExpress PRO/100 SR Combo Mobile Adapter
8086 2101 EtherExpress PRO/100 P Mobile Adapter
8086 2102 EtherExpress PRO/100 SP Mobile Adapter
8086 2103 EtherExpress PRO/100 SP Mobile Adapter
8086 2104 EtherExpress PRO/100 SP Mobile Adapter
8086 2105 EtherExpress PRO/100 SP Mobile Adapter
8086 2106 EtherExpress PRO/100 P Mobile Adapter
8086 2107 EtherExpress PRO/100 Network Connection
8086 2108 EtherExpress PRO/100 Network Connection
8086 2200 EtherExpress PRO/100 P Mobile Combo Adapter

8086 2201 EtherExpress PRO/100 P Mobile
Combo Adapter
8086 2202 EtherExpress PRO/100 SP Mobile Combo Adapter
8086 2203 EtherExpress PRO/100+ MiniPCI
8086 2204 EtherExpress PRO/100+ MiniPCI
8086 2205 EtherExpress PRO/100 SP Mobile Combo Adapter
8086 2206 EtherExpress PRO/100 SP Mobile Combo Adapter
8086 2207 EtherExpress PRO/100 SP Mobile Combo Adapter
8086 2208 EtherExpress PRO/100 P Mobile Combo Adapter
8086 2402 EtherExpress PRO/100+ MiniPCI
8086 2407 EtherExpress PRO/100+ MiniPCI
8086 2408 EtherExpress PRO/100+ MiniPCI
8086 2409 EtherExpress PRO/100+ MiniPCI
8086 240f EtherExpress PRO/100+ MiniPCI
8086 2410 EtherExpress PRO/100+ MiniPCI
8086 2411 EtherExpress PRO/100+ MiniPCI
8086 2412 EtherExpress PRO/100+ MiniPCI
8086 2413 EtherExpress PRO/100+ MiniPCI
8086 3000 82559 Fast Ethernet LAN on Motherboard
8086 3001 82559 Fast Ethernet LOM with Basic Alert on LAN*
8086 3002 82559 Fast Ethernet LOM with Alert on LAN II*
8086 3006 EtherExpress PRO/100 S Network Connection
8086
3007 EtherExpress PRO/100 S Network Connection
8086 3008 EtherExpress PRO/100 Network Connection
8086 3010 EtherExpress PRO/100 S Network Connection
8086 3011 EtherExpress PRO/100 S Network Connection
8086 3012 EtherExpress PRO/100 Network Connection
8086 301a S845WD1-E mainboard
8086 3411 SDS2 Mainboard
122d 430FX - 82437FX TSC [Triton I]
122e 82371FB PIIX ISA [Triton I]
1230 82371FB PIIX IDE [Triton I]
1231 DSVD Modem
1234 430MX - 82371MX Mobile PCI I/O IDE Xcelerator (MPIIX)
1235 430MX - 82437MX Mob. System Ctrlr (MTSC) & 82438MX Data Path (MTDP)
1237 440FX - 82441FX PMC [Natoma]
1af4 1100 Qemu virtual machine
1239 82371FB PIIX IDE Interface
123b 82380PB PCI to PCI Docking Bridge
123c 82380AB (MISA) Mobile PCI-to-ISA Bridge
123d 683053 Programmable Interrupt Device
123e 82466GX (IHPC) Integrated Hot-Plug Controller (hidden mode)
123f 82466GX Integrated Hot-Plug Controller (IHPC)
1240 82752 (752) AGP Graphics Accelerator
124b
82380FB (MPCI2) Mobile Docking Controller
1250 430HX - 82439HX TXC [Triton II]

1360 82806AA PCI64 Hub PCI Bridge
1361 82806AA PCI64 Hub Controller (HRes)
8086 1361 82806AA PCI64 Hub Controller (HRes)
8086 8000 82806AA PCI64 Hub Controller (HRes)
1460 82870P2 P64H2 Hub PCI Bridge
1461 82870P2 P64H2 I/OxAPIC
15d9 3480 P4DP6
4c53 1090 Cx9/Vx9 mainboard
1462 82870P2 P64H2 Hot Plug Controller
1501 82567V-3 Gigabit Network Connection
1502 82579LM Gigabit Network Connection (Lewisville)
1028 04a3 Precision M4600
17aa 21ce ThinkPad T520
8086 3578 Server Board S1200BTLR
8086 357a Server Board S1200BTS
1503 82579V Gigabit Network Connection
1043 849c P8P67 Deluxe Motherboard
10cf 161c LIFEBOOK E752
1507 Ethernet Express Module X520-P2
1508 82598EB Gigabit BX Network Connection
1509 82580 Gigabit Network Connection
150a 82576NS Gigabit Network Connection
150b 82598EB 10-Gigabit AT2 Server Adapter
8086 a10c 82598EB 10-Gigabit AT2
Server Adapter
8086 a11c 82598EB 10-Gigabit AT2 Server Adapter
8086 a12c 82598EB 10-Gigabit AT2 Server Adapter
150c 82583V Gigabit Network Connection
150d 82576 Gigabit Backplane Connection
8086 a10c Gigabit ET Quad Port Mezzanine Card
150e 82580 Gigabit Network Connection
103c 1780 NC365T 4-port Ethernet Server Adapter
8086 12a1 Ethernet Server Adapter I340-T4
8086 12a2 Ethernet Server Adapter I340-T4
150f 82580 Gigabit Fiber Network Connection
1510 82580 Gigabit Backplane Connection
1511 82580 Gigabit SFP Connection
1513 CV82524 Thunderbolt Controller [Light Ridge 4C 2010]
1514 Ethernet X520 10GbE Dual Port KX4 Mezz
8086 000b Ethernet X520 10GbE Dual Port KX4 Mezz
1515 X540 Ethernet Controller Virtual Function
1516 82580 Gigabit Network Connection
8086 12b1 Ethernet Server Adapter I340-T2
8086 12b2 Ethernet Server Adapter I340-T2
1517 82599ES 10 Gigabit Network Connection
1137 006a UCS CNA M61KR-I Intel Converged Network Adapter
1518

82576NS SerDes Gigabit Network Connection
151a DSL2310 Thunderbolt Controller [Eagle Ridge 2C 2011]
151b CVL2510 Thunderbolt Controller [Light Peak 2C 2010]
151c 82599 10 Gigabit TN Network Connection
108e 7b13 Dual 10GBASE-T LP
1520 I350 Ethernet Controller Virtual Function
1521 I350 Gigabit Network Connection
1028 0602 Gigabit 2P I350-t LOM
1028 0693 Gigabit 2P I350-t LOM
1028 06e2 Gigabit 2P I350-t LOM
1028 0757 Gigabit I350-t LOM
1028 075a Gigabit I350-t LOM
1028 1f60 Gigabit 4P I350-t rNDC
1028 1f62 Gigabit 4P X540/I350 rNDC
1028 1fa8 Ethernet 10G 4P X550/I350 rNDC
1028 1fa9 Ethernet 10G 4P X550 rNDC
1028 1faa Gigabit 4P X550/I350 rNDC
1028 ff9a Gigabit 4P X710/I350 rNDC
103c 17d1 Ethernet 1Gb 4-port 366FLR Adapter
103c 2003 Ethernet 1Gb 2-port 367i Adapter
103c 2226 Ethernet 1Gb 1-port 364i Adapter
103c 337f Ethernet 1Gb 2-port 361i Adapter
103c 3380 Ethernet 1Gb 4-port 366i Adapter
103c 339e Ethernet 1Gb 2-port
361T Adapter
103c 8157 Ethernet 1Gb 4-port 366T Adapter
108e 7b16 Quad Port GbE PCIe 2.0 ExpressModule, UTP
108e 7b18 Quad Port GbE PCIe 2.0 Low Profile Adapter, UTP
1093 7648 PCIe-8237R Ethernet Adapter
1093 7649 PCIe-8236 Ethernet Adapter
1093 76b1 PCIe-8237R-S Ethernet Adapter
1093 775b PCIe-8237 Ethernet Adapter
10a9 802a UV2-BaseIO dual-port GbE
1137 023e 1GigE I350 LOM
15d9 0652 Dual Port i350 GbE MicroLP [AOC-CGP-i2]
17aa 1074 ThinkServer I350-T4 AnyFabric
17aa 4005 I350 Gigabit Network Connection
18d4 0c07 I350 1Gb 2-port RJ45 OCP Mezz Card MOP41-I-1GT2
193d 1005 360T-B
193d 1007 360T-L
1bd4 001d 1G base-T QP EP014Ti1 Adapter
1bd4 0035 1G base-T QP EP014Ti1 Adapter
8086 0001 Ethernet Server Adapter I350-T4
8086 0002 Ethernet Server Adapter I350-T2
8086 0003 Ethernet Network Adapter I350-T4 for OCP NIC 3.0
8086 00a1 Ethernet Server Adapter I350-T4
8086 00a2 Ethernet Server Adapter I350-T2
8086 00a3 Ethernet Network

Adapter I350-T4 for OCP NIC 3.0
8086 00aa Ethernet Network Adapter I350-T4 for OCP NIC 3.0
8086 5001 Ethernet Server Adapter I350-T4
8086 5002 Ethernet Server Adapter I350-T2
8086 5003 Ethernet 1G 4P I350-t OCP
1522 I350 Gigabit Fiber Network Connection
108e 7b17 Quad Port GbE PCIe 2.0 ExpressModule, MMF
108e 7b19 Dual Port GbE PCIe 2.0 Low Profile Adapter, MMF
8086 0002 Ethernet Server Adapter I350-T2
8086 0003 Ethernet Server Adapter I350-F4
8086 0004 Ethernet Server Adapter I350-F2
8086 0005 Ethernet Server Adapter I350-F1
8086 00a2 Ethernet Server Adapter I350-T2
8086 00a3 Ethernet Server Adapter I350-F4
8086 00a4 Ethernet Server Adapter I350-F2
1523 I350 Gigabit Backplane Connection
1028 0060 Gigabit 2P I350 LOM
1028 1f9b Gigabit 4P I350-t bNDC
103c 1784 Ethernet 1Gb 2-port 361FLB Adapter
103c 18d1 Ethernet 1Gb 2-port 361FLB Adapter
103c 1989 Ethernet 1Gb 2-port 363i Adapter
103c 339f Ethernet 1Gb 4-port 366M Adapter
8086
1f52 1GbE 4P I350 Mezz
1524 I350 Gigabit Connection
1525 82567V-4 Gigabit Network Connection
1526 82576 Gigabit Network Connection
8086 a05c Gigabit ET2 Quad Port Server Adapter
8086 a06c Gigabit ET2 Quad Port Server Adapter
1527 82580 Gigabit Fiber Network Connection
8086 0001 Ethernet Server Adapter I340-F4
8086 0002 Ethernet Server Adapter I340-F4
1528 Ethernet Controller 10-Gigabit X540-AT2
1028 1f61 Ethernet 10G 4P X540/I350 rNDC
103c 192d 561FLR-T 2-port 10Gb Ethernet Adapter
103c 2004 Ethernet 10Gb 2-port 561i Adapter
103c 211a Ethernet 10Gb 2-port 561T Adapter
108e 4853 Ethernet Controller 10-Gigabit X540-AT2
108e 7b14 Sun Dual Port 10 GbE PCIe 2.0 ExpressModule, Base-T
108e 7b15 Sun Dual Port 10 GbE PCIe 2.0 Low Profile Adapter, Base-T
1137 00bf Ethernet Converged Network Adapter X540-T2
1170 0052 Ethernet Controller 10-Gigabit X540-AT2
15d9 0734 AOC-STG-I2T
17aa 1073 ThinkServer X540-T2 AnyFabric
17aa 4006 Ethernet
Controller 10-Gigabit X540-AT2
1bd4 001a 10G base-T DP ER102Ti3 Rack Adapter
1bd4 0033 10G base-T DP EP102Ti3 Adapter

1bd4 0034 10G base-T DP EP102Ti3A Adapter
8086 0001 Ethernet Converged Network Adapter X540-T2
8086 0002 Ethernet Converged Network Adapter X540-T1
8086 001a Ethernet Converged Network Adapter X540-T2
8086 00a2 Ethernet Converged Network Adapter X540-T1
8086 1f61 Ethernet 10G 4P X540/I350 rNDC
8086 5003 Ethernet 10G 2P X540-t Adapter
8086 5004 Ethernet 10G 2P X540-t Adapter
1529 82599 10 Gigabit Dual Port Network Connection with FCoE
152a 82599 10 Gigabit Dual Port Backplane Connection with FCoE
152e 82599 Virtual Function
152f I350 Virtual Function
1530 X540 Virtual Function
1531 I210 Gigabit Unprogrammed
1533 I210 Gigabit Network Connection
103c 0003 Ethernet I210-T1 GbE NIC
1059 0180 RD10019 1GbE interface
1093 7706 Compact Vision System Ethernet Adapter
10a9 802c UV300 BaseIO single-port GbE
10a9 802d
UV3000 BaseIO GbE Network
17aa 1100 ThinkServer Ethernet Server Adapter
8086 0001 Ethernet Server Adapter I210-T1
8086 0002 Ethernet Server Adapter I210-T1
1536 I210 Gigabit Fiber Network Connection
1537 I210 Gigabit Backplane Connection
1059 0110 T4005 1GbE interface
1059 0111 T4007 1GbE interface
1059 0120 T4008 1GbE interface
1059 0130 T4009 1GbE interface
1059 0140 T2035 1GbE interface
1059 0150 RD-01068 1GbE interface
1059 0170 RD-01213 10GbE interface
1538 I210 Gigabit Network Connection
1539 I211 Gigabit Network Connection
153a Ethernet Connection I217-LM
103c 1909 ZBook 15
17aa 220e ThinkPad T440p
17aa 309f ThinkCentre M83
153b Ethernet Connection I217-V
1547 DSL3510 Thunderbolt Controller [Cactus Ridge 4C 2012]
1548 DSL3310 Thunderbolt Controller [Cactus Ridge 2C 2012]
1549 DSL2210 Thunderbolt Controller [Port Ridge 1C 2011]
154a Ethernet Server Adapter X520-4
8086 011a Ethernet Converged Network Adapter X520-4
8086
011b Ethernet Converged Network Adapter X520-4
8086 011c Ethernet Converged Network Adapter X520-4

154c Ethernet Virtual Function 700 Series
154d Ethernet 10G 2P X520 Adapter
8086 7b11 10GbE 2P X520 Adapter
1557 82599 10 Gigabit Network Connection
17aa 4008 82599EN 10 Gigabit Network Connection
1bd4 001c 10G SFP+ SP ER101Fi4 Rack Adapter
1bd4 0030 10G SFP+ SP EP101Fi4A Adapter
8086 0001 Ethernet OCP Server Adapter X520-1
1558 Ethernet Converged Network Adapter X520-Q1
8086 011a Ethernet Converged Network Adapter X520-Q1
8086 011b Ethernet Converged Network Adapter X520-Q1
1559 Ethernet Connection I218-V
155a Ethernet Connection I218-LM
17aa 2214 ThinkPad X240
155c Ethernet Server Bypass Adapter
8086 0001 Ethernet Server Bypass Adapter X540-T2
155d Ethernet Server Bypass Adapter
8086 0001 Ethernet Server Bypass Adapter X520-SR2
8086 0002 Ethernet Server Bypass Adapter X520-LR2
1560 Ethernet Controller X540
1563 Ethernet Controller
10G X550T
1028 1fa8 Ethernet 10G 4P X550/I350 rNDC
1028 1fa9 Ethernet 10G 4P X550 rNDC
1137 02b2 X550-TX 10 Gig LOM
1137 02b3 X550-TX 10 Gig LOM
1170 0001 Intel Ethernet Controller X550-T2 OCP card
14c0 1201 X550 10Gb 2P RJ45 OCP Mezz
1590 00d1 Ethernet 10Gb 2-port 562T Adapter
1590 00d2 Ethernet 10Gb 2-port 562FLR-T Adapter
16b8 7217 Twin10G Thunderbolt 3 Edition
18d4 0c08 X550 10Gb 2-port RJ45 OCP Mezz Card MOP81-I-10GT2
193d 1008 560T-B
193d 1009 560T-L
193d 1011 UN-NIC-ETH563T-sL-2P
8086 0001 Ethernet Converged Network Adapter X550-T2
8086 001a Ethernet Converged Network Adapter X550-T2
8086 001b Ethernet Server Adapter X550-T2 for OCP
8086 001d Ethernet 10G 2P X550-t Adapter
8086 0022 Ethernet Converged Network Adapter X550-T2
1564 X550 Virtual Function
1565 X550 Virtual Function
1566 DSL4410 Thunderbolt NHI [Redwood Ridge 2C 2013]
1567 DSL4410 Thunderbolt Bridge [Redwood Ridge 2C 2013]
1568 DSL4510 Thunderbolt
NHI [Redwood Ridge 4C 2013]
1569 DSL4510 Thunderbolt Bridge [Redwood Ridge 4C 2013]
156a DSL5320 Thunderbolt 2 NHI [Falcon Ridge 2C 2013]

156b DSL5320 Thunderbolt 2 Bridge [Falcon Ridge 2C 2013]
156c DSL5520 Thunderbolt 2 NHI [Falcon Ridge 4C 2013]
156d DSL5520 Thunderbolt 2 Bridge [Falcon Ridge 4C 2013]
156f Ethernet Connection I219-LM
1028 06dc Latitude E7470
103c 8079 EliteBook 840 G3
1570 Ethernet Connection I219-V
1571 Ethernet Virtual Function 700 Series
1572 Ethernet Controller X710 for 10GbE SFP+
1028 0000 Ethernet 10G X710 rNDC
1028 1f99 Ethernet 10G 4P X710/I350 rNDC
1028 1f9c Ethernet 10G 4P X710 SFP+ rNDC
103c 0000 Ethernet 10Gb 562SFP+ Adapter
103c 22fc Ethernet 10Gb 2-port 562FLR-SFP+ Adapter
103c 22fd Ethernet 10Gb 2-port 562SFP+ Adapter
1137 0000 Ethernet Converged NIC X710-DA
1137 013b Ethernet Converged NIC X710-DA4
1137 020a Ethernet Converged NIC X710-DA2
1590 0000 Ethernet Controller X710 for 10GbE SFP+
1590 0225
Ethernet 10GbE 4P 563SFP+ Adapter
1590 022f Ethernet 10Gb 2-port 564i Communication Board
17aa 0000 ThinkServer X710 AnyFabric for 10GbE SFP+
17aa 4001 ThinkServer X710-4 AnyFabric for 10GbE SFP+
17aa 4002 ThinkServer X710-2 AnyFabric for 10GbE SFP+
19e5 d11c Ethernet 2-port X710 10Gb SFP+ Adapter SP330
8086 0000 Ethernet Converged Network Adapter X710
8086 0001 Ethernet Converged Network Adapter X710-4
8086 0002 Ethernet Converged Network Adapter X710-4
8086 0004 Ethernet Converged Network Adapter X710-4
8086 0005 Ethernet 10G 4P X710 Adapter
8086 0006 Ethernet 10G 2P X710 Adapter
8086 0007 Ethernet Converged Network Adapter X710-2
8086 0008 Ethernet Converged Network Adapter X710-2
8086 0009 Ethernet Controller X710 for 10GbE SFP+
8086 000a Ethernet Controller X710 for 10GbE SFP+
8086 000b Ethernet Server Adapter X710-DA2 for OCP
8086 000d Ethernet Controller X710 for 10GbE SFP+
8086 000e Ethernet Server Adapter OCP X710-2
8086
000f Ethernet Server Adapter OCP X710-2
8086 0010 Ethernet Converged Network Adapter X710
8086 0011 Ethernet Network Adapter X710-2 for OCP NIC 3.0
8086 0012 Ethernet Network Adapter X710-4 for OCP NIC 3.0
8086 0013 Ethernet 10G 2P X710 OCP
8086 0014 Ethernet 10G 4P X710 OCP
8086 0015 Ethernet Server Adapter X710-DA2 for OCP
8086 00a1 Ethernet Network Adapter X710-2 for OCP NIC 3.0

8086 00a2 Ethernet Network Adapter X710-4 for OCP NIC 3.0
8086 4005 Ethernet Controller X710 for 10GbE SFP+
8086 4006 Ethernet Controller X710 for 10GbE SFP+
8086 4007 Ethernet Controller X710 for 10GbE SFP+
1574 Ethernet Controller XL710 Emulation
1575 DSL6340 Thunderbolt 3 NHI [Alpine Ridge 2C 2015]
1576 DSL6340 Thunderbolt 3 Bridge [Alpine Ridge 2C 2015]
1577 DSL6540 Thunderbolt 3 NHI [Alpine Ridge 4C 2015]
1578 DSL6540 Thunderbolt 3 Bridge [Alpine Ridge 4C 2015]
157b I210 Gigabit Network Connection
157c I210 Gigabit Backplane Connection
157d DSL5110
Thunderbolt 2 NHI (Low Power) [Win Ridge 2C 2014]
157e DSL5110 Thunderbolt 2 Bridge (Low Power) [Win Ridge 2C 2014]
1580 Ethernet Controller XL710 for 40GbE backplane
1581 Ethernet Controller X710 for 10GbE backplane
1028 0000 Ethernet 10G X710-k bNDC
1028 1f98 Ethernet 10G 4P X710-k bNDC
1028 1f9e Ethernet 10G 2P X710-k bNDC
1059 0150 RD-01068 10GbE-KR interface
1059 0170 RD-01213 10GbE interface
1590 0000 Ethernet 2-port 563i Adapter
1590 00f8 Ethernet 2-port 563i Adapter
8086 0000 Ethernet Converged Network Adapter XL710-Q2
1583 Ethernet Controller XL710 for 40GbE QSFP+
1028 0000 Ethernet 40G 2P XL710 QSFP+ rNDC
1028 1f9f Ethernet 40G 2P XL710 QSFP+ rNDC
108e 0000 10 Gb/40 Gb Ethernet Adapter
108e 7b1b 10 Gb/40 Gb Ethernet Adapter
108e 7b1d 10Gb/40Gb Ethernet Adapter
1137 0000 Ethernet Converged NIC XL710-QDA2
1137 013c Ethernet Converged NIC XL710-QDA2
8086 0000 Ethernet Converged Network Adapter XL710-Q2
8086 0001 Ethernet
Converged Network Adapter XL710-Q2
8086 0002 Ethernet Converged Network Adapter XL710-Q2
8086 0003 Ethernet I/O Module XL710-Q2
8086 0004 Ethernet Server Adapter XL710-Q2OCP
8086 0006 Ethernet Converged Network Adapter XL710-Q2
1584 Ethernet Controller XL710 for 40GbE QSFP+
8086 0000 Ethernet Converged Network Adapter XL710-Q1
8086 0001 Ethernet Converged Network Adapter XL710-Q1
8086 0002 Ethernet Converged Network Adapter XL710-Q1
8086 0003 Ethernet I/O Module XL710-Q1
8086 0004 Ethernet Server Adapter XL710-Q1OCP
1585 Ethernet Controller X710 for 10GbE QSFP+
1586 Ethernet Controller X710 for 10GBASE-T
108e 0000 Ethernet Controller X710 for 10GBASE-T

108e 4857 Ethernet Controller X710 for 10GBASE-T
1587 Ethernet Controller XL710 for 20GbE backplane
103c 0000 Ethernet 10/20Gb 2-port 660FLB Adapter
103c 22fe Ethernet 10/20Gb 2-port 660FLB Adapter
1588 Ethernet Controller XL710 for 20GbE backplane
103c 0000 Ethernet 10/20Gb 2-port 660M
Adapter
103c 22ff Ethernet 10/20Gb 2-port 660M Adapter
1137 0000 Ethernet Network Adapter XXV710
1137 02b4 Ethernet Network Adapter XXV710 OCP 2.0
1589 Ethernet Controller X710/X557-AT 10GBASE-T
108e 0000 Quad Port 10GBase-T Adapter
108e 7b1c Quad Port 10GBase-T Adapter
8086 0000 Ethernet Converged Network Adapter X710-T
8086 0001 Ethernet Converged Network Adapter X710-T4
8086 0002 Ethernet Converged Network Adapter X710-T4
8086 0003 Ethernet Converged Network Adapter X710-T
8086 00a0 Ethernet Converged Network Adapter X710-T4
8086 1003 Ethernet Converged Network Adapter X710-T
158a Ethernet Controller XXV710 for 25GbE backplane
1590 0000 10/25Gb Ethernet Adapter
1590 0286 Synergy 4610C 10/25Gb Ethernet Adapter
8086 0000 Ethernet Controller XXV710 for 25GbE backplane
8086 000a Ethernet 25G 2P XXV710 Mezz
158b Ethernet Controller XXV710 for 25GbE SFP28
1137 0000 Ethernet Network Adapter XXV710
1137 0225 Ethernet Network Adapter
XXV710
1137 02b4 Ethernet Network Adapter XXV710 OCP 2.0
UEFI PXE Disabled
1374 0230 Single Port 25 Gigabit Ethernet PCI Express Server Adapter (PE325G1I71)
With UEFI PXE Enabled
1374 0231 Single Port 25 Gigabit Ethernet PCI Express Server Adapter (PE325G1I71EU)
UEFI PXE Disabled
1374 0234 Dual Port 25 Gigabit Ethernet PCI Express Server Adapter (PE325G2I71)
With UEFI PXE Enabled
1374 0235 Dual Port 25 Gigabit Ethernet PCI Express Server Adapter (PE325G2I71EU)
PCIe x8 Bifurcated as x4x4, UEFI PXE Disabled, low profile
1374 0238 Quad Port 25 Gigabit Ethernet PCI Express Server Adapter (PE325G4I71L)
PCIe x8 Bifurcated as x4x4, UEFI PXE Enabled, low profile
1374 0239 Quad Port 25 Gigabit Ethernet PCI Express Server Adapter (PE325G4I71LEU)
PCIe x16 Bifurcated as x8x8, UEFI PXE Disabled, low profile
1374 023a Quad Port 25 Gigabit Ethernet PCI Express Server Adapter (PE31625G4I71L)
PCIe x16 Bifurcated as x8x8, UEFI PXE Enabled, low profile
1374 023b
Quad Port 25 Gigabit Ethernet PCI Express Server Adapter (PE31625G4I71LEU)
1590 0000 Ethernet Network Adapter XXV710-2
1590 0253 Ethernet 10/25/Gb 2-port 661SFP28 Adapter

8086 0000 Ethernet Network Adapter XXV710
8086 0001 Ethernet Network Adapter XXV710-2
8086 0002 Ethernet Network Adapter XXV710-2
8086 0003 Ethernet Network Adapter XXV710-1
8086 0004 Ethernet Network Adapter XXV710-1
8086 0005 Ethernet Network Adapter OCP XXV710-2
8086 0006 Ethernet Network Adapter OCP XXV710-2
8086 0007 Ethernet Network Adapter OCP XXV710-1
8086 0008 Ethernet Network Adapter OCP XXV710-1
8086 0009 Ethernet 25G 2P XXV710 Adapter
8086 000a Ethernet 25G 2P XXV710 OCP
8086 4001 Ethernet Network Adapter XXV710-2
1591 Ethernet Controller E810-C for backplane
1592 Ethernet Controller E810-C for QSFP
8086 0002 Ethernet Network Adapter E810-C-Q2
8086 0004 Ethernet Network Adapter E810-C-Q2
8086 0005 Ethernet Network Adapter E810-C-Q1 for OCP3.0
8086
0006 Ethernet Network Adapter E810-C-Q2 for OCP3.0
8086 0009 Ethernet Network Adapter E810-C-Q1
1593 Ethernet Controller E810-C for SFP
8086 0002 Ethernet Network Adapter E810-L-2
8086 0005 Ethernet Network Adapter E810-XXV-4
8086 0006 Ethernet Network Adapter E810-XXV-4
8086 0007 Ethernet Network Adapter E810-XXV-4
8086 0008 Ethernet Network Adapter E810-XXV-2
8086 0009 Ethernet Network Adapter E810-XXV-2 for OCP 2.0
15a0 Ethernet Connection (2) I218-LM
15a1 Ethernet Connection (2) I218-V
15a2 Ethernet Connection (3) I218-LM
15a3 Ethernet Connection (3) I218-V
15a4 Ethernet Switch FM10000 Host Interface
15a5 Ethernet Switch FM10000 Host Virtual Interface
15a8 Ethernet Connection X552 Virtual Function
15a9 X552 Virtual Function
15aa Ethernet Connection X552 10 GbE Backplane
1059 0120 T4008 10GbE interface
15ab Ethernet Connection X552 10 GbE Backplane
1059 0150 RD-01068 10GbE interface
1059 0170 RD-01213 10GbE interface
15ac Ethernet
Connection X552 10 GbE SFP+
1059 0160 RD-01167 10GbE interface
15ad Ethernet Connection X552/X557-AT 10GBASE-T
15ae Ethernet Connection X552 1000BASE-T
15b0 Ethernet Connection X552 Backplane
15b4 X553 Virtual Function
15b5 DSL6340 USB 3.1 Controller [Alpine Ridge]

15b6 DSL6540 USB 3.1 Controller [Alpine Ridge]
15b7 Ethernet Connection (2) I219-LM
15b8 Ethernet Connection (2) I219-V
15b9 Ethernet Connection (3) I219-LM
15bb Ethernet Connection (7) I219-LM
15bc Ethernet Connection (7) I219-V
15bd Ethernet Connection (6) I219-LM
15be Ethernet Connection (6) I219-V
15bf JHL6240 Thunderbolt 3 NHI (Low Power) [Alpine Ridge LP 2016]
15c0 JHL6240 Thunderbolt 3 Bridge (Low Power) [Alpine Ridge LP 2016]
15c1 JHL6240 Thunderbolt 3 USB 3.1 Controller (Low Power) [Alpine Ridge LP 2016]
15c2 Ethernet Connection X553 Backplane
15c3 Ethernet Connection X553 Backplane
15c4 Ethernet Connection X553 10 GbE SFP+
15c5 X553 Virtual Function
15c6 Ethernet Connection
X553 1GbE
15c7 Ethernet Connection X553 1GbE
15c8 Ethernet Connection X553/X557-AT 10GBASE-T
15ce Ethernet Connection X553 10 GbE SFP+
15d0 Ethernet SDI Adapter
8086 0001 Ethernet SDI Adapter FM10420-100GbE-QDA2
8086 0002 Ethernet SDI Adapter FM10840-MTP2
15d1 Ethernet Controller 10G X550T
8086 0002 Ethernet Converged Network Adapter X550-T1
8086 001b Ethernet Server Adapter X550-T1 for OCP
8086 0021 Ethernet Converged Network Adapter X550-T1
8086 00a2 Ethernet Converged Network Adapter X550-T1
15d2 JHL6540 Thunderbolt 3 NHI (C step) [Alpine Ridge 4C 2016]
15d3 JHL6540 Thunderbolt 3 Bridge (C step) [Alpine Ridge 4C 2016]
15d4 JHL6540 Thunderbolt 3 USB Controller (C step) [Alpine Ridge 4C 2016]
15d5 Ethernet SDI Adapter FM10420-25GbE-DA2
8086 0001 Intel(R) Ethernet SDI Adapter FM10420-25GbE-DA2
15d6 Ethernet Connection (5) I219-V
15d7 Ethernet Connection (4) I219-LM
15d8 Ethernet Connection (4) I219-V
17aa 2247 ThinkPad T570
17aa
224f ThinkPad X1 Carbon 5th Gen
17aa 225d ThinkPad T480
15d9 JHL6340 Thunderbolt 3 NHI (C step) [Alpine Ridge 2C 2016]
15da JHL6340 Thunderbolt 3 Bridge (C step) [Alpine Ridge 2C 2016]
15db JHL6340 Thunderbolt 3 USB 3.1 Controller (C step) [Alpine Ridge 2C 2016]
15df Ethernet Connection (8) I219-LM
15e0 Ethernet Connection (8) I219-V
15e1 Ethernet Connection (9) I219-LM
15e2 Ethernet Connection (9) I219-V
15e3 Ethernet Connection (5) I219-LM

15e4 Ethernet Connection X553 1GbE
15e5 Ethernet Connection X553 1GbE
15e7 JHL7540 Thunderbolt 3 Bridge [Titan Ridge 2C 2018]
15e8 JHL7540 Thunderbolt 3 NHI [Titan Ridge 2C 2018]
15e9 JHL7540 Thunderbolt 3 USB Controller [Titan Ridge 2C 2018]
15ea JHL7540 Thunderbolt 3 Bridge [Titan Ridge 4C 2018]
15eb JHL7540 Thunderbolt 3 NHI [Titan Ridge 4C 2018]
15ec JHL7540 Thunderbolt 3 USB Controller [Titan Ridge 4C 2018]
15ef JHL7540 Thunderbolt 3 Bridge [Titan Ridge DD 2018]
15f0 JHL7540 Thunderbolt 3 USB Controller
[Titan Ridge DD 2018]
15f4 Ethernet Connection (15) I219-LM
15f5 Ethernet Connection (15) I219-V
15f6 I210 Gigabit Ethernet Connection
15f9 Ethernet Connection (14) I219-LM
15fa Ethernet Connection (14) I219-V
15fb Ethernet Connection (13) I219-LM
15fc Ethernet Connection (13) I219-V
15ff Ethernet Controller X710 for 10GBASE-T
1137 0000 X710TLG GbE RJ45 PCIe NIC
1137 02c1 X710T2LG 2x10 GbE RJ45 PCIe NIC
1137 02c2 X710T4LG 4x10 GbE RJ45 PCIe NIC
8086 0000 Ethernet Network Adapter X710-TL
8086 0001 Ethernet Network Adapter X710-T4L
8086 0002 Ethernet Network Adapter X710-T4L
8086 0003 Ethernet Network Adapter X710-T2L
8086 0004 Ethernet Network Adapter X710-T2L
8086 0005 Ethernet 10G 2P X710-T2L-t Adapter
8086 0006 Ethernet 10G 4P X710-T4L-t Adapter
8086 0007 Ethernet 10G 2P X710-T2L-t OCP
8086 0008 Ethernet 10G 4P X710-T4L-t OCP
8086 0009 Ethernet Network Adapter X710-T4L for OCP 3.0
8086 000a Ethernet Network Adapter X710-T4L for
OCP 3.0
8086 000b Ethernet Network Adapter X710-T2L for OCP 3.0
8086 000c Ethernet Network Adapter X710-T2L for OCP 3.0
8086 000f Ethernet Network Adapter X710-T2L for OCP 3.0
1600 Broadwell-U Host Bridge -OPI
1601 Broadwell-U PCI Express x16 Controller
1602 Broadwell-U Integrated Graphics
1603 Broadwell-U Processor Thermal Subsystem
1604 Broadwell-U Host Bridge -OPI
1605 Broadwell-U PCI Express x8 Controller
1606 HD Graphics
1607 Broadwell-U CHAPS Device
1608 Broadwell-U Host Bridge -OPI
1609 Broadwell-U x4 PCIe
160a Broadwell-U Integrated Graphics

160b Broadwell-U Integrated Graphics
160c Broadwell-U Audio Controller
160d Broadwell-U Integrated Graphics
160e Broadwell-U Integrated Graphics
160f Broadwell-U SoftSKU
1610 Broadwell-U Host Bridge - DMI
1612 HD Graphics 5600
1614 Broadwell-U Host Bridge - DMI
1616 HD Graphics 5500
103c 2216 ZBook 15u G2 Mobile Workstation
1618 Broadwell-U Host Bridge - DMI
161a Broadwell-U Integrated
Graphics
161b Broadwell-U Integrated Graphics
161d Broadwell-U Integrated Graphics
161e HD Graphics 5300
1622 Iris Pro Graphics 6200
1626 HD Graphics 6000
162a Iris Pro Graphics P6300
162b Iris Graphics 6100
162d Broadwell-U Integrated Graphics
162e Broadwell-U Integrated Graphics
1632 Broadwell-U Integrated Graphics
1636 Broadwell-U Integrated Graphics
163a Broadwell-U Integrated Graphics
163b Broadwell-U Integrated Graphics
163d Broadwell-U Integrated Graphics
163e Broadwell-U Integrated Graphics
1889 Ethernet Adaptive Virtual Function
18a0 C4xxx Series QAT
18a1 C4XXX Series QAT Virtual Function
1900 Xeon E3-1200 v5/E3-1500 v5/6th Gen Core Processor Host Bridge/DRAM Registers
1901 Xeon E3-1200 v5/E3-1500 v5/6th Gen Core Processor PCIe Controller (x16)
1902 HD Graphics 510
1903 Xeon E3-1200 v5/E3-1500 v5/6th Gen Core Processor Thermal Subsystem
1028 06dc Latitude E7470
1028 06e4 XPS 15 9550
103c 825b OMEN-17-w001nv
17aa 225d ThinkPad
T480
1904 Xeon E3-1200 v5/E3-1500 v5/6th Gen Core Processor Host Bridge/DRAM Registers
1028 06dc Latitude E7470
1028 06f3 Latitude 3570
103c 8079 EliteBook 840 G3
17aa 382a B51-80 Laptop
1905 Xeon E3-1200 v5/E3-1500 v5/6th Gen Core Processor PCIe Controller (x8)
1906 HD Graphics 510
17aa 382a B51-80 Laptop

1908 Xeon E3-1200 v5/E3-1500 v5/6th Gen Core Processor Host Bridge/DRAM Registers
1909 Xeon E3-1200 v5/E3-1500 v5/6th Gen Core Processor PCIe Controller (x4)
190c Xeon E3-1200 v5/E3-1500 v5/6th Gen Core Processor Host Bridge/DRAM Registers
190f Xeon E3-1200 v5/E3-1500 v5/6th Gen Core Processor Host Bridge/DRAM Registers
1910 Xeon E3-1200 v5/E3-1500 v5/6th Gen Core Processor Host Bridge/DRAM Registers
1028 06e4 XPS 15 9550
103c 825b OMEN-17-w001nv
1911 Xeon E3-1200 v5/v6 / E3-1500 v5 / 6th/7th/8th Gen Core Processor Gaussian Mixture Model
17aa 2247 ThinkPad T570
17aa 224f ThinkPad X1 Carbon 5th Gen
17aa 225d ThinkPad T480
1912
HD Graphics 530
1916 Skylake GT2 [HD Graphics 520]
1028 06dc Latitude E7470
1028 06f3 Latitude 3570
103c 8079 EliteBook 840 G3
1918 Xeon E3-1200 v5/E3-1500 v5/6th Gen Core Processor Host Bridge/DRAM Registers
1919 Xeon E3-1200 v5/E3-1500 v5/6th Gen Core Processor Imaging Unit
191b HD Graphics 530
1028 06e4 XPS 15 9550
103c 825b OMEN-17-w001nv
191d HD Graphics P530
191e HD Graphics 515
191f Xeon E3-1200 v5/E3-1500 v5/6th Gen Core Processor Host Bridge/DRAM Registers
1921 HD Graphics 520
1926 Iris Graphics 540
1927 Iris Graphics 550
192b Iris Graphics 555
192d Iris Graphics P555
1932 Iris Pro Graphics 580
193a Iris Pro Graphics P580
193b Iris Pro Graphics 580
193d Iris Pro Graphics P580
1960 80960RP (i960RP) Microprocessor
101e 0431 MegaRAID 431 RAID Controller
101e 0438 MegaRAID 438 Ultra2 LVD RAID Controller
101e 0466 MegaRAID 466 Express Plus RAID Controller
101e 0467 MegaRAID 467 Enterprise 1500 RAID Controller
101e 0490
MegaRAID 490 Express 300 RAID Controller
101e 0762 MegaRAID 762 Express RAID Controller
101e 09a0 PowerEdge Expandable RAID Controller 2/SC
1028 0467 PowerEdge Expandable RAID Controller 2/DC
1028 1111 PowerEdge Expandable RAID Controller 2/SC
103c 03a2 MegaRAID
103c 10c6 MegaRAID 438, NetRAID-3Si
103c 10c7 MegaRAID T5, Integrated NetRAID

103c 10cc MegaRAID, Integrated NetRAID
103c 10cd NetRAID-1Si
105a 0000 SuperTrak
105a 2168 SuperTrak Pro
105a 5168 SuperTrak66/100
1111 1111 MegaRAID 466, PowerEdge Expandable RAID Controller 2/SC
1111 1112 PowerEdge Expandable RAID Controller 2/SC
113c 03a2 MegaRAID
e4bf 1010 CG1-RADIO
e4bf 1020 CU2-QUARTET
e4bf 1040 CU1-CHORUS
e4bf 3100 CX1-BAND
1962 80960RM (i960RM) Microprocessor
105a 0000 SuperTrak SX6000 I2O CPU
1964 80960RN (i960RN) Microprocessor
1980 Atom Processor C3000 Series System Agent
19a1 Atom Processor C3000 Series Error Registers
19a2 Atom Processor C3000 Series Root
Complex Event Collector
19a3 Atom Processor C3000 Series Integrated QAT Root Port
19a4 Atom Processor C3000 Series PCI Express Root Port #0
19a5 Atom Processor C3000 Series PCI Express Root Port #1
19a6 Atom Processor C3000 Series PCI Express Root Port #2
19a7 Atom Processor C3000 Series PCI Express Root Port #3
19a8 Atom Processor C3000 Series PCI Express Root Port #4
19a9 Atom Processor C3000 Series PCI Express Root Port #5
19aa Atom Processor C3000 Series PCI Express Root Port #6
19ab Atom Processor C3000 Series PCI Express Root Port #7
19ac Atom Processor C3000 Series SMBus Controller - Host
19b0 Atom Processor C3000 Series SATA Controller 0
19b1 Atom Processor C3000 Series SATA Controller 0
19b2 Atom Processor C3000 Series SATA Controller 0
19b3 Atom Processor C3000 Series SATA Controller 0
19b4 Atom Processor C3000 Series SATA Controller 0
19b5 Atom Processor C3000 Series SATA Controller 0
19b6 Atom Processor C3000 Series SATA Controller 0
19b7
Atom Processor C3000 Series SATA Controller 0
19be Atom Processor C3000 Series SATA Controller 0
19bf Atom Processor C3000 Series SATA Controller 0
19c0 Atom Processor C3000 Series SATA Controller 1
19c1 Atom Processor C3000 Series SATA Controller 1
19c2 Atom Processor C3000 Series SATA Controller 1
19c3 Atom Processor C3000 Series SATA Controller 1
19c4 Atom Processor C3000 Series SATA Controller 1
19c5 Atom Processor C3000 Series SATA Controller 1
19c6 Atom Processor C3000 Series SATA Controller 1
19c7 Atom Processor C3000 Series SATA Controller 1

19ce Atom Processor C3000 Series SATA Controller 1
19cf Atom Processor C3000 Series SATA Controller 1
19d0 Atom Processor C3000 Series USB 3.0 xHCI Controller
19d1 Atom Processor C3000 Series Integrated LAN Root Port #0
19d2 Atom Processor C3000 Series Integrated LAN Root Port #1
19d3 Atom Processor C3000 Series ME HECI 1
19d4 Atom Processor C3000 Series ME HECI 2
19d5 Atom Processor C3000 Series ME KT
Controller
19d6 Atom Processor C3000 Series ME HECI 3
19d8 Atom Processor C3000 Series HSUART Controller
19dc Atom Processor C3000 Series LPC or eSPI
19dd Atom Processor C3000 Series Primary to Side Band (P2SB) Bridge
19de Atom Processor C3000 Series Power Management Controller
19df Atom Processor C3000 Series SMBus controller
19e0 Atom Processor C3000 Series SPI Controller
19e2 Atom Processor C3000 Series QuickAssist Technology
1a1c Ethernet Connection (17) I219-LM
1a1d Ethernet Connection (17) I219-V
1a1e Ethernet Connection (16) I219-LM
1a1f Ethernet Connection (16) I219-V
1a21 82840 840 [Carmel] Chipset Host Bridge (Hub A)
1a23 82840 840 [Carmel] Chipset AGP Bridge
1a24 82840 840 [Carmel] Chipset PCI Bridge (Hub B)
1a30 82845 845 [Brookdale] Chipset Host Bridge
1028 010e Optiplex GX240
147b 0505 BL7 motherboard
15d9 3280 Supermicro P4SBE Mainboard
1a31 82845 845 [Brookdale] Chipset AGP Bridge
1a38 5000 Series Chipset DMA Engine
15d9
8680 X7DVL-E-O motherboard
8086 3476 S5000PSLSATA Server Board
1a48 82597EX 10GbE Ethernet Controller
8086 a01f PRO/10GbE SR Server Adapter
8086 a11f PRO/10GbE SR Server Adapter
1b48 82597EX 10GbE Ethernet Controller
8086 a01f PRO/10GbE LR Server Adapter
8086 a11f PRO/10GbE LR Server Adapter
1c00 6 Series/C200 Series Chipset Family Desktop SATA Controller (IDE mode, ports 0-3)
1c01 6 Series/C200 Series Chipset Family Mobile SATA Controller (IDE mode, ports 0-3)
1c02 6 Series/C200 Series Chipset Family 6 port Desktop SATA AHCI Controller
1028 04aa XPS 8300
1043 844d P8 series motherboard
8086 7270 Server Board S1200BT Family
1c03 6 Series/C200 Series Chipset Family 6 port Mobile SATA AHCI Controller
1028 04a3 Precision M4600
1028 04b2 Vostro 3350

1028 04da Vostro 3750
17aa 21cf ThinkPad T520
8086 7270 Apple MacBookPro8,2 [Core i7, 15", 2011]
1c04 6 Series/C200 Series Desktop SATA RAID Controller
103c 3118 Smart Array B110i SATA RAID
Controller
1c05 6 Series/C200 Series Mobile SATA RAID Controller
1c06 Z68 Express Chipset SATA RAID Controller
1c08 6 Series/C200 Series Chipset Family Desktop SATA Controller (IDE mode, ports 4-5)
1c09 6 Series/C200 Series Chipset Family Mobile SATA Controller (IDE mode, ports 4-5)
1c10 6 Series/C200 Series Chipset Family PCI Express Root Port 1
1028 04aa XPS 8300
1028 04da Vostro 3750
1043 844d P8 series motherboard
17aa 21cf ThinkPad T520
8086 7270 Server Board S1200BTS / Apple MacBook Pro 8,1/8,2
1c12 6 Series/C200 Series Chipset Family PCI Express Root Port 2
1028 04aa XPS 8300
17aa 21cf ThinkPad T520
8086 7270 Apple MacBookPro8,2 [Core i7, 15", 2011]
1c14 6 Series/C200 Series Chipset Family PCI Express Root Port 3
1028 04da Vostro 3750
8086 7270 Apple MacBookPro8,2 [Core i7, 15", 2011]
1c16 6 Series/C200 Series Chipset Family PCI Express Root Port 4
1028 04aa XPS 8300
17aa 21cf ThinkPad T520
1c18 6 Series/C200 Series Chipset
Family PCI Express Root Port 5
1028 04da Vostro 3750
17aa 21cf ThinkPad T520
8086 7270 Server Board S1200BTS
1c1a 6 Series/C200 Series Chipset Family PCI Express Root Port 6
1028 04da Vostro 3750
1043 844d P8 series motherboard
1c1c 6 Series/C200 Series Chipset Family PCI Express Root Port 7
1c1e 6 Series/C200 Series Chipset Family PCI Express Root Port 8
1043 844d P8 series motherboard
1c20 6 Series/C200 Series Chipset Family High Definition Audio Controller
1028 0490 Alienware M17x R3
1028 04a3 Precision M4600
1028 04aa XPS 8300
1028 04b2 Vostro 3350
1028 04da Vostro 3750
1043 8418 P8P67 Deluxe Motherboard
1043 841b P8H67 Series Motherboard
17aa 21cf ThinkPad T520
Realtek ALC888 audio codec
8086 2008 DQ67SW board

8086 7270 Apple MacBookPro8,2 [Core i7, 15", 2011]
1c22 6 Series/C200 Series Chipset Family SMBus Controller
1028 04a3 Precision M4600
1028 04aa XPS 8300
1028 04b2 Vostro 3350
1028 04da Vostro 3750
1043
844d P8 series motherboard
17aa 21cf ThinkPad T520
8086 7270 Server Board S1200BT Family / Apple MacBook Pro 8,1/8,2
1c24 6 Series/C200 Series Chipset Family Thermal Management Controller
1c25 6 Series/C200 Series Chipset Family DMI to PCI Bridge
1c26 6 Series/C200 Series Chipset Family USB Enhanced Host Controller #1
1028 04a3 Precision M4600
1028 04aa XPS 8300
1028 04b2 Vostro 3350
1028 04da Vostro 3750
1043 844d P8 series motherboard
17aa 21cf ThinkPad T520
8086 7270 Server Board S1200BT Family / Apple MacBook Pro 8,1/8,2
1c27 6 Series/C200 Series Chipset Family USB Universal Host Controller #1
8086 7270 Apple MacBookPro8,2 [Core i7, 15", 2011]
1c2c 6 Series/C200 Series Chipset Family USB Universal Host Controller #5
8086 7270 Apple MacBookPro8,2 [Core i7, 15", 2011]
1c2d 6 Series/C200 Series Chipset Family USB Enhanced Host Controller #2
1028 04a3 Precision M4600
1028 04aa XPS 8300
1028 04b2 Vostro 3350
1028 04da Vostro
3750
1043 844d P8 series motherboard
17aa 21cf ThinkPad T520
8086 7270 Server Board S1200BT Family / Apple MacBook Pro 8,1/8,2
1c33 6 Series/C200 Series Chipset Family LAN Controller
1c35 6 Series/C200 Series Chipset Family VECI Controller
1c3a 6 Series/C200 Series Chipset Family MEI Controller #1
1028 04a3 Precision M4600
1028 04aa XPS 8300
1028 04b2 Vostro 3350
1028 04da Vostro 3750
1043 844d P8 series motherboard
17aa 21cf ThinkPad T520
8086 7270 Apple MacBookPro8,2 [Core i7, 15", 2011]
1c3b 6 Series/C200 Series Chipset Family MEI Controller #2
1c3c 6 Series/C200 Series Chipset Family IDE-r Controller
1c3d 6 Series/C200 Series Chipset Family KT Controller
1c40 6 Series/C200 Series Chipset Family LPC Controller
1c41 Mobile SFF 6 Series Chipset Family LPC Controller

1c42 6 Series/C200 Series Chipset Family LPC Controller
1c43 Mobile 6 Series Chipset Family LPC Controller
1c44 Z68 Express Chipset LPC Controller
1c45 6 Series/C200 Series
Chipset Family LPC Controller
1c46 P67 Express Chipset LPC Controller
1043 844d P8P67 Deluxe Motherboard
1c47 UM67 Express Chipset LPC Controller
1c48 6 Series/C200 Series Chipset Family LPC Controller
1c49 HM65 Express Chipset LPC Controller
8086 7270 Apple MacBookPro8,2 [Core i7, 15", 2011]
1c4a H67 Express Chipset LPC Controller
1028 04aa XPS 8300
1043 844d P8H67 Series Motherboard
1c4b HM67 Express Chipset LPC Controller
1028 04b2 Vostro 3350
1028 04da Vostro 3750
1c4c Q65 Express Chipset LPC Controller
1c4d QS67 Express Chipset LPC Controller
1c4e Q67 Express Chipset LPC Controller
1c4f QM67 Express Chipset LPC Controller
1028 04a3 Precision M4600
17aa 21cf ThinkPad T520
1c50 B65 Express Chipset LPC Controller
1c51 6 Series/C200 Series Chipset Family LPC Controller
1c52 C202 Chipset LPC Controller
8086 7270 Server Board S1200BTS
1c53 6 Series/C200 Series Chipset Family LPC Controller
1c54 C204 Chipset LPC Controller
1c55
6 Series/C200 Series Chipset Family LPC Controller
1c56 C206 Chipset LPC Controller
1043 844d P8B WS Motherboard
1c57 6 Series/C200 Series Chipset Family LPC Controller
1c58 Upgraded B65 Express Chipset LPC Controller
1c59 Upgraded HM67 Express Chipset LPC Controller
1c5a Upgraded Q67 Express Chipset LPC Controller
1c5b 6 Series/C200 Series Chipset Family LPC Controller
1c5c H61 Express Chipset LPC Controller
1c5d 6 Series/C200 Series Chipset Family LPC Controller
1c5e 6 Series/C200 Series Chipset Family LPC Controller
1c5f 6 Series/C200 Series Chipset Family LPC Controller
1d00 C600/X79 series chipset 4-Port SATA IDE Controller
1d02 C600/X79 series chipset 6-Port SATA AHCI Controller
1028 04f7 C602J on PowerEdge R320 server
1d04 C600/X79 series chipset SATA RAID Controller
1d06 C600/X79 series chipset SATA Premium RAID Controller
1d08 C600/X79 series chipset 2-Port SATA IDE Controller

1d10 C600/X79 series chipset PCI Express Root Port 1
1028
04f7 C602J on PowerEdge R320 server

1d11 C600/X79 series chipset PCI Express Root Port 1

1d12 C600/X79 series chipset PCI Express Root Port 2

1d13 C600/X79 series chipset PCI Express Root Port 2

1d14 C600/X79 series chipset PCI Express Root Port 3

1d15 C600/X79 series chipset PCI Express Root Port 3

1d16 C600/X79 series chipset PCI Express Root Port 4

1d17 C600/X79 series chipset PCI Express Root Port 4

1d18 C600/X79 series chipset PCI Express Root Port 5
1028 04f7 C602J on PowerEdge R320 server

1d19 C600/X79 series chipset PCI Express Root Port 5

1d1a C600/X79 series chipset PCI Express Root Port 6

1d1b C600/X79 series chipset PCI Express Root Port 6

1d1c C600/X79 series chipset PCI Express Root Port 7

1d1d C600/X79 series chipset PCI Express Root Port 7

1d1e C600/X79 series chipset PCI Express Root Port 8
1028 04f7 C602J on PowerEdge R320 server

1d1f C600/X79 series chipset PCI Express Root Port 8

1d20 C600/X79 series chipset High Definition Audio
Controller

1d22 C600/X79 series chipset SMBus Host Controller
15d9 066b X9SRL-F

1d24 C600/X79 series chipset Thermal Management Controller
15d9 066b X9SRL-F

1d25 C600/X79 series chipset DMI to PCI Bridge

1d26 C600/X79 series chipset USB2 Enhanced Host Controller #1
1028 04f7 C602J on PowerEdge R320 server
15d9 066b X9SRL-F

1d2d C600/X79 series chipset USB2 Enhanced Host Controller #2
1028 04f7 C602J on PowerEdge R320 server
15d9 066b X9SRL-F

1d33 C600/X79 series chipset LAN Controller

1d35 C600/X79 series chipset VECI Controller

1d3a C600/X79 series chipset MEI Controller #1
1028 04f7 C602J on PowerEdge R320 server
15d9 066b X9SRL-F

1d3b C600/X79 series chipset MEI Controller #2
1028 04f7 C602J on PowerEdge R320 server
15d9 066b X9SRL-F

1d3c C600/X79 series chipset IDE-r Controller

1d3d C600/X79 series chipset KT Controller

1d3e C600/X79 series chipset PCI Express Virtual Root Port
1028 04f7 C602J on PowerEdge R320 server
1d3f
C608/C606/X79 series chipset PCI Express Virtual Switch Port

1d40 C600/X79 series chipset LPC Controller

1d41 C600/X79 series chipset LPC Controller
1028 04f7 C602J on PowerEdge R320 server
15d9 066b X9SRL-F
1d50 C608 chipset Dual 4-Port SATA/SAS Storage Control Unit
1d54 C600/X79 series chipset Dual 4-Port SATA/SAS Storage Control Unit
1d55 C600/X79 series chipset 4-Port SATA/SAS Storage Control Unit
1d58 C606 chipset Dual 4-Port SATA/SAS Storage Control Unit
1d59 C604/X79 series chipset 4-Port SATA/SAS Storage Control Unit
1d5a C600/X79 series chipset Dual 4-Port SATA Storage Control Unit
1d5b C602 chipset 4-Port SATA Storage Control Unit
1d5c C600/X79 series chipset Dual 4-Port SATA/SAS Storage Control Unit
1d5d C600/X79 series chipset 4-Port SATA/SAS Storage Control Unit
1d5e C600/X79 series chipset Dual 4-Port SATA Storage Control Unit
1d5f C600/X79 series chipset 4-Port SATA Storage Control Unit
1d60 C608 chipset Dual 4-Port SATA/SAS Storage
Control Unit
1d64 C600/X79 series chipset Dual 4-Port SATA/SAS Storage Control Unit
1d65 C600/X79 series chipset 4-Port SATA/SAS Storage Control Unit
1d68 C606 chipset Dual 4-Port SATA/SAS Storage Control Unit
1d69 C604/X79 series chipset 4-Port SATA/SAS Storage Control Unit
1d6a C600/X79 series chipset Dual 4-Port SATA Storage Control Unit
1d6b C602 chipset 4-Port SATA Storage Control Unit
0497 1028 Dell Precision T3600
1d6c C600/X79 series chipset Dual 4-Port SATA/SAS Storage Control Unit
1d6d C600/X79 series chipset 4-Port SATA/SAS Storage Control Unit
1d6e C600/X79 series chipset Dual 4-Port SATA Storage Control Unit
1d6f C600/X79 series chipset 4-Port SATA Storage Control Unit
1d70 C600/X79 series chipset SMBus Controller 0
1d71 C608/C606/X79 series chipset SMBus Controller 1
1d72 C608 chipset SMBus Controller 2
1d74 C608/C606/X79 series chipset PCI Express Upstream Port
1d76 C600/X79 series chipset Multi-Function Glue
1e00 7 Series/C210 Series Chipset
Family 4-port SATA Controller [IDE mode]
1e01 7 Series Chipset Family 4-port SATA Controller [IDE mode]
144d c652 NP300E5C series laptop
1e02 7 Series/C210 Series Chipset Family 6-port SATA Controller [AHCI mode]
1043 84ca P8 series motherboard
1849 1e02 Motherboard
1e03 7 Series Chipset Family 6-port SATA Controller [AHCI mode]
1043 108d VivoBook X202EV
1043 1477 N56VZ
1043 1517 Zenbook Prime UX31A
10cf 16e2 LIFEBOOK E752
144d c652 NP300E5C series laptop
1e04 7 Series/C210 Series Chipset Family SATA Controller [RAID mode]
1e05 7 Series Chipset SATA Controller [RAID mode]
1e06 7 Series/C210 Series Chipset Family SATA Controller [RAID mode]

1e07 7 Series Chipset Family SATA Controller [RAID mode]
1e08 7 Series/C210 Series Chipset Family 2-port SATA Controller [IDE mode]
1e09 7 Series Chipset Family 2-port SATA Controller [IDE mode]
144d c652 NP300E5C series laptop
1e0e 7 Series/C210 Series Chipset Family SATA Controller [RAID mode]
1e10
7 Series/C216 Chipset Family PCI Express Root Port 1
1043 108d VivoBook X202EV
1043 1477 N56VZ
1043 1517 Zenbook Prime UX31A
1043 84ca P8H77-I Motherboard
10cf 16e9 LIFEBOOK E752
144d c652 NP300E5C series laptop
1849 1e10 Motherboard
1e12 7 Series/C210 Series Chipset Family PCI Express Root Port 2
1043 108d VivoBook X202EV
1043 1477 N56VZ
1043 1517 Zenbook Prime UX31A
1e14 7 Series/C210 Series Chipset Family PCI Express Root Port 3
10cf 16e9 LIFEBOOK E752
1e16 7 Series/C216 Chipset Family PCI Express Root Port 4
1043 108d VivoBook X202EV
1043 1477 N56VZ
144d c652 NP300E5C series laptop
1849 1618 Z77 Extreme4 motherboard
1e18 7 Series/C210 Series Chipset Family PCI Express Root Port 5
1043 84ca P8H77-I Motherboard
1849 1e18 Motherboard
1e1a 7 Series/C210 Series Chipset Family PCI Express Root Port 6
1849 1e1a Motherboard
1e1c 7 Series/C210 Series Chipset Family PCI Express Root Port 7
1e1e 7 Series/C210 Series Chipset
Family PCI Express Root Port 8
10cf 16e9 LIFEBOOK E752
1849 1e1e Motherboard
1e20 7 Series/C216 Chipset Family High Definition Audio Controller
1028 054b XPS One 2710
1043 108d VivoBook X202EV
1043 1477 N56VZ
1043 1517 Zenbook Prime UX31A
1043 8415 P8H77-I Motherboard
1043 8445 P8Z77-V LX Motherboard
10cf 1757 LIFEBOOK E752
144d c652 NP300E5C series laptop
1849 1898 Z77 Extreme4 motherboard
1e22 7 Series/C216 Chipset Family SMBus Controller
1043 108d VivoBook X202EV
1043 1477 N56VZ

1043 1517 Zenbook Prime UX31A
1043 84ca P8 series motherboard
10cf 16e6 LIFEBOOK E752
144d c652 NP300E5C series laptop
1849 1e22 Motherboard
1e24 7 Series/C210 Series Chipset Family Thermal Management Controller
1043 1517 Zenbook Prime UX31A
1e25 7 Series/C210 Series Chipset Family DMI to PCI Bridge
1e26 7 Series/C216 Chipset Family USB Enhanced Host Controller #1
1043 108d VivoBook X202EV
1043 1477 N56VZ
1043 1517 Zenbook Prime
UX31A
1043 84ca P8 series motherboard
10cf 16e8 LIFEBOOK E752
144d c652 NP300E5C series laptop
1849 1e26 Motherboard
1e2d 7 Series/C216 Chipset Family USB Enhanced Host Controller #2
1043 108d VivoBook X202EV
1043 1477 N56VZ
1043 1517 Zenbook Prime UX31A
1043 84ca P8 series motherboard
10cf 16e8 LIFEBOOK E752
144d c652 NP300E5C series laptop
1849 1e2d Motherboard
1e31 7 Series/C210 Series Chipset Family USB xHCI Host Controller
103c 179b Elitebook 8470p
103c 17ab ProBook 6570b
1043 108d VivoBook X202EV
1043 1477 N56VZ
1043 1517 Zenbook Prime UX31A
1043 84ca P8 series motherboard
10cf 16ee LIFEBOOK E752
17aa 21f3 ThinkPad T430
1849 1e31 Motherboard
1e33 7 Series/C210 Series Chipset Family LAN Controller
1e3a 7 Series/C216 Chipset Family MEI Controller #1
1043 108d VivoBook X202EV
1043 1477 N56VZ
1043 1517 Zenbook Prime UX31A
1043 84ca P8 series motherboard
10cf 16ea LIFEBOOK E752
144d c652 NP300E5C series
laptop
1849 1e3a Motherboard
1e3b 7 Series/C210 Series Chipset Family MEI Controller #2
1e3c 7 Series/C210 Series Chipset Family IDE-r Controller
1e3d 7 Series/C210 Series Chipset Family KT Controller

1e41 7 Series Chipset Family LPC Controller
1e42 7 Series Chipset Family LPC Controller
1e43 7 Series Chipset Family LPC Controller
1e44 Z77 Express Chipset LPC Controller
1043 84ca P8 series motherboard
1849 1e44 Motherboard
1e45 7 Series Chipset Family LPC Controller
1e46 Z75 Express Chipset LPC Controller
1e47 Q77 Express Chipset LPC Controller
1e48 Q75 Express Chipset LPC Controller
1e49 B75 Express Chipset LPC Controller
1e4a H77 Express Chipset LPC Controller
1043 84ca P8H77-I Motherboard
1e4b 7 Series Chipset Family LPC Controller
1e4c 7 Series Chipset Family LPC Controller
1e4d 7 Series Chipset Family LPC Controller
1e4e 7 Series Chipset Family LPC Controller
1e4f 7 Series Chipset Family LPC Controller
1e50 7 Series Chipset Family
LPC Controller
1e51 7 Series Chipset Family LPC Controller
1e52 7 Series Chipset Family LPC Controller
1e53 C216 Series Chipset LPC Controller
1e54 7 Series Chipset Family LPC Controller
1e55 QM77 Express Chipset LPC Controller
1e56 QS77 Express Chipset LPC Controller
1e57 HM77 Express Chipset LPC Controller
1e58 UM77 Express Chipset LPC Controller
1e59 HM76 Express Chipset LPC Controller
1043 1477 N56VZ
1043 1517 Zenbook Prime UX31A
10cf 16e0 LIFEBOOK E752
1e5a 7 Series Chipset Family LPC Controller
1e5b UM77 Express Chipset LPC Controller
1e5c 7 Series Chipset Family LPC Controller
1e5d HM75 Express Chipset LPC Controller
144d c652 NP300E5C series laptop
1e5e HM70 Express Chipset LPC Controller
1043 108d VivoBook X202EV
1e5f NM70 Express Chipset LPC Controller
1f00 Atom processor C2000 SoC Transaction Router
1f01 Atom processor C2000 SoC Transaction Router
1f02 Atom processor C2000 SoC Transaction Router
1f03 Atom processor C2000
SoC Transaction Router
1f04 Atom processor C2000 SoC Transaction Router
1f05 Atom processor C2000 SoC Transaction Router
1f06 Atom processor C2000 SoC Transaction Router

1f07 Atom processor C2000 SoC Transaction Router
1f08 Atom processor C2000 SoC Transaction Router
1f09 Atom processor C2000 SoC Transaction Router
1f0a Atom processor C2000 SoC Transaction Router
1f0b Atom processor C2000 SoC Transaction Router
1f0c Atom processor C2000 SoC Transaction Router
1f0d Atom processor C2000 SoC Transaction Router
1f0e Atom processor C2000 SoC Transaction Router
1f0f Atom processor C2000 SoC Transaction Router
1f10 Atom processor C2000 PCIe Root Port 1
1f11 Atom processor C2000 PCIe Root Port 2
1f12 Atom processor C2000 PCIe Root Port 3
1f13 Atom processor C2000 PCIe Root Port 4
1f14 Atom processor C2000 RAS
1f15 Atom processor C2000 SMBus 2.0
1f16 Atom processor C2000 RCEC
1f18 Atom processor C2000 QAT
1f19 Atom processor C2000 QAT
1f20 Atom processor
C2000 4-Port IDE SATA2 Controller
1f21 Atom processor C2000 4-Port IDE SATA2 Controller
1f22 Atom processor C2000 AHCI SATA2 Controller
1f23 Atom processor C2000 AHCI SATA2 Controller
1f24 Atom processor C2000 RAID SATA2 Controller
1f25 Atom processor C2000 RAID SATA2 Controller
1f26 Atom processor C2000 RAID SATA2 Controller
1f27 Atom processor C2000 RAID SATA2 Controller
1f2c Atom processor C2000 USB Enhanced Host Controller
1f2e Atom processor C2000 RAID SATA2 Controller
1f2f Atom processor C2000 RAID SATA2 Controller
1f30 Atom processor C2000 2-Port IDE SATA3 Controller
1f31 Atom processor C2000 2-Port IDE SATA3 Controller
1f32 Atom processor C2000 AHCI SATA3 Controller
1f33 Atom processor C2000 AHCI SATA3 Controller
1f34 Atom processor C2000 RAID SATA3 Controller
1f35 Atom processor C2000 RAID SATA3 Controller
1f36 Atom processor C2000 RAID SATA3 Controller
1f37 Atom processor C2000 RAID SATA3 Controller
1f38 Atom processor C2000 PCU
1f39
Atom processor C2000 PCU
1f3a Atom processor C2000 PCU
1f3b Atom processor C2000 PCU
1f3c Atom processor C2000 PCU SMBus
1f3d Atom Processor C2000 PECI SMBus
1f3e Atom processor C2000 RAID SATA3 Controller
1f3f Atom processor C2000 RAID SATA3 Controller
1f40 Ethernet Connection I354 1.0 GbE Backplane

1028 05f1 Ethernet Connection I354 1.0 GbE Backplane
1f41 Ethernet Connection I354
1f42 Atom processor C2000 GbE
1f44 Atom processor C2000 GbE Virtual Function
1f45 Ethernet Connection I354 2.5 GbE Backplane
2014 Sky Lake-E Ubox Registers
2015 Sky Lake-E Ubox Registers
2016 Sky Lake-E Ubox Registers
2018 Sky Lake-E M2PCI Registers
201a Sky Lake-E Non-Transparent Bridge Registers
201c Sky Lake-E Non-Transparent Bridge Registers
201d Volume Management Device NVMe RAID Controller
2020 Sky Lake-E DMI3 Registers
 15d9 095d X11SPM-TF
2021 Sky Lake-E CBDMA Registers
2024 Sky Lake-E MM/Vt-d Configuration Registers
2025 Sky Lake-E RAS
2026 Sky
Lake-E IOAPIC
2030 Sky Lake-E PCI Express Root Port A
2031 Sky Lake-E PCI Express Root Port B
2032 Sky Lake-E PCI Express Root Port C
2033 Sky Lake-E PCI Express Root Port D
2034 Sky Lake-E VT-d
2035 Sky Lake-E RAS Configuration Registers
2036 Sky Lake-E IOxAPIC Configuration Registers
2040 Sky Lake-E Integrated Memory Controller
2041 Sky Lake-E Integrated Memory Controller
2042 Sky Lake-E Integrated Memory Controller
2043 Sky Lake-E Integrated Memory Controller
2044 Sky Lake-E Integrated Memory Controller
2045 Sky Lake-E LM Channel 1
2046 Sky Lake-E LMS Channel 1
2047 Sky Lake-E LMDP Channel 1
2048 Sky Lake-E DECS Channel 2
2049 Sky Lake-E LM Channel 2
204a Sky Lake-E LMS Channel 2
204b Sky Lake-E LMDP Channel 2
204c Sky Lake-E M3KTI Registers
204d Sky Lake-E M3KTI Registers
204e Sky Lake-E M3KTI Registers
2054 Sky Lake-E CHA Registers
2055 Sky Lake-E CHA Registers
2056 Sky Lake-E CHA Registers
2057 Sky Lake-E CHA Registers
2058
Sky Lake-E KTI 0
2059 Sky Lake-E UPI Registers

2066 Sky Lake-E Integrated Memory Controller
2068 Sky Lake-E DDRIO Registers
2069 Sky Lake-E DDRIO Registers
206a Sky Lake-E IOxAPIC Configuration Registers
206e Sky Lake-E DDRIO Registers
206f Sky Lake-E DDRIO Registers
2078 Sky Lake-E PCU Registers
207a Sky Lake-E PCU Registers
2080 Sky Lake-E PCU Registers
2081 Sky Lake-E PCU Registers
2082 Sky Lake-E PCU Registers
2083 Sky Lake-E PCU Registers
2084 Sky Lake-E PCU Registers
2085 Sky Lake-E PCU Registers
2086 Sky Lake-E PCU Registers
2088 Sky Lake-E DDRIO Registers
208d Sky Lake-E CHA Registers
208e Sky Lake-E CHA Registers
2241 Larrabee
2250 Xeon Phi coprocessor 5100 series
225c Xeon Phi coprocessor SE10/7120 series
225d Xeon Phi coprocessor 3120 series
225e Xeon Phi coprocessor 31S1
2262 Xeon Phi coprocessor 7220
2280 Atom/Celeron/Pentium Processor x5-E8000/J3xxx/N3xxx Series SoC Transaction Register
2284 Atom/Celeron/Pentium Processor
x5-E8000/J3xxx/N3xxx Series High Definition Audio Controller
2286 Atom/Celeron/Pentium Processor x5-E8000/J3xxx/N3xxx Series LPIO1 DMA Controller
228a Atom/Celeron/Pentium Processor x5-E8000/J3xxx/N3xxx Series LPIO1 HSUART Controller #1
228c Atom/Celeron/Pentium Processor x5-E8000/J3xxx/N3xxx Series LPIO1 HSUART Controller #2
2292 Atom/Celeron/Pentium Processor x5-E8000/J3xxx/N3xxx SMBus Controller
2294 Atom/Celeron/Pentium Processor x5-E8000/J3xxx/N3xxx Series MMC Controller
2295 Atom/Celeron/Pentium Processor x5-E8000/J3xxx/N3xxx Series SDIO Controller
2296 Atom/Celeron/Pentium Processor x5-E8000/J3xxx/N3xxx Series SD Controller
2298 Atom/Celeron/Pentium Processor x5-E8000/J3xxx/N3xxx Series Trusted Execution Engine
229c Atom/Celeron/Pentium Processor x5-E8000/J3xxx/N3xxx Series PCU
22a3 Atom/Celeron/Pentium Processor x5-E8000/J3xxx/N3xxx Series SATA Controller
22a4 Atom/Celeron/Pentium Processor x5-E8000/J3xxx/N3xxx Series SATA AHCI Controller
22a8 Atom/Celeron/Pentium
Processor x5-E8000/J3xxx/N3xxx Series Low Power Engine Audio
22b0 Atom/Celeron/Pentium Processor x5-E8000/J3xxx/N3xxx Integrated Graphics Controller
22b1 Atom/Celeron/Pentium Processor x5-E8000/J3xxx/N3xxx Integrated Graphics Controller
22b5 Atom/Celeron/Pentium Processor x5-E8000/J3xxx/N3xxx Series USB xHCI Controller
22b8 Atom/Celeron/Pentium Processor x5-E8000/J3xxx/N3xxx Series Imaging Unit
22c0 Atom/Celeron/Pentium Processor x5-E8000/J3xxx/N3xxx Series LPIO2 DMA Controller
22c1 Atom/Celeron/Pentium Processor x5-E8000/J3xxx/N3xxx Series LPIO2 I2C Controller #1
22c2 Atom/Celeron/Pentium Processor x5-E8000/J3xxx/N3xxx Series LPIO2 I2C Controller #2
22c3 Atom/Celeron/Pentium Processor x5-E8000/J3xxx/N3xxx Series LPIO2 I2C Controller #3

22c4 Atom/Celeron/Pentium Processor x5-E8000/J3xxx/N3xxx Series LPIO2 I2C Controller #4
 22c5 Atom/Celeron/Pentium Processor x5-E8000/J3xxx/N3xxx Series LPIO2 I2C Controller #5
 22c6 Atom/Celeron/Pentium Processor x5-E8000/J3xxx/N3xxx
 Series LPIO2 I2C Controller #6
 22c7 Atom/Celeron/Pentium Processor x5-E8000/J3xxx/N3xxx Series LPIO2 I2C Controller #7
 22c8 Atom/Celeron/Pentium Processor x5-E8000/J3xxx/N3xxx Series PCI Express Port #1
 22ca Atom/Celeron/Pentium Processor x5-E8000/J3xxx/N3xxx Series PCI Express Port #2
 22cc Atom/Celeron/Pentium Processor x5-E8000/J3xxx/N3xxx Series PCI Express Port #3
 22ce Atom/Celeron/Pentium Processor x5-E8000/J3xxx/N3xxx Series PCI Express Port #4
 22dc Atom/Celeron/Pentium Processor x5-E8000/J3xxx/N3xxx Series Power Management Controller
 2310 DH89xxCC LPC Controller
 2323 DH89xxCC 4 Port SATA AHCI Controller
 2330 DH89xxCC SMBus Controller
 2331 DH89xxCC Chap Counter
 2332 DH89xxCC Thermal Subsystem
 2334 DH89xxCC USB2 Enhanced Host Controller #1
 2335 DH89xxCC USB2 Enhanced Host Controller #1
 2342 DH89xxCC PCI Express Root Port #1
 2343 DH89xxCC PCI Express Root Port #1
 2344 DH89xxCC PCI Express Root Port #2
 2345 DH89xxCC PCI Express Root
 Port #2
 2346 DH89xxCC PCI Express Root Port #3
 2347 DH89xxCC PCI Express Root Port #3
 2348 DH89xxCC PCI Express Root Port #4
 2349 DH89xxCC PCI Express Root Port #4
 2360 DH89xxCC Watchdog Timer
 2364 DH89xxCC MEI 0
 2365 DH89xxCC MEI 1
 2390 DH895XCC Series LPC Controller
 23a1 DH895XCC Series 2-Port SATA Controller [IDE Mode]
 23a3 DH895XCC Series 4-Port SATA Controller [AHCI Mode]
 23a6 DH895XCC Series 2-Port SATA Controller [IDE Mode]
 23b0 DH895XCC Series SMBus Controller
 23b1 DH895XCC Series CHAP Counter
 23b2 DH895XCC Series Thermal Management Controller
 23b4 DH895XCC Series USB2 Enhanced Host Controller #1
 23b5 DH895XCC Series USB2 Enhanced Host Controller #1
 23c2 DH895XCC Series PCI Express Root Port #1
 23c3 DH895XCC Series PCI Express Root Port #1
 23c4 DH895XCC Series PCI Express Root Port #2
 23c5 DH895XCC Series PCI Express Root Port #2
 23c6 CDH895XCC Series PCI Express Root Port #3
 23c7 DH895XCC Series PCI Express Root Port #3
 23c8 DH895XCC
 Series PCI Express Root Port #4
 23c9 DH895XCC Series PCI Express Root Port #4
 23e0 DH895XCC Series Watchdog Timer

23e4 DH895XCC Series MEI Controller #1
23e5 DH895XCC Series MEI Controller #2
2410 82801AA ISA Bridge (LPC)
2411 82801AA IDE Controller
2412 82801AA USB Controller
2413 82801AA SMBus Controller
2415 82801AA AC'97 Audio Controller
1028 0095 Precision Workstation 220 Integrated Digital Audio
1028 00b4 OptiPlex GX110
110a 0051 Activy 2xx
11d4 0040 SoundMAX Integrated Digital Audio
11d4 0048 SoundMAX Integrated Digital Audio
11d4 5340 SoundMAX Integrated Digital Audio
1734 1025 Activy 3xx
1af4 1100 QEMU Virtual Machine
2416 82801AA AC'97 Modem Controller
2418 82801AA PCI Bridge
2420 82801AB ISA Bridge (LPC)
2421 82801AB IDE Controller
2422 82801AB USB Controller
2423 82801AB SMBus Controller
2425 82801AB AC'97 Audio Controller
11d4 0040 SoundMAX Integrated Digital Audio
11d4 0048 SoundMAX Integrated Digital Audio
2426
82801AB AC'97 Modem Controller
2428 82801AB PCI Bridge
2440 82801BA ISA Bridge (LPC)
8086 5744 S845WD1-E
2442 82801BA/BAM UHCI USB 1.1 Controller #1
1014 01c6 Netvista A40/A40p
1025 1016 Travelmate 612 TX
1028 00c7 Dimension 8100
1028 00d8 Precision 530
1028 010e Optiplex GX240
103c 126f e-pc 40
1043 8027 TUSL2-C Mainboard
104d 80df Vaio PCG-FX403
147b 0505 BL7 motherboard
147b 0507 TH7II-RAID
8086 4532 Desktop Board D815EEA2/D815EFV
8086 4557 D815EGEW Mainboard
8086 5744 S845WD1-E mainboard
2443 82801BA/BAM SMBus Controller
1014 01c6 Netvista A40/A40p
1025 1016 Travelmate 612 TX
1028 00c7 Dimension 8100
1028 00d8 Precision 530

1028 010e Optiplex GX240
103c 126f e-pc 40
1043 8027 TUSL2-C Mainboard
104d 80df Vaio PCG-FX403
147b 0505 BL7 motherboard
147b 0507 TH7II-RAID
15d9 3280 Supermicro P4SBE Mainboard
8086 4532 Desktop Board D815EEA2/D815EFV
8086 4557 D815EGEW Mainboard
8086 5744 S845WD1-E
mainboard
2444 82801BA/BAM UHCI USB 1.1 Controller #2
1025 1016 Travelmate 612 TX
1028 00c7 Dimension 8100
1028 00d8 Precision 530
1028 010e Optiplex GX240
103c 126f e-pc 40
1043 8027 TUSL2-C Mainboard
104d 80df Vaio PCG-FX403
147b 0505 BL7 motherboard
147b 0507 TH7II-RAID
8086 4532 Desktop Board D815EEA2/D815EFV
8086 5744 S845WD1-E mainboard
2445 82801BA/BAM AC'97 Audio Controller
0e11 000b Compaq Deskpro EN Audio
0e11 0088 Evo D500
1014 01c6 Netvista A40/A40p
1025 1016 Travelmate 612 TX
1028 00d8 Precision 530
103c 126f e-pc 40
104d 80df Vaio PCG-FX403
1462 3370 STAC9721 AC
147b 0505 BL7 motherboard
147b 0507 TH7II-RAID
8086 4557 D815EGEW Mainboard
8086 4656 Desktop Board D815EFV
2446 82801BA/BAM AC'97 Modem Controller
1025 1016 Travelmate 612 TX
104d 80df Vaio PCG-FX403
2448 82801 Mobile PCI Bridge
1028 040a Latitude E6410
1028 040b Latitude E6510
103c 0934 Compaq nw8240 Mobile Workstation
103c
0944 Compaq nc6220 Notebook PC
103c 099c NX6110/NC6120
103c 309f Compaq nx9420 Notebook
103c 30a3 Compaq nw8440

103c 30c1 Compaq 6910p
1043 1017 X58LE
104d 902d VAIO VGN-NR120E
105b 0d7c D270S/D250S Motherboard
1071 8209 Medion MIM 2240 Notebook PC [MD98100]
144d c00c P30 notebook
144d c06a R730 Laptop
144d c072 Notebook N150P
1458 5000 GA-D525TUD
1734 1055 Amilo M1420
17aa 2013 ThinkPad R60e
17aa 20ae ThinkPad T61/R61
17c0 10d2 Medion Akoya E7214 Notebook PC [MD98410]
17c0 4083 Medion WIM 2210 Notebook PC [MD96850]
8086 544b Desktop Board D425KT
e4bf cc47 CCG-RUMBA
2449 82801BA/BAM/CA/CAM Ethernet Controller
0e11 0012 EtherExpress PRO/100 VM
0e11 0091 EtherExpress PRO/100 VE
1014 01ce EtherExpress PRO/100 VE
1014 01dc EtherExpress PRO/100 VE
1014 01eb EtherExpress PRO/100 VE
1014 01ec EtherExpress PRO/100 VE
1014 0202 EtherExpress PRO/100 VE
1014 0205 EtherExpress PRO/100 VE
1014 0217 EtherExpress
PRO/100 VE
1014 0234 EtherExpress PRO/100 VE
1014 023d EtherExpress PRO/100 VE
1014 0244 EtherExpress PRO/100 VE
1014 0245 EtherExpress PRO/100 VE
1014 0265 PRO/100 VE Desktop Connection
1014 0267 PRO/100 VE Desktop Connection
1014 026a PRO/100 VE Desktop Connection
109f 315d EtherExpress PRO/100 VE
109f 3181 EtherExpress PRO/100 VE
1179 ff01 PRO/100 VE Network Connection
1186 7801 EtherExpress PRO/100 VE
144d 2602 HomePNA 1M CNR
1af4 1100 QEMU Virtual Machine
8086 3010 EtherExpress PRO/100 VE
8086 3011 EtherExpress PRO/100 VM
8086 3012 82562EH based Phonenumber
8086 3013 EtherExpress PRO/100 VE
8086 3014 EtherExpress PRO/100 VM
8086 3015 82562EH based Phonenumber
8086 3016 EtherExpress PRO/100 P Mobile Combo
8086 3017 EtherExpress PRO/100 P Mobile

8086 3018 EtherExpress PRO/100
244a 82801BAM IDE U100 Controller
1025 1016 Travelmate 612TX
104d 80df Vaio PCG-FX403
244b 82801BA IDE U100 Controller
1014 01c6
Netvista A40/A40p
1028 00c7 Dimension 8100
1028 00d8 Precision 530
1028 010e Optiplex GX240
103c 126f e-pc 40
1043 8027 TUSL2-C Mainboard
147b 0505 BL7 motherboard
147b 0507 TH7II-RAID
15d9 3280 Supermicro P4SBE Mainboard
8086 4532 Desktop Board D815EEA2/D815EFV
8086 4557 D815EGEW Mainboard
8086 5744 S845WD1-E mainboard
244c 82801BAM ISA Bridge (LPC)
244e 82801 PCI Bridge
1014 0267 NetVista A30p
1028 020d Inspiron 530
1028 0211 Optiplex 755
1028 02da OptiPlex 980
1028 04f7 PowerEdge R320 server
103c 2a3b Pavilion A1512X
103c 2a6f Asus IPIBL-LB Motherboard
103c 31fe ProLiant DL140 G3
103c 330b ProLiant ML150 G6 Server
same ID possibly also on other ASUS boards
1043 8277 P5K PRO Motherboard
1043 844d P8 series motherboard
1043 8534 ASUS B85-PLUS
1458 5000 Motherboard
1462 7345 MS-7345 Motherboard: Intel 82801I/IR [ICH9/ICH9R]
1462 7418 Wind PC MS-7418
15d9 060d C7SIM-Q Motherboard
15d9 9680 X7DBN
Motherboard
1775 11cc CC11/CL11
8086 7270 Server Board S1200BTS
2450 82801E ISA Bridge (LPC)
2452 82801E USB Controller
2453 82801E SMBus Controller
2459 82801E Ethernet Controller 0
245b 82801E IDE U100 Controller
245d 82801E Ethernet Controller 1
245e 82801E PCI Bridge

2480 82801CA LPC Interface Controller
2482 82801CA/CAM USB Controller #1
0e11 0030 Evo N600c
1014 0220 ThinkPad A/T/X Series
104d 80e7 VAIO PCG-GR214EP/GR214MP/GR215MP/GR314MP/GR315MP
15d9 3480 P4DP6
8086 1958 vpr Matrix 170B4
8086 3424 SE7501HG2 Mainboard
8086 4541 Latitude C640
2483 82801CA/CAM SMBus Controller
1014 0220 ThinkPad A/T/X Series
104d 80e7 VAIO PCG-GR214EP/GR214MP/GR215MP/GR314MP/GR315MP
15d9 3480 P4DP6
8086 1958 vpr Matrix 170B4
2484 82801CA/CAM USB Controller #2
0e11 0030 Evo N600c
1014 0220 ThinkPad A/T/X Series
104d 80e7 VAIO PCG-GR214EP/GR214MP/GR215MP/GR314MP/GR315MP
15d9 3480 P4DP6
8086 1958 vpr Matrix 170B4
2485 82801CA/CAM
AC'97 Audio Controller
1013 5959 Crystal WMD Audio Codec
1014 0222 ThinkPad A30/A30p/T23
1014 0508 ThinkPad T30
1014 051c ThinkPad A/T/X Series
1043 1583 L3C (SPDIF)
1043 1623 L2B (no SPDIF)
1043 1643 L3F
104d 80e7 VAIO PCG-GR214EP/GR214MP/GR215MP/GR314MP/GR315MP
144d c006 vpr Matrix 170B4
2486 82801CA/CAM AC'97 Modem Controller
1014 0223 ThinkPad A/T/X Series
1014 0503 ThinkPad R31
1014 051a ThinkPad A/T/X Series
101f 1025 620 Series
1043 1496 PCtel HSP56 MR
104d 80e7 VAIO PCG-GR214EP/GR214MP/GR215MP/GR314MP/GR315MP
134d 4c21 Dell Inspiron 2100 internal modem
144d 2115 vpr Matrix 170B4 internal modem
14f1 5421 MD56ORD V.92 MDC Modem
2487 82801CA/CAM USB Controller #3
0e11 0030 Evo N600c
1014 0220 ThinkPad A/T/X Series
104d 80e7 VAIO PCG-GR214EP/GR214MP/GR215MP/GR314MP/GR315MP
15d9 3480 P4DP6
8086 1958 vpr Matrix 170B4
248a 82801CAM IDE U100 Controller

0e11 0030 Evo N600c
1014 0220 ThinkPad A/T/X Series
104d
80e7 VAIO PCG-GR214EP/GR214MP/GR215MP/GR314MP/GR315MP
8086 1958 vpr Matrix 170B4
8086 4541 Latitude C640
248b 82801CA Ultra ATA Storage Controller
15d9 3480 P4DP6
248c 82801CAM ISA Bridge (LPC)
24c0 82801DB/DBL (ICH4/ICH4-L) LPC Interface Bridge
1014 0267 NetVista A30p
1462 5800 845PE Max (MS-6580)
24c1 82801DBL (ICH4-L) IDE Controller
24c2 82801DB/DBL/DBM (ICH4/ICH4-L/ICH4-M) USB UHCI Controller #1
1014 0267 NetVista A30p
1014 052d ThinkPad
1025 005a TravelMate 290
1025 0064 Extensa 3000 series laptop: Intel 82801DBM (ICH4-M)
1028 0126 Optiplex GX260
1028 0160 Dimension 2400
1028 0163 Latitude D505
1028 018d Inspiron 700m/710m
1028 0196 Inspiron 5160
103c 088c NC8000 laptop
103c 0890 NC6000 laptop
103c 08b0 tc1100 tablet
1043 8089 P4B533
1071 8160 MIM2000
114a 0582 PC8 onboard USB 1.x
144d c005 X10 Laptop
144d c00c P30/P35 notebook
1462 5800 845PE Max (MS-6580)
1509 2990 Averatec 5110H laptop
1734
1004 D1451 Mainboard (SCENIC N300, i845GV)
1734 1055 Amilo M1420
4c53 1090 Cx9 / Vx9 mainboard
8086 24c2 Latitude X300
8086 4541 Latitude D400/D500
e4bf 0cc9 CC9-SAMBA
e4bf 0cd2 CD2-BEBOP
24c3 82801DB/DBL/DBM (ICH4/ICH4-L/ICH4-M) SMBus Controller
1014 0267 NetVista A30p
1014 052d ThinkPad
1025 005a TravelMate 290
1025 0064 Extensa 3000 series laptop: Intel 82801DBM (ICH4-M)
1028 0126 Optiplex GX260
1028 014f Latitude X300

1028 0160 Dimension 2400
1028 018d Inspiron 700m/710m
103c 088c NC8000 laptop
103c 0890 NC6000 laptop
103c 08b0 tc1100 tablet
1071 8160 MIM2000
114a 0582 PC8 onboard SMBus
144d c005 X10 Laptop
144d c00c P30/P35 notebook
1458 24c2 GA-8PE667 Ultra
1462 5800 845PE Max (MS-6580)
1734 1004 D1451 Mainboard (SCENIC N300, i845GV)
1734 1055 Amilo M1420
4c53 1090 Cx9 / Vx9 mainboard
e4bf 0cc9 CC9-SAMBA
e4bf 0cd2 CD2-BEBOP
24c4 82801DB/DBL/DBM (ICH4/ICH4-L/ICH4-M) USB UHCI Controller
#2
1014 0267 NetVista A30p
1014 052d ThinkPad
1025 005a TravelMate 290
1025 0064 Extensa 3000 series laptop: Intel 82801DBM (ICH4-M)
1028 0126 Optiplex GX260
1028 0160 Dimension 2400
1028 0163 Latitude D505
1028 018d Inspiron 700m/710m
1028 0196 Inspiron 5160
103c 088c NC8000 laptop
103c 0890 NC6000 laptop
103c 08b0 tc1100 tablet
1043 8089 P4B533
1071 8160 MIM2000
144d c00c P30/P35 notebook
1462 5800 845PE Max (MS-6580)
1509 2990 Averatec 5110H
1734 1004 D1451 Mainboard (SCENIC N300, i845GV)
4c53 1090 Cx9 / Vx9 mainboard
8086 24c2 Latitude X300
8086 4541 Latitude D400/D500
e4bf 0cc9 CC9-SAMBA
e4bf 0cd2 CD2-BEBOP
24c5 82801DB/DBL/DBM (ICH4/ICH4-L/ICH4-M) AC'97 Audio Controller
0e11 00b8 Analog Devices Inc. codec [SoundMAX]
1014 0267 NetVista A30p
1014 0537 ThinkPad T4x Series
1014 055f Thinkpad R50e model 1634
1025 005a TravelMate 290
1025 0064 Extensa 3000 series laptop: Intel 82801DBM (ICH4-M)

1028
0139 Latitude D400
1028 014f Latitude X300
1028 0152 Latitude D500
1028 0160 Dimension 2400
1028 0163 Latitude D505
1028 018d Inspiron 700m/710m [SigmaTel STAC9750,51]
1028 0196 Inspiron 5160
103c 088c NC8000 laptop
103c 0890 NC6000 laptop
103c 08b0 tc1100 tablet
1043 1713 M2400N/M6800N laptop
1043 80b0 P4B533
1071 8160 MIM2000
1179 0201 Toshiba Tecra M1
144d c005 X10 Laptop
144d c00c P30/P35 notebook
1458 a002 GA-8PE667 Ultra
1462 5800 845PE Max (MS-6580)
1734 1005 D1451 (SCENIC N300, i845GV) Sigmatel STAC9750T
1734 1055 Amilo M1420
24c6 82801DB/DBL/DBM (ICH4/ICH4-L/ICH4-M) AC'97 Modem Controller
1014 0524 ThinkPad T4x Series
1014 0525 ThinkPad
1014 0559 ThinkPad R50e
1025 003c Aspire 2001WLCi (Compal CL50 motherboard) implementation
1025 005a TravelMate 290
1025 0064 Extensa 3000 series laptop: Intel 82801DBM (ICH4-M)
1028 0196 Inspiron 5160
103c 088c NC8000 laptop
103c 0890 NC6000 laptop
103c
08b0 tc1100 tablet
1043 1716 M2400N laptop
1043 1826 M6800N
1071 8160 MIM2000
134d 4c21 Latitude D500
144d 2115 X10 Laptop
144d c00c P30/P35 notebook
Conexant HSF Softmodem (CXT22)
14f1 5422 D480 MDC V.9x Modem
24c7 82801DB/DBL/DBM (ICH4/ICH4-L/ICH4-M) USB UHCI Controller #3
1014 0267 NetVista A30p
1014 052d ThinkPad
1025 005a TravelMate 290
1025 0064 Extensa 3000 series laptop: Intel 82801DBM (ICH4-M)
1028 0126 Optiplex GX260
1028 0160 Dimension 2400

1028 0163 Latitude D505
1028 018d Inspiron 700m/710m
1028 0196 Inspiron 5160
103c 088c NC8000 laptop
103c 0890 NC6000 laptop
103c 08b0 tc1100 tablet
1043 8089 P4B533
1071 8160 MIM2000
144d c00c P30/P35 notebook
1462 5800 845PE Max (MS-6580)
1509 2990 Averatec 5110H
1734 1004 D1451 Mainboard (SCENIC N300, i845GV)
4c53 1090 Cx9 / Vx9 mainboard
8086 24c2 Latitude X300
8086 4541 Latitude D400/D500
e4bf 0cc9 CC9-SAMBA
e4bf 0cd2 CD2-BEBOP
24ca 82801DBM
(ICH4-M) IDE Controller
1014 052d ThinkPad
1025 005a TravelMate 290
1025 0064 Extensa 3000 series laptop: Intel 82801DBM (ICH4-M)
1028 014f Latitude X300
1028 0163 Latitude D505
1028 018d Inspiron 700m/710m
1028 0196 Inspiron 5160
103c 088c NC8000 laptop
103c 0890 NC6000 laptop
103c 08b0 tc1100 tablet
1071 8160 MIM2000
144d c005 X10 Laptop
144d c00c P30/P35 notebook
1734 1055 Amilo M1420
8086 4541 Latitude D400/D500
24cb 82801DB (ICH4) IDE Controller
1014 0267 NetVista A30p
1028 0126 Optiplex GX260
1028 0160 Dimension 2400
1043 8089 P4B533
114a 0582 PC8 onboard IDE
1458 24c2 GA-8PE667 Ultra
1462 5800 845PE Max (MS-6580)
1734 1004 D1451 Mainboard (SCENIC N300, i845GV)
4c53 1090 Cx9 / Vx9 mainboard
e4bf 0cc9 CC9-SAMBA
e4bf 0cd2 CD2-BEBOP
24cc 82801DBM (ICH4-M) LPC Interface Bridge
144d c00c P30 notebook

1734 1055 Amilo M1420
24cd 82801DB/DBM (ICH4/ICH4-M) USB2 EHCI Controller
1014 0267 NetVista
A30p
1014 052e ThinkPad
1025 005a TravelMate 290
1025 0064 Extensa 3000 series laptop: Intel 82801DBM (ICH4-M)
1028 011d Latitude D600
1028 0126 Optiplex GX260
1028 0139 Latitude D400
1028 0152 Latitude D500
1028 0160 Dimension 2400
1028 0163 Latitude D505
1028 018d Inspiron 700m/710m
1028 0196 Inspiron 5160
103c 088c NC8000 laptop
103c 0890 NC6000 laptop
103c 08b0 tc1100 tablet
1043 8089 P4B533
1071 8160 MIM2000
114a 0582 PC8 onboard USB 2.0
1179 ff00 Satellite 2430
144d c005 X10 Laptop
144d c00c P30/P35 notebook
1462 3981 845PE Max (MS-6580)
1509 1968 Averatec 5110H
1734 1004 D1451 Mainboard (SCENIC N300, i845GV)
1734 1055 Amilo M1420
1af4 1100 QEMU Virtual Machine
4c53 1090 Cx9 / Vx9 mainboard
8086 24c2 Latitude X300
e4bf 0cc9 CC9-SAMBA
e4bf 0cd2 CD2-BEBOP
24d0 82801EB/ER (ICH5/ICH5R) LPC Interface Bridge
24d1 82801EB (ICH5) SATA Controller
1028 0168 Precision Workstation 670 Mainboard
1028
0169 Precision 470
1028 019a PowerEdge SC1425
103c 12bc d530 CMT (DG746A)
103c 3208 ProLiant DL140 G2
1043 80a6 P4P800 series motherboard
1458 24d1 GA-8IPE1000 Pro2 motherboard (865PE)
1462 7280 865PE Neo2 (MS-6728)
1462 7650 Hetis 865GV-E (MS-7065)
1565 5200 P4TSV Motherboard (865G)
15d9 4580 P4SCE Mainboard
8086 3427 S875WP1-E mainboard

8086 4246 Desktop Board D865GBF
8086 4c43 Desktop Board D865GLC
8086 524c D865PERL mainboard
24d2 82801EB/ER (ICH5/ICH5R) USB UHCI Controller #1
1014 0287 ThinkCentre S50
1014 02dd eServer xSeries server mainboard
1014 02ed eServer xSeries server mainboard
1028 0168 Precision Workstation 670 Mainboard
1028 0169 Precision 470
1028 016c PowerEdge 1850 onboard UHCI
1028 016d PowerEdge 2850 onboard UHCI
1028 0170 PowerEdge 6850 onboard UHCI
1028 0183 PowerEdge 1800
1028 019a PowerEdge SC1425
103c 006a NX9500
103c 12bc d530 CMT (DG746A)
103c 3208 ProLiant DL140 G2
1043
80a6 P4P800/P5P800 series motherboard
1458 24d2 GA-8IPE1000/8KNXP motherboard
1462 7280 865PE Neo2 (MS-6728)
1565 3101 P4TSV Motherboard (865G)
15d9 4580 P4SCE Mainboard
1734 101c PRIMERGY RX/TX series onboard UHCI
8086 3427 S875WP1-E mainboard
8086 4246 Desktop Board D865GBF
8086 4c43 Desktop Board D865GLC
8086 524c D865PERL mainboard
24d3 82801EB/ER (ICH5/ICH5R) SMBus Controller
1014 0287 ThinkCentre S50
1014 02dd eServer xSeries server mainboard
1014 02ed eServer xSeries server mainboard
1028 0156 Precision 360
1028 0168 Precision Workstation 670 Mainboard
1028 0169 Precision 470
103c 12bc d330 uT
103c 3208 ProLiant DL140 G2
1043 80a6 P4P800/P5P800 series motherboard
1458 24d2 GA-8IPE1000 Pro2 motherboard (865PE)
1462 7280 865PE Neo2 (MS-6728)
1462 7650 Hetis 865GV-E (MS-7065)
1565 3101 P4TSV Motherboard (865G)
15d9 4580 P4SCE Mainboard
1734 101c PRIMERGY RX/TX S2 series SMBus
8086 3427 S875WP1-E mainboard
8086
4246 Desktop Board D865GBF
8086 4c43 Desktop Board D865GLC

8086 524c D865PERL mainboard
24d4 82801EB/ER (ICH5/ICH5R) USB UHCI Controller #2
1014 0287 ThinkCentre S50
1014 02dd eServer xSeries server mainboard
1014 02ed eServer xSeries server mainboard
1028 0168 Precision Workstation 670 Mainboard
1028 0169 Precision 470
1028 016c PowerEdge 1850 onboard UHCI
1028 016d PowerEdge 2850 onboard UHCI
1028 0170 PowerEdge 6850 onboard UHCI
1028 0183 PowerEdge 1800
1028 019a PowerEdge SC1425
103c 006a NX9500
103c 12bc d530 CMT (DG746A)
103c 3208 ProLiant DL140 G2
1043 80a6 P4P800/P5P800 series motherboard
1458 24d2 GA-8IPE1000 Pro2 motherboard (865PE)
1462 7280 865PE Neo2 (MS-6728)
1462 7650 Hetis 865GV-E (MS-7065)
1565 3101 P4TSV Motherboard (865G)
15d9 4580 P4SCE Mainboard
1734 101c PRIMERGY RX/TX S2 series onboard UHCI
8086 3427 S875WP1-E mainboard
8086 4246 Desktop Board D865GBF
8086 4c43 Desktop Board
D865GLC
8086 524c D865PERL mainboard
24d5 82801EB/ER (ICH5/ICH5R) AC'97 Audio Controller
100a 147b Abit IS7-E motherboard
1014 0287 ThinkCentre S50
1028 0168 Precision Workstation 670 Mainboard
1028 0169 Precision 470
103c 006a NX9500
103c 12bc d330 uT
1043 80f3 P4P800 series motherboard
1043 810f P5P800-MX Mainboard
1458 a002 GA-8IPE1000/8KNXP motherboard
1462 0080 865PE Neo2-V (MS-6788) Mainboard
1462 7280 865PE Neo2 (MS-6728)
1462 7650 Hetis 865GV-E (MS-7065)
8086 a000 D865PERL mainboard
8086 e000 D865PERL mainboard
8086 e001 Desktop Board D865GBF
8086 e002 SoundMax Integrated Digital Audio
24d6 82801EB/ER (ICH5/ICH5R) AC'97 Modem Controller
103c 006a NX9500
24d7 82801EB/ER (ICH5/ICH5R) USB UHCI Controller #3
1014 0287 ThinkCentre S50

1014 02ed xSeries server mainboard
1028 0168 Precision Workstation 670 Mainboard
1028 0169 Precision 470
1028 016c PowerEdge 1850 onboard UHCI
1028 016d PowerEdge 2850 onboard
UHCI
1028 0170 PowerEdge 6850 onboard UHCI
1028 0183 PowerEdge 1800
103c 006a NX9500
103c 12bc d530 CMT (DG746A)
1043 80a6 P4P800/P5P800 series motherboard
1458 24d2 GA-8IPE1000 Pro2 motherboard (865PE)
1462 7280 865PE Neo2 (MS-6728)
1462 7650 Hetis 865GV-E (MS-7065)
1565 3101 P4TSV Motherboard (865G)
15d9 4580 P4SCE Mainboard
1734 101c PRIMERGY RX/TX S2 series onboard UHCI
8086 3427 S875WP1-E mainboard
8086 4246 Desktop Board D865GBF
8086 4c43 Desktop Board D865GLC
8086 524c D865PERL mainboard
24db 82801EB/ER (ICH5/ICH5R) IDE Controller
1014 0287 ThinkCentre S50
1014 02dd eServer xSeries server mainboard
1014 02ed eServer xSeries server mainboard
1028 0168 Precision Workstation 670 Mainboard
1028 0169 Precision 470
1028 016c PowerEdge 1850 IDE Controller
1028 016d PowerEdge 2850 IDE Controller
1028 0170 PowerEdge 6850 IDE Controller
1028 019a PowerEdge SC1425
103c 006a NX9500
103c 12bc d530 CMT (DG746A)
1043
80a6 P4P800/P5P800 series motherboard
1458 24d2 GA-8IPE1000 Pro2 motherboard (865PE)
1462 7280 865PE Neo2 (MS-6728)
1462 7580 MSI 875P
1462 7650 Hetis 865GV-E (MS-7065)
1565 3101 P4TSV Motherboard (865G)
15d9 4580 P4SCE Mainboard
1734 101c PRIMERGY RX/TX S2 series onboard IDE
8086 24db P4C800 Mainboard
8086 3427 S875WP1-E mainboard
8086 4246 Desktop Board D865GBF
8086 4c43 Desktop Board D865GLC
8086 524c D865PERL mainboard
24dc 82801EB (ICH5) LPC Interface Bridge

24dd 82801EB/ER (ICH5/ICH5R) USB2 EHCI Controller
1014 0287 ThinkCentre S50
1014 02dd eServer xSeries server mainboard
1014 02ed eServer xSeries server mainboard
1028 0168 Precision Workstation 670 Mainboard
1028 0169 Precision 470
1028 016c PowerEdge 1850 onboard EHCI
1028 016d PowerEdge 2850 onboard EHCI
1028 0170 PowerEdge 6850 onboard EHCI
1028 0183 PowerEdge 1800
1028 019a PowerEdge SC1425
103c 006a NX9500
103c 12bc d530 CMT (DG746A)
103c
3208 ProLiant DL140 G2
1043 80a6 P4P800/P5P800 series motherboard
1458 5006 GA-8IPE1000 Pro2 motherboard (865PE)
1462 7280 865PE Neo2 (MS-6728)
1462 7650 Hetis 865GV-E (MS-7065)
8086 3427 S875WP1-E mainboard
8086 4246 Desktop Board D865GBF
8086 4c43 Desktop Board D865GLC
8086 524c D865PERL mainboard
24de 82801EB/ER (ICH5/ICH5R) USB UHCI Controller #4
1014 0287 ThinkCentre S50
1014 02ed xSeries server mainboard
1028 0168 Precision Workstation 670 Mainboard
1028 0169 Precision 470
1043 80a6 P4P800/P5P800 series motherboard
1458 24d2 GA-8IPE1000 Pro2 motherboard (865PE)
1462 7280 865PE Neo2 (MS-6728)
1462 7650 Hetis 865GV-E (MS-7065)
1565 3101 P4TSV Motherboard (865G)
15d9 4580 P4SCE Mainboard
1734 101c PRIMERGY RX/TX S2 series onboard UHCI
8086 3427 S875WP1-E mainboard
8086 4246 Desktop Board D865GBF
8086 4c43 Desktop Board D865GLC
8086 524c D865PERL mainboard
24df 82801ER (ICH5R) SATA Controller
1028 0168 Precision
Workstation 670 Mainboard
24f0 Omni-Path HFI Silicon 100 Series [discrete]
10a9 802e Omni-path HFI 100 Series, 1-port A-board
10a9 802f Omni-path HFI 100 Series, 2-port A-board
10a9 8030 Omni-path HFI 100 Series, 1-port B-board
10a9 8031 Omni-path HFI 100 Series, 2-port B-board
1590 00e7 100Gb 1-port OP101 QSFP28 x8 PCIe Gen3 with Intel Omni-Path Adapter

1590 00e8 100Gb 1-port OP101 QSFP28 x16 PCIe Gen3 with Intel Omni-Path Adapter
 1590 021c Apollo 100Gb 1-port Intel Omni-Path Architecture 860z Mezzanine FIO Adapter
 15d9 0934 Omni-Path HFI Adapter 100 Series, 1 Port, PCIe x16, SIOM Module
 15d9 099b Omni-path HFI Mezz AOC, 1 Port, PCIe x16.
 1cb8 0001 Omni-Path HFI Adapter 100 Series, 1 Port, PCIe x16, TC4600 QSFP28
 1cb8 0002 Omni-Path HFI Adapter 100 Series, 1 Port, PCIe x16, TC6600 Fixed Port
 1cb8 0003 Omni-Path HFI Adapter 100 Series, 2 Port, 2 PCIe x16, Earth Simulation QSFP28
 1cb8 0004 Omni-Path HFI Adapter 100 Series, 1 Port, PCIe x16,
 TC4600E QSFP28
 8086 2628 Omni-Path HFI Adapter 100 Series, 1 Port, PCIe x16
 8086 2629 Omni-Path HFI Adapter 100 Series, 1 Port, PCIe x8
 8086 262a Omni-Path HFI Adapter 100 Series, 2 Ports, Split PCIe x16
 8086 262d Omni-Path HFI Adapter 100 Series, 1 Port, PCIe x16, IO Module AHWKPTP100HF
 24f1 Omni-Path HFI Silicon 100 Series [integrated]
 24f3 Wireless 8260
 # Snow Field Peak AC
 8086 0010 Dual Band Wireless-AC 8260
 8086 1010 Dual Band Wireless-AC 8260
 24f4 Wireless 8260
 # Snow Field Peak AC
 8086 0030 Dual Band Wireless-AC 8260
 24fb Dual Band Wireless-AC 3168NGW [Stone Peak]
 24fd Wireless 8265 / 8275
 # Windstorm Peak
 8086 0010 Dual Band Wireless-AC 8265
 8086 0150 Dual Band Wireless-AC 8265
 8086 1010 Dual Band Wireless-AC 8265
 8086 1130 Dual Band Wireless-AC 8265
 2500 82820 820 (Camino) Chipset Host Bridge (MCH)
 1028 0095 Precision Workstation 220 Chipset
 1043 801c P3C-2000 system chipset
 2501 82820 820 (Camino) Chipset Host Bridge (MCH)
 1043
 801c P3C-2000 system chipset
 250b 82820 820 (Camino) Chipset Host Bridge
 250f 82820 820 (Camino) Chipset AGP Bridge
 2520 82805AA MTH Memory Translator Hub
 2521 82804AA MRH-S Memory Repeater Hub for SDRAM
 2526 Wireless-AC 9260
 2530 82850 850 (Tehama) Chipset Host Bridge (MCH)
 1028 00c7 Dimension 8100
 147b 0507 TH7II-RAID
 2531 82860 860 (Wombat) Chipset Host Bridge (MCH)
 1028 00d8 Precision 530
 2532 82850 850 (Tehama) Chipset AGP Bridge
 2533 82860 860 (Wombat) Chipset AGP Bridge
 2534 82860 860 (Wombat) Chipset PCI Bridge
 2540 E7500 Memory Controller Hub

15d9 3480 P4DP6
2541 E7500/E7501 Host RASUM Controller
15d9 3480 P4DP6
4c53 1090 Cx9 / Vx9 mainboard
8086 3424 SE7501HG2 Mainboard
2543 E7500/E7501 Hub Interface B PCI-to-PCI Bridge
2544 E7500/E7501 Hub Interface B RASUM Controller
4c53 1090 Cx9 / Vx9 mainboard
2545 E7500/E7501 Hub Interface C PCI-to-PCI Bridge
2546 E7500/E7501 Hub Interface C RASUM Controller
2547 E7500/E7501
Hub Interface D PCI-to-PCI Bridge
2548 E7500/E7501 Hub Interface D RASUM Controller
254c E7501 Memory Controller Hub
4c53 1090 Cx9 / Vx9 mainboard
8086 3424 SE7501HG2 Mainboard
2550 E7505 Memory Controller Hub
2551 E7505/E7205 Series RAS Controller
2552 E7505/E7205 PCI-to-AGP Bridge
2553 E7505 Hub Interface B PCI-to-PCI Bridge
2554 E7505 Hub Interface B PCI-to-PCI Bridge RAS Controller
255d E7205 Memory Controller Hub
2560 82845G/GL[Brookdale-G]/GE/PE DRAM Controller/Host-Hub Interface
1028 0126 Optiplex GX260
1458 2560 GA-8PE667 Ultra
1462 5800 845PE Max (MS-6580)
2561 82845G/GL[Brookdale-G]/GE/PE Host-to-AGP Bridge
2562 82845G/GL[Brookdale-G]/GE Chipset Integrated Graphics Device
0e11 00b9 Evo D510 SFF
1014 0267 NetVista A30p
1028 0160 Dimension 2400
1734 1003 D1521 Mainboard (Fujitsu-Siemens)
1734 1004 D1451 Mainboard (SCENIC N300, i845GV)
2570 82865G/PE/P DRAM Controller/Host-Hub Interface
103c 006a NX9500
103c 12bc
d330 uT
1043 80f2 P4P800/P5P800 series motherboard
1458 2570 GA-8IPE1000 Pro2 motherboard (865PE)
2571 82865G/PE/P AGP Bridge
2572 82865G Integrated Graphics Controller
1014 0287 ThinkCentre S50
1028 019d Dimension 3000
103c 12bc D530 sff(dc578av)
1043 80a5 P5P800-MX Mainboard
1462 7650 Hetis 865GV-E (MS-7065)
1734 101b Fujitsu-Siemens Scenic E300 i865GV
8086 4246 Desktop Board D865GBF

8086 4c43 Desktop Board D865GLC
2573 82865G/PE/P PCI to CSA Bridge
2576 82865G/PE/P Processor to I/O Memory Interface
2578 82875P/E7210 Memory Controller Hub
1458 2578 GA-8KNXP motherboard (875P)
1462 7580 MS-6758 (875P Neo)
15d9 4580 P4SCE Motherboard
2579 82875P Processor to AGP Controller
257b 82875P/E7210 Processor to PCI to CSA Bridge
257e 82875P/E7210 Processor to I/O Memory Interface
2580 82915G/P/GV/GL/PL/910GL Memory Controller Hub
1458 2580 GA-8I915ME-G Mainboard
1462 7028 915P/G Neo2
1734 105b Scenic W620
2581 82915G/P/GV/GL/PL/910GL
PCI Express Root Port
2582 82915G/GV/910GL Integrated Graphics Controller
1028 1079 Optiplex GX280
103c 3006 DC7100 SFF(DX878AV)
1043 2582 P5GD1-VW Mainboard
1458 2582 GA-8I915ME-G Mainboard
1734 105b Scenic W620
1849 2582 ASRock P4Dual-915GL
2584 82925X/XE Memory Controller Hub
1028 0177 Dimension 8400
2585 82925X/XE PCI Express Root Port
2588 E7220/E7221 Memory Controller Hub
2589 E7220/E7221 PCI Express Root Port
258a E7221 Integrated Graphics Controller
2590 Mobile 915GM/PM/GMS/910GML Express Processor to DRAM Controller
1014 0575 ThinkPad X41 / Z60t
1028 0182 Latitude C610
103c 0934 Compaq nw8240/nx8220
103c 0944 Compaq nc6220 Notebook PC
103c 099c NX6110/NC6120
104d 81b7 Vaio VGN-S3XP
a304 81b7 Vaio VGN-S3XP
e4bf 0ccd CCD-CALYPSO
e4bf 0cd3 CD3-JIVE
e4bf 58b1 XB1
2591 Mobile 915GM/PM Express PCI Express Root Port
103c 0934 Compaq nw8240 Mobile Workstation
2592 Mobile 915GM/GMS/910GML Express Graphics
Controller
1014 0582 ThinkPad X41
103c 099c NX6110/NC6120
103c 308a NC6220
1043 1881 GMA 900 915GM Integrated Graphics

e4bf 0ccd CCD-CALYPSO
e4bf 0cd3 CD3-JIVE
e4bf 58b1 XB1
25a1 6300ESB LPC Interface Controller
25a2 6300ESB PATA Storage Controller
1734 1073 Primergy Econel 200 D2020 mainboard
1775 10d0 V5D Single Board Computer IDE
1775 1100 CR11/VR11 Single Board Computer
1775 ce90 CE9
4c53 10b0 CL9 mainboard
4c53 10e0 PSL09 PrPMC
25a3 6300ESB SATA Storage Controller
1734 1073 Primergy Econel 200 D2020 mainboard
1775 1100 CR11/VR11 Single Board Computer
1775 ce90 CE9
4c53 10b0 CL9 mainboard
4c53 10d0 Telum ASLP10 Processor AMC
4c53 10e0 PSL09 PrPMC
25a4 6300ESB SMBus Controller
1734 1073 Primergy Econel 200 D2020 mainboard
1775 10d0 V5D Single Board Computer
1775 1100 CR11/VR11 Single Board Computer
1775 ce90 CE9
4c53 10b0 CL9 mainboard
4c53 10d0 Telum ASLP10 Processor AMC
4c53 10e0 PSL09 PrPMC
25a6
6300ESB AC'97 Audio Controller
1775 1100 CR11/VR11 Single Board Computer
1775 ce90 CE9
4c53 10b0 CL9 mainboard
25a7 6300ESB AC'97 Modem Controller
25a9 6300ESB USB Universal Host Controller
1734 1073 Primergy Econel 200 D2020 mainboard
1775 10d0 V5D Single Board Computer USB
1775 1100 CR11/VR11 Single Board Computer
1775 ce90 CE9
4c53 10b0 CL9 mainboard
4c53 10d0 Telum ASLP10 Processor AMC
4c53 10e0 PSL09 PrPMC
25aa 6300ESB USB Universal Host Controller
1734 1073 Primergy Econel 200 D2020 mainboard
1775 1100 CR11/VR11 Single Board Computer
1775 ce90 CE9
4c53 10b0 CL9 mainboard
4c53 10d0 Telum ASLP10 Processor AMC
4c53 10e0 PSL09 PrPMC
25ab 6300ESB Watchdog Timer

1734 1073 Primergy Econel 200 D2020 mainboard
1775 10d0 V5D Single Board Computer
1775 1100 CR11/VR11 Single Board Computer
1775 ce90 CE9
1af4 1100 QEMU Virtual Machine
4c53 10b0 CL9 mainboard
4c53 10d0 Telum ASLP10 Processor AMC
4c53 10e0 PSL09
PrPMC
25ac 6300ESB I/O Advanced Programmable Interrupt Controller
1734 1073 Primergy Econel 200 D2020 mainboard
1775 10d0 V5D Single Board Computer
1775 1100 CR11/VR11 Single Board Computer
1775 ce90 CE9
4c53 10b0 CL9 mainboard
4c53 10d0 Telum ASLP10 Processor AMC
4c53 10e0 PSL09 PrPMC
25ad 6300ESB USB2 Enhanced Host Controller
1734 1073 Primergy Econel 200 D2020 mainboard
1775 10d0 V5D Single Board Computer USB 2.0
1775 1100 CR11/VR11 Single Board Computer
1775 ce90 CE9
4c53 10b0 CL9 mainboard
4c53 10d0 Telum ASLP10 Processor AMC
4c53 10e0 PSL09 PrPMC
25ae 6300ESB 64-bit PCI-X Bridge
25b0 6300ESB SATA RAID Controller
1775 1100 CR11/VR11 Single Board Computer
4c53 10d0 Telum ASLP10 Processor AMC
4c53 10e0 PSL09 PrPMC
25c0 5000X Chipset Memory Controller Hub
25d0 5000Z Chipset Memory Controller Hub
25d4 5000V Chipset Memory Controller Hub
15d9 8680 X7DVL-E-O motherboard
25d8 5000P Chipset Memory Controller Hub
15d9
9680 X7DBN Motherboard
8086 3476 S5000PSLSATA Server Board
25e2 5000 Series Chipset PCI Express x4 Port 2
25e3 5000 Series Chipset PCI Express x4 Port 3
25e4 5000 Series Chipset PCI Express x4 Port 4
25e5 5000 Series Chipset PCI Express x4 Port 5
25e6 5000 Series Chipset PCI Express x4 Port 6
25e7 5000 Series Chipset PCI Express x4 Port 7
25f0 5000 Series Chipset FSB Registers
1028 01bb PowerEdge 1955 FSB Registers
103c 31fd ProLiant DL140 G3
15d9 8680 X7DVL-E-O motherboard

15d9 9680 X7DBN Motherboard
8086 3476 S5000PSLSATA Server Board
25f1 5000 Series Chipset Reserved Registers
103c 31fd ProLiant DL140 G3
15d9 8680 X7DVL-E-O motherboard
15d9 9680 X7DBN Motherboard
8086 3476 S5000PSLSATA Server Board
25f3 5000 Series Chipset Reserved Registers
103c 31fd ProLiant DL140 G3
15d9 8680 X7DVL-E-O motherboard
15d9 9680 X7DBN Motherboard
8086 3476 S5000PSLSATA Server Board
25f5 5000 Series Chipset FBD Registers
103c 31fd ProLiant
DL140 G3
15d9 8680 X7DVL-E-O motherboard
15d9 9680 X7DBN Motherboard
8086 3476 S5000PSLSATA Server Board
25f6 5000 Series Chipset FBD Registers
103c 31fd ProLiant DL140 G3
15d9 8680 X7DVL-E-O motherboard
15d9 9680 X7DBN Motherboard
8086 3476 S5000PSLSATA Server Board
25f7 5000 Series Chipset PCI Express x8 Port 2-3
25f8 5000 Series Chipset PCI Express x8 Port 4-5
25f9 5000 Series Chipset PCI Express x8 Port 6-7
25fa 5000X Chipset PCI Express x16 Port 4-7
2600 E8500/E8501 Hub Interface 1.5
1028 0170 PowerEdge 6850 Hub Interface
2601 E8500/E8501 PCI Express x4 Port D
2602 E8500/E8501 PCI Express x4 Port C0
2603 E8500/E8501 PCI Express x4 Port C1
2604 E8500/E8501 PCI Express x4 Port B0
2605 E8500/E8501 PCI Express x4 Port B1
2606 E8500/E8501 PCI Express x4 Port A0
2607 E8500/E8501 PCI Express x4 Port A1
2608 E8500/E8501 PCI Express x8 Port C
2609 E8500/E8501 PCI Express x8 Port B
260a E8500/E8501 PCI Express x8 Port A
260c E8500/E8501
IMI Registers
2610 E8500/E8501 FSB Registers
2611 E8500/E8501 Address Mapping Registers
2612 E8500/E8501 RAS Registers
2613 E8500/E8501 Reserved Registers
2614 E8500/E8501 Reserved Registers
2615 E8500/E8501 Miscellaneous Registers
2617 E8500/E8501 Reserved Registers

2618 E8500/E8501 Reserved Registers
2619 E8500/E8501 Reserved Registers
261a E8500/E8501 Reserved Registers
261b E8500/E8501 Reserved Registers
261c E8500/E8501 Reserved Registers
261d E8500/E8501 Reserved Registers
261e E8500/E8501 Reserved Registers
2620 E8500/E8501 eXternal Memory Bridge
1028 0170 PowerEdge 6850 Memory Bridge
2621 E8500/E8501 XMB Miscellaneous Registers
1028 0170 PowerEdge 6850 XMB Registers
2622 E8500/E8501 XMB Memory Interleaving Registers
1028 0170 PowerEdge 6850 Memory Interleaving Registers
2623 E8500/E8501 XMB DDR Initialization and Calibration
1028 0170 PowerEdge 6850 DDR Initialization and Calibration
2624 E8500/E8501 XMB Reserved Registers
1028
0170 PowerEdge 6850 Reserved Registers
2625 E8500/E8501 XMB Reserved Registers
1028 0170 PowerEdge 6850 Reserved Registers
2626 E8500/E8501 XMB Reserved Registers
1028 0170 PowerEdge 6850 Reserved Registers
2627 E8500/E8501 XMB Reserved Registers
1028 0170 PowerEdge 6850 Reserved Registers
2640 82801FB/FR (ICH6/ICH6R) LPC Interface Bridge
1462 7028 915P/G Neo2
1734 105c Scenic W620
e4bf 0ccd CCD-CALYPSO
e4bf 0cd3 CD3-JIVE
e4bf 58b1 XB1
2641 82801FBM (ICH6M) LPC Interface Bridge
1014 0568 ThinkPad X41
103c 0934 Compaq nw8240/nx8220
103c 0944 Compaq nc6220 Notebook PC
103c 099c NX6110/NC6120
2642 82801FW/FRW (ICH6W/ICH6RW) LPC Interface Bridge
2651 82801FB/FW (ICH6/ICH6W) SATA Controller
1028 0179 Optiplex GX280
1043 2601 P5GD1-VW Mainboard
1734 105c Scenic W620
8086 4147 D915GAG Motherboard
e4bf 0ccd CCD-CALYPSO
e4bf 0cd3 CD3-JIVE
e4bf 58b1 XB1
2652 82801FR/FRW (ICH6R/ICH6RW) SATA Controller
1028 0177
Dimension 8400
1462 7028 915P/G Neo2

2653 82801FBM (ICH6M) SATA Controller
1014 056a ThinkPad X41
2658 82801FB/FBM/FR/FW/FRW (ICH6 Family) USB UHCI #1
1014 0565 ThinkPad X41
1028 0177 Dimension 8400
1028 0179 Optiplex GX280
103c 0934 Compaq nw8240/nx8220
103c 0944 Compaq nc6220 Notebook PC
103c 099c NX6110/NC6120
1043 80a6 P5GD1-VW Mainboard
1458 2558 GA-8I915ME-G Mainboard
1462 7028 915P/G Neo2
1734 105c Scenic W620
e4bf 0ccd CCD-CALYPSO
e4bf 0cd3 CD3-JIVE
e4bf 58b1 XB1
2659 82801FB/FBM/FR/FW/FRW (ICH6 Family) USB UHCI #2
1014 0565 ThinkPad X41
1028 0177 Dimension 8400
1028 0179 Optiplex GX280
103c 0934 Compaq nw8240/nx8220
103c 0944 Compaq nc6220 Notebook PC
103c 099c NX6110/NC6120
1043 80a6 P5GD1-VW Mainboard
1458 2659 GA-8I915ME-G Mainboard
1462 7028 915P/G Neo2
1734 105c Scenic W620
e4bf 0ccd CCD-CALYPSO
e4bf 0cd3 CD3-JIVE
e4bf 58b1 XB1
265a 82801FB/FBM/FR/FW/FRW (ICH6 Family) USB UHCI #3
1014
0565 ThinkPad X41
1028 0177 Dimension 8400
1028 0179 Optiplex GX280
103c 0934 Compaq nw8240/nx8220
103c 0944 Compaq nc6220 Notebook PC
103c 099c NX6110/NC6120
1043 80a6 P5GD1-VW Mainboard
1458 265a GA-8I915ME-G Mainboard
1462 7028 915P/G Neo2
1734 105c Scenic W620
e4bf 0ccd CCD-CALYPSO
e4bf 0cd3 CD3-JIVE
e4bf 58b1 XB1
265b 82801FB/FBM/FR/FW/FRW (ICH6 Family) USB UHCI #4
1014 0565 ThinkPad X41
1028 0177 Dimension 8400

1028 0179 Optiplex GX280
103c 099c NX6110/NC6120
1043 80a6 P5GD1-VW Mainboard
1458 265a GA-8I915ME-G Mainboard
1462 7028 915P/G Neo2
1734 105c Scenic W620
e4bf 0ccd CCD-CALYPSO
e4bf 0cd3 CD3-JIVE
e4bf 58b1 XB1
265c 82801FB/FBM/FR/FW/FRW (ICH6 Family) USB2 EHCI Controller
1014 0566 ThinkPad X41
1028 0177 Dimension 8400
1028 0179 Optiplex GX280
103c 0934 Compaq nw8240/nx8220
103c 0944 Compaq nc6220 Notebook PC
103c 099c NX6110/NC6120
1043 80a6 P5GD1-VW Mainboard
1458 5006
GA-8I915ME-G Mainboard
1462 7028 915P/G Neo2
1734 105c Scenic W620
8086 265c Dimension 3100
e4bf 0ccd CCD-CALYPSO
e4bf 0cd3 CD3-JIVE
e4bf 58b1 XB1
2660 82801FB/FBM/FR/FW/FRW (ICH6 Family) PCI Express Port 1
103c 0934 Compaq nw8240 Mobile Workstation
103c 0944 Compaq nc6220 Notebook PC
103c 099c NX6110/NC6120
e4bf 0ccd CCD-CALYPSO
e4bf 0cd3 CD3-JIVE
e4bf 58b1 XB1
2662 82801FB/FBM/FR/FW/FRW (ICH6 Family) PCI Express Port 2
103c 0934 Compaq nw8240 Mobile Workstation
103c 0944 Compaq nc6220 Notebook PC
e4bf 0ccd CCD-CALYPSO
e4bf 0cd3 CD3-JIVE
e4bf 58b1 XB1
2664 82801FB/FBM/FR/FW/FRW (ICH6 Family) PCI Express Port 3
e4bf 0ccd CCD-CALYPSO
e4bf 0cd3 CD3-JIVE
e4bf 58b1 XB1
2666 82801FB/FBM/FR/FW/FRW (ICH6 Family) PCI Express Port 4
e4bf 0ccd CCD-CALYPSO
e4bf 0cd3 CD3-JIVE
e4bf 58b1 XB1
2668 82801FB/FBM/FR/FW/FRW (ICH6 Family) High Definition Audio Controller
1014 05b7 ThinkPad Z60t

based on the PTGD1-LA motherboard
103c
2a09 PufferM-UL8E
1043 1173 A6VC
1043 814e P5GD1-VW Mainboard
1462 7028 915P/G Neo2
1af4 1100 QEMU Virtual Machine
266a 82801FB/FBM/FR/FW/FRW (ICH6 Family) SMBus Controller
1014 056b ThinkPad X41
1028 0177 Dimension 8400
1028 0179 Optiplex GX280
1043 80a6 P5GD1-VW Mainboard
1458 266a GA-8I915ME-G Mainboard
1462 7028 915P/G Neo2
1734 105c Scenic W620
e4bf 0ccd CCD-CALYPSO
e4bf 0cd3 CD3-JIVE
e4bf 58b1 XB1
266c 82801FB/FBM/FR/FW/FRW (ICH6 Family) LAN Controller
266d 82801FB/FBM/FR/FW/FRW (ICH6 Family) AC'97 Modem Controller
1025 006a Conexant AC'97 CoDec (in Acer TravelMate 2410 serie laptop)
103c 0934 Compaq nw8240/nx8220
103c 099c NX6110/NC6120
266e 82801FB/FBM/FR/FW/FRW (ICH6 Family) AC'97 Audio Controller
1014 0581 ThinkPad X41 (Analog Devices AD1981B codec)
1025 006a Realtek ALC 655 codec (in Acer TravelMate 2410 serie laptop)
1028 0177 Dimension 8400
1028 0179 Optiplex GX280
1028 0182 Latitude D610
Laptop
1028 0187 Precision M70 Laptop
1028 0188 Inspiron 6000 laptop
103c 0934 Compaq nw8240/nx8220
103c 0944 Compaq NC6220
103c 099c NX6110/NC6120
103c 3006 DC7100 SFF(DX878AV)
1458 a002 GA-8I915ME-G Mainboard
152d 0745 Packard Bell A8550 Laptop
1734 105a Scenic W620
266f 82801FB/FBM/FR/FW/FRW (ICH6 Family) IDE Controller
1028 0177 Dimension 8400
103c 0934 Compaq nw8240/nx8220
103c 0944 Compaq nc6220 Notebook PC
103c 099c NX6110/NC6120
1043 80a6 P5GD1-VW Mainboard
1458 266f GA-8I915ME-G Mainboard
1462 7028 915P/G Neo2
1734 105c Scenic W620

e4bf 0ccd CCD-CALYPSO
e4bf 0cd3 CD3-JIVE
e4bf 58b1 XB1
2670 631xESB/632xESB/3100 Chipset LPC Interface Controller
103c 31fe ProLiant DL140 G3
15d9 8680 X7DVL-E-O motherboard
15d9 9680 X7DBN Motherboard
8086 3476 S5000PSLSATA Server Board
2680 631xESB/632xESB/3100 Chipset SATA IDE Controller
2681 631xESB/632xESB SATA AHCI Controller
103c 31fe ProLiant DL140 G3
15d9
8680 X7DVL-E-O motherboard
15d9 9680 X7DBN Motherboard
8086 3476 S5000PSLSATA Server Board
2682 631xESB/632xESB SATA RAID Controller
103c 31fe Adaptec Serial ATA HostRAID
2683 631xESB/632xESB SATA RAID Controller
2688 631xESB/632xESB/3100 Chipset UHCI USB Controller #1
1028 01bb PowerEdge 1955 onboard USB
1028 01f0 PowerEdge R900 onboard USB
103c 31fe ProLiant DL140 G3
15d9 8680 X7DVL-E-O motherboard
15d9 9680 X7DBN Motherboard
8086 3476 S5000PSLSATA Server Board
2689 631xESB/632xESB/3100 Chipset UHCI USB Controller #2
1028 01bb PowerEdge 1955 onboard USB
1028 01f0 PowerEdge R900 onboard USB
103c 31fe ProLiant DL140 G3
15d9 8680 X7DVL-E-O motherboard
15d9 9680 X7DBN Motherboard
8086 3476 S5000PSLSATA Server Board
268a 631xESB/632xESB/3100 Chipset UHCI USB Controller #3
1028 01f0 PowerEdge R900 onboard USB
103c 31fe ProLiant DL140 G3
15d9 8680 X7DVL-E-O motherboard
15d9 9680 X7DBN Motherboard
8086 3476 S5000PSLSATA
Server Board
268b 631xESB/632xESB/3100 Chipset UHCI USB Controller #4
1028 01f0 PowerEdge R900 onboard USB
15d9 8680 X7DVL-E-O motherboard
8086 3476 S5000PSLSATA Server Board
268c 631xESB/632xESB/3100 Chipset EHCI USB2 Controller
1028 01bb PowerEdge 1955 onboard USB
1028 01f0 PowerEdge R900 onboard USB
103c 31fe ProLiant DL140 G3
15d9 8680 X7DVL-E-O motherboard

15d9 9680 X7DBN Motherboard
8086 3476 S5000PSLSATA Server Board
2690 631xESB/632xESB/3100 Chipset PCI Express Root Port 1
103c 31fe ProLiant DL140 G3
15d9 9680 X7DBN Motherboard
2692 631xESB/632xESB/3100 Chipset PCI Express Root Port 2
103c 31fe ProLiant DL140 G3
2694 631xESB/632xESB/3100 Chipset PCI Express Root Port 3
2696 631xESB/632xESB/3100 Chipset PCI Express Root Port 4
2698 631xESB/632xESB AC '97 Audio Controller
2699 631xESB/632xESB AC '97 Modem Controller
269a 631xESB/632xESB High Definition Audio Controller
269b 631xESB/632xESB/3100 Chipset SMBus Controller
103c
31fe ProLiant DL140 G3
15d9 8680 X7DVL-E-O motherboard
15d9 9680 X7DBN Motherboard
8086 3476 S5000PSLSATA Server Board
269e 631xESB/632xESB IDE Controller
103c 31fe ProLiant DL140 G3
15d9 8680 X7DVL-E-O motherboard
15d9 9680 X7DBN Motherboard
2700 Optane SSD 900P Series
8086 3900 900P Series [Add-in Card]
8086 3901 900P Series [2.5" SFF]
2701 NVMe Datacenter SSD [Optane]
1028 2000 Express Flash NVMe [Optane] 375GB 2.5" U.2 (P4800X)
1028 2001 Express Flash NVMe [Optane] 750GB 2.5" U.2 (P4800X)
1028 2002 Express Flash NVMe [Optane] 750GB AIC (P4800X)
1028 200a Express Flash NVMe [Optane] 375GB AIC (P4800X)
8086 3904 NVMe Datacenter SSD [Optane] x4 AIC (P4800X)
8086 3905 NVMe Datacenter SSD [Optane] 15mm 2.5" U.2 (P4800X)
2723 Wi-Fi 6 AX200
8086 2723 Wireless AX200
2770 82945G/GZ/P/PL Memory Controller Hub
1028 01ad OptiPlex GX620
103c 2a3b Pavilion A1512X
1043 817a P5LD2-VM Mainboard
107b 5048 E4500
1462 7418 Wind
PC MS-7418
1849 2770 ConRoe1333-D667
8086 544e DeskTop Board D945GTP
2771 82945G/GZ/P/PL PCI Express Root Port
2772 82945G/GZ Integrated Graphics Controller
103c 2a3b Pavilion A1512X
1462 7418 Wind PC MS-7418
1849 2772 ConRoe1333-D667

8086 544e DeskTop Board D945GTP
8086 d605 Desktop Board D945GCCR
2774 82955X Memory Controller Hub
2775 82955X PCI Express Root Port
2776 82945G/GZ Integrated Graphics Controller
2778 E7230/3000/3010 Memory Controller Hub
1028 01df PowerEdge SC440
1028 01e6 PowerEdge 860
2779 E7230/3000/3010 PCI Express Root Port
277a 82975X/3010 PCI Express Root Port
277c 82975X Memory Controller Hub
1043 8178 P5WDG2 WS Professional motherboard
277d 82975X PCI Express Root Port
2782 82915G Integrated Graphics Controller
1043 2582 P5GD1-VW Mainboard
1734 105b Scenic W620
2792 Mobile 915GM/GMS/910GML Express Graphics Controller
1014 0582 ThinkPad X41
103c 099c NX6110/NC6120
103c 308a Compaq nc6220 Notebook
PC
1043 1881 GMA 900 915GM Integrated Graphics
e4bf 0ccd CCD-CALYPSO
e4bf 0cd3 CD3-JIVE
e4bf 58b1 XB1
27a0 Mobile 945GM/PM/GMS, 943/940GML and 945GT Express Memory Controller Hub
1025 006c 9814 WKMI
1028 01d7 XPS M1210
103c 309f Compaq nx9420 Notebook
103c 30a1 NC2400
103c 30a3 Compaq nw8440
103c 30d5 530 Laptop
1043 1237 A6J-Q008
1071 8209 Medion MIM 2240 Notebook PC [MD98100]
17aa 2015 ThinkPad T60
17aa 2017 ThinkPad R60/T60/X60 series
27a1 Mobile 945GM/PM/GMS, 943/940GML and 945GT Express PCI Express Root Port
103c 309f Compaq nx9420 Notebook
103c 30a3 Compaq nw8440
1071 8209 Medion MIM 2240 Notebook PC [MD98100]
27a2 Mobile 945GM/GMS, 943/940GML Express Integrated Graphics Controller
103c 30a1 NC2400
103c 30d5 530 Laptop
17aa 201a ThinkPad R60/T60/X60 series
9902 1584 CCE MPL-D10H120F
27a6 Mobile 945GM/GMS/GME, 943/940GML Express Integrated Graphics Controller
103c 30a1 NC2400
103c 30d5 530 Laptop

1775
11cc CC11/CL11 integrated graphics (secondary)
17aa 201a ThinkPad R60/T60/X60 series
27ac Mobile 945GSE Express Memory Controller Hub
1775 11cc CC11/CL11
27ad Mobile 945GSE Express PCI Express Root Port
27ae Mobile 945GSE Express Integrated Graphics Controller
1775 11cc CC11/CL11 integrated graphics (primary)
27b0 82801GH (ICH7DH) LPC Interface Bridge
103c 2a3b Pavilion A1512X
8086 544e DeskTop Board D945GTP
27b8 82801GB/GR (ICH7 Family) LPC Interface Bridge
1028 01e6 PowerEdge 860
103c 2a8c Compaq 500B Microtower
1043 8179 P5B-MX/WiFi-AP, P5KPL-VM Motherboard
107b 5048 E4500
1462 7418 Wind PC MS-7418
1775 11cc CC11/CL11
8086 544e DeskTop Board D945GTP
27b9 82801GBM (ICH7-M) LPC Interface Bridge
1028 01d7 XPS M1210
103c 309f Compaq nx9420 Notebook
103c 30a1 NC2400
103c 30a3 Compaq nw8440
103c 30d5 530 Laptop
1071 8209 Medion MIM 2240 Notebook PC [MD98100]
10f7 8338 Panasonic CF-Y5 laptop
17aa 2009 ThinkPad R60/T60/X60
series
27bc NM10 Family LPC Controller
1043 83ad Eee PC 1015PX
105b 0d7c D270S/D250S Motherboard
144d c072 Notebook N150P
1458 5001 GA-D525TUD
8086 4f4d DeskTop Board D510MO
8086 544b Desktop Board D425KT
27bd 82801GHM (ICH7-M DH) LPC Interface Bridge
1025 006c 9814 WKMI
27c0 NM10/ICH7 Family SATA Controller [IDE mode]
1028 01ad OptiPlex GX620
1028 01df PowerEdge SC440
1028 01e6 PowerEdge 860
103c 2a8c Compaq 500B Microtower
1043 8179 P5B-MX/WiFi-AP, P5KPL-VM Motherboard
107b 5048 E4500
1462 2310 MSI Hetis 945
1462 7236 945P Neo3-F Rev. 2.2 motherboard
1462 7418 Wind PC MS-7418

1775 11cc CC11/CL11
8086 544b Desktop Board D425KT
8086 544e DeskTop Board D945GTP
27c1 NM10/ICH7 Family SATA Controller [AHCI mode]
1028 01df PowerEdge SC440
103c 2a3b Pavilion A1512X
1043 83ad Eee PC 1015PX
105b 0d7c D270S/D250S Motherboard
144d c072 Notebook N150P
1458 b005 GA-D525TUD
1775 11cc CC11/CL11
8086 4f4d
DeskTop Board D510MO
8086 5842 DeskTop Board D975XBX
27c3 82801GR/GDH (ICH7R/ICH7DH) SATA Controller [RAID mode]
1775 11cc CC11/CL11
8086 544e DeskTop Board D945GTP
27c4 82801GBM/GHM (ICH7-M Family) SATA Controller [IDE mode]
1025 006c 9814 WKMI
1028 01d7 XPS M1210
1071 8209 Medion MIM 2240 Notebook PC [MD98100]
17aa 200e ThinkPad T60
27c5 82801GBM/GHM (ICH7-M Family) SATA Controller [AHCI mode]
103c 309f Compaq nx9420 Notebook
103c 30a3 Compaq nw8440
103c 30d5 530 Laptop
17aa 200d ThinkPad R60/T60/X60 series
27c6 82801GHM (ICH7-M DH) SATA Controller [RAID mode]
27c8 NM10/ICH7 Family USB UHCI Controller #1
1025 006c 9814 WKMI
1028 01ad OptiPlex GX620
1028 01d7 XPS M1210
1028 01df PowerEdge SC440
1028 01e6 PowerEdge 860
103c 2a3b Pavilion A1512X
103c 2a8c Compaq 500B Microtower
103c 309f Compaq nx9420 Notebook
103c 30a1 NC2400
103c 30a3 Compaq nw8440
103c 30d5 530 Laptop
1043 1237 A6J-Q008
1043 8179 P5B-MX/WiFi-AP,
P5KPL-VM, P5LD2-VM Mainboard
1043 83ad Eee PC 1015PX
105b 0d7c D270S/D250S Motherboard
1071 8209 Medion MIM 2240 Notebook PC [MD98100]
107b 5048 E4500
144d c072 Notebook N150P

1458 5004 GA-D525TUD
1462 7418 Wind PC MS-7418
1775 11cc CC11/CL11
17aa 200a ThinkPad R60/T60/X60 series
8086 4f4d DeskTop Board D510MO
8086 544b Desktop Board D425KT
8086 544e DeskTop Board D945GTP
27c9 NM10/ICH7 Family USB UHCI Controller #2
1025 006c 9814 WKMI
1028 01ad OptiPlex GX620
1028 01d7 XPS M1210
1028 01df PowerEdge SC440
1028 01e6 PowerEdge 860
103c 2a3b Pavilion A1512X
103c 2a8c Compaq 500B Microtower
103c 309f Compaq nx9420 Notebook
103c 30a1 NC2400
103c 30a3 Compaq nw8440
1043 1237 A6J-Q008
1043 8179 P5B-MX/WiFi-AP, P5KPL-VM, P5LD2-VM Mainboard
1043 83ad Eee PC 1015PX
105b 0d7c D270S/D250S Motherboard
1071 8209 Medion MIM 2240 Notebook PC [MD98100]
107b 5048 E4500
144d c072 Notebook N150P
1458 5004
GA-D525TUD
1462 7418 Wind PC MS-7418
1775 11cc CC11/CL11
17aa 200a ThinkPad R60/T60/X60 series
8086 4f4d DeskTop Board D510MO
8086 544b Desktop Board D425KT
8086 544e DeskTop Board D945GTP
27ca NM10/ICH7 Family USB UHCI Controller #3
1025 006c 9814 WKMI
1028 01ad OptiPlex GX620
1028 01d7 XPS M1210
1028 01df PowerEdge SC440
1028 01e6 PowerEdge 860
103c 2a3b Pavilion A1512X
103c 2a8c Compaq 500B Microtower
103c 309f Compaq nx9420 Notebook
103c 30a1 NC2400
103c 30a3 Compaq nw8440
1043 1237 A6J-Q008
1043 8179 P5B-MX/WiFi-AP, P5KPL-VM, P5LD2-VM Mainboard
1043 83ad Eee PC 1015PX
105b 0d7c D270S/D250S Motherboard

1071 8209 Medion MIM 2240 Notebook PC [MD98100]
107b 5048 E4500
144d c072 Notebook N150P
1458 5004 GA-D525TUD
1462 7418 Wind PC MS-7418
1775 11cc CC11/CL11
17aa 200a ThinkPad R60/T60/X60 series
8086 4f4d DeskTop Board D510MO
8086 544e DeskTop Board D945GTP
27cb NM10/ICH7 Family USB UHCI Controller
#4
1025 006c 9814 WKMI
1028 01ad OptiPlex GX620
1028 01d7 XPS M1210
1028 01df PowerEdge SC440
103c 2a3b Pavilion A1512X
103c 2a8c Compaq 500B Microtower
103c 309f Compaq nx9420 Notebook
103c 30a1 NC2400
103c 30a3 Compaq nw8440
1043 1237 A6J-Q008
1043 8179 P5B-MX/WiFi-AP, P5KPL-VM, P5LD2-VM Mainboard
1043 83ad Eee PC 1015PX
105b 0d7c D270S/D250S Motherboard
1071 8209 Medion MIM 2240 Notebook PC [MD98100]
107b 5048 E4500
144d c072 Notebook N150P
1458 5004 GA-D525TUD
1462 7418 Wind PC MS-7418
1775 11cc CC11/CL11
17aa 200a ThinkPad R60/T60/X60 series
8086 4f4d DeskTop Board D510MO
8086 544e DeskTop Board D945GTP
27cc NM10/ICH7 Family USB2 EHCI Controller
1025 006c 9814 WKMI
1028 01ad OptiPlex GX620
1028 01d7 XPS M1210
1028 01df PowerEdge SC440
1028 01e6 PowerEdge 860
103c 2a3b Pavilion A1512X
103c 2a8c Compaq 500B Microtower
103c 309f Compaq nx9420 Notebook
103c 30a1 NC2400
103c 30a3 Compaq
nw8440
103c 30d5 530 Laptop
1043 1237 A6J-Q008
1043 8179 P5B-MX/WiFi-AP, P5KPL-VM, P5LD2-VM Mainboard

1043 83ad Eee PC 1015PX
105b 0d7c D270S/D250S Motherboard
1071 8209 Medion MIM 2240 Notebook PC [MD98100]
144d c072 Notebook N150P
1458 5006 GA-D525TUD
1462 7418 Wind PC MS-7418
1775 11cc CC11/CL11
17aa 200b ThinkPad R60/T60/X60 series
8086 4f4d DeskTop Board D510MO
8086 544b Desktop Board D425KT
8086 544e DeskTop Board D945GTP
27d0 NM10/ICH7 Family PCI Express Port 1
103c 309f Compaq nx9420 Notebook
103c 30a3 Compaq nw8440
1071 8209 Medion MIM 2240 Notebook PC [MD98100]
144d c072 Notebook N150P
1458 5001 GA-D525TUD
1462 7418 Wind PC MS-7418
1775 11cc CC11/CL11
17aa 2011 ThinkPad R60e
8086 544b Desktop Board D425KT
27d2 NM10/ICH7 Family PCI Express Port 2
103c 309f Compaq nx9420 Notebook
103c 30a3 Compaq nw8440
1071 8209 Medion MIM 2240 Notebook PC [MD98100]
144d c072 Notebook N150P
1462 7418 Wind
PC MS-7418
1775 11cc CC11/CL11
17aa 2011 ThinkPad R60e
8086 544b Desktop Board D425KT
27d4 NM10/ICH7 Family PCI Express Port 3
1071 8209 Medion MIM 2240 Notebook PC [MD98100]
144d c072 Notebook N150P
1462 7418 Wind PC MS-7418
1775 11cc CC11/CL11
17aa 2011 ThinkPad R60e
8086 544b Desktop Board D425KT
27d6 NM10/ICH7 Family PCI Express Port 4
103c 30a3 Compaq nw8440
1071 8209 Medion MIM 2240 Notebook PC [MD98100]
144d c072 Notebook N150P
1462 7418 Wind PC MS-7418
1775 11cc CC11/CL11
17aa 2011 ThinkPad R60e
8086 544b Desktop Board D425KT
27d8 NM10/ICH7 Family High Definition Audio Controller
1025 006c 9814 WKMI

1028 01d7 XPS M1210
103c 2a3b Pavilion A1512X
103c 2a8c Compaq 500B Microtower
103c 309f Compaq nx9420 Notebook
103c 30a1 NC2400
103c 30a3 Compaq nw8440
103c 30d5 530 Laptop
1043 1123 A6J-Q008
1043 13c4 G2P
1043 817f P5LD2-VM Mainboard (Realtek ALC 882 codec)
1043 8249 P5B-MX/WiFi-AP
1043 8290
P5KPL-VM Motherboard
1043 82ea P5KPL-CM Motherboard
1043 8437 Eee PC 1015PX
105b 0d7c D270S/D250S Motherboard
1071 8207 Medion MIM 2240 Notebook PC [MD98100]
107b 5048 E4500
10f7 8338 Panasonic CF-Y5 laptop
1179 ff10 Toshiba Satellite A100-796 audio (Realtek ALC861)
1179 ff31 AC97 Data Fax SoftModem with SmartCP
1447 1043 Asus A8JP (Analog Devices AD1986A)
144d c072 Notebook N150P
1458 a002 GA-D525TUD (Realtek ALC887)
1458 a102 GA-8I945PG-RH Mainboard
1462 7418 Wind PC MS-7418
152d 0753 Softmodem
1734 10ad Conexant softmodem SmartCP
17aa 2010 ThinkPad R60/T60/X60 series
17aa 3802 3000 C200 audio [Realtek ALC861VD]
8086 1112 DeskTop Board D945GTP
8086 27d8 DeskTop Board D945GTP
8086 d618 DeskTop Board D510MO
8384 7680 STAC9221 HD Audio Codec
27da NM10/ICH7 Family SMBus Controller
1025 006c 9814 WKMI
1028 01ad OptiPlex GX620
1028 01d7 XPS M1210
1028 01df PowerEdge SC440
1028 01e6 PowerEdge 860
103c 2a3b
Pavilion A1512X
103c 2a8c Compaq 500B Microtower
1043 8179 P5B-MX/WiFi-AP, P5KPL-VM Motherboard
105b 0d7c D270S/D250S Motherboard
1071 8209 Medion MIM 2240 Notebook PC [MD98100]
10f7 8338 Panasonic CF-Y5 laptop
144d c072 Notebook N150P

1458 5001 GA-8I945PG-RH/GA-D525TUD Mainboard
1462 7418 Wind PC MS-7418
1775 11cc CC11/CL11
17aa 200f ThinkPad R60/T60/X60 series
8086 4f4d DeskTop Board D510MO
8086 544b Desktop Board D425KT
8086 544e DeskTop Board D945GTP
8086 5842 DeskTop Board D975XBX
27dc NM10/ICH7 Family LAN Controller
103c 2a3b Pavilion A1512X
8086 308d DeskTop Board D945GTP
27dd 82801G (ICH7 Family) AC'97 Modem Controller
27de 82801G (ICH7 Family) AC'97 Audio Controller
1028 01ad OptiPlex GX620
1462 7267 Realtek ALC883 Audio Controller
1775 11cc CC11 integrated audio (AD1981BL codec)
27df 82801G (ICH7 Family) IDE Controller
1028 01df PowerEdge SC440
1028 01e6 PowerEdge 860
103c 2a3b Pavilion A1512X
103c
2a8c Compaq 500B Microtower
103c 309f Compaq nx9420 Notebook
103c 30a1 NC2400
103c 30a3 Compaq nw8440
103c 30d5 530 Laptop
1043 1237 A6J-Q008
1043 8179 P5B-MX/WiFi-AP, P5KPL-VM Motherboard
107b 5048 E4500
10f7 8338 Panasonic CF-Y5 laptop
1462 7418 Wind PC MS-7418
1775 11cc CC11/CL11
17aa 200c ThinkPad R60/T60/X60 series
8086 544e DeskTop Board D945GTP
27e0 82801GR/GH/GHM (ICH7 Family) PCI Express Port 5
1775 11cc CC11/CL11
27e2 82801GR/GH/GHM (ICH7 Family) PCI Express Port 6
1775 11cc CC11/CL11
280b Intel(R) Display Audio
2810 82801HB/HR (ICH8/R) LPC Interface Controller
1043 81ec P5B
2811 82801HEM (ICH8M-E) LPC Interface Controller
103c 30c1 Compaq 6910p
17aa 20b6 ThinkPad T61/R61
e4bf cc47 CCG-RUMBA
2812 82801HH (ICH8DH) LPC Interface Controller
2814 82801HO (ICH8DO) LPC Interface Controller
2815 82801HM (ICH8M) LPC Interface Controller

1025 0121 Aspire 5920G
1028 01f3 Inspiron 1420
1028 022f Inspiron 1525
103c
30c0 Compaq 6710b
103c 30cc Pavilion dv6700
103c 30d9 Presario C700
1043 1017 X58LE
104d 9005 Vaio VGN-FZ260E
104d 902d VAIO VGN-NR120E
17aa 20a5 ThinkPad R61
17c0 4083 Medion WIM 2210 Notebook PC [MD96850]
2820 82801H (ICH8 Family) 4 port SATA Controller [IDE mode]
1028 01da OptiPlex 745
1462 7235 P965 Neo MS-7235 mainboard
2821 82801HR/HO/HH (ICH8R/DO/DH) 6 port SATA Controller [AHCI mode]
2822 SATA Controller [RAID mode]
1028 020d Inspiron 530
103c 2a6f Asus IPIBL-LB Motherboard
1043 8277 P5K PRO Motherboard: 82801IR [ICH9R]
1462 7345 MS-7345 Motherboard: Intel 82801I/IR [ICH9/ICH9R]
2823 C610/X99 series chipset sSATA Controller [RAID mode]
2824 82801HB (ICH8) 4 port SATA Controller [AHCI mode]
1043 81ec P5B
2825 82801HR/HO/HH (ICH8R/DO/DH) 2 port SATA Controller [IDE mode]
1028 01da OptiPlex 745
1462 7235 P965 Neo MS-7235 mainboard
2826 C600/X79 series chipset SATA RAID Controller
1d49 0100 Intel RSTe SATA
Software RAID
1d49 0101 Intel RSTe SATA Software RAID
1d49 0102 Intel RSTe SATA Software RAID
1d49 0103 Intel RSTe SATA Software RAID
1d49 0104 Intel RSTe SATA Software RAID
1d49 0105 Intel RSTe SATA Software RAID
2827 C610/X99 series chipset sSATA Controller [RAID mode]
2828 82801HM/HEM (ICH8M/ICH8M-E) SATA Controller [IDE mode]
1028 01f3 Inspiron 1420
103c 30c0 Compaq 6710b
17aa 20a8 ThinkPad R61
e4bf cc47 CCG-RUMBA
2829 82801HM/HEM (ICH8M/ICH8M-E) SATA Controller [AHCI mode]
1025 0121 Aspire 5920G
1028 022f Inspiron 1525
103c 30c0 Compaq 6710b
103c 30c1 Compaq 6910p
103c 30cc Pavilion dv6700
103c 30d9 Presario C700

1043 1017 X58LE
104d 9005 Vaio VGN-FZ260E
104d 902d VAIO VGN-NR120E
17aa 20a7 ThinkPad T61/R61
17c0 4083 Medion WIM 2210 Notebook PC [MD96850]
e4bf cc47 CCG-RUMBA
282a 82801 Mobile SATA Controller [RAID mode]
1028 040b Latitude E6510
e4bf 50c1 PC1-GROOVE
2830 82801H (ICH8 Family) USB UHCI Controller
#1
1025 0121 Aspire 5920G
1028 01da OptiPlex 745
1028 01f3 Inspiron 1420
1028 022f Inspiron 1525
103c 30c0 Compaq 6710b
103c 30c1 Compaq 6910p
103c 30cc Pavilion dv6700
103c 30d9 Presario C700
1043 1017 X58LE
1043 81ec P5B
104d 9005 Vaio VGN-FZ260E
104d 902d VAIO VGN-NR120E
1462 7235 P965 Neo MS-7235 mainboard
17aa 20aa ThinkPad T61/R61
17c0 4083 Medion WIM 2210 Notebook PC [MD96850]
e4bf cc47 CCG-RUMBA
2831 82801H (ICH8 Family) USB UHCI Controller #2
1025 0121 Aspire 5920G
1028 01da OptiPlex 745
1028 01f3 Inspiron 1420
1028 022f Inspiron 1525
103c 30c0 Compaq 6710b
103c 30c1 Compaq 6910p
103c 30cc Pavilion dv6700
103c 30d9 Presario C700
1043 1017 X58LE
1043 81ec P5B
104d 9005 Vaio VGN-FZ260E
104d 902d VAIO VGN-NR120E
1462 7235 P965 Neo MS-7235 mainboard
17aa 20aa ThinkPad T61/R61
17c0 4083 Medion WIM 2210 Notebook PC [MD96850]
e4bf cc47 CCG-RUMBA
2832 82801H (ICH8 Family) USB UHCI
Controller #3
1025 0121 Aspire 5920G
1028 01da OptiPlex 745

1028 01f3 Inspiron 1420
1028 022f Inspiron 1525
103c 30c0 Compaq 6710b
103c 30c1 Compaq 6910p
103c 30cc Pavilion dv6700
103c 30d9 Presario C700
1043 1017 X58LE
1043 81ec P5B
104d 9005 Vaio VGN-FZ260E
104d 902d VAIO VGN-NR120E
17aa 20aa ThinkPad T61/R61
17c0 4083 Medion WIM 2210 Notebook PC [MD96850]
e4bf cc47 CCG-RUMBA
2833 82801H (ICH8 Family) USB UHCI Controller #4
1043 81ec P5B
2834 82801H (ICH8 Family) USB UHCI Controller #4
1025 0121 Aspire 5920G
1028 01da OptiPlex 745
1028 01f3 Inspiron 1420
1028 022f Inspiron 1525
103c 30c0 Compaq 6710b
103c 30c1 Compaq 6910p
103c 30cc Pavilion dv6700
1043 1017 X58LE
1043 81ec P5B
104d 9005 Vaio VGN-FZ260E
104d 902d VAIO VGN-NR120E
1462 7235 P965 Neo MS-7235 mainboard
17aa 20aa ThinkPad T61/R61
17c0 4083 Medion WIM 2210 Notebook PC [MD96850]
e4bf cc47 CCG-RUMBA
2835 82801H (ICH8 Family) USB
UHCI Controller #5
1025 0121 Aspire 5920G
1028 01da OptiPlex 745
1028 01f3 Inspiron 1420
1028 022f Inspiron 1525
103c 30c0 Compaq 6710b
103c 30c1 Compaq 6910p
103c 30cc Pavilion dv6700
1043 1017 X58LE
1043 81ec P5B
104d 9005 Vaio VGN-FZ260E
104d 902d VAIO VGN-NR120E
17aa 20aa Thinkpad T61/R61
17c0 4083 Medion WIM 2210 Notebook PC [MD96850]
e4bf cc47 CCG-RUMBA
2836 82801H (ICH8 Family) USB2 EHCI Controller #1

1025 0121 Aspire 5920G
1028 01da OptiPlex 745
1028 01f3 Inspiron 1420
1028 022f Inspiron 1525
103c 30c0 Compaq 6710b
103c 30c1 Compaq 6910p
103c 30cc Pavilion dv6700
103c 30d9 Presario C700
1043 1017 X58LE
1043 81ec P5B
104d 9005 Vaio VGN-FZ260E
104d 902d VAIO VGN-NR120E
1462 7235 P965 Neo MS-7235 mainboard
17aa 20ab ThinkPad T61/R61
17c0 4083 Medion WIM 2210 Notebook PC [MD96850]
e4bf cc47 CCG-RUMBA
283a 82801H (ICH8 Family) USB2 EHCI Controller #2
1025 0121 Aspire 5920G
1028 01da
OptiPlex 745
1028 01f3 Inspiron 1420
1028 022f Inspiron 1525
103c 30c0 Compaq 6710b
103c 30c1 Compaq 6910p
103c 30cc Pavilion dv6700
1043 1017 X58LE
1043 81ec P5B
104d 9005 Vaio VGN-FZ260E
104d 902d VAIO VGN-NR120E
17aa 20ab ThinkPad T61/R61
17c0 4083 Medion WIM 2210 Notebook PC [MD96850]
e4bf cc47 CCG-RUMBA
283e 82801H (ICH8 Family) SMBus Controller
1025 0121 Aspire 5920G
1028 01da OptiPlex 745
1028 01f3 Inspiron 1420
1028 022f Inspiron 1525
103c 30d9 Presario C700
1043 1017 X58LE
1043 81ec P5B
104d 9005 Vaio VGN-FZ260E
104d 9008 Vaio VGN-SZ79SN_C
104d 902d VAIO VGN-NR120E
1462 7235 P965 Neo MS-7235 mainboard
17aa 20a9 ThinkPad T61/R61
17c0 4083 Medion WIM 2210 Notebook PC [MD96850]
e4bf cc47 CCG-RUMBA
283f 82801H (ICH8 Family) PCI Express Port 1

1028 01da OptiPlex 745
103c 30c1 Compaq 6910p
1043 1017 X58LE
104d 902d VAIO VGN-NR120E
17aa 20ad ThinkPad T61/R61
17c0 4083 Medion WIM 2210
Notebook PC [MD96850]
2841 82801H (ICH8 Family) PCI Express Port 2
103c 30c1 Compaq 6910p
1043 1017 X58LE
104d 902d VAIO VGN-NR120E
17aa 20ad ThinkPad T61/R61
17c0 4083 Medion WIM 2210 Notebook PC [MD96850]
2843 82801H (ICH8 Family) PCI Express Port 3
1043 1017 X58LE
104d 902d VAIO VGN-NR120E
17aa 20ad ThinkPad T61/R61
17c0 4083 Medion WIM 2210 Notebook PC [MD96850]
2845 82801H (ICH8 Family) PCI Express Port 4
1043 1017 X58LE
17aa 20ad ThinkPad T61/R61
17c0 4083 Medion WIM 2210 Notebook PC [MD96850]
2847 82801H (ICH8 Family) PCI Express Port 5
1028 01da OptiPlex 745
103c 30c1 Compaq 6910p
17aa 20ad ThinkPad T61/R61
17c0 4083 Medion WIM 2210 Notebook PC [MD96850]
2849 82801H (ICH8 Family) PCI Express Port 6
284b 82801H (ICH8 Family) HD Audio Controller
1025 011f Realtek ALC268 audio codec
1025 0121 Aspire 5920G
1025 0145 Realtek ALC889 (Aspire 8920G w. Dolby Theater)
1028 01da OptiPlex 745
1028 01f3 Inspiron 1420
1028
01f9 Latitude D630
1028 01ff Precision M4300
1028 022f Inspiron 1525
1028 0256 Studio 1735
103c 2802 Compaq dc7700p
103c 30c0 Compaq 6710b
103c 30c1 Compaq 6910p
103c 30cc Pavilion dv6700
1043 1339 M51S series
1043 17f3 X58LE
1043 81ec P5B
104d 9005 Vaio VGN-FZ260E
104d 9008 Vaio VGN-SZ79SN_C

104d 9016 Sony VAIO VGN-AR51M
104d 902d VAIO VGN-NR120E
14f1 5051 Presario C700
17aa 20ac ThinkPad T61/R61
17c0 4088 Medion WIM 2210 Notebook PC [MD96850]
8384 7616 Dell Vostro 1400
e4bf cc47 CCG-RUMBA
284f 82801H (ICH8 Family) Thermal Reporting Device
2850 82801HM/HEM (ICH8M/ICH8M-E) IDE Controller
1025 0121 Aspire 5920G
1028 01f3 Inspiron 1420
1028 022f Inspiron 1525
103c 30c0 Compaq 6710b
103c 30c1 Compaq 6910p
103c 30cc Pavilion dv6700
103c 30d9 Presario C700
1043 1017 X58LE
104d 9005 Vaio VGN-FZ260E
104d 902d VAIO VGN-NR120E
17aa 20a6 ThinkPad T61/R61
17c0 4083 Medion WIM 2210 Notebook PC
[MD96850]
e4bf cc47 CCG-RUMBA
28c0 Volume Management Device NVMe RAID Controller
2912 82801IH (ICH9DH) LPC Interface Controller
2914 82801IO (ICH9DO) LPC Interface Controller
1028 0211 Optiplex 755
2916 82801IR (ICH9R) LPC Interface Controller
1028 020d Inspiron 530
103c 2a6f Asus IPIBL-LB Motherboard
1043 8277 P5K PRO Motherboard
1462 7345 MS-7345 Motherboard
8086 5044 Desktop Board DP35DP
2917 ICH9M-E LPC Interface Controller
17aa 20f5 ThinkPad T400
e4bf cc4d CCM-BOOGIE
2918 82801IB (ICH9) LPC Interface Controller
1028 0236 PowerEdge R610 82801IB (ICH9) LPC Interface Controller
1462 7360 G33/P35 Neo
1af4 1100 QEMU Virtual Machine
2919 ICH9M LPC Interface Controller
2920 82801IR/IO/IH (ICH9R/DO/DH) 4 port SATA Controller [IDE mode]
1028 020d Inspiron 530
1028 020f PowerEdge R300 onboard SATA Controller
1028 0210 PowerEdge T300 onboard SATA Controller
1028 0211 Optiplex 755
1028 023c PowerEdge R200 onboard SATA Controller
1043

8277 P5K PRO Motherboard: 82801IR [ICH9R]
1462 7345 MS-7345 Motherboard: Intel 82801IR [ICH9R]
2921 82801IB (ICH9) 2 port SATA Controller [IDE mode]
1028 0235 PowerEdge R710 SATA IDE Controller
1028 0236 PowerEdge R610 SATA IDE Controller
1028 0237 PowerEdge T610 SATA IDE Controller
1462 7360 G33/P35 Neo
2922 82801IR/IO/IH (ICH9R/DO/DH) 6 port SATA Controller [AHCI mode]
1043 8277 P5K PRO Motherboard: 82801IR [ICH9R]
1462 7345 MS-7345 Motherboard: Intel 82801IR [ICH9R]
1af4 1100 QEMU Virtual Machine
8086 5044 Desktop Board DP35DP
2923 82801IB (ICH9) 4 port SATA Controller [AHCI mode]
2925 82801IR/IO (ICH9R/DO) SATA Controller [RAID mode]
1734 10e0 System Board D2542
8086 2925 System Board D2542
2926 82801I (ICH9 Family) 2 port SATA Controller [IDE mode]
1028 020d Inspiron 530
1028 020f PowerEdge R300 onboard SATA Controller
1028 0210 PowerEdge T300 onboard SATA Controller
1028 0211 Optiplex 755
1043 8277 P5K PRO Motherboard:
82801IR [ICH9R]
1462 7345 MS-7345 Motherboard: Intel 82801IR [ICH9R]
1462 7360 G33/P35 Neo
2928 82801IBM/IEM (ICH9M/ICH9M-E) 2 port SATA Controller [IDE mode]
2929 82801IBM/IEM (ICH9M/ICH9M-E) 4 port SATA Controller [AHCI mode]
103c 3628 dv6-1190en
17aa 20f8 ThinkPad T400
e4bf cc4d CCM-BOOGIE
292c 82801IEM (ICH9M-E) SATA Controller [RAID mode]
292d 82801IBM/IEM (ICH9M/ICH9M-E) 2 port SATA Controller [IDE mode]
e4bf cc4d CCM-BOOGIE
2930 82801I (ICH9 Family) SMBus Controller
1028 020d Inspiron 530
1028 0211 Optiplex 755
103c 2a6f Asus IPIBL-LB Motherboard
103c 3628 dv6-1190en
1043 8277 P5K PRO Motherboard: 82801IR [ICH9R]
1462 7345 MS-7345 Motherboard: Intel 82801I/IR [ICH9/ICH9R]
1462 7360 G33/P35 Neo
17aa 20f9 ThinkPad T400
1af4 1100 QEMU Virtual Machine
8086 5044 Desktop Board DP35DP
e4bf cc4d CCM-BOOGIE
2932 82801I (ICH9 Family) Thermal Subsystem
103c 3628 dv6-1190en
2934 82801I (ICH9 Family) USB UHCI Controller

#1

1028 020d Inspiron 530
1028 020f PowerEdge R300 onboard UHCI
1028 0210 PowerEdge T300 onboard UHCI
1028 0211 Optiplex 755
1028 0235 PowerEdge R710 USB UHCI Controller
1028 0236 PowerEdge R610 USB UHCI Controller
1028 0237 PowerEdge T610 USB UHCI Controller
1028 023c PowerEdge R200 onboard UHCI
1028 0287 PowerEdge M610 onboard UHCI
1028 029c PowerEdge M710 USB UHCI Controller
1028 2011 Optiplex 755
103c 2a6f Asus IPIBL-LB Motherboard
1043 8277 P5K PRO Motherboard: 82801IR [ICH9R]
1462 7345 MS-7345 Motherboard: Intel 82801I/IR [ICH9/ICH9R]
1462 7360 G33/P35 Neo
17aa 20f0 ThinkPad T400
1af4 1100 QEMU Virtual Machine
8086 5044 Desktop Board DP35DP
e4bf cc4d CCM-BOOGIE
2935 82801I (ICH9 Family) USB UHCI Controller #2
1028 020d Inspiron 530
1028 020f PowerEdge R300 onboard UHCI
1028 0210 PowerEdge T300 onboard UHCI
1028 0211 Optiplex 755
1028 0235 PowerEdge R710 USB UHCI Controller
1028 0236 PowerEdge R610
USB UHCI Controller
1028 0237 PowerEdge T610 USB UHCI Controller
1028 023c PowerEdge R200 onboard UHCI
1028 0287 PowerEdge M610 onboard UHCI
1028 029c PowerEdge M710 USB UHCI Controller
103c 2a6f Asus IPIBL-LB Motherboard
1043 8277 P5K PRO Motherboard: 82801IR [ICH9R]
1462 7345 MS-7345 Motherboard: Intel 82801I/IR [ICH9/ICH9R]
1462 7360 G33/P35 Neo
17aa 20f0 ThinkPad T400
1af4 1100 QEMU Virtual Machine
8086 5044 Desktop Board DP35DP
e4bf cc4d CCM-BOOGIE
2936 82801I (ICH9 Family) USB UHCI Controller #3
1028 020d Inspiron 530
1028 020f PowerEdge R300 onboard UHCI
1028 0210 PowerEdge T300 onboard UHCI
1028 0211 Optiplex 755
1028 0237 PowerEdge T610 USB UHCI Controller
1028 023c PowerEdge R200 onboard UHCI
1028 0287 PowerEdge M610 onboard UHCI

1028 029c PowerEdge M710 USB UHCI Controller
103c 2a6f Asus IPIBL-LB Motherboard
1043 8277 P5K PRO Motherboard: 82801IR [ICH9R]
1462 7345 MS-7345 Motherboard: Intel 82801I/IR [ICH9/ICH9R]
1462
7360 G33/P35 Neo
17aa 20f0 ThinkPad T400
1af4 1100 QEMU Virtual Machine
8086 5044 Desktop Board DP35DP
e4bf cc4d CCM-BOOGIE
2937 82801I (ICH9 Family) USB UHCI Controller #4
1028 020d Inspiron 530
1028 0211 Optiplex 755
1028 0235 PowerEdge R710 USB UHCI Controller
1028 0236 PowerEdge R610 USB UHCI Controller
1028 0237 PowerEdge T610 USB UHCI Controller
1028 0287 PowerEdge M610 onboard UHCI
1028 029c PowerEdge M710 USB UHCI Controller
1028 2011 Optiplex 755
103c 2a6f Asus IPIBL-LB Motherboard
1043 8277 P5K PRO Motherboard: 82801IR [ICH9R]
1462 7345 MS-7345 Motherboard: Intel 82801I/IR [ICH9/ICH9R]
1462 7360 G33/P35 Neo
17aa 20f0 ThinkPad T400
1af4 1100 QEMU Virtual Machine
8086 2937 Optiplex 755
8086 2942 828011 (ICH9 Family) USB UHCI Controller
8086 5044 Desktop Board DP35DP
e4bf cc4d CCM-BOOGIE
2938 82801I (ICH9 Family) USB UHCI Controller #5
1028 020d Inspiron 530
1028 0211 Optiplex 755
1028
0235 PowerEdge R710 USB UHCI Controller
1028 0236 PowerEdge R610 USB UHCI Controller
1028 0237 PowerEdge T610 USB UHCI Controller
1028 0287 PowerEdge M610 onboard UHCI
1028 029c PowerEdge M710 USB UHCI Controller
103c 2a6f Asus IPIBL-LB Motherboard
1043 8277 P5K PRO Motherboard: 82801IR [ICH9R]
1462 7345 MS-7345 Motherboard: Intel 82801I/IR [ICH9/ICH9R]
1462 7360 G33/P35 Neo
17aa 20f0 ThinkPad T400
1af4 1100 QEMU Virtual Machine
8086 2938 Optiplex 755
8086 5044 Desktop Board DP35DP
e4bf cc4d CCM-BOOGIE
2939 82801I (ICH9 Family) USB UHCI Controller #6

1028 020d Inspiron 530
1028 0210 PowerEdge T300 onboard UHCI
1028 0237 PowerEdge T610 USB UHCI Controller
103c 2a6f Asus IPIBL-LB Motherboard
1043 8277 P5K PRO Motherboard: 82801IR [ICH9R]
1462 7345 MS-7345 Motherboard: Intel 82801I/IR [ICH9/ICH9R]
1462 7360 G33/P35 Neo
17aa 20f0 ThinkPad T400
1af4 1100 QEMU Virtual Machine
8086 5044 Desktop Board DP35DP
e4bf cc4d

CCM-BOOGIE

293a 82801I (ICH9 Family) USB2 EHCI Controller #1
1028 020d Inspiron 530
1028 020f PowerEdge R300 onboard EHCI
1028 0210 PowerEdge T300 onboard EHCI
1028 0211 Optiplex 755
1028 0235 PowerEdge R710 USB EHCI Controller
1028 0236 PowerEdge R610 USB EHCI Controller
1028 0237 PowerEdge T610 USB EHCI Controller
1028 023c PowerEdge R200 onboard EHCI
1028 0287 PowerEdge M610 onboard EHCI
1028 029c PowerEdge M710 USB EHCI Controller
103c 2a6f Asus IPIBL-LB Motherboard
1043 8277 P5K PRO Motherboard: 82801IR [ICH9R]
1462 7345 MS-7345 Motherboard: Intel 82801I/IR [ICH9/ICH9R]
1462 7360 G33/P35 Neo
17aa 20f1 ThinkPad T400
1af4 1100 QEMU Virtual Machine
8086 5044 Desktop Board DP35DP
e4bf cc4d CCM-BOOGIE

293c 82801I (ICH9 Family) USB2 EHCI Controller #2

1028 020d Inspiron 530
1028 0211 Optiplex 755
1028 0235 PowerEdge R710 USB EHCI Controller
1028 0236 PowerEdge R610 USB EHCI Controller
1028 0237 PowerEdge T610 USB

EHCI Controller

1028 0287 PowerEdge M610 onboard EHCI
1028 029c PowerEdge M710 USB EHCI Controller
103c 2a6f Asus IPIBL-LB Motherboard
1043 8277 P5K PRO Motherboard: 82801IR [ICH9R]
1462 7345 MS-7345 Motherboard: Intel 82801I/IR [ICH9/ICH9R]
1462 7360 G33/P35 Neo
17aa 20f1 ThinkPad T400
1af4 1100 QEMU Virtual Machine
8086 293c Optiplex 755
8086 5044 Desktop Board DP35DP

e4bf cc4d CCM-BOOGIE
293e 82801I (ICH9 Family) HD Audio Controller
1028 020d Inspiron 530
1028 0211 Optiplex 755
103c 2a6f Asus IPIBL-LB Motherboard
103c 3628 dv6-1190en
1043 829f P5K PRO Motherboard: 82801IR [ICH9R]
1462 735a MS-7345 Motherboard: Intel 82801I/IR [ICH9/ICH9R]
1462 7360 G33/P35 Neo
17aa 20f2 ThinkPad T400
1af4 1100 QEMU Virtual Machine
8086 293e Optiplex 755
8086 2940 Optiplex 755
e4bf cc4d CCM-BOOGIE
2940 82801I (ICH9 Family) PCI Express Port 1
1028 020d Inspiron 530
1028 0211 Optiplex 755
103c 2a6f Asus IPIBL-LB Motherboard
1043
8277 P5K PRO Motherboard: 82801IR [ICH9R]
1462 7345 MS-7345 Motherboard: Intel 82801I/IR [ICH9/ICH9R]
8086 2940 Optiplex 755
2942 82801I (ICH9 Family) PCI Express Port 2
1028 020d Inspiron 530
2944 82801I (ICH9 Family) PCI Express Port 3
1028 020d Inspiron 530
103c 2a6f Asus IPIBL-LB Motherboard
2946 82801I (ICH9 Family) PCI Express Port 4
1028 020d Inspiron 530
2948 82801I (ICH9 Family) PCI Express Port 5
1028 020d Inspiron 530
1043 8277 P5K PRO Motherboard: 82801IR [ICH9R]
1462 7345 MS-7345 Motherboard: Intel 82801I/IR [ICH9/ICH9R]
294a 82801I (ICH9 Family) PCI Express Port 6
1028 020d Inspiron 530
1043 8277 P5K PRO Motherboard: 82801IR [ICH9R]
1462 7345 MS-7345 Motherboard: Intel 82801I/IR [ICH9/ICH9R]
294c 82566DC-2 Gigabit Network Connection
17aa 302e 82566DM-2 Gigabit Network Connection
2970 82946GZ/PL/GL Memory Controller Hub
1043 823b P5B-MX/WiFi-AP
2971 82946GZ/PL/GL PCI Express Root Port
2972 82946GZ/GL Integrated
Graphics Controller
1043 823b P5B-MX/WiFi-AP
2973 82946GZ/GL Integrated Graphics Controller
2974 82946GZ/GL HECI Controller
2975 82946GZ/GL HECI Controller

2976 82946GZ/GL PT IDER Controller
2977 82946GZ/GL KT Controller
2980 82G35 Express DRAM Controller
2981 82G35 Express PCI Express Root Port
2982 82G35 Express Integrated Graphics Controller
2983 82G35 Express Integrated Graphics Controller
2984 82G35 Express HECI Controller
2990 82Q963/Q965 Memory Controller Hub
1028 01da OptiPlex 745
2991 82Q963/Q965 PCI Express Root Port
2992 82Q963/Q965 Integrated Graphics Controller
2993 82Q963/Q965 Integrated Graphics Controller
2994 82Q963/Q965 HECI Controller
2995 82Q963/Q965 HECI Controller
2996 82Q963/Q965 PT IDER Controller
2997 82Q963/Q965 KT Controller
29a0 82P965/G965 Memory Controller Hub
1043 81ea P5B
1462 7276 MS-7276 [G965MDH]
29a1 82P965/G965 PCI Express Root Port
29a2 82G965 Integrated Graphics Controller
1462 7276
MS-7276 [G965MDH]
29a3 82G965 Integrated Graphics Controller
29a4 82P965/G965 HECI Controller
29a5 82P965/G965 HECI Controller
29a6 82P965/G965 PT IDER Controller
29a7 82P965/G965 KT Controller
29b0 82Q35 Express DRAM Controller
1028 0211 OptiPlex 755
29b1 82Q35 Express PCI Express Root Port
1028 0211 OptiPlex 755
29b2 82Q35 Express Integrated Graphics Controller
1028 0211 OptiPlex 755
29b3 82Q35 Express Integrated Graphics Controller
1028 0211 OptiPlex 755
29b4 82Q35 Express MEI Controller
1028 0211 OptiPlex 755
29b5 82Q35 Express MEI Controller
29b6 82Q35 Express PT IDER Controller
1028 0211 OptiPlex 755
29b7 82Q35 Express Serial KT Controller
1028 0211 OptiPlex 755
29c0 82G33/G31/P35/P31 Express DRAM Controller
1028 020d Inspiron 530
103c 2a6f Asus IPIBL-LB Motherboard
1043 8276 P5K PRO Motherboard: Intel 82P35 Northbridge
1043 82b0 P5KPL-VM Motherboard

1462 7345 MS-7345 Motherboard: Intel 82G33/P35 Northbridge
1462
7360 G33/P35 Neo
1af4 1100 QEMU Virtual Machine
8086 5044 Desktop Board DP35DP
29c1 82G33/G31/P35/P31 Express PCI Express Root Port
1028 020d Inspiron 530
1043 8276 P5K PRO Motherboard: Intel 82P35 Northbridge
29c2 82G33/G31 Express Integrated Graphics Controller
1028 020d Inspiron 530
1043 82b0 P5KPL-VM Motherboard
29c3 82G33/G31 Express Integrated Graphics Controller
1028 020d Inspiron 530
1043 82b0 P5KPL-VM Motherboard
29c4 82G33/G31/P35/P31 Express MEI Controller
8086 5044 Desktop Board DP35DP
29c5 82G33/G31/P35/P31 Express MEI Controller
29c6 82G33/G31/P35/P31 Express PT IDER Controller
29c7 82G33/G31/P35/P31 Express Serial KT Controller
29cf Virtual HECI Controller
29d0 82Q33 Express DRAM Controller
29d1 82Q33 Express PCI Express Root Port
29d2 82Q33 Express Integrated Graphics Controller
29d3 82Q33 Express Integrated Graphics Controller
29d4 82Q33 Express MEI Controller
29d5 82Q33 Express MEI Controller
29d6 82Q33 Express
PT IDER Controller
29d7 82Q33 Express Serial KT Controller
29e0 82X38/X48 Express DRAM Controller
29e1 82X38/X48 Express Host-Primary PCI Express Bridge
29e4 82X38/X48 Express MEI Controller
29e5 82X38/X48 Express MEI Controller
29e6 82X38/X48 Express PT IDER Controller
29e7 82X38/X48 Express Serial KT Controller
29e9 82X38/X48 Express Host-Secondary PCI Express Bridge
29f0 3200/3210 Chipset DRAM Controller
29f1 3200/3210 Chipset Host-Primary PCI Express Bridge
29f4 3200/3210 Chipset MEI Controller
29f5 3200/3210 Chipset MEI Controller
29f6 3200/3210 Chipset PT IDER Controller
29f7 3200/3210 Chipset Serial KT Controller
29f9 3210 Chipset Host-Secondary PCI Express Bridge
2a00 Mobile PM965/GM965/GL960 Memory Controller Hub
1025 0121 Aspire 5920G
1028 01f3 Inspiron 1420
1028 022f Inspiron 1525
103c 30c0 Compaq 6710b

103c 30c1 Compaq 6910p
103c 30cc Pavilion dv6700
103c 30d9 Presario C700
1043 1017 X58LE
104d 9005 Vaio VGN-FZ260E
104d
902d VAIO VGN-NR120E
17aa 20b1 ThinkPad T61
17aa 20b3 ThinkPad T61/R61
17c0 4082 Medion WIM 2210 Notebook PC [MD96850]
e4bf cc47 CCG-RUMBA
2a01 Mobile PM965/GM965/GL960 PCI Express Root Port
2a02 Mobile GM965/GL960 Integrated Graphics Controller (primary)
1028 01f3 Inspiron 1420
1028 01f9 Latitude D630
1028 022f Inspiron 1525
103c 30c0 Compaq 6710b
103c 30d9 Presario C700
1043 14e2 X58LE
104d 902d VAIO VGN-NR120E
17aa 20b5 GM965 [X3100] on ThinkPad T61/R61
17c0 4082 GM965 on Medion WIM 2210 Notebook PC [MD96850]
e4bf cc47 CCG-RUMBA
2a03 Mobile GM965/GL960 Integrated Graphics Controller (secondary)
1028 01f3 Inspiron 1420
1028 022f Inspiron 1525
103c 30c0 Compaq 6710b
103c 30d9 Presario C700
1043 14e2 X58LE
104d 902d VAIO VGN-NR120E
17aa 20b5 GM965 [X3100] on ThinkPad T61/R61
17c0 4082 GM965 on Medion WIM 2210 Notebook PC [MD96850]
e4bf cc47 CCG-RUMBA
2a04 Mobile PM965/GM965 MEI Controller
103c 30c1
Compaq 6910p
2a05 Mobile PM965/GM965 MEI Controller
2a06 Mobile PM965/GM965 PT IDER Controller
103c 30c1 Compaq 6910p
2a07 Mobile PM965/GM965 KT Controller
103c 30c1 Compaq 6910p
2a10 Mobile GME965/GLE960 Memory Controller Hub
e4bf cc47 CCG-RUMBA
2a11 Mobile GME965/GLE960 PCI Express Root Port
2a12 Mobile GME965/GLE960 Integrated Graphics Controller
e4bf cc47 CCG-RUMBA
2a13 Mobile GME965/GLE960 Integrated Graphics Controller
e4bf cc47 CCG-RUMBA

2a14 Mobile GME965/GLE960 MEI Controller
2a15 Mobile GME965/GLE960 MEI Controller
2a16 Mobile GME965/GLE960 PT IDER Controller
2a17 Mobile GME965/GLE960 KT Controller
2a40 Mobile 4 Series Chipset Memory Controller Hub
17aa 20e0 ThinkPad T400
e4bf cc4d CCM-BOOGIE
2a41 Mobile 4 Series Chipset PCI Express Graphics Port
e4bf cc4d CCM-BOOGIE
2a42 Mobile 4 Series Chipset Integrated Graphics Controller
17aa 2112 ThinkPad T400
e4bf cc4d CCM-BOOGIE
2a43 Mobile 4 Series Chipset Integrated Graphics
Controller
17aa 2112 ThinkPad T400
e4bf cc4d CCM-BOOGIE
2a44 Mobile 4 Series Chipset MEI Controller
17aa 20e6 ThinkPad T400
2a45 Mobile 4 Series Chipset MEI Controller
2a46 Mobile 4 Series Chipset PT IDER Controller
2a47 Mobile 4 Series Chipset AMT SOL Redirection
2a50 Cantiga MEI Controller
2a51 Cantiga MEI Controller
2a52 Cantiga PT IDER Controller
2a53 Cantiga AMT SOL Redirection
2b00 Xeon Processor E7 Product Family System Configuration Controller 1
2b02 Xeon Processor E7 Product Family System Configuration Controller 2
2b04 Xeon Processor E7 Product Family Power Controller
2b08 Xeon Processor E7 Product Family Caching Agent 0
2b0c Xeon Processor E7 Product Family Caching Agent 1
2b10 Xeon Processor E7 Product Family QPI Home Agent 0
2b13 Xeon Processor E7 Product Family Memory Controller 0c
2b14 Xeon Processor E7 Product Family Memory Controller 0a
2b16 Xeon Processor E7 Product Family Memory Controller 0b
2b18 Xeon Processor E7 Product
Family QPI Home Agent 1
2b1b Xeon Processor E7 Product Family Memory Controller 1c
2b1c Xeon Processor E7 Product Family Memory Controller 1a
2b1e Xeon Processor E7 Product Family Memory Controller 1b
2b20 Xeon Processor E7 Product Family Last Level Cache Coherence Engine 0
2b22 Xeon Processor E7 Product Family System Configuration Controller 3
2b24 Xeon Processor E7 Product Family Last Level Cache Coherence Engine 1
2b28 Xeon Processor E7 Product Family Last Level Cache Coherence Engine 2
2b2a Xeon Processor E7 Product Family System Configuration Controller 4
2b2c Xeon Processor E7 Product Family Last Level Cache Coherence Engine 3
2b30 Xeon Processor E7 Product Family Last Level Cache Coherence Engine 4
2b34 Xeon Processor E7 Product Family Last Level Cache Coherence Engine 5
2b38 Xeon Processor E7 Product Family Last Level Cache Coherence Engine 6

2b3c Xeon Processor E7 Product Family Last Level Cache Coherence Engine 7

2b40 Xeon Processor E7 Product Family QPI Router Port 0-1

2b42 Xeon Processor E7 Product Family QPI Router Port 2-3

2b44 Xeon Processor E7 Product Family QPI Router Port 4-5

2b46 Xeon Processor E7 Product Family QPI Router Port 6-7

2b48 Xeon Processor E7 Product Family Test and Debug 0

2b4c Xeon Processor E7 Product Family Test and Debug 1

2b50 Xeon Processor E7 Product Family QPI Physical Port 0: REUT control/status

2b52 Xeon Processor E7 Product Family QPI Physical Port 0: Misc. control/status

2b54 Xeon Processor E7 Product Family QPI Physical Port 1: REUT control/status

2b56 Xeon Processor E7 Product Family QPI Physical Port 1: Misc. control/status

2b58 Xeon Processor E7 Product Family QPI Physical Port 2: REUT control/status

2b5a Xeon Processor E7 Product Family QPI Physical Port 2: Misc. control/status

2b5c Xeon Processor E7 Product Family QPI Physical Port 3: REUT control/status

2b5e Xeon Processor E7 Product Family QPI Physical Port 3: Misc. control/status

2b60 Xeon Processor E7 Product Family SMI Physical Port 0: REUT control/status

2b62 Xeon Processor E7 Product Family SMI Physical Port 0: Misc control/status

2b64 Xeon Processor E7 Product Family SMI Physical Port 1: REUT control/status

2b66 Xeon Processor E7 Product Family SMI Physical Port 1: Misc control/status

2b68 Xeon Processor E7 Product Family Last Level Cache Coherence Engine 8

2b6c Xeon Processor E7 Product Family Last Level Cache Coherence Engine 9

2c01 Xeon 5500/Core i7 QuickPath Architecture System Address Decoder

2c10 Xeon 5500/Core i7 QPI Link 0

2c11 Xeon 5500/Core i7 QPI Physical 0

2c14 Xeon 5500/Core i7 QPI Link 1

2c15 Xeon 5500/Core i7 QPI Physical 1

2c18 Xeon 5500/Core i7 Integrated Memory Controller

2c19 Xeon 5500/Core i7 Integrated Memory Controller Target Address Decoder

2c1a Xeon 5500/Core i7 Integrated Memory Controller RAS Registers

2c1c Xeon 5500/Core i7 Integrated Memory Controller Test Registers

2c20 Xeon 5500/Core i7 Integrated Memory Controller Channel 0 Control Registers

2c21 Xeon 5500/Core i7 Integrated Memory Controller Channel 0 Address Registers

2c22 Xeon 5500/Core i7 Integrated Memory Controller Channel 0 Rank Registers

2c23 Xeon 5500/Core i7 Integrated Memory Controller Channel 0 Thermal Control Registers

2c28 Xeon 5500/Core i7 Integrated Memory Controller Channel 1 Control Registers

2c29 Xeon 5500/Core i7 Integrated Memory Controller Channel 1 Address Registers

2c2a Xeon 5500/Core i7 Integrated Memory Controller Channel 1 Rank Registers

2c2b Xeon 5500/Core i7 Integrated Memory Controller Channel 1 Thermal Control Registers

2c30 Xeon 5500/Core i7 Integrated Memory Controller Channel 2 Control Registers

2c31 Xeon 5500/Core i7 Integrated Memory Controller Channel 2 Address Registers

2c32 Xeon 5500/Core i7 Integrated Memory Controller Channel 2 Rank Registers

2c33 Xeon 5500/Core i7 Integrated Memory Controller Channel 2 Thermal Control Registers

2c40 Xeon 5500/Core i7 QuickPath Architecture Generic Non-Core Registers

2c41 Xeon 5500/Core i7 QuickPath Architecture Generic Non-Core Registers

2c50 Core Processor QuickPath Architecture Generic Non-Core Registers
2c51 Core Processor QuickPath Architecture Generic Non-Core Registers
2c52 Core Processor QuickPath Architecture Generic Non-Core Registers
2c53 Core Processor QuickPath Architecture Generic Non-Core Registers
2c54 Core Processor QuickPath Architecture Generic Non-Core Registers
2c55 Core Processor QuickPath Architecture Generic Non-Core Registers
2c56 Core Processor QuickPath Architecture Generic Non-Core Registers
2c57 Core Processor QuickPath Architecture Generic Non-Core Registers
2c58 Xeon C5500/C3500 QPI Generic Non-core Registers
2c59 Xeon C5500/C3500 QPI Generic Non-core Registers
2c5a Xeon C5500/C3500 QPI Generic Non-core Registers
2c5b Xeon C5500/C3500 QPI Generic Non-core Registers
2c5c Xeon C5500/C3500 QPI Generic Non-core Registers
2c5d Xeon C5500/C3500 QPI Generic Non-core Registers
2c5e
Xeon C5500/C3500 QPI Generic Non-core Registers
2c5f Xeon C5500/C3500 QPI Generic Non-core Registers
2c61 Core Processor QuickPath Architecture Generic Non-core Registers
2c62 Core Processor QuickPath Architecture Generic Non-core Registers
2c70 Xeon 5600 Series QuickPath Architecture Generic Non-core Registers
2c81 Core Processor QuickPath Architecture System Address Decoder
2c90 Core Processor QPI Link 0
2c91 Core Processor QPI Physical 0
2c98 Core Processor Integrated Memory Controller
2c99 Core Processor Integrated Memory Controller Target Address Decoder
2c9a Core Processor Integrated Memory Controller Test Registers
2c9c Core Processor Integrated Memory Controller Test Registers
2ca0 Core Processor Integrated Memory Controller Channel 0 Control Registers
2ca1 Core Processor Integrated Memory Controller Channel 0 Address Registers
2ca2 Core Processor Integrated Memory Controller Channel 0 Rank Registers
2ca3 Core Processor Integrated Memory Controller
Channel 0 Thermal Control Registers
2ca8 Core Processor Integrated Memory Controller Channel 1 Control Registers
2ca9 Core Processor Integrated Memory Controller Channel 1 Address Registers
2caa Core Processor Integrated Memory Controller Channel 1 Rank Registers
2cab Core Processor Integrated Memory Controller Channel 1 Thermal Control Registers
2cc1 Xeon C5500/C3500 QPI System Address Decoder
2cd0 Xeon C5500/C3500 QPI Link 0
2cd1 Xeon C5500/C3500 QPI Physical 0
2cd4 Xeon C5500/C3500 QPI Link 1
2cd5 Xeon C5500/C3500 QPI Physical 1
2cd8 Xeon C5500/C3500 Integrated Memory Controller Registers
2cd9 Xeon C5500/C3500 Integrated Memory Controller Target Address Decoder
2cda Xeon C5500/C3500 Integrated Memory Controller RAS Registers
2cdc Xeon C5500/C3500 Integrated Memory Controller Test Registers
2ce0 Xeon C5500/C3500 Integrated Memory Controller Channel 0 Control
2ce1 Xeon C5500/C3500 Integrated Memory Controller Channel 0 Address
2ce2 Xeon C5500/C3500 Integrated

Memory Controller Channel 0 Rank

2ce3 Xeon C5500/C3500 Integrated Memory Controller Channel 0 Thermal Control

2ce8 Xeon C5500/C3500 Integrated Memory Controller Channel 1 Control

2ce9 Xeon C5500/C3500 Integrated Memory Controller Channel 1 Address

2cea Xeon C5500/C3500 Integrated Memory Controller Channel 1 Rank

2ceb Xeon C5500/C3500 Integrated Memory Controller Channel 1 Thermal Control

2cf0 Xeon C5500/C3500 Integrated Memory Controller Channel 2 Control

2cf1 Xeon C5500/C3500 Integrated Memory Controller Channel 2 Address

2cf2 Xeon C5500/C3500 Integrated Memory Controller Channel 2 Rank

2cf3 Xeon C5500/C3500 Integrated Memory Controller Channel 2 Thermal Control

2d01 Core Processor QuickPath Architecture System Address Decoder

2d10 Core Processor QPI Link 0

2d11 1st Generation Core i3/5/7 Processor QPI Physical 0

2d12 1st Generation Core i3/5/7 Processor Reserved

2d13 1st Generation Core i3/5/7 Processor Reserved

2d81 Xeon 5600 Series QuickPath
Architecture System Address Decoder

2d90 Xeon 5600 Series QPI Link 0

2d91 Xeon 5600 Series QPI Physical 0

2d92 Xeon 5600 Series Mirror Port Link 0

2d93 Xeon 5600 Series Mirror Port Link 1

2d94 Xeon 5600 Series QPI Link 1

2d95 Xeon 5600 Series QPI Physical 1

2d98 Xeon 5600 Series Integrated Memory Controller Registers

2d99 Xeon 5600 Series Integrated Memory Controller Target Address Decoder

2d9a Xeon 5600 Series Integrated Memory Controller RAS Registers

2d9c Xeon 5600 Series Integrated Memory Controller Test Registers

2da0 Xeon 5600 Series Integrated Memory Controller Channel 0 Control

2da1 Xeon 5600 Series Integrated Memory Controller Channel 0 Address

2da2 Xeon 5600 Series Integrated Memory Controller Channel 0 Rank

2da3 Xeon 5600 Series Integrated Memory Controller Channel 0 Thermal Control

2da8 Xeon 5600 Series Integrated Memory Controller Channel 1 Control

2da9 Xeon 5600 Series Integrated Memory Controller Channel 1 Address

2daa Xeon 5600 Series Integrated
Memory Controller Channel 1 Rank

2dab Xeon 5600 Series Integrated Memory Controller Channel 1 Thermal Control

2db0 Xeon 5600 Series Integrated Memory Controller Channel 2 Control

2db1 Xeon 5600 Series Integrated Memory Controller Channel 2 Address

2db2 Xeon 5600 Series Integrated Memory Controller Channel 2 Rank

2db3 Xeon 5600 Series Integrated Memory Controller Channel 2 Thermal Control

2e00 4 Series Chipset DRAM Controller

2e01 4 Series Chipset PCI Express Root Port

2e02 4 Series Chipset Integrated Graphics Controller

2e03 4 Series Chipset Integrated Graphics Controller

2e04 4 Series Chipset HECI Controller

2e05 4 Series Chipset HECI Controller

2e06 4 Series Chipset PT IDER Controller

2e07 4 Series Chipset Serial KT Controller

2e10 4 Series Chipset DRAM Controller
2e11 4 Series Chipset PCI Express Root Port
2e12 4 Series Chipset Integrated Graphics Controller
17aa 3048 ThinkCentre M6258
2e13 4 Series Chipset Integrated Graphics Controller
2e14
4 Series Chipset HECI Controller
2e15 4 Series Chipset HECI Controller
2e16 4 Series Chipset PT IDER Controller
2e17 4 Series Chipset Serial KT Controller
2e20 4 Series Chipset DRAM Controller
1028 0283 Vostro 220
1043 82d3 P5Q Deluxe Motherboard
1458 5000 GA-EP45-DS5/GA-EG45M-DS2H Motherboard
2e21 4 Series Chipset PCI Express Root Port
1043 82d3 P5Q Deluxe Motherboard
1458 5000 GA-EP45-DS5 Motherboard
2e22 4 Series Chipset Integrated Graphics Controller
1458 d000 GA-EG45M-DS2H Mainboard
2e23 4 Series Chipset Integrated Graphics Controller
1458 d000 GA-EG45M-DS2H Mainboard
2e24 4 Series Chipset HECI Controller
2e25 4 Series Chipset HECI Controller
2e26 4 Series Chipset PT IDER Controller
2e27 4 Series Chipset Serial KT Controller
2e29 4 Series Chipset PCI Express Root Port
2e30 4 Series Chipset DRAM Controller
103c 2a8c Compaq 500B Microtower
2e31 4 Series Chipset PCI Express Root Port
2e32 4 Series Chipset Integrated Graphics
Controller
103c 2a8c Compaq 500B Microtower
2e33 4 Series Chipset Integrated Graphics Controller
2e34 4 Series Chipset HECI Controller
2e35 4 Series Chipset HECI Controller
2e36 4 Series Chipset PT IDER Controller
2e37 4 Series Chipset Serial KT Controller
2e40 4 Series Chipset DRAM Controller
2e41 4 Series Chipset PCI Express Root Port
2e42 4 Series Chipset Integrated Graphics Controller
2e43 4 Series Chipset Integrated Graphics Controller
2e44 4 Series Chipset HECI Controller
2e45 4 Series Chipset HECI Controller
2e46 4 Series Chipset PT IDER Controller
2e47 4 Series Chipset Serial KT Controller
2e50 CE Media Processor CE3100
2e52 CE Media Processor Clock and Reset Controller
2e58 CE Media Processor Interrupt Controller

2e5a CE Media Processor CE3100 A/V Bridge
2e5b Graphics Media Accelerator 500 Graphics
2e5c CE Media Processor Video Decoder
2e5d CE Media Processor Transport Stream Interface
2e5e CE Media Processor Transport Stream Processor
0
2e5f CE Media Processor Audio DSP
2e60 CE Media Processor Audio Interfaces
2e61 CE Media Processor Video Display Controller
2e62 CE Media Processor Video Processing Unit
2e63 CE Media Processor HDMI Tx Interface
2e65 CE Media Processor Expansion Bus Interface
2e66 CE Media Processor UART
2e67 CE Media Processor General Purpose I/Os
2e68 CE Media Processor I2C Interface
2e69 CE Media Processor Smart Card Interface
2e6a CE Media Processor SPI Master Interface
2e6e CE Media Processor Gigabit Ethernet Controller
2e6f CE Media Processor Media Timing Unit
2e70 CE Media Processor USB
2e71 CE Media Processor SATA
2e73 CE Media Processor CE3100 PCI Express
2e90 4 Series Chipset DRAM Controller
2e91 4 Series Chipset PCI Express Root Port
2e92 4 Series Chipset Integrated Graphics Controller
2e93 4 Series Chipset Integrated Graphics Controller
2e94 4 Series Chipset HECI Controller
2e95 4 Series Chipset HECI Controller
2e96 4 Series Chipset PT
IDER Controller
2f00 Xeon E7 v3/Xeon E5 v3/Core i7 DMI2
2f01 Xeon E7 v3/Xeon E5 v3/Core i7 PCI Express Root Port 0
2f02 Xeon E7 v3/Xeon E5 v3/Core i7 PCI Express Root Port 1
2f03 Xeon E7 v3/Xeon E5 v3/Core i7 PCI Express Root Port 1
2f04 Xeon E7 v3/Xeon E5 v3/Core i7 PCI Express Root Port 2
2f05 Xeon E7 v3/Xeon E5 v3/Core i7 PCI Express Root Port 2
2f06 Xeon E7 v3/Xeon E5 v3/Core i7 PCI Express Root Port 2
2f07 Xeon E7 v3/Xeon E5 v3/Core i7 PCI Express Root Port 2
2f08 Xeon E7 v3/Xeon E5 v3/Core i7 PCI Express Root Port 3
2f09 Xeon E7 v3/Xeon E5 v3/Core i7 PCI Express Root Port 3
2f0a Xeon E7 v3/Xeon E5 v3/Core i7 PCI Express Root Port 3
2f0b Xeon E7 v3/Xeon E5 v3/Core i7 PCI Express Root Port 3
2f0d Haswell Xeon Non-Transparent Bridge (Back-to-back)
2f0e Haswell Xeon Non-Transparent Bridge (Primary Side)
2f0f Haswell Xeon Non-Transparent Bridge (Secondary Side)
2f10 Xeon E7 v3/Xeon E5 v3/Core i7 IIO Debug
2f11 Xeon E7 v3/Xeon E5 v3/Core i7 IIO Debug
2f12

Xeon E7 v3/Xeon E5 v3/Core i7 IIO Debug
2f13 Xeon E7 v3/Xeon E5 v3/Core i7 IIO Debug
2f14 Xeon E7 v3/Xeon E5 v3/Core i7 IIO Debug
2f15 Xeon E7 v3/Xeon E5 v3/Core i7 IIO Debug
2f16 Xeon E7 v3/Xeon E5 v3/Core i7 IIO Debug
2f17 Xeon E7 v3/Xeon E5 v3/Core i7 IIO Debug
2f18 Xeon E7 v3/Xeon E5 v3/Core i7 IIO Debug
2f19 Xeon E7 v3/Xeon E5 v3/Core i7 IIO Debug
2f1a Xeon E7 v3/Xeon E5 v3/Core i7 IIO Debug
2f1b Xeon E7 v3/Xeon E5 v3/Core i7 IIO Debug
2f1c Xeon E7 v3/Xeon E5 v3/Core i7 IIO Debug
2f1d Xeon E7 v3/Xeon E5 v3/Core i7 PCIe Ring Interface
2f1e Xeon E7 v3/Xeon E5 v3/Core i7 Scratchpad & Semaphore Registers
2f1f Xeon E7 v3/Xeon E5 v3/Core i7 Scratchpad & Semaphore Registers
2f20 Xeon E7 v3/Xeon E5 v3/Core i7 DMA Channel 0
2f21 Xeon E7 v3/Xeon E5 v3/Core i7 DMA Channel 1
2f22 Xeon E7 v3/Xeon E5 v3/Core i7 DMA Channel 2
2f23 Xeon E7 v3/Xeon E5 v3/Core i7 DMA Channel 3
2f24 Xeon E7 v3/Xeon E5 v3/Core i7 DMA Channel 4
2f25 Xeon E7 v3/Xeon E5 v3/Core
i7 DMA Channel 5
2f26 Xeon E7 v3/Xeon E5 v3/Core i7 DMA Channel 6
2f27 Xeon E7 v3/Xeon E5 v3/Core i7 DMA Channel 7
2f28 Xeon E7 v3/Xeon E5 v3/Core i7 Address Map, VTd_Misc, System Management
2f29 Xeon E7 v3/Xeon E5 v3/Core i7 Hot Plug
2f2a Xeon E7 v3/Xeon E5 v3/Core i7 RAS, Control Status and Global Errors
2f2c Xeon E7 v3/Xeon E5 v3/Core i7 I/O APIC
2f2e Xeon E7 v3/Xeon E5 v3/Core i7 RAID 5/6
2f2f Xeon E7 v3/Xeon E5 v3/Core i7 RAID 5/6
2f30 Xeon E7 v3/Xeon E5 v3/Core i7 Home Agent 0
2f32 Xeon E7 v3/Xeon E5 v3/Core i7 QPI Link 0
2f33 Xeon E7 v3/Xeon E5 v3/Core i7 QPI Link 1
2f34 Xeon E7 v3/Xeon E5 v3/Core i7 PCIe Ring Interface
2f36 Xeon E7 v3/Xeon E5 v3/Core i7 R3 QPI Link 0 & 1 Monitoring
2f37 Xeon E7 v3/Xeon E5 v3/Core i7 R3 QPI Link 0 & 1 Monitoring
2f38 Xeon E7 v3/Xeon E5 v3/Core i7 Home Agent 1
2f39 Xeon E7 v3/Xeon E5 v3/Core i7 I/O Performance Monitoring
2f3a Xeon E7 v3/Xeon E5 v3/Core i7 QPI Link 2
2f3e Xeon E7 v3/Xeon E5 v3/Core i7 R3 QPI
Link 2 Monitoring
2f3f Xeon E7 v3/Xeon E5 v3/Core i7 R3 QPI Link 2 Monitoring
2f40 Xeon E7 v3/Xeon E5 v3/Core i7 QPI Link 2
2f41 Xeon E7 v3/Xeon E5 v3/Core i7 R3 QPI Link 2 Monitoring
2f43 Xeon E7 v3/Xeon E5 v3/Core i7 QPI Link 2
2f45 Xeon E7 v3/Xeon E5 v3/Core i7 QPI Link 2 Debug
2f46 Xeon E7 v3/Xeon E5 v3/Core i7 QPI Link 2 Debug
2f47 Xeon E7 v3/Xeon E5 v3/Core i7 QPI Link 2 Debug
2f60 Xeon E7 v3/Xeon E5 v3/Core i7 Home Agent 1

2f68 Xeon E7 v3/Xeon E5 v3/Core i7 Integrated Memory Controller 1 Target Address, Thermal & RAS Registers
2f6a Xeon E7 v3/Xeon E5 v3/Core i7 Integrated Memory Controller 1 Channel Target Address Decoder
2f6b Xeon E7 v3/Xeon E5 v3/Core i7 Integrated Memory Controller 1 Channel Target Address Decoder
2f6c Xeon E7 v3/Xeon E5 v3/Core i7 Integrated Memory Controller 1 Channel Target Address Decoder
2f6d Xeon E7 v3/Xeon E5 v3/Core i7 Integrated Memory Controller 1 Channel Target Address Decoder
2f6e Xeon E7 v3/Xeon E5 v3/Core i7 DDRIO Channel
2/3 Broadcast
2f6f Xeon E7 v3/Xeon E5 v3/Core i7 DDRIO Global Broadcast
2f70 Xeon E7 v3/Xeon E5 v3/Core i7 Home Agent 0 Debug
2f71 Xeon E7 v3/Xeon E5 v3/Core i7 Integrated Memory Controller 0 Target Address, Thermal & RAS Registers
2f76 Xeon E7 v3/Xeon E5 v3/Core i7 E3 QPI Link Debug
2f78 Xeon E7 v3/Xeon E5 v3/Core i7 Home Agent 1 Debug
2f79 Xeon E7 v3/Xeon E5 v3/Core i7 Integrated Memory Controller 1 Target Address, Thermal & RAS Registers
2f7d Xeon E7 v3/Xeon E5 v3/Core i7 Scratchpad & Semaphore Registers
2f7e Xeon E7 v3/Xeon E5 v3/Core i7 E3 QPI Link Debug
2f80 Xeon E7 v3/Xeon E5 v3/Core i7 QPI Link 0
2f81 Xeon E7 v3/Xeon E5 v3/Core i7 R3 QPI Link 0 & 1 Monitoring
2f83 Xeon E7 v3/Xeon E5 v3/Core i7 QPI Link 0
2f85 Xeon E7 v3/Xeon E5 v3/Core i7 QPI Link 0 Debug
2f86 Xeon E7 v3/Xeon E5 v3/Core i7 QPI Link 0 Debug
2f87 Xeon E7 v3/Xeon E5 v3/Core i7 QPI Link 0 Debug
2f88 Xeon E7 v3/Xeon E5 v3/Core i7 VCU
2f8a Xeon E7 v3/Xeon E5 v3/Core i7 VCU
2f90
Xeon E7 v3/Xeon E5 v3/Core i7 QPI Link 1
2f93 Xeon E7 v3/Xeon E5 v3/Core i7 QPI Link 1
2f95 Xeon E7 v3/Xeon E5 v3/Core i7 QPI Link 1 Debug
2f96 Xeon E7 v3/Xeon E5 v3/Core i7 QPI Link 1 Debug
2f98 Xeon E7 v3/Xeon E5 v3/Core i7 Power Control Unit
2f99 Xeon E7 v3/Xeon E5 v3/Core i7 Power Control Unit
2f9a Xeon E7 v3/Xeon E5 v3/Core i7 Power Control Unit
2f9c Xeon E7 v3/Xeon E5 v3/Core i7 Power Control Unit
2fa0 Xeon E7 v3/Xeon E5 v3/Core i7 Home Agent 0
2fa8 Xeon E7 v3/Xeon E5 v3/Core i7 Integrated Memory Controller 0 Target Address, Thermal & RAS Registers
2faa Xeon E7 v3/Xeon E5 v3/Core i7 Integrated Memory Controller 0 Channel Target Address Decoder
2fab Xeon E7 v3/Xeon E5 v3/Core i7 Integrated Memory Controller 0 Channel Target Address Decoder
2fac Xeon E7 v3/Xeon E5 v3/Core i7 Integrated Memory Controller 0 Channel Target Address Decoder
2fad Xeon E7 v3/Xeon E5 v3/Core i7 Integrated Memory Controller 0 Channel Target Address Decoder
2fae Xeon E7 v3/Xeon E5
v3/Core i7 DDRIO Channel 0/1 Broadcast
2faf Xeon E7 v3/Xeon E5 v3/Core i7 DDRIO Global Broadcast
2fb0 Xeon E7 v3/Xeon E5 v3/Core i7 Integrated Memory Controller 0 Channel 0 Thermal Control
2fb1 Xeon E7 v3/Xeon E5 v3/Core i7 Integrated Memory Controller 0 Channel 1 Thermal Control
2fb2 Xeon E7 v3/Xeon E5 v3/Core i7 Integrated Memory Controller 0 Channel 0 ERROR Registers
2fb3 Xeon E7 v3/Xeon E5 v3/Core i7 Integrated Memory Controller 0 Channel 1 ERROR Registers
2fb4 Xeon E7 v3/Xeon E5 v3/Core i7 Integrated Memory Controller 0 Channel 2 Thermal Control
2fb5 Xeon E7 v3/Xeon E5 v3/Core i7 Integrated Memory Controller 0 Channel 3 Thermal Control
2fb6 Xeon E7 v3/Xeon E5 v3/Core i7 Integrated Memory Controller 0 Channel 2 ERROR Registers

2fb7 Xeon E7 v3/Xeon E5 v3/Core i7 Integrated Memory Controller 0 Channel 3 ERROR Registers
 2fb8 Xeon E7 v3/Xeon E5 v3/Core i7 DDRIO (VMSE) 2 & 3
 2fb9 Xeon E7 v3/Xeon E5 v3/Core i7 DDRIO (VMSE) 2 & 3
 2fba Xeon E7 v3/Xeon E5 v3/Core i7
 DDRIO (VMSE) 2 & 3
 2fbb Xeon E7 v3/Xeon E5 v3/Core i7 DDRIO (VMSE) 2 & 3
 2fbc Xeon E7 v3/Xeon E5 v3/Core i7 DDRIO (VMSE) 0 & 1
 2fbd Xeon E7 v3/Xeon E5 v3/Core i7 DDRIO (VMSE) 0 & 1
 2fbe Xeon E7 v3/Xeon E5 v3/Core i7 DDRIO (VMSE) 0 & 1
 2fbf Xeon E7 v3/Xeon E5 v3/Core i7 DDRIO (VMSE) 0 & 1
 2fc0 Xeon E7 v3/Xeon E5 v3/Core i7 Power Control Unit
 2fc1 Xeon E7 v3/Xeon E5 v3/Core i7 Power Control Unit
 2fc2 Xeon E7 v3/Xeon E5 v3/Core i7 Power Control Unit
 2fc3 Xeon E7 v3/Xeon E5 v3/Core i7 Power Control Unit
 2fc4 Xeon E7 v3/Xeon E5 v3/Core i7 Power Control Unit
 2fc5 Xeon E7 v3/Xeon E5 v3/Core i7 Power Control Unit
 2fd0 Xeon E7 v3/Xeon E5 v3/Core i7 Integrated Memory Controller 1 Channel 0 Thermal Control
 2fd1 Xeon E7 v3/Xeon E5 v3/Core i7 Integrated Memory Controller 1 Channel 1 Thermal Control
 2fd2 Xeon E7 v3/Xeon E5 v3/Core i7 Integrated Memory Controller 1 Channel 0 ERROR Registers
 2fd3 Xeon E7 v3/Xeon E5 v3/Core i7 Integrated Memory Controller 1 Channel 1 ERROR
 Registers
 2fd4 Xeon E7 v3/Xeon E5 v3/Core i7 Integrated Memory Controller 1 Channel 2 Thermal Control
 2fd5 Xeon E7 v3/Xeon E5 v3/Core i7 Integrated Memory Controller 1 Channel 3 Thermal Control
 2fd6 Xeon E7 v3/Xeon E5 v3/Core i7 Integrated Memory Controller 1 Channel 2 ERROR Registers
 2fd7 Xeon E7 v3/Xeon E5 v3/Core i7 Integrated Memory Controller 1 Channel 3 ERROR Registers
 2fe0 Xeon E7 v3/Xeon E5 v3/Core i7 Unicast Registers
 2fe1 Xeon E7 v3/Xeon E5 v3/Core i7 Unicast Registers
 2fe2 Xeon E7 v3/Xeon E5 v3/Core i7 Unicast Registers
 2fe3 Xeon E7 v3/Xeon E5 v3/Core i7 Unicast Registers
 2fe4 Xeon E7 v3/Xeon E5 v3/Core i7 Unicast Registers
 2fe5 Xeon E7 v3/Xeon E5 v3/Core i7 Unicast Registers
 2fe6 Xeon E7 v3/Xeon E5 v3/Core i7 Unicast Registers
 2fe7 Xeon E7 v3/Xeon E5 v3/Core i7 Unicast Registers
 2fe8 Xeon E7 v3/Xeon E5 v3/Core i7 Unicast Registers
 2fe9 Xeon E7 v3/Xeon E5 v3/Core i7 Unicast Registers
 2fea Xeon E7 v3/Xeon E5 v3/Core i7 Unicast Registers
 2feb
 Xeon E7 v3/Xeon E5 v3/Core i7 Unicast Registers
 2fec Xeon E7 v3/Xeon E5 v3/Core i7 Unicast Registers
 2fed Xeon E7 v3/Xeon E5 v3/Core i7 Unicast Registers
 2fee Xeon E7 v3/Xeon E5 v3/Core i7 Unicast Registers
 2fef Xeon E7 v3/Xeon E5 v3/Core i7 Unicast Registers
 2ff0 Xeon E7 v3/Xeon E5 v3/Core i7 Unicast Registers
 2ff1 Xeon E7 v3/Xeon E5 v3/Core i7 Unicast Registers
 2ff2 Xeon E7 v3/Xeon E5 v3/Core i7 Unicast Registers
 2ff3 Xeon E7 v3/Xeon E5 v3/Core i7 Unicast Registers
 2ff4 Xeon E7 v3/Xeon E5 v3/Core i7 Unicast Registers
 2ff5 Xeon E7 v3/Xeon E5 v3/Core i7 Unicast Registers

2ff6 Xeon E7 v3/Xeon E5 v3/Core i7 Unicast Registers
 2ff7 Xeon E7 v3/Xeon E5 v3/Core i7 Unicast Registers
 2ff8 Xeon E7 v3/Xeon E5 v3/Core i7 Buffered Ring Agent
 2ff9 Xeon E7 v3/Xeon E5 v3/Core i7 Buffered Ring Agent
 2ffa Xeon E7 v3/Xeon E5 v3/Core i7 Buffered Ring Agent
 2ffb Xeon E7 v3/Xeon E5 v3/Core i7 Buffered Ring Agent
 2ffc Xeon E7 v3/Xeon E5 v3/Core i7 System Address Decoder & Broadcast Registers
 2ffd Xeon E7 v3/Xeon E5 v3/Core i7 System Address Decoder & Broadcast Registers
 2ffe Xeon E7 v3/Xeon E5 v3/Core i7 System Address Decoder & Broadcast Registers
 3165 Wireless 3165
 # Stone Peak 1x1
 8086 4010 Dual Band Wireless AC 3165
 # Stone Peak 1x1
 8086 4210 Dual Band Wireless AC 3165
 3166 Dual Band Wireless-AC 3165 Plus Bluetooth
 3184 UHD Graphics 605
 3185 UHD Graphics 605
 318c Celeron/Pentium Silver Processor Dynamic Platform and Thermal Framework Processor Participant
 318e Celeron/Pentium Silver Processor NorthPeak
 3192 Gemini Lake P2SB
 3197 Celeron/Pentium Silver Processor PCI-default ISA-bridge
 319a Celeron/Pentium Silver Processor Trusted Execution Engine Interface
 31a2 Celeron/Pentium Silver Processor Integrated Sensor Solution
 31ac Celeron/Pentium Silver Processor Serial IO I2C Host Controller
 31ae Celeron/Pentium Silver Processor Serial IO I2C Host Controller
 31bc Celeron/Pentium Silver Processor Serial IO UART Host Controller
 31be
 Celeron/Pentium Silver Processor Serial IO UART Host Controller
 31c0 Celeron/Pentium Silver Processor Serial IO UART Host Controller
 31c2 Celeron/Pentium Silver Processor Serial IO SPI Host Controller
 31c4 Celeron/Pentium Silver Processor Serial IO SPI Host Controller
 31c6 Celeron/Pentium Silver Processor Serial IO SPI Host Controller
 31cc Celeron/Pentium Silver Processor SDA Standard Compliant SD Host Controller
 31d4 Celeron/Pentium Silver Processor Gaussian Mixture Model
 31d6 Gemini Lake PCI Express Root Port
 31d7 Gemini Lake PCI Express Root Port
 31d8 Gemini Lake PCI Express Root Port
 31d9 Gemini Lake PCI Express Root Port
 31da Gemini Lake PCI Express Root Port
 31db Gemini Lake PCI Express Root Port
 31ee Celeron/Pentium Silver Processor Serial IO UART Host Controller
 31f0 Gemini Lake Host Bridge
 3200 GD31244 PCI-X SATA HBA
 1775 c200 C2K onboard SATA host bus adapter
 3310 IOP348 I/O Processor
 1054 3030 HRA380 Hitachi RAID Adapter to PCIe
 1054

3034 HRA381 Hitachi RAID Adapter to PCIe
3313 IOP348 I/O Processor (SL8e) in IOC Mode SAS/SATA
331b IOP348 I/O Processor (SL8x) in IOC Mode SAS/SATA
3331 IOC340 I/O Controller (VV8e) SAS/SATA
3339 IOC340 I/O Controller (VV8x) SAS/SATA
3340 82855PM Processor to I/O Controller
1014 0529 Thinkpad T40 series
1025 005a TravelMate 290
103c 088c NC8000 laptop
103c 0890 NC6000 laptop
103c 08b0 tc1100 tablet
144d c005 X10 Laptop
144d c00c P30/P35 notebook
3341 82855PM Processor to AGP Controller
144d c00c P30 notebook
3363 IOC340 I/O Controller in IOC Mode SAS/SATA
3382 81342 [Chevelon] I/O Processor (ATUe)
33c3 IOP348 I/O Processor (SL8De) in IOC Mode SAS/SATA
33cb IOP348 I/O Processor (SL8Dx) in IOC Mode SAS/SATA
3400 5520/5500/X58 I/O Hub to ESI Port
3401 5520/5500/X58 I/O Hub to ESI Port
3402 5520/5500/X58 I/O Hub to ESI Port
3403 5500 I/O Hub to ESI Port
1028 0236 PowerEdge R610 I/O Hub to ESI Port
1028 0287 PowerEdge M610
I/O Hub to ESI Port
1028 028c PowerEdge R410 I/O Hub to ESI Port
1028 028d PowerEdge T410 I/O Hub to ESI Port
103c 330b ProLiant ML150 G6 Server
3404 5520/5500/X58 I/O Hub to ESI Port
3405 5520/5500/X58 I/O Hub to ESI Port
3406 5520 I/O Hub to ESI Port
103c 330b ProLiant G6 series
3407 5520/5500/X58 I/O Hub to ESI Port
3408 5520/5500/X58 I/O Hub PCI Express Root Port 1
103c 330b ProLiant G6 series
3409 5520/5500/X58 I/O Hub PCI Express Root Port 2
340a 5520/5500/X58 I/O Hub PCI Express Root Port 3
103c 330b ProLiant ML150 G6 Server
340b 5520/X58 I/O Hub PCI Express Root Port 4
340c 5520/X58 I/O Hub PCI Express Root Port 5
340d 5520/X58 I/O Hub PCI Express Root Port 6
340e 5520/5500/X58 I/O Hub PCI Express Root Port 7
103c 330b ProLiant ML150 G6 Server
340f 5520/5500/X58 I/O Hub PCI Express Root Port 8
3410 7500/5520/5500/X58 I/O Hub PCI Express Root Port 9
3411 7500/5520/5500/X58 I/O Hub PCI Express Root Port 10
3418 7500/5520/5500/X58

Physical Layer Port 0

- 3419 7500/5520/5500 Physical Layer Port 1
- 3420 7500/5520/5500/X58 I/O Hub PCI Express Root Port 0
- 3421 7500/5520/5500/X58 I/O Hub PCI Express Root Port 0
- 3422 7500/5520/5500/X58 I/O Hub GPIO and Scratch Pad Registers
 - 103c 330b ProLiant G6 series
- 3423 7500/5520/5500/X58 I/O Hub Control Status and RAS Registers
 - 103c 330b ProLiant G6 series
- 3425 7500/5520/5500/X58 Physical and Link Layer Registers Port 0
- 3426 7500/5520/5500/X58 Routing and Protocol Layer Registers Port 0
- 3427 7500/5520/5500 Physical and Link Layer Registers Port 1
- 3428 7500/5520/5500 Routing & Protocol Layer Register Port 1
- 3429 5520/5500/X58 Chipset QuickData Technology Device
- 342a 5520/5500/X58 Chipset QuickData Technology Device
- 342b 5520/5500/X58 Chipset QuickData Technology Device
- 342c 5520/5500/X58 Chipset QuickData Technology Device
- 342d 7500/5520/5500/X58 I/O Hub I/OxAPIC Interrupt Controller
- 342e 7500/5520/5500/X58 I/O Hub System Management Registers
 - 103c
 - 330b ProLiant G6 series
- 342f 7500/5520/5500/X58 Trusted Execution Technology Registers
- 3430 5520/5500/X58 Chipset QuickData Technology Device
- 3431 5520/5500/X58 Chipset QuickData Technology Device
- 3432 5520/5500/X58 Chipset QuickData Technology Device
- 3433 5520/5500/X58 Chipset QuickData Technology Device
- 3438 7500/5520/5500/X58 I/O Hub Throttle Registers
- 3482 Ice Lake-LP LPC Controller
- 34a3 Ice Lake-LP SMBus Controller
- 34a4 Ice Lake-LP SPI Controller
- 34a8 Ice Lake-LP Serial IO UART Controller #0
- 34a9 Ice Lake-LP Serial IO UART Controller #1
- 34aa Ice Lake-LP Serial IO SPI Controller #0
- 34ab Ice Lake-LP Serial IO SPI Controller #1
- 34b0 Ice Lake-LP PCI Express Root Port #9
- 34bc Ice Lake-LP PCI Express Root Port #5
- 34c5 Ice Lake-LP Serial IO I2c Controller #4
- 34c6 Ice Lake-LP Serial IO I2c Controller #5
- 34c8 Smart Sound Technology Audio Controller
- 34d3 Ice Lake-LP SATA Controller [AHCI mode]
- 34e0 Management Engine Interface
- 34e8 Ice Lake-LP
 - Serial IO I2C Controller #0
 - 34e9 Ice Lake-LP Serial IO I2C Controller #1
 - 34ea Ice Lake-LP Serial IO I2C Controller #2
 - 34eb Ice Lake-LP Serial IO I2C Controller #3
 - 34ed Ice Lake-LP USB 3.1 xHCI Host Controller
 - 34f0 Killer Wi-Fi 6 AX1650i 160MHz Wireless Network Adapter (201NGW)
 - 34f8 Ice Lake-LP SD Controller

3500 6311ESB/6321ESB PCI Express Upstream Port
103c 31fe ProLiant DL140 G3
15d9 9680 X7DBN Motherboard
3501 6310ESB PCI Express Upstream Port
3504 6311ESB/6321ESB I/OxAPIC Interrupt Controller
3505 6310ESB I/OxAPIC Interrupt Controller
350c 6311ESB/6321ESB PCI Express to PCI-X Bridge
103c 31fe ProLiant DL140 G3
15d9 9680 X7DBN Motherboard
350d 6310ESB PCI Express to PCI-X Bridge
3510 6311ESB/6321ESB PCI Express Downstream Port E1
103c 31fe ProLiant DL140 G3
15d9 9680 X7DBN Motherboard
3511 6310ESB PCI Express Downstream Port E1
3514 6311ESB/6321ESB PCI Express Downstream Port E2
3515 6310ESB PCI Express Downstream Port E2
3518 6311ESB/6321ESB
PCI Express Downstream Port E3
15d9 9680 X7DBN Motherboard
3519 6310ESB PCI Express Downstream Port E3
3575 82830M/MG/MP Host Bridge
0e11 0030 Evo N600c
1014 021d ThinkPad A/T/X Series
104d 80e7 VAIO PCG-GR214EP/GR214MP/GR215MP/GR314MP/GR315MP
3576 82830M/MP AGP Bridge
3577 82830M/MG Integrated Graphics Controller
1014 0513 ThinkPad A/T/X Series
3578 82830M/MG/MP Host Bridge
3580 82852/82855 GM/GME/PM/GMV Processor to I/O Controller
1014 055c ThinkPad R50e
1025 0064 Extensa 3000 series laptop
1028 0139 Latitude D400
1028 014f Latitude X300
1028 0152 Latitude D500
1028 0163 Latitude D505
1028 018d Inspiron 700m/710m
1028 0196 Inspiron 5160
114a 0582 PC8
1734 1055 Amilo M1420
1775 10d0 V5D Single Board Computer
1775 ce90 CE9
4c53 10b0 CL9 mainboard
4c53 10e0 PSL09 PrPMC
e4bf 0cc9 CC9-SAMBA
e4bf 0cd2 CD2-BEBOP
3581 82852/82855 GM/GME/PM/GMV Processor to AGP Controller
1734 1055 Amilo M1420
3582

82852/855GM Integrated Graphics Device
1014 0562 ThinkPad R50e
1028 0139 Latitude D400
1028 014f Latitude X300
1028 0152 Latitude D500
1028 0163 Latitude D505
1028 018d Inspiron 700m/710m
114a 0582 PC8 integrated graphics
1775 10d0 V5D Single Board Computer VGA
1775 ce90 CE9
4c53 10b0 CL9 mainboard
4c53 10e0 PSL09 PrPMC
e4bf 0cc9 CC9-SAMBA
e4bf 0cd2 CD2-BEBOP
3584 82852/82855 GM/GME/PM/GMV Processor to I/O Controller
1014 055d ThinkPad R50e
1025 0064 Extensa 3000 series laptop
1028 0139 Latitude D400
1028 014f Latitude X300
1028 0152 Latitude D500
1028 0163 Latitude D505
1028 018d Inspiron 700m/710m
1028 0196 Inspiron 5160
114a 0582 PC8
1734 1055 Amilo M1420
1775 10d0 V5D Single Board Computer
1775 ce90 CE9
4c53 10b0 CL9 mainboard
4c53 10e0 PSL09 PrPMC
3585 82852/82855 GM/GME/PM/GMV Processor to I/O Controller
1014 055e ThinkPad R50e
1025 0064 Extensa 3000 series laptop
1028 0139 Latitude D400
1028
014f Latitude X300
1028 0152 Latitude D500
1028 0163 Latitude D505
1028 018d Inspiron 700m/710m
1028 0196 Inspiron 5160
114a 0582 PC8
1734 1055 Amilo M1420
1775 10d0 V5D Single Board Computer
1775 ce90 CE9
4c53 10b0 CL9 mainboard
4c53 10e0 PSL09 PrPMC
358c 82854 GMCH
358e 82854 GMCH Integrated Graphics Device
3590 E7520 Memory Controller Hub

1014 02dd eServer xSeries server mainboard
1028 016c PowerEdge 1850 Memory Controller Hub
1028 016d PowerEdge 2850 Memory Controller Hub
1028 019a PowerEdge SC1425
1734 103e PRIMERGY RX/TX S2 series
1775 1100 CR11/VR11 Single Board Computer
4c53 10d0 Telum ASLP10 Processor AMC
3591 E7525/E7520 Error Reporting Registers
1014 02dd eServer xSeries server mainboard
1028 0168 Precision Workstation 670 Mainboard
1028 0169 Precision 470
103c 3208 ProLiant DL140 G2
4c53 10d0 Telum ASLP10 Processor AMC
3592 E7320 Memory Controller Hub
1734 1073 Primergy Econel 200 D2020
mainboard
3593 E7320 Error Reporting Registers
1734 1073 Primergy Econel 200 D2020 mainboard
3594 E7520 DMA Controller
1775 1100 CR11/VR11 Single Board Computer
4c53 10d0 Telum ASLP10 Processor AMC
3595 E7525/E7520/E7320 PCI Express Port A
1775 1100 CR11/VR11 Single Board Computer
3596 E7525/E7520/E7320 PCI Express Port A1
3597 E7525/E7520 PCI Express Port B
1775 1100 CR11/VR11 Single Board Computer
3598 E7520 PCI Express Port B1
1775 1100 CR11/VR11 Single Board Computer
3599 E7520 PCI Express Port C
1775 1100 CR11/VR11 Single Board Computer
359a E7520 PCI Express Port C1
359b E7525/E7520/E7320 Extended Configuration Registers
1014 02dd eServer xSeries server mainboard
359e E7525 Memory Controller Hub
1028 0168 Precision Workstation 670 Mainboard
1028 0169 Precision 470
35b0 3100 Chipset Memory I/O Controller Hub
35b1 3100 DRAM Controller Error Reporting Registers
35b5 3100 Chipset Enhanced DMA Controller
35b6 3100 Chipset PCI Express
Port A
35b7 3100 Chipset PCI Express Port A1
35c8 3100 Extended Configuration Test Overflow Registers
3600 7300 Chipset Memory Controller Hub
3604 7300 Chipset PCI Express Port 1
3605 7300 Chipset PCI Express Port 2
3606 7300 Chipset PCI Express Port 3
3607 7300 Chipset PCI Express Port 4

3608 7300 Chipset PCI Express Port 5
3609 7300 Chipset PCI Express Port 6
360a 7300 Chipset PCI Express Port 7
360b 7300 Chipset QuickData Technology Device
360c 7300 Chipset FSB Registers
1028 01f0 PowerEdge R900 7300 Chipset FSB Registers
360d 7300 Chipset Snoop Filter Registers
360e 7300 Chipset Debug and Miscellaneous Registers
360f 7300 Chipset FBD Branch 0 Registers
3610 7300 Chipset FBD Branch 1 Registers
3700 Xeon C5500/C3500 DMI
3701 Xeon C5500/C3500 DMI
3702 Xeon C5500/C3500 DMI
3703 Xeon C5500/C3500 DMI
3704 Xeon C5500/C3500 DMI
3705 Xeon C5500/C3500 DMI
3706 Xeon C5500/C3500 DMI
3707 Xeon C5500/C3500 DMI
3708 Xeon C5500/C3500 DMI
3709
Xeon C5500/C3500 DMI
370a Xeon C5500/C3500 DMI
370b Xeon C5500/C3500 DMI
370c Xeon C5500/C3500 DMI
370d Xeon C5500/C3500 DMI
370e Xeon C5500/C3500 DMI
370f Xeon C5500/C3500 DMI
3710 Xeon C5500/C3500 CB3 DMA
3711 Xeon C5500/C3500 CB3 DMA
3712 Xeon C5500/C3500 CB3 DMA
3713 Xeon C5500/C3500 CB3 DMA
3714 Xeon C5500/C3500 CB3 DMA
3715 Xeon C5500/C3500 CB3 DMA
3716 Xeon C5500/C3500 CB3 DMA
3717 Xeon C5500/C3500 CB3 DMA
3718 Xeon C5500/C3500 CB3 DMA
3719 Xeon C5500/C3500 CB3 DMA
371a Xeon C5500/C3500 QPI Link
371b Xeon C5500/C3500 QPI Routing and Protocol
371d Xeon C5500/C3500 QPI Routing and Protocol
3720 Xeon C5500/C3500 PCI Express Root Port 0
3721 Xeon C5500/C3500 PCI Express Root Port 1
3722 Xeon C5500/C3500 PCI Express Root Port 2
3723 Xeon C5500/C3500 PCI Express Root Port 3
3724 Xeon C5500/C3500 PCI Express Root Port 4
3725 Xeon C5500/C3500 NTB Primary
3726 Xeon C5500/C3500 NTB Primary
3727 Xeon C5500/C3500 NTB Secondary

3728
Xeon C5500/C3500 Core
3729 Xeon C5500/C3500 Core
372a Xeon C5500/C3500 Core
372b Xeon C5500/C3500 Core
372c Xeon C5500/C3500 Reserved
373f Xeon C5500/C3500 IOxAPIC
37c8 C62x Chipset QuickAssist Technology
37cc Ethernet Connection X722
37cd Ethernet Virtual Function 700 Series
37ce Ethernet Connection X722 for 10GbE backplane
1590 0215 Ethernet 10Gb 2-port 568i Adapter
17aa 4023 Intel Ethernet Connection X722 for 10GbE backplane
17aa 4025 Ethernet Connection X722 for 10GbE backplane
37cf Ethernet Connection X722 for 10GbE QSFP+
37d0 Ethernet Connection X722 for 10GbE SFP+
17aa 4020 Intel Ethernet Connection X722 for 10G SFP+
17aa 4021 Intel Ethernet Connection X722 for 10G SFP+
17aa 4022 Ethernet Connection X722 for 10GbE SFP+
8086 0001 Ethernet Network Adapter X722-2
8086 0002 Ethernet Network Adapter X722-2
8086 0003 Ethernet Network Adapter X722-4
8086 0004 Ethernet Network Adapter X722-4
37d1 Ethernet Connection X722 for 1GbE
14cd
0010 88E1514 Ethernet OCP 2x1G RJ45 Phy Card [USI-1514-1GbaseT]
1590 0216 Ethernet 1Gb 2-port 368i Adapter
1590 0217 Ethernet 1Gb 2-port 368FLR-MMT Adapter
1590 0247 Ethernet 1Gb 4-port 369i Adapter
17aa 4020 Ethernet Connection X722 for 1GbE
17aa 4021 Ethernet Connection X722 for 1GbE
17aa 4022 Ethernet Connection X722 for 1GbE
17aa 4024 Ethernet Connection X722 for 1GbE
37d2 Ethernet Connection X722 for 10GBASE-T
1059 0180 RD10019 10GbE interface
1170 37d2 Ethernet Connection X722 for 10GBASE-T
14cd 0030 Ethernet OCP 2x10G RJ45 Phy Card [USI-X557-10GbaseT]
1590 0218 Ethernet 10Gb 2-port 568FLR-MMT Adapter
17aa 4020 Ethernet Connection X722 for 10GBASE-T
17aa 4021 Ethernet Connection X722 for 10GBASE-T
17aa 4022 Ethernet Connection X722 for 10GBASE-T
17aa 4024 Ethernet Connection X722 for 10GBASE-T
17aa 4025 Ethernet Connection X722 for 10GBASE-T
37d3 Ethernet Connection X722 for 10GbE SFP+
1590 0219 Ethernet 10Gb 2-port
568FLR-MMSFP+ Adapter
17aa 4020 Ethernet Connection X722 for 10GbE SFP+
17aa 4021 Ethernet Connection X722 for 10GbE SFP+

17aa 4025 Ethernet Connection X722 for 10GbE SFP+
37d4 Ethernet Connection X722 for 10GbE QSFP+
37d9 X722 Hyper-V Virtual Function
3a00 82801JD/DO (ICH10 Family) 4-port SATA IDE Controller
3a02 82801JD/DO (ICH10 Family) SATA AHCI Controller
3a05 82801JD/DO (ICH10 Family) SATA RAID Controller
3a06 82801JD/DO (ICH10 Family) 2-port SATA IDE Controller
3a14 82801JDO (ICH10DO) LPC Interface Controller
3a16 82801JIR (ICH10R) LPC Interface Controller
1028 028c PowerEdge R410 LPC Interface Controller
1028 028d PowerEdge T410 LPC Interface Controller
103c 330b ProLiant G6 series
1043 82d4 P5Q Deluxe Motherboard
1458 5001 GA-EP45-DS5 Motherboard
3a18 82801JIB (ICH10) LPC Interface Controller
3a1a 82801JD (ICH10D) LPC Interface Controller
3a20 82801JI (ICH10 Family) 4 port SATA IDE Controller #1
1028 028c PowerEdge R410 SATA IDE
Controller
1028 028d PowerEdge T410 SATA IDE Controller
3a22 82801JI (ICH10 Family) SATA AHCI Controller
103c 330b ProLiant G6 series
1043 82d4 P5Q Deluxe Motherboard
1458 b005 GA-EP45-DS5/GA-EG45M-DS2H Motherboard
3a25 82801JIR (ICH10R) SATA RAID Controller
1028 028c PERC S100 Controller (PE R410)
1028 028d PERC S100 Controller (PE T410)
1028 02f1 PERC S100 Controller (PE R510)
3a26 82801JI (ICH10 Family) 2 port SATA IDE Controller #2
1028 028c PowerEdge R410 SATA IDE Controller
1028 028d PowerEdge T410 SATA IDE Controller
3a30 82801JI (ICH10 Family) SMBus Controller
1043 82d4 P5Q Deluxe Motherboard
1458 5001 GA-EP45-DS5/GA-EG45M-DS2H Motherboard
3a32 82801JI (ICH10 Family) Thermal Subsystem
3a34 82801JI (ICH10 Family) USB UHCI Controller #1
1028 028c PowerEdge R410 USB UHCI Controller
1028 028d PowerEdge T410 USB UHCI Controller
103c 330b ProLiant G6 series
1043 82d4 P5Q Deluxe Motherboard
1458 5004 GA-EP45-DS5 Motherboard
3a35
82801JI (ICH10 Family) USB UHCI Controller #2
1028 028c PowerEdge R410 USB UHCI Controller
1028 028d PowerEdge T410 USB UHCI Controller
103c 330b ProLiant G6 series
1043 82d4 P5Q Deluxe Motherboard
1458 5004 GA-EP45-DS5 Motherboard

3a36 82801JI (ICH10 Family) USB UHCI Controller #3
1028 028c PowerEdge R410 USB UHCI Controller
1028 028d PowerEdge T410 USB UHCI Controller
103c 330b ProLiant G6 series
1043 82d4 P5Q Deluxe Motherboard
1458 5004 GA-EP45-DS5 Motherboard

3a37 82801JI (ICH10 Family) USB UHCI Controller #4
1028 028c PowerEdge R410 USB UHCI Controller
1028 028d PowerEdge T410 USB UHCI Controller
103c 330b ProLiant G6 series
1043 82d4 P5Q Deluxe Motherboard
1458 5004 Motherboard

3a38 82801JI (ICH10 Family) USB UHCI Controller #5
1028 028c PowerEdge R410 USB UHCI Controller
1028 028d PowerEdge T410 USB UHCI Controller
103c 330b ProLiant ML150 G6 Server
1043 82d4 P5Q Deluxe Motherboard
1458 5004 Motherboard

3a39
82801JI (ICH10 Family) USB UHCI Controller #6
1028 028c PowerEdge R410 USB UHCI Controller
1028 028d PowerEdge T410 USB UHCI Controller
103c 330b ProLiant ML150 G6 Server
1043 82d4 P5Q Deluxe Motherboard
1458 5004 Motherboard

3a3a 82801JI (ICH10 Family) USB2 EHCI Controller #1
1028 028c PowerEdge R410 USB EHCI Controller
1028 028d PowerEdge T410 USB EHCI Controller
103c 330b ProLiant G6 series
1043 82d4 P5Q Deluxe Motherboard
1458 5006 GA-EP45-DS5 Motherboard

3a3c 82801JI (ICH10 Family) USB2 EHCI Controller #2
1028 028c PowerEdge R410 USB EHCI Controller
1028 028d PowerEdge T410 USB EHCI Controller
103c 330b ProLiant G6 series
1043 82d4 P5Q Deluxe Motherboard
1458 5006 Motherboard

3a3e 82801JI (ICH10 Family) HD Audio Controller
1043 8311 P5Q Deluxe Motherboard
1458 a002 GA-EP45-UD3R Motherboard
1458 a102 GA-EP45-DS5/GA-EG45M-DS2H Motherboard

3a40 82801JI (ICH10 Family) PCI Express Root Port 1
1028 028c PowerEdge R410
PCI Express Port 1
1028 028d PowerEdge T410 PCI Express Port 1
103c 330b ProLiant ML150 G6 Server
1043 82d4 P5Q Deluxe Motherboard
1043 82ea P6T DeLuxe Motherboard

1458 5001 GA-EP45-DS5/GA-EG45M-DS2H Motherboard
3a42 82801JI (ICH10 Family) PCI Express Port 2
3a44 82801JI (ICH10 Family) PCI Express Root Port 3
1043 82ea P6T DeLuxe Motherboard
3a46 82801JI (ICH10 Family) PCI Express Root Port 4
1043 82ea P6T DeLuxe Motherboard
1458 5001 GA-EP45-DS5 Motherboard
3a48 82801JI (ICH10 Family) PCI Express Root Port 5
103c 330b ProLiant ML150 G6 Server
1043 82ea P6T Deluxe Motherboard
1458 5001 GA-EP45-DS5 Motherboard
3a4a 82801JI (ICH10 Family) PCI Express Root Port 6
103c 330b ProLiant ML150 G6 Server
1043 82d4 P5Q Deluxe Motherboard
1043 82ea P6T DeLuxe Motherboard
1458 5001 GA-EP45-DS5/GA-EG45M-DS2H Motherboard
3a4c 82801JI (ICH10 Family) Gigabit Ethernet Controller
3a51 82801JDO (ICH10DO) VECI Controller
3a55 82801JD/DO (ICH10 Family)
Virtual SATA Controller
3a60 82801JD/DO (ICH10 Family) SMBus Controller
3a62 82801JD/DO (ICH10 Family) Thermal Subsystem
3a64 82801JD/DO (ICH10 Family) USB UHCI Controller #1
3a65 82801JD/DO (ICH10 Family) USB UHCI Controller #2
3a66 82801JD/DO (ICH10 Family) USB UHCI Controller #3
3a67 82801JD/DO (ICH10 Family) USB UHCI Controller #4
3a68 82801JD/DO (ICH10 Family) USB UHCI Controller #5
3a69 82801JD/DO (ICH10 Family) USB UHCI Controller #6
3a6a 82801JD/DO (ICH10 Family) USB2 EHCI Controller #1
3a6c 82801JD/DO (ICH10 Family) USB2 EHCI Controller #2
3a6e 82801JD/DO (ICH10 Family) HD Audio Controller
3a70 82801JD/DO (ICH10 Family) PCI Express Port 1
3a72 82801JD/DO (ICH10 Family) PCI Express Port 2
3a74 82801JD/DO (ICH10 Family) PCI Express Port 3
3a76 82801JD/DO (ICH10 Family) PCI Express Port 4
3a78 82801JD/DO (ICH10 Family) PCI Express Port 5
3a7a 82801JD/DO (ICH10 Family) PCI Express Port 6
3a7c 82801JD/DO (ICH10 Family) Gigabit Ethernet Controller
3b00
5 Series/3400 Series Chipset LPC Interface Controller
3b01 Mobile 5 Series Chipset LPC Interface Controller
3b02 P55 Chipset LPC Interface Controller
3b03 PM55 Chipset LPC Interface Controller
3b04 5 Series Chipset LPC Interface Controller
3b05 Mobile 5 Series Chipset LPC Interface Controller
3b06 H55 Chipset LPC Interface Controller
3b07 QM57 Chipset LPC Interface Controller
1028 040a Latitude E6410

1028 040b Latitude E6510
e4bf 50c1 PC1-GROOVE
3b08 H57 Chipset LPC Interface Controller
3b09 HM55 Chipset LPC Interface Controller
1025 0347 Aspire 7740G
144d c06a R730 Laptop
17c0 10d2 Medion Akoya E7214 Notebook PC [MD98410]
3b0a Q57 Chipset LPC Interface Controller
1028 02da OptiPlex 980
15d9 060d C7SIM-Q Motherboard
3b0b HM57 Chipset LPC Interface Controller
3b0c 5 Series Chipset LPC Interface Controller
3b0d 5 Series/3400 Series Chipset LPC Interface Controller
3b0e 5 Series/3400 Series Chipset LPC Interface Controller
3b0f
QS57 Chipset LPC Interface Controller
3b10 5 Series/3400 Series Chipset LPC Interface Controller
3b11 5 Series/3400 Series Chipset LPC Interface Controller
3b12 3400 Series Chipset LPC Interface Controller
3b13 5 Series/3400 Series Chipset LPC Interface Controller
3b14 3420 Chipset LPC Interface Controller
15d9 0605 X8SIL
3b15 5 Series/3400 Series Chipset LPC Interface Controller
3b16 3450 Chipset LPC Interface Controller
3b17 5 Series/3400 Series Chipset LPC Interface Controller
3b18 5 Series/3400 Series Chipset LPC Interface Controller
3b19 5 Series/3400 Series Chipset LPC Interface Controller
3b1a 5 Series/3400 Series Chipset LPC Interface Controller
3b1b 5 Series/3400 Series Chipset LPC Interface Controller
3b1c 5 Series/3400 Series Chipset LPC Interface Controller
3b1d 5 Series/3400 Series Chipset LPC Interface Controller
3b1e 5 Series/3400 Series Chipset LPC Interface Controller
3b1f 5 Series/3400 Series Chipset LPC Interface Controller
3b20
5 Series/3400 Series Chipset 4 port SATA IDE Controller
3b21 5 Series/3400 Series Chipset 2 port SATA IDE Controller
3b22 5 Series/3400 Series Chipset 6 port SATA AHCI Controller
1028 02da OptiPlex 980
15d9 0605 X8SIL
15d9 060d C7SIM-Q Motherboard
3b23 5 Series/3400 Series Chipset 4 port SATA AHCI Controller
3b25 5 Series/3400 Series Chipset SATA RAID Controller
103c 3118 Smart Array B110i SATA RAID Controller
3b26 5 Series/3400 Series Chipset 2 port SATA IDE Controller
3b28 5 Series/3400 Series Chipset 4 port SATA IDE Controller
144d c06a R730 Laptop
17c0 10d2 Medion Akoya E7214 Notebook PC [MD98410]
3b29 5 Series/3400 Series Chipset 4 port SATA AHCI Controller

1025 0347 Aspire 7740G
144d c06a R730 Laptop
17c0 10d2 Medion Akoya E7214 Notebook PC [MD98410]
3b2c 5 Series/3400 Series Chipset SATA RAID Controller
3b2d 5 Series/3400 Series Chipset 2 port SATA IDE Controller
144d c06a R730 Laptop
17c0 10d2 Medion Akoya E7214 Notebook
PC [MD98410]
e4bf 50c1 PC1-GROOVE
3b2e 5 Series/3400 Series Chipset 4 port SATA IDE Controller
e4bf 50c1 PC1-GROOVE
3b2f 5 Series/3400 Series Chipset 6 port SATA AHCI Controller
1028 040a Latitude E6410
1028 040b Latitude E6510
e4bf 50c1 PC1-GROOVE
3b30 5 Series/3400 Series Chipset SMBus Controller
1025 0347 Aspire 7740G
1028 02da OptiPlex 980
1028 040a Latitude E6410
1028 040b Latitude E6510
1043 3838 P7P55-M Motherboard
1043 8383 P7P55-M Motherboard
144d c06a R730 Laptop
15d9 0605 X8SIL
15d9 060d C7SIM-Q Motherboard
17c0 10d2 Medion Akoya E7214 Notebook PC [MD98410]
e4bf 50c1 PC1-GROOVE
3b32 5 Series/3400 Series Chipset Thermal Subsystem
1025 0347 Aspire 7740G
1028 040a Latitude E6410
144d c06a R730 Laptop
17c0 10d2 Medion Akoya E7214 Notebook PC [MD98410]
3b34 5 Series/3400 Series Chipset USB2 Enhanced Host Controller
1025 0347 Aspire 7740G
1028 02da OptiPlex 980
1028 040a Latitude E6410
1028 040b Latitude
E6510
144d c06a R730 Laptop
15d9 0605 X8SIL
15d9 060d C7SIM-Q Motherboard
17c0 10d2 Medion Akoya E7214 Notebook PC [MD98410]
e4bf 50c1 PC1-GROOVE
3b36 5 Series/3400 Series Chipset USB Universal Host Controller
3b37 5 Series/3400 Series Chipset USB Universal Host Controller
3b38 5 Series/3400 Series Chipset USB Universal Host Controller
3b39 5 Series/3400 Series Chipset USB Universal Host Controller
3b3a 5 Series/3400 Series Chipset USB Universal Host Controller

3b3b 5 Series/3400 Series Chipset USB Universal Host Controller
3b3c 5 Series/3400 Series Chipset USB2 Enhanced Host Controller
1025 0347 Aspire 7740G
1028 02da OptiPlex 980
1028 040a Latitude E6410
1028 040b Latitude E6510
144d c06a R730 Laptop
15d9 0605 X8SIL
15d9 060d C7SIM-Q Motherboard
17c0 10d2 Medion Akoya E7214 Notebook PC [MD98410]
e4bf 50c1 PC1-GROOVE
3b3e 5 Series/3400 Series Chipset USB Universal Host Controller
3b3f 5 Series/3400 Series Chipset USB Universal
Host Controller
3b40 5 Series/3400 Series Chipset USB Universal Host Controller
3b41 5 Series/3400 Series Chipset LAN Controller
3b42 5 Series/3400 Series Chipset PCI Express Root Port 1
1028 02da OptiPlex 980
1028 040a Latitude E6410
1028 040b Latitude E6510
103c 1521 EliteBook 8540p
144d c06a R730 Laptop
15d9 060d C7SIM-Q Motherboard
17c0 10d2 Medion Akoya E7214 Notebook PC [MD98410]
3b44 5 Series/3400 Series Chipset PCI Express Root Port 2
1028 040a Latitude E6410
1028 040b Latitude E6510
15d9 060d C7SIM-Q Motherboard
17c0 10d2 Medion Akoya E7214 Notebook PC [MD98410]
3b46 5 Series/3400 Series Chipset PCI Express Root Port 3
1028 040a Latitude E6410
1028 040b Latitude E6510
144d c06a R730 Laptop
17c0 10d2 Medion Akoya E7214 Notebook PC [MD98410]
3b48 5 Series/3400 Series Chipset PCI Express Root Port 4
1028 040a Latitude E6410
1028 040b Latitude E6510
144d c06a R730 Laptop
3b4a 5 Series/3400 Series Chipset PCI
Express Root Port 5
1028 02da OptiPlex 980
17c0 10d2 Medion Akoya E7214 Notebook PC [MD98410]
3b4c 5 Series/3400 Series Chipset PCI Express Root Port 6
3b4e 5 Series/3400 Series Chipset PCI Express Root Port 7
3b50 5 Series/3400 Series Chipset PCI Express Root Port 8
3b53 5 Series/3400 Series Chipset VECI Controller
3b56 5 Series/3400 Series Chipset High Definition Audio
1025 0347 Aspire 7740G

1028 02da OptiPlex 980
1028 040a Latitude E6410
1028 040b Latitude E6510
1043 1373 G73-series gaming laptop
144d c06a R730 Laptop
15d9 060d C7SIM-Q Motherboard
17c0 10d2 Medion Akoya E7214 Notebook PC [MD98410]
e4bf 50c1 PC1-GROOVE
3b57 5 Series/3400 Series Chipset High Definition Audio
3b64 5 Series/3400 Series Chipset HECI Controller
1025 0347 Aspire 7740G
15d9 060d C7SIM-Q Motherboard
17c0 10d2 Medion Akoya E7214 Notebook PC [MD98410]
e4bf 50c1 PC1-GROOVE
3b65 5 Series/3400 Series Chipset HECI Controller
3b66 5 Series/3400 Series
Chipset PT IDER Controller
3b67 5 Series/3400 Series Chipset KT Controller
e4bf 50c1 PC1-GROOVE
3c00 Xeon E5/Core i7 DMI2
3c01 Xeon E5/Core i7 DMI2 in PCI Express Mode
3c02 Xeon E5/Core i7 IIO PCI Express Root Port 1a
3c03 Xeon E5/Core i7 IIO PCI Express Root Port 1b
3c04 Xeon E5/Core i7 IIO PCI Express Root Port 2a
3c05 Xeon E5/Core i7 IIO PCI Express Root Port 2b
3c06 Xeon E5/Core i7 IIO PCI Express Root Port 2c
3c07 Xeon E5/Core i7 IIO PCI Express Root Port 2d
3c08 Xeon E5/Core i7 IIO PCI Express Root Port 3a in PCI Express Mode
3c09 Xeon E5/Core i7 IIO PCI Express Root Port 3b
3c0a Xeon E5/Core i7 IIO PCI Express Root Port 3c
3c0b Xeon E5/Core i7 IIO PCI Express Root Port 3d
3c0d Xeon E5/Core i7 Non-Transparent Bridge
3c0e Xeon E5/Core i7 Non-Transparent Bridge
3c0f Xeon E5/Core i7 Non-Transparent Bridge
3c20 Xeon E5/Core i7 DMA Channel 0
3c21 Xeon E5/Core i7 DMA Channel 1
3c22 Xeon E5/Core i7 DMA Channel 2
3c23 Xeon E5/Core i7 DMA Channel
3
3c24 Xeon E5/Core i7 DMA Channel 4
3c25 Xeon E5/Core i7 DMA Channel 5
3c26 Xeon E5/Core i7 DMA Channel 6
3c27 Xeon E5/Core i7 DMA Channel 7
3c28 Xeon E5/Core i7 Address Map, VTd_Misc, System Management
3c2a Xeon E5/Core i7 Control Status and Global Errors
3c2c Xeon E5/Core i7 I/O APIC
3c2e Xeon E5/Core i7 DMA
3c2f Xeon E5/Core i7 DMA

3c40 Xeon E5/Core i7 IIO Switch and IRP Performance Monitor
3c43 Xeon E5/Core i7 Ring to PCI Express Performance Monitor
3c44 Xeon E5/Core i7 Ring to QuickPath Interconnect Link 0 Performance Monitor
3c45 Xeon E5/Core i7 Ring to QuickPath Interconnect Link 1 Performance Monitor
3c46 Xeon E5/Core i7 Processor Home Agent Performance Monitoring
3c71 Xeon E5/Core i7 Integrated Memory Controller RAS Registers
3c80 Xeon E5/Core i7 QPI Link 0
3c83 Xeon E5/Core i7 QPI Link Reut 0
3c84 Xeon E5/Core i7 QPI Link Reut 0
3c90 Xeon E5/Core i7 QPI Link 1
3c93 Xeon E5/Core i7 QPI Link Reut 1
3c94 Xeon E5/Core i7 QPI Link Reut
1
3ca0 Xeon E5/Core i7 Processor Home Agent
3ca8 Xeon E5/Core i7 Integrated Memory Controller Registers
3caa Xeon E5/Core i7 Integrated Memory Controller Target Address Decoder 0
3cab Xeon E5/Core i7 Integrated Memory Controller Target Address Decoder 1
3cac Xeon E5/Core i7 Integrated Memory Controller Target Address Decoder 2
3cad Xeon E5/Core i7 Integrated Memory Controller Target Address Decoder 3
3cae Xeon E5/Core i7 Integrated Memory Controller Target Address Decoder 4
3cb0 Xeon E5/Core i7 Integrated Memory Controller Channel 0-3 Thermal Control 0
3cb1 Xeon E5/Core i7 Integrated Memory Controller Channel 0-3 Thermal Control 1
3cb2 Xeon E5/Core i7 Integrated Memory Controller ERROR Registers 0
3cb3 Xeon E5/Core i7 Integrated Memory Controller ERROR Registers 1
3cb4 Xeon E5/Core i7 Integrated Memory Controller Channel 0-3 Thermal Control 2
3cb5 Xeon E5/Core i7 Integrated Memory Controller Channel 0-3 Thermal Control 3
3cb6 Xeon E5/Core i7 Integrated Memory
Controller ERROR Registers 2
3cb7 Xeon E5/Core i7 Integrated Memory Controller ERROR Registers 3
3cb8 Xeon E5/Core i7 DDRIO
3cc0 Xeon E5/Core i7 Power Control Unit 0
3cc1 Xeon E5/Core i7 Power Control Unit 1
3cc2 Xeon E5/Core i7 Power Control Unit 2
3cd0 Xeon E5/Core i7 Power Control Unit 3
3ce0 Xeon E5/Core i7 Interrupt Control Registers
3ce3 Xeon E5/Core i7 Semaphore and Scratchpad Configuration Registers
3ce4 Xeon E5/Core i7 R2PCIe
3ce6 Xeon E5/Core i7 QuickPath Interconnect Agent Ring Registers
3ce8 Xeon E5/Core i7 Unicast Register 0
3ce9 Xeon E5/Core i7 Unicast Register 5
3cea Xeon E5/Core i7 Unicast Register 1
3ceb Xeon E5/Core i7 Unicast Register 6
3cec Xeon E5/Core i7 Unicast Register 3
3ced Xeon E5/Core i7 Unicast Register 7
3cee Xeon E5/Core i7 Unicast Register 4
3cef Xeon E5/Core i7 Unicast Register 8
3cf4 Xeon E5/Core i7 Integrated Memory Controller System Address Decoder 0
3cf5 Xeon E5/Core i7 Integrated Memory Controller System Address

Decoder 1

- 3cf6 Xeon E5/Core i7 System Address Decoder
- 3e10 8th Gen Core 4-core Processor Host Bridge/DRAM Registers [Coffee Lake H]
- 3e18 8th Gen Core 4-core Workstation Processor Host Bridge/DRAM Registers [Coffee Lake S]
- 3e1f 8th Gen Core 4-core Desktop Processor Host Bridge/DRAM Registers [Coffee Lake S]
1458 5000 Z370 AORUS Gaming K3-CF
- 3e30 8th Gen Core 8-core Desktop Processor Host Bridge/DRAM Registers [Coffee Lake S]
- 3e33 8th/9th Gen Core Processor Host Bridge/DRAM Registers [Coffee Lake]
- 3e34 Coffee Lake HOST and DRAM Controller
- 3e81 8th Gen Core Processor PCIe Controller (x16)
- 3e85 8th Gen Core Processor PCIe Controller (x8)
- 3e89 8th Gen Core Processor PCIe Controller (x4)
- 3e91 8th Gen Core Processor Gaussian Mixture Model
- 3e92 UHD Graphics 630 (Desktop)
- 3e93 UHD Graphics 610
- 3e96 HD Graphics P630
- 3e98 UHD Graphics 630 (Desktop 9 Series)
- 3e9b UHD Graphics 630 (Mobile)
- 3ea0 UHD Graphics 620 (Whiskey Lake)
1028 089e Inspiron 5482
- 3ea5
Iris Plus Graphics 655
- 3ec2 8th Gen Core Processor Host Bridge/DRAM Registers
1043 8694 PRIME H310M-D
- 3ec4 8th Gen Core Processor Host Bridge/DRAM Registers
- 3ec6 8th Gen Core Processor Host Bridge/DRAM Registers
- 3eca 8th Gen Core Processor Host Bridge/DRAM Registers
- 3ed0 8th Gen Core Processor Host Bridge/DRAM Registers
- 4000 5400 Chipset Memory Controller Hub
- 4001 5400 Chipset Memory Controller Hub
- 4003 5400 Chipset Memory Controller Hub
- 4021 5400 Chipset PCI Express Port 1
- 4022 5400 Chipset PCI Express Port 2
- 4023 5400 Chipset PCI Express Port 3
- 4024 5400 Chipset PCI Express Port 4
- 4025 5400 Chipset PCI Express Port 5
- 4026 5400 Chipset PCI Express Port 6
- 4027 5400 Chipset PCI Express Port 7
- 4028 5400 Chipset PCI Express Port 8
- 4029 5400 Chipset PCI Express Port 9
- 402d 5400 Chipset IBIST Registers
- 402e 5400 Chipset IBIST Registers
- 402f 5400 Chipset QuickData Technology Device
- 4030 5400 Chipset FSB Registers
- 4031 5400 Chipset CE/SF Registers
- 4032
5400 Chipset IOxAPIC
- 4035 5400 Chipset FBD Registers

4036 5400 Chipset FBD Registers
4100 Moorestown Graphics and Video
4108 Atom Processor E6xx Integrated Graphics Controller
4109 Atom Processor E6xx Integrated Graphics Controller
410a Atom Processor E6xx Integrated Graphics Controller
410b Atom Processor E6xx Integrated Graphics Controller
410c Atom Processor E6xx Integrated Graphics Controller
410d Atom Processor E6xx Integrated Graphics Controller
410e Atom Processor E6xx Integrated Graphics Controller
410f Atom Processor E6xx Integrated Graphics Controller
4114 Atom Processor E6xx PCI Host Bridge #1
4115 Atom Processor E6xx PCI Host Bridge #2
4116 Atom Processor E6xx PCI Host Bridge #3
4117 Atom Processor E6xx PCI Host Bridge #4
4220 PRO/Wireless 2200BG [Calexico2] Network Connection
103c 0934 Compaq nw8240/nx8220
103c 12f6 nc6120/nc6220/nw8240/nx8220
8086 2701 WM3B2200BG Mini-PCI Card
8086 2712 IBM ThinkPad R50e
8086 2721
Dell B130 laptop integrated WLAN
8086 2722 Dell Latitude D600
8086 2731 Samsung P35 integrated WLAN
4222 PRO/Wireless 3945ABG [Golan] Network Connection
103c 135c PRO/Wireless 3945ABG [Golan] Network Connection
8086 1000 PRO/Wireless 3945ABG Network Connection
8086 1001 WM3945ABG MOW2
8086 1005 PRO/Wireless 3945BG Network Connection
8086 1034 PRO/Wireless 3945BG Network Connection
8086 1044 PRO/Wireless 3945BG Network Connection
8086 1c00 PRO/Wireless 3945ABG Network Connection
4223 PRO/Wireless 2915ABG [Calexico2] Network Connection
1000 8086 mPCI 3B Americas/Europe ZZA
1001 8086 mPCI 3B Europe ZZE
1002 8086 mPCI 3B Japan ZZJ
1003 8086 mPCI 3B High-Band ZZH
103c 1351 Compaq nc6220
4224 PRO/Wireless 2915ABG [Calexico2] Network Connection
4227 PRO/Wireless 3945ABG [Golan] Network Connection
8086 1010 ThinkPad R60e
8086 1011 ThinkPad T60/R60e/X60s/R61
8086 1014 PRO/Wireless 3945BG Network Connection
4229 PRO/Wireless 4965 AG
or AGN [Kedron] Network Connection
8086 1100 Vaio VGN-SZ79SN_C
8086 1101 PRO/Wireless 4965 AG or AGN
422b Centrino Ultimate-N 6300
8086 1101 Centrino Ultimate-N 6300 3x3 AGN

8086 1121 Centrino Ultimate-N 6300 3x3 AGN
422c Centrino Advanced-N 6200
8086 1301 Centrino Advanced-N 6200 2x2 AGN
8086 1306 Centrino Advanced-N 6200 2x2 ABG
8086 1307 Centrino Advanced-N 6200 2x2 BG
8086 1321 Centrino Advanced-N 6200 2x2 AGN
8086 1326 Centrino Advanced-N 6200 2x2 ABG
4230 PRO/Wireless 4965 AG or AGN [Kedron] Network Connection
8086 1110 Lenovo ThinkPad T51
8086 1111 Lenovo ThinkPad T61
4232 WiFi Link 5100
8086 1201 WiFi Link 5100 AGN
8086 1204 WiFi Link 5100 AGN
8086 1205 WiFi Link 5100 BGN
8086 1206 WiFi Link 5100 ABG
8086 1221 WiFi Link 5100 AGN
8086 1224 WiFi Link 5100 AGN
8086 1225 WiFi Link 5100 BGN
8086 1226 WiFi Link 5100 ABG
8086 1301 WiFi Link 5100 AGN
8086 1304 WiFi Link 5100 AGN
8086 1305 WiFi Link 5100 BGN
8086
1306 WiFi Link 5100 ABG
8086 1321 WiFi Link 5100 AGN
8086 1324 WiFi Link 5100 AGN
8086 1325 WiFi Link 5100 BGN
8086 1326 WiFi Link 5100 ABG
4235 Ultimate N WiFi Link 5300
4236 Ultimate N WiFi Link 5300
4237 PRO/Wireless 5100 AGN [Shiloh] Network Connection
8086 1211 WiFi Link 5100 AGN
8086 1214 WiFi Link 5100 AGN
8086 1215 WiFi Link 5100 BGN
8086 1216 WiFi Link 5100 ABG
8086 1311 WiFi Link 5100 AGN
8086 1314 WiFi Link 5100 AGN
8086 1315 WiFi Link 5100 BGN
8086 1316 WiFi Link 5100 ABG
4238 Centrino Ultimate-N 6300
8086 1111 Centrino Ultimate-N 6300 3x3 AGN
4239 Centrino Advanced-N 6200
8086 1311 Centrino Advanced-N 6200 2x2 AGN
8086 1316 Centrino Advanced-N 6200 2x2 ABG
423a PRO/Wireless 5350 AGN [Echo Peak] Network Connection
423b PRO/Wireless 5350 AGN [Echo Peak] Network Connection
423c WiMAX/WiFi Link 5150
8086 1201 WiMAX/WiFi Link 5150 AGN

8086 1206 WiMAX/WiFi Link 5150 ABG
8086 1221 WiMAX/WiFi Link 5150 AGN
8086
1301 WiMAX/WiFi Link 5150 AGN
8086 1306 WiMAX/WiFi Link 5150 ABG
8086 1321 WiMAX/WiFi Link 5150 AGN
423d WiMAX/WiFi Link 5150
8086 1211 WiMAX/WiFi Link 5150 AGN
8086 1216 WiMAX/WiFi Link 5150 ABG
8086 1311 WiMAX/WiFi Link 5150 AGN
8086 1316 WiMAX/WiFi Link 5150 ABG
444e Turbo Memory Controller
467f Volume Management Device NVMe RAID Controller
4c3d Volume Management Device NVMe RAID Controller
5001 LE80578
5002 LE80578 Graphics Processor Unit
5009 LE80578 Video Display Controller
500d LE80578 Expansion Bus
500e LE80578 UART Controller
500f LE80578 General Purpose IO
5010 LE80578 I2C Controller
5012 LE80578 Serial Peripheral Interface Bus
5020 EP80579 Memory Controller Hub
5021 EP80579 DRAM Error Reporting Registers
5023 EP80579 EDMA Controller
5024 EP80579 PCI Express Port PEA0
5025 EP80579 PCI Express Port PEA1
5028 EP80579 S-ATA IDE
5029 EP80579 S-ATA AHCI
502a EP80579 S-ATA Reserved
502b EP80579 S-ATA Reserved
502c
EP80579 Integrated Processor ASU
502d EP80579 Integrated Processor with QuickAssist ASU
502e EP80579 Reserved
502f EP80579 Reserved
5030 EP80579 Reserved
5031 EP80579 LPC Bus
5032 EP80579 SMBus Controller
5033 EP80579 USB 1.1 Controller
5035 EP80579 USB 2.0 Controller
5037 EP80579 PCI-PCI Bridge (transparent mode)
5039 EP80579 Controller Area Network (CAN) interface #1
503a EP80579 Controller Area Network (CAN) interface #2
503b EP80579 Synchronous Serial Port (SPP)
503c EP80579 IEEE 1588 Hardware Assist
503d EP80579 Local Expansion Bus
503e EP80579 Global Control Unit (GCU)

503f EP80579 Reserved
5040 EP80579 Integrated Processor Gigabit Ethernet MAC
5041 EP80579 Integrated Processor with QuickAssist Gigabit Ethernet MAC
5042 EP80579 Reserved
5043 EP80579 Reserved
5044 EP80579 Integrated Processor Gigabit Ethernet MAC
5045 EP80579 Integrated Processor with QuickAssist Gigabit Ethernet MAC
5046 EP80579 Reserved
5047 EP80579 Reserved
5048
EP80579 Integrated Processor Gigabit Ethernet MAC
5049 EP80579 Integrated Processor with QuickAssist Gigabit Ethernet MAC
504a EP80579 Reserved
504b EP80579 Reserved
504c EP80579 Integrated Processor with QuickAssist TDM
5200 EtherExpress PRO/100 Intelligent Server PCI Bridge
5201 EtherExpress PRO/100 Intelligent Server Fast Ethernet Controller
8086 0001 EtherExpress PRO/100 Server Ethernet Adapter
530d 80310 (IOP) IO Processor
5845 QEMU NVM Express Controller
1af4 1100 QEMU Virtual Machine
5900 Xeon E3-1200 v6/7th Gen Core Processor Host Bridge/DRAM Registers
5901 Xeon E3-1200 v6/7th Gen Core Processor PCIe Controller (x16)
5902 HD Graphics 610
5904 Xeon E3-1200 v6/7th Gen Core Processor Host Bridge/DRAM Registers
1025 115f Aspire E5-575G
17aa 2247 ThinkPad T570
17aa 224f ThinkPad X1 Carbon 5th Gen
5905 Xeon E3-1200 v6/7th Gen Core Processor PCIe Controller (x8)
5909 Xeon E3-1200 v6/7th Gen Core Processor PCIe Controller (x4)
590c Xeon E3-1200
v6/7th Gen Core Processor Host Bridge/DRAM Registers
590f Xeon E3-1200 v6/7th Gen Core Processor Host Bridge/DRAM Registers
1462 7a68 B250 KRAIT GAMING (MS-7A68)
5910 Xeon E3-1200 v6/7th Gen Core Processor Host Bridge/DRAM Registers
5911 Xeon E3-1200 v6/7th Gen Core Processor Gaussian Mixture Model
5912 HD Graphics 630
5914 Xeon E3-1200 v6/7th Gen Core Processor Host Bridge/DRAM Registers
17aa 225d ThinkPad T480
5916 HD Graphics 620
1025 1094 Aspire E5-575G
17aa 2248 ThinkPad T570
17aa 224f ThinkPad X1 Carbon 5th Gen
5917 UHD Graphics 620
17aa 225e ThinkPad T480
5918 Xeon E3-1200 v6/7th Gen Core Processor Host Bridge/DRAM Registers
591b HD Graphics 630
591c UHD Graphics 615

591d HD Graphics P630
591e HD Graphics 615
591f Xeon E3-1200 v6/7th Gen Core Processor Host Bridge/DRAM Registers
5923 HD Graphics 635
5926 Iris Plus Graphics 640
5927 Iris Plus Graphics 650
5a84 Celeron N3350/Pentium N4200/Atom E3900 Series Integrated Graphics
Controller
5a85 HD Graphics 500
5a88 Celeron N3350/Pentium N4200/Atom E3900 Series Imaging Unit
5a98 Celeron N3350/Pentium N4200/Atom E3900 Series Audio Cluster
5a9a Celeron N3350/Pentium N4200/Atom E3900 Series Trusted Execution Engine
5aa2 Celeron N3350/Pentium N4200/Atom E3900 Series Integrated Sensor Hub
5aa8 Celeron N3350/Pentium N4200/Atom E3900 Series USB xHCI
5aac Celeron N3350/Pentium N4200/Atom E3900 Series I2C Controller #1
5aae Celeron N3350/Pentium N4200/Atom E3900 Series I2C Controller #2
5ab0 Celeron N3350/Pentium N4200/Atom E3900 Series I2C Controller #3
5ab2 Celeron N3350/Pentium N4200/Atom E3900 Series I2C Controller #4
5ab4 Celeron N3350/Pentium N4200/Atom E3900 Series I2C Controller #5
5ab6 Celeron N3350/Pentium N4200/Atom E3900 Series I2C Controller #6
5ab8 Celeron N3350/Pentium N4200/Atom E3900 Series I2C Controller #7
5aba Celeron N3350/Pentium N4200/Atom E3900 Series I2C Controller #8
5abc Celeron N3350/Pentium N4200/Atom E3900 Series
HSUART Controller #1
5abe Celeron N3350/Pentium N4200/Atom E3900 Series HSUART Controller #2
5ac0 Celeron N3350/Pentium N4200/Atom E3900 Series HSUART Controller #3
5ac2 Celeron N3350/Pentium N4200/Atom E3900 Series SPI Controller #1
5ac4 Celeron N3350/Pentium N4200/Atom E3900 Series SPI Controller #2
5ac6 Celeron N3350/Pentium N4200/Atom E3900 Series SPI Controller #3
5ac8 Celeron N3350/Pentium N4200/Atom E3900 Series PWM Pin Controller
5aca Celeron N3350/Pentium N4200/Atom E3900 Series SDXC/MMC Host Controller
5acc Celeron N3350/Pentium N4200/Atom E3900 Series eMMC Controller
5ad0 Celeron N3350/Pentium N4200/Atom E3900 Series SDIO Controller
5ad4 Celeron N3350/Pentium N4200/Atom E3900 Series SMBus Controller
5ad6 Celeron N3350/Pentium N4200/Atom E3900 Series PCI Express Port B #1
5ad7 Celeron N3350/Pentium N4200/Atom E3900 Series PCI Express Port B #2
5ad8 Celeron N3350/Pentium N4200/Atom E3900 Series PCI Express Port A #1
5ad9 Celeron N3350/Pentium
N4200/Atom E3900 Series PCI Express Port A #2
5ada Celeron N3350/Pentium N4200/Atom E3900 Series PCI Express Port A #3
5adb Celeron N3350/Pentium N4200/Atom E3900 Series PCI Express Port A #4
5ae3 Celeron N3350/Pentium N4200/Atom E3900 Series SATA AHCI Controller
5ae8 Celeron N3350/Pentium N4200/Atom E3900 Series Low Pin Count Interface
5aee Celeron N3350/Pentium N4200/Atom E3900 Series HSUART Controller #4
5af0 Celeron N3350/Pentium N4200/Atom E3900 Series Host Bridge
65c0 5100 Chipset Memory Controller Hub
65e2 5100 Chipset PCI Express x4 Port 2
65e3 5100 Chipset PCI Express x4 Port 3

65e4 5100 Chipset PCI Express x4 Port 4
65e5 5100 Chipset PCI Express x4 Port 5
65e6 5100 Chipset PCI Express x4 Port 6
65e7 5100 Chipset PCI Express x4 Port 7
65f0 5100 Chipset FSB Registers
1028 020f PowerEdge R300
1028 0210 PowerEdge T300
65f1 5100 Chipset Reserved Registers
1028 0210 PowerEdge T300
65f3 5100 Chipset Reserved Registers
65f5 5100 Chipset DDR
Channel 0 Registers
65f6 5100 Chipset DDR Channel 1 Registers
65f7 5100 Chipset PCI Express x8 Port 2-3
65f8 5100 Chipset PCI Express x8 Port 4-5
65f9 5100 Chipset PCI Express x8 Port 6-7
65fa 5100 Chipset PCI Express x16 Port 4-7
65ff 5100 Chipset DMA Engine
6f00 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D DMI2
15d9 0832 X10SRL-F
6f01 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D PCI Express Root Port 0
6f02 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D PCI Express Root Port 1
6f03 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D PCI Express Root Port 1
6f04 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D PCI Express Root Port 2
6f05 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D PCI Express Root Port 2
6f06 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D PCI Express Root Port 2
6f07 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D PCI Express Root Port 2
6f08 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D PCI Express Root Port 3
6f09 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D PCI Express Root Port 3
6f0a Xeon E7
v4/Xeon E5 v4/Xeon E3 v4/Xeon D PCI Express Root Port 3
6f0b Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D PCI Express Root Port 3
6f10 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D IIO Debug
6f11 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D IIO Debug
6f12 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D IIO Debug
6f13 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D IIO Debug
6f14 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D IIO Debug
6f15 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D IIO Debug
6f16 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D IIO Debug
6f17 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D IIO Debug
6f18 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D IIO Debug
6f19 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D IIO Debug
6f1a Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D IIO Debug
6f1b Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D IIO Debug
6f1c Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D IIO Debug
6f1d Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D R2PCIe Agent
6f1e Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Ubox
6f1f Xeon E7 v4/Xeon

E5 v4/Xeon E3 v4/Xeon D Ubox
 6f20 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Crystal Beach DMA Channel 0
 15d9 0832 X10SRL-F
 6f21 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Crystal Beach DMA Channel 1
 15d9 0832 X10SRL-F
 6f22 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Crystal Beach DMA Channel 2
 15d9 0832 X10SRL-F
 6f23 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Crystal Beach DMA Channel 3
 15d9 0832 X10SRL-F
 6f24 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Crystal Beach DMA Channel 4
 15d9 0832 X10SRL-F
 6f25 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Crystal Beach DMA Channel 5
 15d9 0832 X10SRL-F
 6f26 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Crystal Beach DMA Channel 6
 15d9 0832 X10SRL-F
 6f27 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Crystal Beach DMA Channel 7
 15d9 0832 X10SRL-F
 6f28 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Map/VTd_Misc/System Management
 15d9 0832 X10SRL-F
 6f29 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D IIO Hot Plug
 15d9 0832 X10SRL-F
 6f2a Xeon
 E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D IIO RAS/Control Status/Global Errors
 15d9 0832 X10SRL-F
 6f2c Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D I/O APIC
 15d9 0832 X10SRL-F
 6f30 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Home Agent 0
 6f32 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D QPI Link 0
 6f33 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D QPI Link 1
 6f34 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D R2PCIe Agent
 6f36 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D R3 QPI Link 0/1
 6f37 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D R3 QPI Link 0/1
 6f38 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Home Agent 1
 6f39 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D IO Performance Monitoring
 6f3a Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D QPI Link 2
 6f3e Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D R3 QPI Link 2
 6f3f Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D R3 QPI Link 2
 6f40 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D QPI Link 2
 6f41 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D R3 QPI Link 2
 6f43 Xeon E7 v4/Xeon E5 v4/Xeon
 E3 v4/Xeon D QPI Link 2
 6f45 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D QPI Link 2 Debug
 6f46 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D QPI Link 2 Debug
 6f47 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D QPI Link 2 Debug
 6f50 Xeon Processor D Family QuickData Technology Register DMA Channel 0
 6f51 Xeon Processor D Family QuickData Technology Register DMA Channel 1
 6f52 Xeon Processor D Family QuickData Technology Register DMA Channel 2
 6f53 Xeon Processor D Family QuickData Technology Register DMA Channel 3

6f54 Xeon Processor D Family QuickAssist Technology

6f55 Xeon Processor D Family QuickAssist Technology Virtual Fuction

6f60 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Home Agent 1

6f68 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Target Address/Thermal/RAS

6f6a Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Channel Target Address Decoder

6f6b Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Channel Target Address Decoder

6f6c Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Channel Target Address Decoder

6f6d Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Channel Target Address Decoder

6f6e Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D DDRIO Channel 2/3 Broadcast

6f6f Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D DDRIO Global Broadcast

6f70 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Home Agent 0 Debug

6f71 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Memory Controller 0 - Target Address/Thermal/RAS

6f76 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D R3 QPI Link Debug

6f78 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Home Agent 1 Debug

6f79 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Target Address/Thermal/RAS

6f7d Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Ubox

6f7e Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D R3 QPI Link Debug

6f80 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D QPI Link 0

6f81 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D R3 QPI Link 0/1

6f83 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D QPI Link 0

6f85 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D QPI Link 0 Debug

6f86 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D QPI Link 0 Debug

6f87 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D QPI Link 0 Debug

6f88 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Power Control Unit

6f8a Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Power Control Unit

6f90 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D QPI Link 1

6f93 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D QPI Link 1

6f95 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D QPI Link 1 Debug

6f96 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D QPI Link 1 Debug

6f98 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Power Control Unit

6f99 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Power Control Unit

6f9a Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Power Control Unit

6f9c Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Power Control Unit

6fa0 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Home Agent 0

6fa8 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Memory Controller 0 - Target Address/Thermal/RAS

6faa Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Memory Controller 0 - Channel Target Address Decoder

6fab Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Memory Controller 0 - Channel Target Address Decoder

6fac Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Memory Controller 0 - Channel Target Address Decoder

6fad Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Memory Controller 0 - Channel Target Address Decoder

6fae Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D DDRIO Channel 0/1 Broadcast

6faf Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D DDRIO Global Broadcast

6fb0 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Memory Controller 0 - Channel 0 Thermal Control

6fb1 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Memory Controller 0 - Channel 1 Thermal Control

6fb2 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Memory Controller 0 - Channel 0 Error

6fb3 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Memory Controller 0 - Channel 1 Error

6fb4 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Memory Controller 0 - Channel 2 Thermal Control
6fb5 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Memory Controller 0 - Channel 3 Thermal Control
6fb6 Xeon E7 v4/Xeon
E5 v4/Xeon E3 v4/Xeon D Memory Controller 0 - Channel 2 Error
6fb7 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Memory Controller 0 - Channel 3 Error
6fb8 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D DDRIO Channel 2/3 Interface
6fb9 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D DDRIO Channel 2/3 Interface
6fba Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D DDRIO Channel 2/3 Interface
6fbb Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D DDRIO Channel 2/3 Interface
6fbc Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D DDRIO Channel 0/1 Interface
6fbd Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D DDRIO Channel 0/1 Interface
6fbe Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D DDRIO Channel 0/1 Interface
6fbf Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D DDRIO Channel 0/1 Interface
6fc0 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Power Control Unit
6fc1 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Power Control Unit
6fc2 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Power Control Unit
6fc3 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Power
Control Unit
6fc4 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Power Control Unit
6fc5 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Power Control Unit
6fc6 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Power Control Unit
6fc7 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Power Control Unit
6fc8 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Power Control Unit
6fc9 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Power Control Unit
6fca Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Power Control Unit
6fcb Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Power Control Unit
6fcc Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Power Control Unit
6fcd Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Power Control Unit
6fce Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Power Control Unit
6fcf Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Power Control Unit
6fd0 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Memory Controller 1 - Channel 0 Thermal Control
6fd1 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Memory Controller 1 - Channel 1 Thermal Control
6fd2
Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Memory Controller 1 - Channel 0 Error
6fd3 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Memory Controller 1 - Channel 1 Error
6fd4 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Memory Controller 1 - Channel 2 Thermal Control
6fd5 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Memory Controller 1 - Channel 3 Thermal Control
6fd6 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Memory Controller 1 - Channel 2 Error
6fd7 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Memory Controller 1 - Channel 3 Error
6fe0 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Caching Agent
6fe1 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Caching Agent
6fe2 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Caching Agent
6fe3 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Caching Agent
6fe4 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Caching Agent
6fe5 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Caching Agent
6fe6 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Caching Agent
6fe7 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Caching

Agent

6fe8 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Caching Agent
6fe9 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Caching Agent
6fea Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Caching Agent
6feb Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Caching Agent
6fec Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Caching Agent
6fed Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Caching Agent
6fee Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Caching Agent
6fef Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Caching Agent
6ff0 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Caching Agent
6ff1 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Caching Agent
6ff8 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Caching Agent
6ff9 Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Caching Agent
6ffa Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Caching Agent
6ffb Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Caching Agent
6ffc Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Caching Agent
6ffd Xeon E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Caching Agent
6ffe Xeon
E7 v4/Xeon E5 v4/Xeon E3 v4/Xeon D Caching Agent
7000 82371SB PIIX3 ISA [Natoma/Triton II]
1af4 1100 Qemu virtual machine
7010 82371SB PIIX3 IDE [Natoma/Triton II]
1af4 1100 Qemu virtual machine
7020 82371SB PIIX3 USB [Natoma/Triton II]
1af4 1100 QEMU Virtual Machine
7030 430VX - 82437VX TVX [Triton VX]
7050 Intercast Video Capture Card
7051 PB 642365-003 (Business Video Conferencing Card)
7100 430TX - 82439TX MTXC
7110 82371AB/EB/MB PIIX4 ISA
15ad 1976 Virtual Machine Chipset
7111 82371AB/EB/MB PIIX4 IDE
15ad 1976 Virtual Machine Chipset
7112 82371AB/EB/MB PIIX4 USB
15ad 1976 Virtual Machine Chipset
1af4 1100 QEMU Virtual Machine
7113 82371AB/EB/MB PIIX4 ACPI
15ad 1976 Virtual Machine Chipset
1af4 1100 Qemu virtual machine
7120 82810 GMCH (Graphics Memory Controller Hub)
4c53 1040 CL7 mainboard
4c53 1060 PC7 mainboard
7121 82810 (CGC) Chipset Graphics Controller
4c53 1040 CL7 mainboard
4c53 1060 PC7 mainboard
8086 4341
Cayman (CA810) Mainboard
7122 82810 DC-100 (GMCH) Graphics Memory Controller Hub

7123 82810 DC-100 (CGC) Chipset Graphics Controller
7124 82810E DC-133 (GMCH) Graphics Memory Controller Hub
1028 00b4 OptiPlex GX110
7125 82810E DC-133 (CGC) Chipset Graphics Controller
1028 00b4 OptiPlex GX110
7126 82810 DC-133 System and Graphics Controller
7128 82810-M DC-100 System and Graphics Controller
712a 82810-M DC-133 System and Graphics Controller
7180 440LX/EX - 82443LX/EX Host bridge
7181 440LX/EX - 82443LX/EX AGP bridge
7190 440BX/ZX/DX - 82443BX/ZX/DX Host bridge
0e11 0500 Armada 1750 Laptop System Chipset
0e11 b110 Armada M700/E500
1028 008e PowerEdge 1300 mainboard
1043 803b CUBX-L/E Mainboard
1179 0001 Toshiba Tecra 8100 Laptop System Chipset
15ad 1976 Virtual Machine Chipset
4c53 1050 CT7 mainboard
4c53 1051 CE7 mainboard
7191 440BX/ZX/DX - 82443BX/ZX/DX AGP bridge
1028 008e PowerEdge 1300 mainboard
7192 440BX/ZX/DX - 82443BX/ZX/DX
Host bridge (AGP disabled)
0e11 0460 Armada 1700 Laptop System Chipset
1179 0001 Satellite 4010
4c53 1000 CC7/CR7/CP7/VC7/VP7/VR7 mainboard
8086 7190 Dell PowerEdge 350
7194 82440MX Host Bridge
1033 0000 Versa Note Vxi
4c53 10a0 CA3/CR3 mainboard
7195 82440MX AC'97 Audio Controller
1033 80cc Versa Note VXi
10cf 1099 QSound_SigmaTel Stac97 PCI Audio
11d4 0040 SoundMAX Integrated Digital Audio
11d4 0048 SoundMAX Integrated Digital Audio
7196 82440MX AC'97 Modem Controller
7198 82440MX ISA Bridge
7199 82440MX EIDE Controller
719a 82440MX USB Universal Host Controller
719b 82440MX Power Management Controller
71a0 440GX - 82443GX Host bridge
4c53 1050 CT7 mainboard
4c53 1051 CE7 mainboard
71a1 440GX - 82443GX AGP bridge
71a2 440GX - 82443GX Host bridge (AGP disabled)
4c53 1000 CC7/CR7/CP7/VC7/VP7/VR7 mainboard
7360 XMM7360 LTE Advanced Modem
7600 82372FB PIIX5 ISA

7601 82372FB PIIX5 IDE
7602 82372FB PIIX5 USB
7603 82372FB
PIIX5 SMBus
7800 82740 (i740) AGP Graphics Accelerator
003d 0008 Starfighter AGP
003d 000b Starfighter AGP
1092 0100 Stealth II G460
10b4 201a Lightspeed 740
10b4 202f Lightspeed 740
8086 0000 Terminator 2x/i
8086 0100 Intel740 Graphics Accelerator
8002 Trusted Execution Technology Registers
8003 Trusted Execution Technology Registers
8100 US15W/US15X SCH [Poulsbo] Host Bridge
8101 US15L/UL11L SCH [Poulsbo] Host Bridge
8108 US15W/US15X SCH [Poulsbo] Graphics Controller
8109 US15L/UL11L SCH [Poulsbo] Graphics Controller
8110 US15W/US15X/US15L/UL11L SCH [Poulsbo] PCI Express Port 1
8112 US15W/US15X/US15L/UL11L SCH [Poulsbo] PCI Express Port 2
8114 US15W/US15X/US15L/UL11L SCH [Poulsbo] USB UHCI Controller #1
8115 US15W/US15X/US15L/UL11L SCH [Poulsbo] USB UHCI Controller #2
8116 US15W/US15X/US15L/UL11L SCH [Poulsbo] USB UHCI Controller #3
8117 US15W/US15X/US15L/UL11L SCH [Poulsbo] USB EHCI Controller
8118 US15W/US15X/US15L/UL11L SCH [Poulsbo]
USB Client Controller
8119 US15W/US15X/US15L/UL11L SCH [Poulsbo] LPC Bridge
811a US15W/US15X/US15L/UL11L SCH [Poulsbo] IDE Controller
811b US15W/US15X/US15L/UL11L SCH [Poulsbo] HD Audio Controller
811c US15W/US15X/US15L/UL11L SCH [Poulsbo] SDIO/MMC Controller #1
811d US15W/US15X/US15L/UL11L SCH [Poulsbo] SDIO/MMC Controller #2
811e US15W/US15X/US15L/UL11L SCH [Poulsbo] SDIO/MMC Controller #3
8180 Atom Processor E6xx PCI Express Port 3
8181 Atom Processor E6xx PCI Express Port 4
8182 Atom Processor E6xx Integrated Graphics Controller
8183 Atom Processor E6xx Configuration Unit
8184 Atom Processor E6xx PCI Express Port 1
8185 Atom Processor E6xx PCI Express Port 2
8186 Atom Processor E6xx LPC Bridge
84c4 450KX/GX [Orion] - 82454KX/GX PCI bridge
84c5 450KX/GX [Orion] - 82453KX/GX Memory controller
84ca 450NX - 82451NX Memory & I/O Controller
84cb 450NX - 82454NX/84460GX PCI Expander Bridge
84e0 460GX - 84460GX System Address Controller (SAC)
84e1
460GX - 84460GX System Data Controller (SDC)
84e2 460GX - 84460GX AGP Bridge (GXB function 2)
84e3 460GX - 84460GX Memory Address Controller (MAC)

84e4 460GX - 84460GX Memory Data Controller (MDC)
84e6 460GX - 82466GX Wide and fast PCI eXpander Bridge (WXB)
84ea 460GX - 84460GX AGP Bridge (GXB function 1)
8500 IXP4XX Network Processor (IXP420/421/422/425/IXC1100)
1993 0ded mGuard-PCI AV#2
1993 0dee mGuard-PCI AV#1
1993 0def mGuard-PCI AV#0
87c0 UHD Graphics 617
8800 Platform Controller Hub EG20T PCI Express Port
8801 Platform Controller Hub EG20T Packet Hub
8802 Platform Controller Hub EG20T Gigabit Ethernet Controller
8803 Platform Controller Hub EG20T General Purpose IO Controller
8804 Platform Controller Hub EG20T USB OHCI Controller #4
8805 Platform Controller Hub EG20T USB OHCI Controller #5
8806 Platform Controller Hub EG20T USB OHCI Controller #6
8807 Platform Controller Hub EG20T USB2 EHCI Controller #2
8808 Platform Controller Hub EG20T
USB Client Controller
8809 Platform Controller Hub EG20T SDIO Controller #1
880a Platform Controller Hub EG20T SDIO Controller #2
880b Platform Controller Hub EG20T SATA AHCI Controller
880c Platform Controller Hub EG20T USB OHCI Controller #1
880d Platform Controller Hub EG20T USB OHCI Controller #2
880e Platform Controller Hub EG20T USB OHCI Controller #3
880f Platform Controller Hub EG20T USB2 EHCI Controller #1
8810 Platform Controller Hub EG20T DMA Controller #1
8811 Platform Controller Hub EG20T UART Controller 0
8812 Platform Controller Hub EG20T UART Controller 1
8813 Platform Controller Hub EG20T UART Controller 2
8814 Platform Controller Hub EG20T UART Controller 3
8815 Platform Controller Hub EG20T DMA Controller #2
8816 Platform Controller Hub EG20T Serial Peripheral Interface Bus
8817 Platform Controller Hub EG20T I2C Controller
8818 Platform Controller Hub EG20T Controller Area Network (CAN) Controller
8819 Platform Controller Hub EG20T
IEEE 1588 Hardware Assist
8a0d Ice Lake Thunderbolt 3 NHI #1
8a13 Ice Lake Thunderbolt 3 USB Controller
8a17 Ice Lake Thunderbolt 3 NHI #0
8a1d Ice Lake Thunderbolt 3 PCI Express Root Port #0
8a1f Ice Lake Thunderbolt 3 PCI Express Root Port #1
8a21 Ice Lake Thunderbolt 3 PCI Express Root Port #2
8a23 Ice Lake Thunderbolt 3 PCI Express Root Port #3
8a52 Iris Plus Graphics G7
8c00 8 Series/C220 Series Chipset Family 4-port SATA Controller 1 [IDE mode]
8c01 8 Series Chipset Family 4-port SATA Controller 1 [IDE mode] - Mobile
8c02 8 Series/C220 Series Chipset Family 6-port SATA Controller 1 [AHCI mode]
17aa 309f ThinkCentre M83

8c03 8 Series/C220 Series Chipset Family 6-port SATA Controller 1 [AHCI mode]
103c 1909 ZBook 15
17aa 220e ThinkPad T440p

8c04 8 Series/C220 Series Chipset Family SATA Controller 1 [RAID mode]

8c05 8 Series/C220 Series Chipset Family SATA Controller 1 [RAID mode]

8c06 8 Series/C220 Series Chipset Family SATA Controller 1 [RAID mode]

8c07 8 Series/C220 Series Chipset Family SATA Controller 1 [RAID mode]

8c08 8 Series/C220 Series Chipset Family 2-port SATA Controller 2 [IDE mode]

8c09 8 Series/C220 Series Chipset Family 2-port SATA Controller 2 [IDE mode]

8c0e 8 Series/C220 Series Chipset Family SATA Controller 1 [RAID mode]

8c0f 8 Series/C220 Series Chipset Family SATA Controller 1 [RAID mode]

8c10 8 Series/C220 Series Chipset Family PCI Express Root Port #1
17aa 220e ThinkPad T440p

8c11 8 Series/C220 Series Chipset Family PCI Express Root Port #1

8c12 8 Series/C220 Series Chipset Family PCI Express Root Port #2
17aa 220e ThinkPad T440p

8c13 8 Series/C220 Series Chipset Family PCI Express Root Port #2

8c14 8 Series/C220 Series Chipset Family PCI Express Root Port #3

8c15 8 Series/C220 Series Chipset Family PCI Express Root Port #3

8c16 8 Series/C220 Series Chipset Family PCI Express Root Port #4

8c17 8 Series/C220 Series Chipset Family PCI Express Root Port #4

8c18 8 Series/C220 Series Chipset Family PCI Express Root Port #5

8c19 8 Series/C220 Series Chipset Family PCI Express Root Port #5

8c1a 8 Series/C220 Series Chipset Family PCI Express Root Port #6

8c1b 8 Series/C220 Series Chipset Family PCI Express Root Port #6

8c1c 8 Series/C220 Series Chipset Family PCI Express Root Port #7

8c1d 8 Series/C220 Series Chipset Family PCI Express Root Port #7

8c1e 8 Series/C220 Series Chipset Family PCI Express Root Port #8

8c1f 8 Series/C220 Series Chipset Family PCI Express Root Port #8

8c20 8 Series/C220 Series Chipset High Definition Audio Controller
103c 1909 ZBook 15
17aa 220e ThinkPad T440p
17aa 309f ThinkCentre M83

8c21 8 Series/C220 Series Chipset High Definition Audio Controller

8c22 8 Series/C220 Series Chipset Family SMBus Controller
103c 1909 ZBook 15
17aa 220e ThinkPad T440p
17aa 309f ThinkCentre M83

8c23 8 Series Chipset Family CHAP Counters

8c24 8 Series Chipset Family Thermal Management Controller

8c26 8 Series/C220 Series Chipset Family USB EHCI #1
103c 1909 ZBook 15
17aa 220e ThinkPad T440p
17aa 2210 ThinkPad T540p
17aa 309f ThinkCentre M83

2210 17aa ThinkPad T540p
8c2d 8 Series/C220 Series Chipset Family USB EHCI #2
103c 1909 ZBook 15
17aa 220e ThinkPad T440p
17aa 309f ThinkCentre M83
8c31 8 Series/C220 Series Chipset Family USB xHCI
103c 1909 ZBook 15
17aa 220e ThinkPad T440p
17aa 309f ThinkCentre M83
8c33 8 Series/C220 Series Chipset Family LAN Controller
8c34 8 Series/C220 Series Chipset Family NAND Controller
8c3a 8 Series/C220 Series Chipset Family MEI Controller #1
103c 1909 ZBook 15
17aa 220e ThinkPad T440p
17aa 309f ThinkCentre M83
8c3b 8 Series/C220 Series Chipset Family MEI Controller #2
8c3c 8 Series/C220 Series Chipset Family IDE-r Controller
8c3d 8 Series/C220 Series Chipset Family KT Controller
8c40 8 Series/C220 Series Chipset Family LPC Controller
8c41 8 Series Chipset Family Mobile Super SKU LPC Controller
8c42
8 Series/C220 Series Chipset Family Desktop Super SKU LPC Controller
8c43 8 Series/C220 Series Chipset Family LPC Controller
8c44 Z87 Express LPC Controller
8c45 8 Series/C220 Series Chipset Family LPC Controller
8c46 Z85 Express LPC Controller
8c47 8 Series/C220 Series Chipset Family LPC Controller
8c48 8 Series/C220 Series Chipset Family LPC Controller
8c49 HM86 Express LPC Controller
8c4a H87 Express LPC Controller
8c4b HM87 Express LPC Controller
8c4c Q85 Express LPC Controller
17aa 309f ThinkCentre M83
8c4d 8 Series/C220 Series Chipset Family LPC Controller
8c4e Q87 Express LPC Controller
8c4f QM87 Express LPC Controller
103c 1909 ZBook 15
17aa 220e ThinkPad T440p
8c50 B85 Express LPC Controller
8c51 8 Series/C220 Series Chipset Family LPC Controller
8c52 C222 Series Chipset Family Server Essential SKU LPC Controller
8c53 8 Series/C220 Series Chipset Family LPC Controller
8c54 C224 Series Chipset Family Server Standard SKU LPC
Controller
8c55 8 Series/C220 Series Chipset Family LPC Controller
8c56 C226 Series Chipset Family Server Advanced SKU LPC Controller
8c57 8 Series/C220 Series Chipset Family LPC Controller
8c58 8 Series/C220 Series Chipset Family WS SKU LPC Controller

8c59 8 Series/C220 Series Chipset Family LPC Controller
8c5a 8 Series/C220 Series Chipset Family LPC Controller
8c5b 8 Series/C220 Series Chipset Family LPC Controller
8c5c H81 Express LPC Controller
8c5d 8 Series/C220 Series Chipset Family LPC Controller
8c5e 8 Series/C220 Series Chipset Family LPC Controller
8c5f 8 Series/C220 Series Chipset Family LPC Controller
8c80 9 Series Chipset Family SATA Controller [IDE Mode]
8c81 9 Series Chipset Family SATA Controller [IDE Mode]
8c82 9 Series Chipset Family SATA Controller [AHCI Mode]
8c83 9 Series Chipset Family SATA Controller [AHCI Mode]
8c84 9 Series Chipset Family SATA Controller [RAID Mode]
8c85 9 Series Chipset Family SATA Controller [RAID Mode]
8c86
9 Series Chipset Family SATA Controller [RAID Mode]
8c87 9 Series Chipset Family SATA Controller [RAID Mode]
8c88 9 Series Chipset Family SATA Controller [IDE Mode]
8c89 9 Series Chipset Family SATA Controller [IDE Mode]
8c8e 9 Series Chipset Family SATA Controller [RAID Mode]
8c8f 9 Series Chipset Family SATA Controller [RAID Mode]
8c90 9 Series Chipset Family PCI Express Root Port 1
8c92 9 Series Chipset Family PCI Express Root Port 2
8c94 9 Series Chipset Family PCI Express Root Port 3
8c96 9 Series Chipset Family PCI Express Root Port 4
8c98 9 Series Chipset Family PCI Express Root Port 5
8c9a 9 Series Chipset Family PCI Express Root Port 6
8c9c 9 Series Chipset Family PCI Express Root Port 7
8c9e 9 Series Chipset Family PCI Express Root Port 8
8ca0 9 Series Chipset Family HD Audio Controller
8ca2 9 Series Chipset Family SMBus Controller
8ca4 9 Series Chipset Family Thermal Controller
8ca6 9 Series Chipset Family USB EHCI Controller #1
8cad
9 Series Chipset Family USB EHCI Controller #2
8cb1 9 Series Chipset Family USB xHCI Controller
8cb3 9 Series Chipset Family LAN Controller
8cba 9 Series Chipset Family ME Interface #1
8cbb 9 Series Chipset Family ME Interface #2
8cbc 9 Series Chipset Family IDE-R Controller
8cbd 9 Series Chipset Family KT Controller
8cc1 9 Series Chipset Family LPC Controller
8cc2 9 Series Chipset Family LPC Controller
8cc3 HM97 Chipset LPC Controller
8cc4 Z97 Chipset LPC Controller
8cc5 QM97 Chipset LPC Controller
8cc6 H97 Chipset LPC Controller
8d00 C610/X99 series chipset 4-port SATA Controller [IDE mode]
8d02 C610/X99 series chipset 6-Port SATA Controller [AHCI mode]

8d04 C610/X99 series chipset SATA Controller [RAID mode]
8d06 C610/X99 series chipset SATA Controller [RAID mode]
17aa 1031 ThinkServer RAID 110i
8d08 C610/X99 series chipset 2-port SATA Controller [IDE mode]
8d0e C610/X99 series chipset SATA Controller [RAID mode]
8d10 C610/X99 series chipset
PCI Express Root Port #1
8d11 C610/X99 series chipset PCI Express Root Port #1
8d12 C610/X99 series chipset PCI Express Root Port #2
8d13 C610/X99 series chipset PCI Express Root Port #2
8d14 C610/X99 series chipset PCI Express Root Port #3
8d15 C610/X99 series chipset PCI Express Root Port #3
8d16 C610/X99 series chipset PCI Express Root Port #4
8d17 C610/X99 series chipset PCI Express Root Port #4
8d18 C610/X99 series chipset PCI Express Root Port #5
8d19 C610/X99 series chipset PCI Express Root Port #5
8d1a C610/X99 series chipset PCI Express Root Port #6
8d1b C610/X99 series chipset PCI Express Root Port #6
8d1c C610/X99 series chipset PCI Express Root Port #7
8d1d C610/X99 series chipset PCI Express Root Port #7
8d1e C610/X99 series chipset PCI Express Root Port #8
8d1f C610/X99 series chipset PCI Express Root Port #8
8d20 C610/X99 series chipset HD Audio Controller
8d21 C610/X99 series chipset HD Audio Controller
8d22 C610/X99 series chipset SMBus
Controller
15d9 0832 X10SRL-F
8d24 C610/X99 series chipset Thermal Subsystem
8d26 C610/X99 series chipset USB Enhanced Host Controller #1
15d9 0832 X10SRL-F
8d2d C610/X99 series chipset USB Enhanced Host Controller #2
15d9 0832 X10SRL-F
8d31 C610/X99 series chipset USB xHCI Host Controller
15d9 0832 X10SRL-F
8d33 C610/X99 series chipset LAN Controller
8d34 C610/X99 series chipset NAND Controller
8d3a C610/X99 series chipset MEI Controller #1
15d9 0832 X10SRL-F
8d3b C610/X99 series chipset MEI Controller #2
15d9 0832 X10SRL-F
8d3c C610/X99 series chipset IDE-r Controller
8d3d C610/X99 series chipset KT Controller
8d40 C610/X99 series chipset LPC Controller
8d41 C610/X99 series chipset LPC Controller
8d42 C610/X99 series chipset LPC Controller
8d43 C610/X99 series chipset LPC Controller
8d44 C610/X99 series chipset LPC Controller
15d9 0832 X10SRL-F

8d45 C610/X99 series chipset LPC Controller
8d46 C610/X99 series chipset LPC Controller
8d47
C610/X99 series chipset LPC Controller
8d48 C610/X99 series chipset LPC Controller
8d49 C610/X99 series chipset LPC Controller
8d4a C610/X99 series chipset LPC Controller
8d4b C610/X99 series chipset LPC Controller
8d4c C610/X99 series chipset LPC Controller
8d4d C610/X99 series chipset LPC Controller
8d4e C610/X99 series chipset LPC Controller
8d4f C610/X99 series chipset LPC Controller
8d60 C610/X99 series chipset sSATA Controller [IDE mode]
8d62 C610/X99 series chipset sSATA Controller [AHCI mode]
8d64 C610/X99 series chipset sSATA Controller [RAID mode]
8d66 C610/X99 series chipset sSATA Controller [RAID mode]
8d68 C610/X99 series chipset sSATA Controller [IDE mode]
8d6e C610/X99 series chipset sSATA Controller [RAID mode]
8d7c C610/X99 series chipset SPSR
15d9 0832 X10SRL-F
8d7d C610/X99 series chipset MS SMBus 0
8d7e C610/X99 series chipset MS SMBus 1
8d7f C610/X99 series chipset MS SMBus 2
9000 IXP2000 Family Network Processor
9001
IXP2400 Network Processor
9002 IXP2300 Network Processor
9004 IXP2800 Network Processor
9621 Integrated RAID
9622 Integrated RAID
9641 Integrated RAID
96a1 Integrated RAID
9a0b Volume Management Device NVMe RAID Controller
9b41 UHD Graphics
9b54 10th Gen Core Processor Host Bridge/DRAM Registers
9b64 10th Gen Core Processor Host Bridge/DRAM Registers
9bc4 UHD Graphics
9c00 8 Series SATA Controller 1 [IDE mode]
9c01 8 Series SATA Controller 1 [IDE mode]
9c02 8 Series SATA Controller 1 [AHCI mode]
9c03 8 Series SATA Controller 1 [AHCI mode]
17aa 2214 ThinkPad X240
9c04 8 Series SATA Controller 1 [RAID mode]
9c05 8 Series SATA Controller 1 [RAID mode]
9c06 8 Series SATA Controller 1 [RAID mode]
9c07 8 Series SATA Controller 1 [RAID mode]
9c08 8 Series SATA Controller 2 [IDE mode]
9c09 8 Series SATA Controller 2 [IDE mode]

9c0a 8 Series SATA Controller [Reserved]
9c0b 8 Series SATA Controller [Reserved]
9c0c 8 Series SATA Controller
[Reserved]
9c0d 8 Series SATA Controller [Reserved]
9c0e 8 Series SATA Controller 1 [RAID mode]
9c0f 8 Series SATA Controller 1 [RAID mode]
9c10 8 Series PCI Express Root Port 1
9c11 8 Series PCI Express Root Port 1
9c12 8 Series PCI Express Root Port 2
9c13 8 Series PCI Express Root Port 2
9c14 8 Series PCI Express Root Port 3
9c15 8 Series PCI Express Root Port 3
9c16 8 Series PCI Express Root Port 4
9c17 8 Series PCI Express Root Port 4
9c18 8 Series PCI Express Root Port 5
9c19 8 Series PCI Express Root Port 5
9c1a 8 Series PCI Express Root Port 6
9c1b 8 Series PCI Express Root Port 6
9c1c 8 Series PCI Express Root Port 7
9c1d 8 Series PCI Express Root Port 7
9c1e 8 Series PCI Express Root Port 8
9c1f 8 Series PCI Express Root Port 8
9c20 8 Series HD Audio Controller
17aa 2214 ThinkPad X240
9c21 8 Series HD Audio Controller
9c22 8 Series SMBus Controller
17aa 2214 ThinkPad X240
9c23 8 Series CHAP Counters
9c24 8 Series Thermal
9c26
8 Series USB EHCI #1
17aa 220c T440s
17aa 2214 ThinkPad X240
9c2d 8 Series USB EHCI #2
9c31 8 Series USB xHCI HC
17aa 2214 ThinkPad X240
8086 7270 Apple MacBookAir6,2 / MacBookPro11,1
9c35 8 Series SDIO Controller
9c36 8 Series Audio DSP Controller
9c3a 8 Series HECI #0
17aa 2214 ThinkPad X240
9c3b 8 Series HECI #1
9c3c 8 Series HECI IDER
9c3d 8 Series HECI KT
9c40 8 Series LPC Controller
9c41 8 Series LPC Controller
9c42 8 Series LPC Controller

9c43 8 Series LPC Controller
17aa 2214 ThinkPad X240
9c44 8 Series LPC Controller
9c45 8 Series LPC Controller
9c46 8 Series LPC Controller
9c47 8 Series LPC Controller
9c60 8 Series Low Power Sub-System DMA
9c61 8 Series I2C Controller #0
9c62 8 Series I2C Controller #1
9c63 8 Series UART Controller #0
9c64 8 Series UART Controller #1
9c65 8 Series SPI Controller #0
9c66 8 Series SPI Controller #1
9c83 Wildcat Point-LP SATA Controller [AHCI Mode]
9c85 Wildcat Point-LP
SATA Controller [RAID Mode]
9c87 Wildcat Point-LP SATA Controller [RAID Mode]
9c8f Wildcat Point-LP SATA Controller [RAID Mode]
9c90 Wildcat Point-LP PCI Express Root Port #1
9c92 Wildcat Point-LP PCI Express Root Port #2
9c94 Wildcat Point-LP PCI Express Root Port #3
9c96 Wildcat Point-LP PCI Express Root Port #4
9c98 Wildcat Point-LP PCI Express Root Port #5
9c9a Wildcat Point-LP PCI Express Root Port #6
9ca0 Wildcat Point-LP High Definition Audio Controller
9ca2 Wildcat Point-LP SMBus Controller
9ca4 Wildcat Point-LP Thermal Management Controller
9ca6 Wildcat Point-LP USB EHCI Controller
9cb1 Wildcat Point-LP USB xHCI Controller
9cb5 Wildcat Point-LP Secure Digital IO Controller
9cb6 Wildcat Point-LP Smart Sound Technology Controller
9cba Wildcat Point-LP MEI Controller #1
9cbb Wildcat Point-LP MEI Controller #2
9cbc Wildcat Point-LP IDE-r Controller
9cbd Wildcat Point-LP KT Controller
9cc1 Wildcat Point-LP LPC Controller
9cc2 Wildcat Point-LP
LPC Controller
9cc3 Wildcat Point-LP LPC Controller
9cc5 Wildcat Point-LP LPC Controller
9cc6 Wildcat Point-LP LPC Controller
9cc7 Wildcat Point-LP LPC Controller
9cc9 Wildcat Point-LP LPC Controller
9ce0 Wildcat Point-LP Serial IO DMA Controller
9ce1 Wildcat Point-LP Serial IO I2C Controller #0
9ce2 Wildcat Point-LP Serial IO I2C Controller #1
9ce3 Wildcat Point-LP Serial IO UART Controller #0
9ce4 Wildcat Point-LP Serial IO UART Controller #1

9ce5 Wildcat Point-LP Serial IO GSPI Controller #0
9ce6 Wildcat Point-LP Serial IO GSPI Controller #1
9d03 Sunrise Point-LP SATA Controller [AHCI mode]
1025 115f Acer Aspire E5-575G
1028 06dc Latitude E7470
1028 06f3 Latitude 3570
103c 8079 EliteBook 840 G3
17aa 225d ThinkPad T480
17aa 382a B51-80 Laptop
9d10 Sunrise Point-LP PCI Express Root Port #1
9d11 Sunrise Point-LP PCI Express Root Port #2
9d12 Sunrise Point-LP PCI Express Root Port #3
9d13 Sunrise Point-LP PCI Express Root Port #4
9d14
Sunrise Point-LP PCI Express Root Port #5
17aa 382a B51-80 Laptop
9d15 Sunrise Point-LP PCI Express Root Port #6
17aa 382a B51-80 Laptop
9d16 Sunrise Point-LP PCI Express Root Port #7
9d17 Sunrise Point-LP PCI Express Root Port #8
9d18 Sunrise Point-LP PCI Express Root Port #9
17aa 382a B51-80 Laptop
9d19 Sunrise Point-LP PCI Express Root Port #10
9d1a Sunrise Point-LP PCI Express Root Port #11
9d21 Sunrise Point-LP PMC
1025 115f Acer Aspire E5-575G
1028 06dc Latitude E7470
1028 06f3 Latitude 3570
103c 8079 EliteBook 840 G3
17aa 224f ThinkPad X1 Carbon 5th Gen
17aa 225d ThinkPad T480
17aa 382a B51-80 Laptop
9d23 Sunrise Point-LP SMBus
1025 115f Acer Aspire E5-575G
1028 06dc Latitude E7470
1028 06f3 Latitude 3570
103c 8079 EliteBook 840 G3
17aa 2247 ThinkPad T570
17aa 224f ThinkPad X1 Carbon 5th Gen
17aa 225d ThinkPad T480
17aa 382a B51-80 Laptop
9d27 Sunrise Point-LP Serial IO UART Controller #0
9d28 Sunrise
Point-LP Serial IO UART Controller #1
9d29 Sunrise Point-LP Serial IO SPI Controller #0
9d2a Sunrise Point-LP Serial IO SPI Controller #1
9d2d Sunrise Point-LP Secure Digital IO Controller
9d2f Sunrise Point-LP USB 3.0 xHCI Controller

1025 115f Acer Aspire E5-575G
1028 06dc Latitude E7470
1028 06f3 Latitude 3570
103c 8079 EliteBook 840 G3
17aa 2247 ThinkPad T570
17aa 225d ThinkPad T480
17aa 382a B51-80 Laptop
9d31 Sunrise Point-LP Thermal subsystem
1025 115f Acer Aspire E5-575G
1028 06dc Latitude E7470
1028 06f3 Latitude 3570
103c 8079 EliteBook 840 G3
17aa 2247 ThinkPad T570
17aa 224f ThinkPad X1 Carbon 5th Gen
17aa 225d ThinkPad T480
17aa 382a B51-80 Laptop
9d35 Sunrise Point-LP Integrated Sensor Hub
9d3a Sunrise Point-LP CSME HECI #1
1025 115f Acer Aspire E5-575G
1028 06dc Latitude E7470
1028 06f3 Latitude 3570
103c 8079 EliteBook 840 G3
17aa 2247 ThinkPad T570
17aa 224f ThinkPad X1 Carbon 5th Gen
17aa
225d ThinkPad T480
17aa 382a B51-80 Laptop
9d3d Sunrise Point-LP Active Management Technology - SOL
103c 8079 EliteBook 840 G3
9d43 Sunrise Point-LP LPC Controller
17aa 382a B51-80 Laptop
9d48 Sunrise Point-LP LPC Controller
1028 06dc Latitude E7470
1028 06f3 Latitude 3570
103c 8079 EliteBook 840 G3
9d4e Sunrise Point LPC Controller/eSPI Controller
17aa 225d ThinkPad T480
9d50 Sunrise Point LPC Controller
9d56 Sunrise Point-LP LPC Controller
9d58 Sunrise Point-LP LPC Controller
1025 115f Acer Aspire E5-575G
17aa 2247 ThinkPad T570
17aa 224f ThinkPad X1 Carbon 5th Gen
9d60 Sunrise Point-LP Serial IO I2C Controller #0
1025 115f Acer Aspire E5-575G
1028 06f3 Latitude 3570
103c 8079 EliteBook 840 G3
17aa 225d ThinkPad T480

8086 9d60 100 Series PCH/Sunrise Point PCH I2C0 [Skylake/Kaby Lake LPSS I2C]
9d61 Sunrise Point-LP Serial IO I2C Controller #1
9d62 Sunrise Point-LP Serial IO I2C Controller #2
9d63 Sunrise Point-LP Serial
IO I2C Controller #3
9d64 Sunrise Point-LP Serial IO I2C Controller #4
9d65 Sunrise Point-LP Serial IO I2C Controller #5
9d66 Sunrise Point-LP Serial IO UART Controller #2
9d70 Sunrise Point-LP HD Audio
1028 06dc Latitude E7470
1028 06f3 Latitude 3570
103c 8079 EliteBook 840 G3
17aa 382a B51-80 Laptop
9d71 Sunrise Point-LP HD Audio
1025 1094 Acer Aspire E5-575G
17aa 224f ThinkPad X1 Carbon 5th Gen
17aa 225d ThinkPad T480
9d84 Cannon Point-LP LPC Controller
1028 089e Inspiron 5482
9da3 Cannon Point-LP SMBus Controller
9da4 Cannon Point-LP SPI Controller
9db0 Cannon Point-LP PCI Express Root Port #9
9db1 Cannon Point-LP PCI Express Root Port #10
9db2 Cannon Point-LP PCI Express Root Port #1
9db4 Cannon Point-LP PCI Express Root Port #13
1028 089e Inspiron 5482
9db6 Cannon Point-LP PCI Express Root Port #15
9db8 Cannon Point-LP PCI Express Root Port #1
9dbc Cannon Point-LP PCI Express Root Port #5
9dbe Cannon Point-LP PCI Express
Root Port #7
9dbf Cannon Point PCI Express Root Port #8
9dc5 Cannon Point-LP Serial IO I2C Host Controller
9dc8 Cannon Point-LP High Definition Audio Controller
1028 089e Inspiron 5482
9dd3 Cannon Point-LP SATA Controller [AHCI Mode]
9de0 Cannon Point-LP MEI Controller #1
9de3 Cannon Point-LP Keyboard and Text (KT) Redirection
9de8 Cannon Point-LP Serial IO I2C Controller #0
1028 089e Inspiron 5482
9de9 Cannon Point-LP Serial IO I2C Controller #1
1028 089e Inspiron 5482
9ded Cannon Point-LP USB 3.1 xHCI Controller
9def Cannon Point-LP Shared SRAM
9df0 Cannon Point-LP CNVi [Wireless-AC]
9df5 BayHubTech Integrated SD controller
9df9 Cannon Point-LP Thermal Controller
9dfc Cannon Point-LP Integrated Sensor Hub

a000 Atom Processor D4xx/D5xx/N4xx/N5xx DMI Bridge
1458 5000 GA-D525TUD
8086 4f4d DeskTop Board D510MO
8086 544b Desktop Board D425KT
a001 Atom Processor D4xx/D5xx/N4xx/N5xx Integrated Graphics Controller
1458 d000 GA-D525TUD
8086
4f4d DeskTop Board D510MO
8086 544b Desktop Board D425KT
a002 Atom Processor D4xx/D5xx/N4xx/N5xx Integrated Graphics Controller
a003 Atom Processor D4xx/D5xx/N4xx/N5xx CHAPS counter
a010 Atom Processor D4xx/D5xx/N4xx/N5xx DMI Bridge
1043 83ac Eee PC 1015PX
144d c072 Notebook N150P
a011 Atom Processor D4xx/D5xx/N4xx/N5xx Integrated Graphics Controller
1043 83ac Eee PC 1015PX
144d c072 Notebook N150P
a012 Atom Processor D4xx/D5xx/N4xx/N5xx Integrated Graphics Controller
1043 83ac Eee PC 1015PX
144d c072 Notebook N150P
a013 Atom Processor D4xx/D5xx/N4xx/N5xx CHAPS counter
a102 Q170/Q150/B150/H170/H110/Z170/CM236 Chipset SATA Controller [AHCI Mode]
a103 HM170/QM170 Chipset SATA Controller [AHCI Mode]
1028 06e4 XPS 15 9550
103c 825b OMEN-17-w001nv
a105 Sunrise Point-H SATA Controller [RAID mode]
a106 Q170/H170/Z170/CM236 Chipset SATA Controller [RAID Mode]
a107 HM170/QM170 Chipset SATA Controller [RAID Mode]
a10f Sunrise Point-H SATA
Controller [RAID mode]
a110 100 Series/C230 Series Chipset Family PCI Express Root Port #1
a111 100 Series/C230 Series Chipset Family PCI Express Root Port #2
a112 100 Series/C230 Series Chipset Family PCI Express Root Port #3
a113 100 Series/C230 Series Chipset Family PCI Express Root Port #4
a114 100 Series/C230 Series Chipset Family PCI Express Root Port #5
a115 100 Series/C230 Series Chipset Family PCI Express Root Port #6
a116 100 Series/C230 Series Chipset Family PCI Express Root Port #7
a117 100 Series/C230 Series Chipset Family PCI Express Root Port #8
a118 100 Series/C230 Series Chipset Family PCI Express Root Port #9
a119 100 Series/C230 Series Chipset Family PCI Express Root Port #10
a11a 100 Series/C230 Series Chipset Family PCI Express Root Port #11
a11b 100 Series/C230 Series Chipset Family PCI Express Root Port #12
a11c 100 Series/C230 Series Chipset Family PCI Express Root Port #13
a11d 100 Series/C230 Series Chipset Family PCI Express Root
Port #14
a11e 100 Series/C230 Series Chipset Family PCI Express Root Port #15
a11f 100 Series/C230 Series Chipset Family PCI Express Root Port #16
a120 100 Series/C230 Series Chipset Family P2SB

a121 100 Series/C230 Series Chipset Family Power Management Controller
1028 06e4 XPS 15 9550
103c 825b OMEN-17-w001nv

a122 Sunrise Point-H cAVS

a123 100 Series/C230 Series Chipset Family SMBus
1028 06e4 XPS 15 9550
103c 825b OMEN-17-w001nv

a124 100 Series/C230 Series Chipset Family SPI Controller

a125 100 Series/C230 Series Chipset Family Gigabit Ethernet Controller

a126 100 Series/C230 Series Chipset Family Trace Hub

a127 100 Series/C230 Series Chipset Family Serial IO UART #0

a128 100 Series/C230 Series Chipset Family Serial IO UART #1

a129 100 Series/C230 Series Chipset Family Serial IO GSPI #0

a12a 100 Series/C230 Series Chipset Family Serial IO GSPI #1

a12f 100 Series/C230 Series Chipset Family USB 3.0 xHCI Controller
1028 06e4 XPS 15 9550
103c
825b OMEN-17-w001nv

a130 100 Series/C230 Series Chipset Family USB Device Controller (OTG)

a131 100 Series/C230 Series Chipset Family Thermal Subsystem
1028 06e4 XPS 15 9550
103c 825b OMEN-17-w001nv

a133 Sunrise Point-H Northpeak ACPI Function

a135 100 Series/C230 Series Chipset Family Integrated Sensor Hub

a13a 100 Series/C230 Series Chipset Family MEI Controller #1
1028 06e4 XPS 15 9550
103c 825b OMEN-17-w001nv

a13b 100 Series/C230 Series Chipset Family MEI Controller #2

a13c 100 Series/C230 Series Chipset Family IDE Redirection

a13d 100 Series/C230 Series Chipset Family KT Redirection

a13e 100 Series/C230 Series Chipset Family MEI Controller #3

a140 Sunrise Point-H LPC Controller

a141 Sunrise Point-H LPC Controller

a142 Sunrise Point-H LPC Controller

a143 H110 Chipset LPC/eSPI Controller

a144 H170 Chipset LPC/eSPI Controller

a145 Z170 Chipset LPC/eSPI Controller

a146 Q170 Chipset LPC/eSPI Controller

a147 Q150 Chipset LPC/eSPI Controller

a148
B150 Chipset LPC/eSPI Controller

a149 C236 Chipset LPC/eSPI Controller

a14a C232 Chipset LPC/eSPI Controller

a14b Sunrise Point-H LPC Controller

a14c Sunrise Point-H LPC Controller

a14d QM170 Chipset LPC/eSPI Controller

a14e HM170 Chipset LPC/eSPI Controller
1028 06e4 XPS 15 9550

103c 825b OMEN-17-w001nv
a14f Sunrise Point-H LPC Controller
a150 CM236 Chipset LPC/eSPI Controller
a151 Sunrise Point-H LPC Controller
a152 HM175 Chipset LPC/eSPI Controller
a153 QM175 Chipset LPC/eSPI Controller
a154 CM238 Chipset LPC/eSPI Controller
a155 Sunrise Point-H LPC Controller
a156 Sunrise Point-H LPC Controller
a157 Sunrise Point-H LPC Controller
a158 Sunrise Point-H LPC Controller
a159 Sunrise Point-H LPC Controller
a15a Sunrise Point-H LPC Controller
a15b Sunrise Point-H LPC Controller
a15c Sunrise Point-H LPC Controller
a15d Sunrise Point-H LPC Controller
a15e Sunrise Point-H LPC Controller
a15f Sunrise Point-H LPC Controller
a160 100
Series/C230 Series Chipset Family Serial IO I2C Controller #0
1028 06e4 XPS 15 9550
103c 825b OMEN-17-w001nv
a161 100 Series/C230 Series Chipset Family Serial IO I2C Controller #1
1028 06e4 XPS 15 9550
a162 100 Series/C230 Series Chipset Family Serial IO I2C Controller #2
a163 100 Series/C230 Series Chipset Family Serial IO I2C Controller #3
a166 100 Series/C230 Series Chipset Family Serial IO UART Controller #2
a167 100 Series/C230 Series Chipset Family PCI Express Root Port #17
a168 100 Series/C230 Series Chipset Family PCI Express Root Port #18
a169 100 Series/C230 Series Chipset Family PCI Express Root Port #19
a16a 100 Series/C230 Series Chipset Family PCI Express Root Port #20
a170 100 Series/C230 Series Chipset Family HD Audio Controller
1028 06e4 XPS 15 9550
103c 825b OMEN-17-w001nv
a171 CM238 HD Audio Controller
a182 C620 Series Chipset Family SATA Controller [AHCI mode]
a186 C620 Series Chipset Family SATA Controller [RAID mode]
a190
C620 Series Chipset Family PCI Express Root Port #1
a191 C620 Series Chipset Family PCI Express Root Port #2
a192 C620 Series Chipset Family PCI Express Root Port #3
a193 C620 Series Chipset Family PCI Express Root Port #4
a194 C620 Series Chipset Family PCI Express Root Port #5
a195 C620 Series Chipset Family PCI Express Root Port #6
a196 C620 Series Chipset Family PCI Express Root Port #7
a197 C620 Series Chipset Family PCI Express Root Port #8
a198 C620 Series Chipset Family PCI Express Root Port #9
a199 C620 Series Chipset Family PCI Express Root Port #10

a19a C620 Series Chipset Family PCI Express Root Port #11
a19b C620 Series Chipset Family PCI Express Root Port #12
a19c C620 Series Chipset Family PCI Express Root Port #13
a19d C620 Series Chipset Family PCI Express Root Port #14
a19e C620 Series Chipset Family PCI Express Root Port #15
a19f C620 Series Chipset Family PCI Express Root Port #16
a1a0 C620 Series Chipset Family P2SB
a1a1 C620 Series
Chipset Family Power Management Controller
15d9 095d X11SPM-TF
a1a2 C620 Series Chipset Family cAVS
a1a3 C620 Series Chipset Family SMBus
15d9 095d X11SPM-TF
a1a4 C620 Series Chipset Family SPI Controller
15d9 095d X11SPM-TF
a1a6 C620 Series Chipset Family Trace Hub
a1af C620 Series Chipset Family USB 3.0 xHCI Controller
15d9 095d X11SPM-TF
a1b1 C620 Series Chipset Family Thermal Subsystem
15d9 095d X11SPM-TF
a1ba C620 Series Chipset Family MEI Controller #1
15d9 095d X11SPM-TF
a1bb C620 Series Chipset Family MEI Controller #2
15d9 095d X11SPM-TF
a1bc C620 Series Chipset Family IDE Redirection
a1bd C620 Series Chipset Family KT Redirection
a1be C620 Series Chipset Family MEI Controller #3
15d9 095d X11SPM-TF
a1c1 C621 Series Chipset LPC/eSPI Controller
a1c2 C622 Series Chipset LPC/eSPI Controller
15d9 095d X11SPM-TF
a1c3 C624 Series Chipset LPC/eSPI Controller
a1c4 C625 Series Chipset LPC/eSPI Controller
a1c5 C626 Series Chipset
LPC/eSPI Controller
a1c6 C627 Series Chipset LPC/eSPI Controller
a1c7 C628 Series Chipset LPC/eSPI Controller
a1d2 C620 Series Chipset Family SSATA Controller [AHCI mode]
a1d6 C620 Series Chipset Family SSATA Controller [RAID mode]
a1e7 C620 Series Chipset Family PCI Express Root Port #17
a1e8 C620 Series Chipset Family PCI Express Root Port #18
a1e9 C620 Series Chipset Family PCI Express Root Port #19
a1ea C620 Series Chipset Family PCI Express Root Port #20
a1ec C620 Series Chipset Family MROM 0
a1ed C620 Series Chipset Family MROM 1
a1f8 Lewisburg IE: HECI #1
a1f9 Lewisburg IE: HECI #2
a1fa Lewisburg IE: IDE-r

a1fb Lewisburg IE: KT Controller
a1fc Lewisburg IE: HECI #3
a202 Lewisburg SATA Controller [AHCI mode]
a206 Lewisburg SATA Controller [RAID mode]
a223 Lewisburg SMBus
a224 Lewisburg SPI Controller
a242 Lewisburg LPC or eSPI Controller
a243 Lewisburg LPC or eSPI Controller
a252 Lewisburg SSATA Controller [AHCI mode]
a256 Lewisburg
SSATA Controller [RAID mode]
a282 200 Series PCH SATA controller [AHCI mode]
a286 200 Series PCH SATA controller [RAID mode]
a290 200 Series PCH PCI Express Root Port #1
a291 200 Series PCH PCI Express Root Port #2
a292 200 Series PCH PCI Express Root Port #3
a293 200 Series PCH PCI Express Root Port #4
a294 200 Series PCH PCI Express Root Port #5
a295 200 Series PCH PCI Express Root Port #6
a296 200 Series PCH PCI Express Root Port #7
a297 200 Series PCH PCI Express Root Port #8
a298 200 Series PCH PCI Express Root Port #9
a299 200 Series PCH PCI Express Root Port #10
a29a 200 Series PCH PCI Express Root Port #11
a29b 200 Series PCH PCI Express Root Port #12
a29c 200 Series PCH PCI Express Root Port #13
a29d 200 Series PCH PCI Express Root Port #14
a29e 200 Series PCH PCI Express Root Port #15
a29f 200 Series PCH PCI Express Root Port #16
a2a0 200 Series/Z370 Chipset Family P2SB
a2a1 200 Series/Z370 Chipset Family Power Management Controller
a2a3
200 Series/Z370 Chipset Family SMBus Controller
a2a4 200 Series/Z370 Chipset Family SPI Controller
a2a5 200 Series/Z370 Chipset Family Gigabit Ethernet Controller
a2a6 200 Series/Z370 Chipset Family Trace Hub
a2a7 200 Series/Z370 Chipset Family Serial IO UART Controller #0
a2a8 200 Series/Z370 Chipset Family Serial IO UART Controller #1
a2a9 200 Series/Z370 Chipset Family Serial IO SPI Controller #0
a2aa 200 Series/Z370 Chipset Family Serial IO SPI Controller #1
a2af 200 Series/Z370 Chipset Family USB 3.0 xHCI Controller
a2b1 200 Series PCH Thermal Subsystem
a2ba 200 Series PCH CSME HECI #1
a2bb 200 Series PCH CSME HECI #2
a2c4 200 Series PCH LPC Controller (H270)
a2c5 200 Series PCH LPC Controller (Z270)
a2c6 200 Series PCH LPC Controller (Q270)
a2c7 200 Series PCH LPC Controller (Q250)

a2c8 200 Series PCH LPC Controller (B250)
a2c9 Z370 Chipset LPC/eSPI Controller
a2d2 X299 Chipset LPC/eSPI Controller
a2d3 C422 Chipset LPC/eSPI Controller
a2e0
200 Series PCH Serial IO I2C Controller #0
a2e1 200 Series PCH Serial IO I2C Controller #1
a2e2 200 Series PCH Serial IO I2C Controller #2
a2e3 200 Series PCH Serial IO I2C Controller #3
a2e6 200 Series PCH Serial IO UART Controller #2
a2e7 200 Series PCH PCI Express Root Port #17
a2e8 200 Series PCH PCI Express Root Port #18
a2e9 200 Series PCH PCI Express Root Port #19
a2ea 200 Series PCH PCI Express Root Port #20
a2eb 200 Series PCH PCI Express Root Port #21
a2ec 200 Series PCH PCI Express Root Port #22
a2ed 200 Series PCH PCI Express Root Port #23
a2ee 200 Series PCH PCI Express Root Port #24
a2f0 200 Series PCH HD Audio
a304 H370 Chipset LPC/eSPI Controller
a305 Z390 Chipset LPC/eSPI Controller
a306 Q370 Chipset LPC/eSPI Controller
a309 Cannon Point-LP LPC Controller
a30c QM370 Chipset LPC/eSPI Controller
a30d HM470 Chipset LPC/eSPI Controller
a323 Cannon Lake PCH SMBus Controller
a324 Cannon Lake PCH SPI Controller
a328 Cannon Lake
PCH Serial IO UART Host Controller
a32c Cannon Lake PCH PCI Express Root Port #21
a32d Cannon Lake PCH PCI Express Root Port #22
a32e Cannon Lake PCH PCI Express Root Port #23
a32f Cannon Lake PCH PCI Express Root Port #24
a330 Cannon Lake PCH PCI Express Root Port #9
a331 Cannon Lake PCH PCI Express Root Port #10
a332 Cannon Lake PCH PCI Express Root Port #11
a333 Cannon Lake PCH PCI Express Root Port #12
a334 Cannon Lake PCH PCI Express Root Port #13
a335 Cannon Lake PCH PCI Express Root Port #14
a336 Cannon Lake PCH PCI Express Root Port #15
a337 Cannon Lake PCH PCI Express Root Port #16
a338 Cannon Lake PCH PCI Express Root Port #1
a339 Cannon Lake PCH PCI Express Root Port #2
a33a Cannon Lake PCH PCI Express Root Port #3
a33b Cannon Lake PCH PCI Express Root Port #4
a33c Cannon Lake PCH PCI Express Root Port #5
a33d Cannon Lake PCH PCI Express Root Port #6
a33e Cannon Lake PCH PCI Express Root Port #7

a33f Cannon Lake PCH PCI Express Root
Port #8
a340 Cannon Lake PCH PCI Express Root Port #17
a341 Cannon Lake PCH PCI Express Root Port #18
a342 Cannon Lake PCH PCI Express Root Port #19
a343 Cannon Lake PCH PCI Express Root Port #20
a348 Cannon Lake PCH cAVS
a352 Cannon Lake PCH SATA AHCI Controller
a353 Cannon Lake Mobile PCH SATA AHCI Controller
a360 Cannon Lake PCH HECI Controller
a363 Cannon Lake PCH Active Management Technology - SOL
a364 Cannon Lake PCH HECI Controller #2
a368 Cannon Lake PCH Serial IO I2C Controller #0
a369 Cannon Lake PCH Serial IO I2C Controller #1
a36a Cannon Lake PCH Serial IO I2C Controller #2
a36b Cannon Lake PCH Serial IO I2C Controller #3
a36d Cannon Lake PCH USB 3.1 xHCI Host Controller
a36f Cannon Lake PCH Shared SRAM
a370 Wireless-AC 9560 [Jefferson Peak]
a379 Cannon Lake PCH Thermal Controller
a620 6400/6402 Advanced Memory Buffer (AMB)
abc0 Omni-Path Fabric Switch Silicon 100 Series
b152 21152 PCI-to-PCI Bridge
8086 b152 21152 PCI-to-PCI Bridge

observed, and documented in Intel revision note; new mask of 1011:0026
b154 21154 PCI-to-PCI Bridge
b555 21555 Non transparent PCI-to-PCI Bridge
12c7 5005 SS7HD PCI Adaptor Card
12c7 5006 SS7HDC cPCI Adaptor Card
12d9 000a PCI VoIP Gateway
4c53 1050 CT7 mainboard
4c53 1051 CE7 mainboard
e4bf 1000 CC8-1-BLUES
d130 Core Processor DMI
15d9 0605 X8SIL
d131 Core Processor DMI
1028 02da OptiPlex 980
15d9 060d C7SIM-Q Motherboard
d132 Core Processor DMI
1028 040b Latitude E6510
d133 Core Processor DMI
d134 Core Processor DMI
d135 Core Processor DMI
d136 Core Processor DMI
d137 Core Processor DMI
d138 Core Processor PCI Express Root Port 1
1028 02da OptiPlex 980

1028 040b Latitude E6510
15d9 060d C7SIM-Q Motherboard
d139 Core Processor PCI Express Root Port 2
d13a Core Processor PCI Express Root Port 3
d13b Core Processor PCI Express Root Port 4
d150 Core Processor QPI Link
d151 Core Processor QPI Routing and Protocol
Registers
d155 Core Processor System Management Registers
d156 Core Processor Semaphore and Scratchpad Registers
d157 Core Processor System Control and Status Registers
d158 Core Processor Miscellaneous Registers
f1a5 SSD 600P Series
f1a6 SSD Pro 7600p/760p/E 6100p Series
8086 390b Intel Corporation SSD Pro 7600p/760p/E 6100p Series [NVM Express]
f1a8 SSD 660P Series
8088 Beijing Wangxun Technology Co., Ltd.
0101 WX1860A2 Gigabit Ethernet Controller
8088 0201 Dual-Port Ethernet Network Adaptor SF200T
0102 WX1860A2S Gigabit Ethernet Controller
8088 0210 Dual-Port Ethernet Network Adaptor SF200T-S
0103 WX1860A4 Gigabit Ethernet Controller
8088 0401 Qual-Port Ethernet Network Adaptor SF400T
8088 0440 Qual-Port Ethernet Network Adaptor SF400-OCF
0104 WX1860A4S Gigabit Ethernet Controller
8088 0410 Qual-Port Ethernet Network Adaptor SF400T-S
0105 WX1860AL2 Gigabit Ethernet Controller
8088 0202 Dual-Port Ethernet Network Adaptor SF200HT
0106
WX1860AL2S Gigabit Ethernet Controller
8088 0220 Dual-Port Ethernet Network Adaptor SF200HT-S
0107 WX1860AL4 Gigabit Ethernet Controller
8088 0402 Qual-Port Ethernet Network Adaptor SF400HT
0108 WX1860AL4S Gigabit Ethernet Controller
8088 0420 Qual-Port Ethernet Network Adaptor SF400HT-S
1001 Ethernet Controller RP1000 for 10GbE SFP+
8088 0000 Ethernet Network Adaptor RP1000 for 10GbE SFP+
2001 Ethernet Controller RP2000 for 10GbE SFP+
8088 2000 Ethernet Network Adaptor RP2000 for 10GbE SFP+
80ee InnoTek Systemberatung GmbH
beef VirtualBox Graphics Adapter
cafe VirtualBox Guest Service
8322 Sodick America Corp.
8384 SigmaTel
8401 TRENDware International Inc.
8686 ScaleMP
1010 vSMP Foundation controller [vSMP CTL]
1011 vSMP Foundation MEX/FLX controller [vSMP CTL]

8800 Trigem Computer Inc.
2008 Video assistant component
8866 T-Square Design Inc.
8888 Silicon Magic
8912 TRX
8c4a is not Winbond but there is a board misprogrammed
8c4a Winbond
1980
W89C940 misprogrammed [ne2k]
8e0e Computone Corporation
8e2e KTI
3000 ET32P2
9004 Adaptec
0078 AHA-2940U_CN
1078 AIC-7810
1160 AIC-1160 [Family Fibre Channel Adapter]
2178 AIC-7821
3860 AHA-2930CU
3b78 AHA-4844W/4844UW
5075 AIC-755x
5078 AIC-7850T/7856T [AVA-2902/4/6 / AHA-2910]
9004 7850 AIC-7850T/7856T [AVA-290x / AHA-2910]
5175 AIC-755x
5178 AIC-7851
5275 AIC-755x
5278 AIC-7852
5375 AIC-755x
5378 AIC-7850
5475 AIC-755x
5478 AIC-7850
5575 AVA-2930
5578 AIC-7855
5647 ANA-7711 TCP Offload Engine
9004 7710 ANA-7711F TCP Offload Engine - Optical
9004 7711 ANA-7711LP TCP Offload Engine - Copper
5675 AIC-755x
5678 AIC-7856
5775 AIC-755x
5778 AIC-7850
5800 AIC-5800
5900 ANA-5910/5930/5940 ATM155 & 25 LAN Adapter
5905 ANA-5910A/5930A/5940A ATM Adapter
6038 AIC-3860
6075 AIC-1480 / APA-1480
9004 7560 AIC-1480 / APA-1480 Cardbus
6078 AIC-7860
6178 AIC-7861
9004 7861 AHA-2940AU Single

6278 AIC-7860
6378 AIC-7860
6478
AIC-786x
6578 AIC-786x
6678 AIC-786x
6778 AIC-786x
6915 ANA620xx/ANA69011A
9004 0008 ANA69011A/TX 10/100
9004 0009 ANA69011A/TX 10/100
9004 0010 ANA62022 2-port 10/100
9004 0018 ANA62044 4-port 10/100
9004 0019 ANA62044 4-port 10/100
9004 0020 ANA62022 2-port 10/100
9004 0028 ANA69011A/TX 10/100
9004 8008 ANA69011A/TX 64 bit 10/100
9004 8009 ANA69011A/TX 64 bit 10/100
9004 8010 ANA62022 2-port 64 bit 10/100
9004 8018 ANA62044 4-port 64 bit 10/100
9004 8019 ANA62044 4-port 64 bit 10/100
9004 8020 ANA62022 2-port 64 bit 10/100
9004 8028 ANA69011A/TX 64 bit 10/100
7078 AHA-294x / AIC-7870
7178 AIC-7870P/7871 [AHA-2940/W/S76]
7278 AHA-3940/3940W / AIC-7872
7378 AHA-3985 / AIC-7873
7478 AHA-2944/2944W / AIC-7874
7578 AHA-3944/3944W / AIC-7875
7678 AHA-4944W/UW / AIC-7876
7710 ANA-7711F Network Accelerator Card (NAC) - Optical
7711 ANA-7711C Network Accelerator Card (NAC) - Copper
7778 AIC-787x
7810 AIC-7810
7815
AIC-7815 RAID+Memory Controller IC
9004 7815 ARO-1130U2 RAID Controller
9004 7840 AIC-7815 RAID+Memory Controller IC
7850 AIC-7850
7855 AHA-2930
7860 AIC-7860
7870 AIC-7870
7871 AHA-2940
7872 AHA-3940
7873 AHA-3980
7874 AHA-2944
7880 AIC-7880P
7890 AIC-7890
7891 AIC-789x

7892 AIC-789x
7893 AIC-789x
7894 AIC-789x
7895 AHA-2940U/UW / AHA-39xx / AIC-7895
9004 7890 AHA-2940U/2940UW Dual AHA-394xAU/AUW/AUWD AIC-7895B
9004 7891 AHA-2940U/2940UW Dual
9004 7892 AHA-3940AU/AUW/AUWD/UWD
9004 7894 AHA-3944AUWD
9004 7895 AHA-2940U/2940UW Dual AHA-394xAU/AUW/AUWD AIC-7895B
9004 7896 AHA-2940U/2940UW Dual AHA-394xAU/AUW/AUWD AIC-7895B
9004 7897 AHA-2940U/2940UW Dual AHA-394xAU/AUW/AUWD AIC-7895B
7896 AIC-789x
7897 AIC-789x
8078 AIC-7880U
9004 7880 AIC-7880P Ultra/Ultra Wide SCSI Chipset
8178 AIC-7870P/7881U [AHA-2940U/UW/D/S76]
9004 7881 AHA-2940UW SCSI Host Adapter
8278 AHA-3940U/UW/UWD / AIC-7882U
8378 AHA-3940U/UW
/ AIC-7883U
8478 AHA-2944UW / AIC-7884U
8578 AHA-3944U/UWD / AIC-7885
8678 AHA-4944UW / AIC-7886
8778 AHA-2940UW Pro / AIC-788x
9004 7887 2940UW Pro Ultra-Wide SCSI Controller
8878 AHA-2930UW / AIC-7888
9004 7888 AHA-2930UW SCSI Controller
8b78 ABA-1030
ec78 AHA-4944W/UW
Acquired by Microchip Technology
9005 Adaptec
0010 AHA-2940U2/U2W
9005 2180 AHA-2940U2 SCSI Controller
9005 8100 AHA-2940U2B SCSI Controller
9005 a100 AHA-2940U2B SCSI Controller
9005 a180 AIC-3860Q [AHA-2940U2W/GE] SCSI Controller
9005 e100 AHA-2950U2B SCSI Controller
0011 AHA-2930U2
0013 78902
9005 0003 AAA-131U2 Array1000 1 Channel RAID Controller
9005 000f AIC7890_ARO
001f AHA-2940U2/U2W / 7890/7891
9005 000f 2940U2W SCSI Controller
9005 a180 2940U2W SCSI Controller
0020 AIC-7890
002f AIC-7890
0030 AIC-7890
003f AIC-7890

0050 AHA-3940U2x/395U2x
 9005 f500 AHA-3950U2B
 9005 ffff AHA-3950U2B
 0051 AHA-3950U2D
 9005 b500 AHA-3950U2D
 0053 AIC-7896
 SCSI Controller
 9005 ffff AIC-7896 SCSI Controller mainboard implementation
 005f AIC-7896U2/7897U2
 0080 AIC-7892A U160/m
 0e11 e2a0 Compaq 64-Bit/66MHz Wide Ultra3 SCSI Adapter
 9005 6220 AHA-29160C
 9005 62a0 29160N Ultra160 SCSI Controller
 9005 e220 29160LP Low Profile Ultra160 SCSI Controller
 9005 e2a0 29160 Ultra160 SCSI Controller
 0081 AIC-7892B U160/m
 9005 62a1 19160 Ultra160 SCSI Controller
 0083 AIC-7892D U160/m
 008f AIC-7892P U160/m
 1179 0001 Magnia Z310
 15d9 9005 Onboard SCSI Host Adapter
 0092 AVC-2010 [VideoH!]
 0093 AVC-2410 [VideoH!]
 00c0 AHA-3960D / AIC-7899A U160/m
 0e11 f620 Compaq 64-Bit/66MHz Dual Channel Wide Ultra3 SCSI Adapter
 9005 f620 AHA-3960D U160/m
 00c1 AIC-7899B U160/m
 00c3 AIC-7899D U160/m
 00c5 RAID subsystem HBA
 1028 00c5 PowerEdge 2400,2500,2550,4400
 00cf AIC-7899P U160/m
 1028 00ce PowerEdge 1400
 1028 00d1 PowerEdge 2550
 1028 00d9 PowerEdge 2500
 10f1 2462 Thunder K7 S2462
 15d9 9005 Onboard
 SCSI Host Adapter
 8086 3411 SDS2 Mainboard
 0241 Serial ATA II RAID 1420SA
 0242 Serial ATA II RAID 1220SA
 0243 Serial ATA II RAID 1430SA
 0244 eSATA II RAID 1225SA
 0250 ServeRAID Controller
 1014 0279 ServeRAID 6M
 1014 028c ServeRAID 6i/6i+
 1014 028e ServeRAID 7k
 0279 ServeRAID 6M
 0283 AAC-RAID

9005 0283 Catapult
0284 AAC-RAID
9005 0284 Tomcat
0285 AAC-RAID
0e11 0295 SATA 6Ch (Bearcat)
1014 02f2 ServeRAID 8i
1028 0287 PowerEdge Expandable RAID Controller 320/DC
1028 0291 CERC SATA RAID 2 PCI SATA 6ch (DellCorsair)
103c 3227 AAR-2610SA
108e 0286 Sun StorageTek SAS RAID HBA, Internal
108e 0287 STK RAID EXT
108e 7aac STK RAID REM
108e 7aae STK RAID EX
15d9 02b5 SMC AOC-USAS-S4i
15d9 02b6 SMC AOC-USAS-S8i
15d9 02c9 SMC AOC-USAS-S4iR
15d9 02ca SMC AOC-USAS-S8iR
15d9 02d2 SMC AOC-USAS-S8i-LP
15d9 02d3 SMC AOC-USAS-S8iR-LP
17aa 0286 Legend S220 (Legend Crusader)
17aa 0287 Legend S230 (Legend Vulcan)
9005
0285 2200S (Vulcan)
9005 0286 2120S (Crusader)
9005 0287 2200S (Vulcan-2m)
9005 0288 3230S (Harrier)
9005 0289 3240S (Tornado)
Some early versions reported 2020S
9005 028a ASR-2020ZCR
Some early versions reported 2025S
9005 028b ASR-2025ZCR (Terminator)
9005 028e ASR-2020SA (Skyhawk)
9005 028f ASR-2025SA
9005 0290 AAR-2410SA PCI SATA 4ch (Jaguar II)
9005 0292 AAR-2810SA PCI SATA 8ch (Corsair-8)
9005 0293 AAR-21610SA PCI SATA 16ch (Corsair-16)
9005 0294 ESD SO-DIMM PCI-X SATA ZCR (Prowler)
9005 0296 ASR-2240S
9005 0297 ASR-4005SAS
9005 0298 ASR-4000
9005 0299 ASR-4800SAS
9005 029a 4805SAS
9005 02a4 ICP ICP9085LI
9005 02a5 ICP ICP5085BR
9005 02b5 ASR5800
9005 02b6 ASR5805
9005 02b7 ASR5808
9005 02b8 ICP5445SL

9005 02b9 ICP5085SL
9005 02ba ICP5805SL
9005 02bb 3405
9005 02bc 3805
9005 02bd 31205
9005 02be 31605
9005 02bf ICP ICP5045BL
9005 02c0 ICP ICP5085BL
9005 02c1 ICP ICP5125BR
9005
02c2 ICP ICP5165BR
9005 02c3 51205
9005 02c4 51605
9005 02c5 ICP ICP5125SL
9005 02c6 ICP ICP5165SL
9005 02c7 3085
9005 02c8 ICP5805BL
9005 02ce 51245
9005 02cf 51645
9005 02d0 52445
9005 02d1 5405
9005 02d4 ASR-2045
9005 02d5 ASR-2405
9005 02d6 ASR-2445
9005 02d7 ASR-2805
9005 02d8 5405G
9005 02d9 5445G
9005 02da 5805G
9005 02db 5085G
9005 02dc 51245G
9005 02dd 51645G
9005 02de 52445G
9005 02df ASR-2045G
9005 02e0 ASR-2405G
9005 02e1 ASR-2445G
9005 02e2 ASR-2805G
0286 AAC-RAID (Rocket)
1014 034d 8s
1014 9540 ServeRAID 8k/8k-14
1014 9580 ServeRAID 8k/8k-18
9005 028c ASR-2230S + ASR-2230SLP PCI-X (Lancer)
9005 028d ASR-2130S
9005 029b ASR-2820SA
9005 029c ASR-2620SA
9005 029d ASR-2420SA
9005 029e ICP ICP9024R0
9005 029f ICP ICP9014R0
9005 02a0 ICP ICP9047MA

9005 02a1 ICP ICP9087MA
9005 02a2 3800
9005 02a3 ICP ICP5445AU
9005 02a4 ICP ICP9085LI
9005 02a5 ICP ICP5085BR
9005
02a6 ICP9067MA
9005 02a7 3805
9005 02a8 3400
9005 02a9 ICP ICP5085AU
9005 02aa ICP ICP5045AU
9005 02ac 1800
9005 02b3 2400
9005 02b4 ICP ICP5045AL
9005 0800 Callisto
028b Series 6 - 6G SAS/PCIe 2
9005 0200 Series 6 Entry Level - ASR-6405E - 4 internal 6G SAS ports
9005 0201 Series 6 Entry Level - ASR-6805E - 8 internal 6G SAS ports
9005 0300 Series 6 - ASR-6405 - 4 internal 6G SAS ports
9005 0301 Series 6 - ASR-6805 - 8 internal 6G SAS ports
9005 0302 Series 6 - ASR-6445 - 4 internal and 4 external 6G SAS ports
9005 0310 Series 6 Connectors on Top - ASR-6405T - 4 internal 6G SAS ports
9005 0311 Series 6 Connectors on Top - ASR-6805T - 8 internal 6G SAS
9005 0400 Series 6 - ASR-61205 - 12 internal 6G SAS ports
9005 0401 Series 6 - ASR-61605 - 16 internal 6G SAS ports
9005 0403 Series 6 - ASR-62405 - 24 internal 6G SAS ports
028c Series 7 6G SAS/PCIe 3
9005 0500 Series 7 - ASR-7805 - 8 internal 6G SAS Port/PCIe 3.0
9005
0501 Series 7 - ASR-71605 - 16 internal 6G SAS Port/PCIe 3.0
9005 0502 Series 7 - ASR-71685 - 16 internal 8 external 6G SAS Port/PCIe 3.0
9005 0503 Series 7 - ASR-72405 - 24 internal 0 external 6G SAS Port/PCIe 3.0
9005 0504 Series 7 - ASR-7885 - 8 internal 8 external 6G SAS Port/PCIe 3.0
9005 0505 Series 7 Entry Level - ASR-71685E - 16 internal 8 external 6G SAS Port/PCIe 3.0
9005 0506 Series 7 Entry Level - ASR-72405E - 24 internal 0 external 6G SAS Port/PCIe 3.0
028d Series 8 12G SAS/PCIe 3
9005 0550 Series 8 - ASR-82405 - 24 internal 0 external 12G SAS Port/PCIe 3.0
9005 0551 Series 8 - ASR-81605 - 16 internal 0 external 12G SAS Port/PCIe 3.0
9005 0552 Series 8 - ASR-8805 - 8 internal 0 external 12G SAS Port/PCIe 3.0
9005 0553 Series 8 - ASR-8085 - 0 internal 8 external 12G SAS Port/PCIe 3.0
9005 0554 Series 8 - ASR-8885 - 8 internal 8 external 12G SAS Port/PCIe 3.0
028f Smart Storage PQI 12G SAS/PCIe 3
103c 0600 Smart Array P408i-p SR
Gen10
103c 0601 Smart Array P408e-p SR Gen10
103c 0602 Smart Array P408i-a SR Gen10
103c 0603 Smart Array P408i-c SR Gen10
103c 0650 Smart Array E208i-p SR Gen10

103c 0651 Smart Array E208e-p SR Gen10
103c 0652 Smart Array E208i-c SR Gen10
103c 0654 Smart Array E208i-a SR Gen10
103c 0655 Smart Array P408e-m SR Gen10
103c 0700 Smart Array P204i-c SR Gen10
103c 0701 Smart Array P204i-b SR Gen10
103c 1100 Smart Array P816i-a SR Gen10
103c 1101 Smart Array P416ie-m SR G10
105b 1211 HBA 8238-16i
105b 1321 HBA 8242-24i
13fe 8312 SKY-9200 MIC-8312BridgeB
152d 8a22 QS-8204-8i
152d 8a23 QS-8238-16i
152d 8a24 QS-8236-16i
152d 8a36 QS-8240-24i
152d 8a37 QS-8242-24i
193d 8460 HBA H460-M1
193d 8461 HBA H460-B1
193d c460 RAID P460-M2
193d c461 RAID P460-B2
193d f460 RAID P460-M4
193d f461 RAID P460-B4
19e5 d227 SmartROC-HD SR465C-M 4G
19e5 d228 SmartROC SR455C-M 2G
19e5 d229 SmartIOC SR155-M
19e5 d22a SmartIOC-HD
SR765-M
19e5 d22b SmartROC-e SR455C-ME 4G
19e5 d22c SmartROC SR455C-M 4G
1bd4 0045 SMART-HBA 8242-24i
1bd4 0046 RAID 8236-16i
1bd4 0047 RAID 8240-24i
1bd4 0048 SMART-HBA 8238-16i
1bd4 004a PM8222-SHBA
1bd4 004b RAID PM8204-2GB
1bd4 004c RAID PM8204-4GB
1bd4 004f PM8222-HBA
9005 0608 SmartRAID 3162-8i /e
9005 0800 SmartRAID 3154-8i
9005 0801 SmartRAID 3152-8i
9005 0802 SmartRAID 3151-4i
9005 0803 SmartRAID 3101-4i
9005 0804 SmartRAID 3154-8e
9005 0805 SmartRAID 3102-8i
9005 0806 SmartRAID 3100
9005 0807 SmartRAID 3162-8i
9005 0900 SmartHBA 2100-8i
9005 0901 SmartHBA 2100-4i

9005 0902 HBA 1100-8i
9005 0903 HBA 1100-4i
9005 0904 SmartHBA 2100-8e
9005 0905 HBA 1100-8e
9005 0906 SmartHBA 2100-4i4e
9005 0907 HBA 1100
9005 0908 SmartHBA 2100
9005 090a SmartHBA 2100A-8i
9005 1200 SmartRAID 3154-24i
9005 1201 SmartRAID 3154-8i16e
9005 1202 SmartRAID 3154-8i8e
9005 1280 HBA 1100-16i
9005 1281
HBA 1100-16e
9005 1300 HBA 1100-8i8e
9005 1301 HBA 1100-24i
9005 1302 SmartHBA 2100-8i8e
9005 1303 SmartHBA 2100-24i
9005 1380 SmartRAID 3154-16i
0410 AIC-9410W SAS (Razor HBA RAID)
9005 0410 ASC-48300(Spirit RAID)
9005 0411 ASC-58300 (Oakmont RAID)
0412 AIC-9410W SAS (Razor HBA non-RAID)
9005 0412 ASC-48300 (Spirit non-RAID)
9005 0413 ASC-58300 (Oakmont non-RAID)
0415 ASC-58300 SAS (Razor-External HBA RAID)
0416 ASC-58300 SAS (Razor-External HBA non-RAID)
041e AIC-9410W SAS (Razor ASIC non-RAID)
041f AIC-9410W SAS (Razor ASIC RAID)
9005 041f AIC-9410W SAS (Razor ASIC RAID)
042f VSC7250/7251 SAS (Aurora ASIC non-RAID)
0430 AIC-9405W SAS (Razor-Lite HBA RAID)
9005 0430 ASC-44300 (Spirit-Lite RAID)
0432 AIC-9405W SAS (Razor-Lite HBA non-RAID)
9005 0432 ASC-44300 (Spirit-Lite non-RAID)
043e AIC-9405W SAS (Razor-Lite ASIC non-RAID)
043f AIC-9405W SAS (Razor-Lite ASIC RAID)
0450 ASC-1405 Unified Serial HBA
0500 Obsidian chipset
SCSI controller
1014 02c1 PCI-X DDR 3Gb SAS Adapter (572A/572C)
1014 02c2 PCI-X DDR 3Gb SAS RAID Adapter (572B/572D)
0503 Scamp chipset SCSI controller
1014 02bf Quad Channel PCI-X DDR U320 SCSI RAID Adapter (571E)
1014 02c3 PCI-X DDR 3Gb SAS RAID Adapter (572F)
1014 02d5 Quad Channel PCI-X DDR U320 SCSI RAID Adapter (571F)
0910 AUA-3100B
091e AUA-3100B

8000 ASC-29320A U320
800f AIC-7901 U320
8010 ASC-39320 U320
8011 ASC-39320D
0e11 00ac ASC-39320D U320
9005 0041 ASC-39320D U320
8012 ASC-29320 U320
8013 ASC-29320B U320
8014 ASC-29320LP U320
8015 ASC-39320B U320
8016 ASC-39320A U320
8017 ASC-29320ALP U320
9005 0044 ASC-29320ALP PCIx U320
9005 0045 ASC-29320LPE PCIe U320
801c ASC-39320D U320
801d AIC-7902B U320
1014 02cc ServeRAID 7e
801e AIC-7901A U320
801f AIC-7902 U320
1734 1011 PRIMERGY RX300 onboard SCSI
8080 ASC-29320A U320 w/HostRAID
8081 PMC-Sierra PM8001 SAS HBA [Series 6H]
8088 PMC-Sierra PM8018 SAS HBA [Series
7H]
8089 PMC-Sierra PM8019 SAS encryption HBA [Series 7He]
808f AIC-7901 U320 w/HostRAID
1028 0168 Precision Workstation 670 Mainboard
8090 ASC-39320 U320 w/HostRAID
8091 ASC-39320D U320 w/HostRAID
8092 ASC-29320 U320 w/HostRAID
8093 ASC-29320B U320 w/HostRAID
8094 ASC-29320LP U320 w/HostRAID
8095 ASC-39320(B) U320 w/HostRAID
8096 ASC-39320A U320 w/HostRAID
8097 ASC-29320ALP U320 w/HostRAID
809c ASC-39320D(B) U320 w/HostRAID
809d AIC-7902(B) U320 w/HostRAID
1014 02cc ServeRAID 7e
809e AIC-7901A U320 w/HostRAID
809f AIC-7902 U320 w/HostRAID
907f Atronics
2015 IDE-2015PL
919a Gigapixel Corp
9412 Holtek
6565 6565
9413 Softlogic Co., Ltd.
6010 SOLO6010 MPEG-4 Video encoder/decoder
6110 SOLO6110 H.264 Video encoder/decoder

9618 JusonTech Corporation
0001 JusonTech Gigabit Ethernet Controller
9699 Omni Media Technology Inc
6565 6565
nee Netmos Technology
9710 MosChip Semiconductor Technology Ltd.
9250 PCI-to-PCI bridge [MCS9250]
9805
PCI 1 port parallel adapter
9815 PCI 9815 Multi-I/O Controller
1000 0020 2P0S (2 port parallel adaptor)
9820 PCI 9820 Multi-I/O Controller
9835 PCI 9835 Multi-I/O Controller
1000 0002 2S (16C550 UART)
1000 0012 1P2S
9845 PCI 9845 Multi-I/O Controller
Serial ports at BAR0-3
1000 0004 0P4S (4 port 16550A serial card)
1000 0006 0P6S (6 port 16550a serial card)
Serial ports at BAR0-3, Parallel port at BAR4
1000 0014 1P4S (1 Parallel / 4 16550A Serial Port Adapter)
9855 PCI 9855 Multi-I/O Controller
Parallel port at BAR0. Serial ports at BAR2-5
1000 0014 1P4S
Parallel ports at BAR0,BAR2. Serial ports at BAR4-5
1000 0022 2P2S (2 Parallel / 2 16550A Serial Port Adapter)
9865 PCI 9865 Multi-I/O Controller
9900 MCS9900 Multi-I/O Controller
9901 PCIe 9901 Multi-I/O Controller
9904 4-Port PCIe Serial Adapter
2-port Serial 1-port Parallel Adaptor
9912 PCIe 9912 Multi-I/O Controller
9922 MCS9922 PCIe Multi-I/O Controller
9990 MCS9990
PCIe to 4Port USB 2.0 Host Controller
Subsystem ID on a 3c985B-SX network card
9850 3Com (wrong ID)
9902 Stargen Inc.
0001 SG2010 PCI over Starfabric Bridge
0002 SG2010 PCI to Starfabric Gateway
0003 SG1010 Starfabric Switch and PCI Bridge
a0a0 AOPEN Inc.
a0f1 UNISYS Corporation
a200 NEC Corporation
a259 Hewlett Packard
a25b Hewlett Packard GmbH PL24-MKT
a304 Sony
a727 3Com Corporation

0013 3CRPAG175 Wireless PC Card
6803 3CRDAG675B Wireless 11a/b/g Adapter
aa00 iTuner
aa01 iTuner
aa02 iTuner
aa03 iTuner
aa04 iTuner
aa05 iTuner
aa06 iTuner
aa07 iTuner
aa08 iTuner
aa09 iTuner
aa0a iTuner
aa0b iTuner
aa0c iTuner
aa0d iTuner
aa0e iTuner
aa0f iTuner
aa42 Scitex Digital Video
aa55 Ncomputing X300 PCI-Engine
aaaa Adnaco Technology Inc.
0001 H1 PCIe over fiber optic host controller
0002 R1BP1 PCIe over fiber optic expansion chassis
abcd Vadatech Inc.
ac1e Digital Receiver Technology Inc
ac3d Actuality Systems
ad00 Alta Data Technologies LLC
aecb
Adrienne Electronics Corporation
6250 VITC/LTC Timecode Reader card [PCI-VLTC/RDR]
affe Sirrix AG security technologies
01e1 PCI1E1 1-port ISDN E1 interface
02e1 PCI2E1 2-port ISDN E1 interface
450e PCI4S0EC 4-port ISDN S0 interface
dead Sirrix.PCI4S0 4-port ISDN S0 interface
b100 OpenVox Communication Co. Ltd.
Not registered officially
b10b Uakron PCI Project
b1b3 Shiva Europe Limited
b1d9 ATCOM Technology co., LTD.
Pinnacle should be 11bd, but they got it wrong several times --mj
bd11 Pinnacle Systems, Inc. (Wrong ID)
bdbd Blackmagic Design
a106 Multibridge Extreme
a117 Intensity Pro
a11a DeckLink HD Extreme 2
a11b DeckLink SDI/Duo/Quad
a11c DeckLink HD Extreme 3

a11d DeckLink Studio
a11e DeckLink Optical Fibre
a120 Decklink Studio 2
a121 DeckLink HD Extreme 3D/3D+
a124 Intensity Extreme
a126 Intensity Shuttle
a127 UltraStudio Express
a129 UltraStudio Mini Recorder
a12a UltraStudio Mini Monitor
a12d UltraStudio 4K
a12e DeckLink
4K Extreme
a12f DeckLink Mini Monitor
a130 DeckLink Mini Recorder
a132 UltraStudio 4K
a136 DeckLink 4K Extreme 12G
a137 DeckLink Studio 4K
a138 Decklink SDI 4K
a139 Intensity Pro 4K
a13b DeckLink Micro Recorder
a13d DeckLink 4K Pro
a13e UltraStudio 4K Extreme
a13f DeckLink Quad 2
a140 DeckLink Duo 2
a141 UltraStudio 4K Extreme 3
a142 UltraStudio HD Mini
a143 DeckLink Mini Recorder 4K
a144 DeckLink Mini Monitor 4K
a148 DeckLink SDI Micro
a14b DeckLink 8K Pro
a14e DeckLink Quad HDMI Recorder
a1ff eGPU RX580
c001 TSI Telsys
c0a9 Micron/Crucial Technology
2263 P1 NVMe PCIe SSD
c0de Motorola
c0fe Motion Engineering, Inc.
ca3b Cambrionix Ltd.
ca50 Varian Australia Pty Ltd
cace CACE Technologies, Inc.
0001 TurboCap Port A
0002 TurboCap Port B
0023 AirPcap N
caed Canny Edge
cafe Chrysalis-ITS
0003 Luna K3 Hardware Security Module
0006 Luna PCI-e 3000 Hardware Security Module
0007 Luna K6 Hardware Security Module

0008 Luna K7 Hardware
Security Module
cc53 ScaleFlux Inc.
cccc Catapult Communications
ccec Curtiss-Wright Controls Embedded Computing
cddd Tyzx, Inc.
0101 DeepSea 1 High Speed Stereo Vision Frame Grabber
0200 DeepSea 2 High Speed Stereo Vision Frame Grabber
ceba KEBA AG
d161 Digium, Inc.
0120 Wildcard TE120P single-span T1/E1/J1 card
0205 Wildcard TE205P/TE207P dual-span T1/E1/J1 card 5.0V
0210 Wildcard TE210P/TE212P dual-span T1/E1/J1 card 3.3V
0220 Wildcard TE220 dual-span T1/E1/J1 card 3.3V (PCI-Express)
0405 Wildcard TE405P/TE407P quad-span T1/E1/J1 card 5.0V
0410 Wildcard TE410P/TE412P quad-span T1/E1/J1 card 3.3V
0420 Wildcard TE420P quad-span T1/E1/J1 card 3.3V (PCI-Express)
0800 Wildcard TDM800P 8-port analog card
1205 Wildcard TE205P/TE207P dual-span T1/E1/J1 card 5.0V (u1)
1220 Wildcard TE220 dual-span T1/E1/J1 card 3.3V (PCI-Express) (5th gen)
1405 Wildcard TE405P/TE407P quad-span T1/E1/J1 card 5.0V (u1)
1410 Wildcard TE410P quad-span T1/E1/J1 card 3.3V (5th Gen)
1420 Wildcard TE420 quad-span T1/E1/J1 card 3.3V (PCI-Express) (5th gen)
1820 Wildcard TE820 octal-span T1/E1/J1 card 3.3V (PCI-Express)
2400 Wildcard TDM2400P 24-port analog card
3400 Wildcard TC400P transcoder base card
8000 Wildcard TE121 single-span T1/E1/J1 card (PCI-Express)
8001 Wildcard TE122 single-span T1/E1/J1 card
8002 Wildcard AEX800 8-port analog card (PCI-Express)
8003 Wildcard AEX2400 24-port analog card (PCI-Express)
8004 Wildcard TCE400P transcoder base card
8005 Wildcard TDM410 4-port analog card
8006 Wildcard AEX410 4-port analog card (PCI-Express)
8007 Hx8 Series 8-port Base Card
8008 Hx8 Series 8-port Base Card (PCI-Express)
800a Wildcard TE133 single-span T1/E1/J1 card (PCI Express)
800b Wildcard TE134 single-span T1/E1/J1 card
800c Wildcard A8A 8-port analog card
800d Wildcard A8B 8-port analog card (PCI-Express)
800e Wildcard TE235/TE435 quad-span T1/E1/J1 card (PCI-Express)
800f Wildcard A4A 4-port analog card
8010
Wildcard A4B 4-port analog card (PCI-Express)
8013 Wildcard TE236/TE436 quad-span T1/E1/J1 card
b410 Wildcard B410 quad-BRI card
d209 Ultimarc
1500 PAC Drive

15a2 SpinTrak
1601 AimTrak
d4d4 Dy4 Systems Inc
0601 PCI Mezzanine Card
d531 I+ME ACTIA GmbH
d84d Exsys
dada Datapath Limited
0133 VisionRGB-X2
0139 VisionRGB-E1
0144 VisionSD8
0150 VisionRGB-E2
0151 VisionSD4+1
0159 VisionAV
0161 DGC161
0165 DGC165
0167 DGC167
0168 DGC168
1139 VisionRGB-E1S
1150 VisionRGB-E2S
1151 VisionSD4+1S
1153 VisionDVI-DL
1154 VisionSDI2
db10 Diablo Technologies
dc93 Dawicontrol GmbH
dcba Dynamic Engineering
0046 PCIe Altera Cyclone IV
VPX format Receiver Controller Board
0047 VPX-RCB
PMC Format FPGA design with 8 high speed UART channels
0048 PMC-Biserial-III-BAE9
004e PC104p-Biserial-III-NVY5
004f PC104p-Biserial-III-NVY6
0052 PCIeBiSerialDb37 BA22 LVDS IO
8 port 16550 compatible UART, PMC format, RS-232 IO, RTS, CTS, DTR, DSR supported
0066
PMC-OctalUART-232
dd01 Digital Devices GmbH
0003 Octopus DVB Adapter
dd01 0001 Octopus DVB adapter
dd01 0002 Octopus LE DVB adapter
dd01 0003 Octopus OEM
dd01 0004 Octopus V3 DVB adapter
dd01 0010 Octopus Mini
dd01 0020 Cine S2 V6 DVB adapter
dd01 0021 Cine S2 V6.5 DVB adapter
dd01 0030 Cine CT V6.1 DVB adapter
dd01 db03 Mystique SaTiX-S2 V3 DVB adapter
0006 Cine V7

0007 Max
dd01 0023 Max S8 4/8
0011 Octopus CI DVB Adapter
dd01 0040 Octopus CI
dd01 0041 Octopus CI Single
0201 Resi DVB-C Modulator
dd01 0001 Resi DVB-C Modulator
dead Indigita Corporation
deaf Middle Digital Inc.
9050 PC Weasel Virtual VGA
9051 PC Weasel Serial Port
9052 PC Weasel Watchdog Timer
formerly SoftHard Technology Ltd.
deda XIMEA
4001 CB or MX camera
4021 MT camera
e000 Winbond
e000 W89C940
e159 Tiger Jet Network Inc.
0001 Tiger3XX Modem/ISDN interface
0059 0001 128k ISDN-S/T Adapter
0059 0003 128k ISDN-U Adapter
00a7 0001 TELES.S0/PCI
2.x ISDN Adapter
8086 0003 Digium X100P/X101P analogue PSTN FXO interface
b100 0003 OpenVox A400P 4-port analog card
b1d9 0003 AX400P 4-port analog card
0002 Tiger100APC ISDN chipset
e1c5 Elcus
e4bf EKF Elektronik GmbH
0ccd CCD-CALYPSO
0cd1 CD1-OPERA
0cd2 CD2-BEBOP
0cd3 CD3-JIVE
50c1 PC1-GROOVE
50c2 PC2-LIMBO
53c1 SC1-ALLEGRO
cc47 CCG-RUMBA
cc4d CCM-BOOGIE
e4e4 Xorcom
e55e Essence Technology, Inc.
ea01 Eagle Technology
000a PCI-773 Temperature Card
0032 PCI-730 & PC104P-30 Card
003e PCI-762 Opto-Isolator Card
0041 PCI-763 Reed Relay Card
0043 PCI-769 Opto-Isolator Reed Relay Combo Card
0046 PCI-766 Analog Output Card

0052 PCI-703 Analog I/O Card
0800 PCI-800 Digital I/O Card
The main chip of all these devices is by Xilinx -> It could also be a Xilinx ID.
ea60 RME
9896 Digi32
9897 Digi32 Pro
9898 Digi32/8
eabb Aashima Technology B.V.
eace Endace Measurement Systems, Ltd
3100 DAG 3.10 OC-3/OC-12
3200 DAG 3.2x OC-3/OC-12
320e
DAG 3.2E Fast Ethernet
340e DAG 3.4E Fast Ethernet
341e DAG 3.41E Fast Ethernet
3500 DAG 3.5 OC-3/OC-12
351c DAG 3.5ECM Fast Ethernet
360d DAG 3.6D DS3
360e DAG 3.6E Fast Ethernet
368e DAG 3.6E Gig Ethernet
3707 DAG 3.7T T1/E1/J1
370d DAG 3.7D DS3/E3
378e DAG 3.7G Gig Ethernet
3800 DAG 3.8S OC-3/OC-12
4100 DAG 4.10 OC-48
4110 DAG 4.11 OC-48
4220 DAG 4.2 OC-48
422e DAG 4.2GE Gig Ethernet
4230 DAG 4.2S OC-48
423e DAG 4.2GE Gig Ethernet
4300 DAG 4.3S OC-48
430e DAG 4.3GE Gig Ethernet
452e DAG 4.5G2 Gig Ethernet
454e DAG 4.5G4 Gig Ethernet
45b8 DAG 4.5Z8 Gig Ethernet
45be DAG 4.5Z2 Gig Ethernet
520e DAG 5.2X 10G Ethernet
521a DAG 5.2SXA 10G Ethernet/OC-192
5400 DAG 5.4S-12 OC-3/OC-12
5401 DAG 5.4SG-48 Gig Ethernet/OC-3/OC-12/OC-48
540a DAG 5.4GA Gig Ethernet
541a DAG 5.4SA-12 OC-3/OC-12
542a DAG 5.4SGA-48 Gig Ethernet/OC-3/OC-12/OC-48
6000 DAG 6.0SE 10G Ethernet/OC-192
6100 DAG 6.1SE 10G Ethernet/OC-192
6200
DAG 6.2SE 10G Ethernet/OC-192
7100 DAG 7.1S OC-3/OC-12

7400 DAG 7.4S OC-3/OC-12
7401 DAG 7.4S48 OC-48
752e DAG 7.5G2 Gig Ethernet
754e DAG 7.5G4 Gig Ethernet
8100 DAG 8.1X 10G Ethernet
8101 DAG 8.1SX 10G Ethernet/OC-192
8102 DAG 8.1X 10G Ethernet
820e DAG 8.2X 10G Ethernet
820f DAG 8.2X 10G Ethernet (2nd bus)
8400 DAG 8.4I Infiniband x4 SDR
8500 DAG 8.5I Infiniband x4 DDR
9200 DAG 9.2SX2 10G Ethernet
920e DAG 9.2X2 10G Ethernet
9540 DAG 9.5G4 Gig Ethernet
954f DAG 9.5G4F Gig Ethernet
a120 DAG 10X2-P 10G Ethernet
a12e DAG 10X2-S 10G Ethernet
a140 DAG 10X4-P 10/40G Ethernet
a14e DAG 10X4-S 10/40G Ethernet
eace vDAG virtual device
ec80 Belkin Corporation
ec00 F5D6000
ecc0 Echo Digital Audio Corporation
edd8 ARK Logic Inc
a091 1000PV [Stingray]
a099 2000PV [Stingray]
a0a1 2000MT
a0a9 2000MI
Found on M2N68-AM Motherboard
f043 ASUSTeK Computer Inc. (Wrong ID)
f05b Foxconn International, Inc. (Wrong ID)
f15e SiFive, Inc.
f1d0 AJA Video
c0fe
Xena HS/HD-R
c0ff Kona/Xena 2
cafe Kona SD
cfee Xena LS/SD-22-DA/SD-DA
dafe Corvid 1
daff KONA LHi
db00 IoExpress
db01 Corvid22
db02 Kona 3G
db03 Corvid 3G
db04 Kona 3G QUAD
db05 Kona LHe+
db06 IoXT
db07 Kona 3G P2P

db08 Kona 3G QUAD P2P
db09 Corvid 24
db11 T-Tap
dcaf Kona HD
dfee Xena HD-DA
eb07 Io4K
eb0a Io4K UFC
eb0b Kona 4
eb0c Kona 4 UFC
eb0d Corvid 88
eb0e Corvid 44
eb16 Corvid HEVC
10cf 1049 Corvid HEVC M31
eb18 Corvid HB-R
eb1a Kona IP 1SFP
eb1c Kona IP 2SFP
eb1d Io4KPlus
eb1e IoIP
eb1f Kona 5
eb23 Kona 1
eb24 Kona HDMI
eb25 Corvid 44 12g
efac Xena SD-MM/SD-22-MM
facd Xena HD-MM
f5f5 F5 Networks, Inc.
Subsystem ID for PATA controller on nForce motherboard
f849 ASRock Incorporation (Wrong ID)
fa57 Interagon AS
0001 PMC [Pattern Matching Chip]
fab7 Fabric7 Systems, Inc.
febd Ultraview Corp.
Nee Epigram
feda Broadcom Inc
a0fa BCM4210 iLine10 HomePNA 2.0
a10e BCM4230 iLine10 HomePNA
2.0
fede Fedetec Inc.
0003 TABIC PCI v3
fffd XenSource, Inc.
0101 PCI Event Channel Controller
Used in some old VMWare products before they got a real ID assigned
fffe VMWare Inc (temporary ID)
0710 Virtual SVGA
ffff Illegal Vendor ID

List of known device classes, subclasses and programming interfaces

```

# Syntax:
# C class class_name
# subclass subclass_name <-- single tab
# prog-if prog-if_name <-- two tabs

C 00 Unclassified device
  00 Non-VGA unclassified device
  01 VGA compatible unclassified device
C 01 Mass storage controller
  00 SCSI storage controller
  01 IDE interface
    00 ISA Compatibility mode-only controller
    05 PCI native mode-only controller
    0a ISA Compatibility mode controller, supports both channels switched to PCI native mode
    0f PCI native mode controller, supports both channels switched to ISA compatibility mode
    80 ISA Compatibility mode-only controller, supports bus mastering
    85 PCI native mode-only controller, supports bus
    mastering
    8a ISA Compatibility mode controller, supports both channels switched to PCI native mode, supports bus mastering
    8f PCI native mode controller, supports both channels switched to ISA compatibility mode, supports bus mastering
  02 Floppy disk controller
  03 IPI bus controller
  04 RAID bus controller
  05 ATA controller
    20 ADMA single stepping
    30 ADMA continuous operation
  06 SATA controller
    00 Vendor specific
    01 AHCI 1.0
    02 Serial Storage Bus
  07 Serial Attached SCSI controller
    01 Serial Storage Bus
  08 Non-Volatile memory controller
    01 NVMHCI
    02 NVM Express
  80 Mass storage controller
C 02 Network controller
  00 Ethernet controller
  01 Token ring network controller
  02 FDDI network controller
  03 ATM network controller
  04 ISDN controller
  05 WorldFip controller
  06 PICMG controller
  07 Infiniband controller
  08 Fabric controller
  80 Network controller
C 03 Display controller

```

- 00 VGA compatible controller
 - 00 VGA controller
 - 01
 - 8514 controller
 - 01 XGA compatible controller
 - 02 3D controller
 - 80 Display controller
- C 04 Multimedia controller
 - 00 Multimedia video controller
 - 01 Multimedia audio controller
 - 02 Computer telephony device
 - 03 Audio device
 - 80 Multimedia controller
- C 05 Memory controller
 - 00 RAM memory
 - 01 FLASH memory
 - 80 Memory controller
- C 06 Bridge
 - 00 Host bridge
 - 01 ISA bridge
 - 02 EISA bridge
 - 03 MicroChannel bridge
 - 04 PCI bridge
 - 00 Normal decode
 - 01 Subtractive decode
 - 05 PCMCIA bridge
 - 06 NuBus bridge
 - 07 CardBus bridge
 - 08 RACEway bridge
 - 00 Transparent mode
 - 01 Endpoint mode
 - 09 Semi-transparent PCI-to-PCI bridge
 - 40 Primary bus towards host CPU
 - 80 Secondary bus towards host CPU
 - 0a InfiniBand to PCI host bridge
 - 80 Bridge
- C 07 Communication controller
 - 00 Serial controller
 - 00 8250
 - 01 16450
 - 02 16550
 - 03 16650
 - 04 16750
 - 05 16850
 - 06 16950
 - 01 Parallel controller
 - 00 SPP
 - 01 BiDir

- 02 ECP
- 03 IEEE1284
- fe IEEE1284
- Target
- 02 Multiport serial controller
- 03 Modem
 - 00 Generic
 - 01 Hayes/16450
 - 02 Hayes/16550
 - 03 Hayes/16650
 - 04 Hayes/16750
- 04 GPIB controller
- 05 Smart Card controller
- 80 Communication controller
- C 08 Generic system peripheral
 - 00 PIC
 - 00 8259
 - 01 ISA PIC
 - 02 EISA PIC
 - 10 IO-APIC
 - 20 IO(X)-APIC
 - 01 DMA controller
 - 00 8237
 - 01 ISA DMA
 - 02 EISA DMA
 - 02 Timer
 - 00 8254
 - 01 ISA Timer
 - 02 EISA Timers
 - 03 HPET
 - 03 RTC
 - 00 Generic
 - 01 ISA RTC
 - 04 PCI Hot-plug controller
 - 05 SD Host controller
 - 06 IOMMU
 - 80 System peripheral
- C 09 Input device controller
 - 00 Keyboard controller
 - 01 Digitizer Pen
 - 02 Mouse controller
 - 03 Scanner controller
 - 04 Gameport controller
 - 00 Generic
 - 10 Extended
 - 80 Input device controller
- C 0a Docking station
 - 00 Generic Docking Station

- 80 Docking Station
- C 0b Processor
 - 00 386
 - 01 486
 - 02 Pentium
 - 10 Alpha
 - 20 Power PC
 - 30 MIPS
 - 40 Co-processor
- C 0c Serial bus controller
 - 00 FireWire (IEEE 1394)
 - 00 Generic
 - 10 OHCI
 - 01 ACCESS Bus
 - 02 SSA
 - 03 USB controller
 - 00 UHCI
 - 10 OHCI
 - 20 EHCI
 - 30 XHCI
 - 80 Unspecified
 - fe USB Device
 - 04 Fibre Channel
 - 05 SMBus
 - 06 InfiniBand
 - 07 IPMI Interface
 - 00 SMIC
 - 01 KCS
 - 02 BT (Block Transfer)
 - 08 SERCOS interface
 - 09 CANBUS
- C 0d Wireless controller
 - 00 IRDA controller
 - 01 Consumer IR controller
 - 10 RF controller
 - 11 Bluetooth
 - 12 Broadband
 - 20 802.1a controller
 - 21 802.1b controller
 - 80 Wireless controller
- C 0e Intelligent controller
 - 00 I2O
- C 0f Satellite communications controller
 - 01 Satellite TV controller
 - 02 Satellite audio communication controller
 - 03 Satellite voice communication controller
 - 04 Satellite data communication controller

C 10 Encryption controller
00 Network and computing encryption device
10 Entertainment encryption device
80 Encryption controller
C 11 Signal processing controller
00 DPIO module
01 Performance counters
10 Communication synchronizer
20 Signal
processing management
80 Signal processing controller
C 12 Processing accelerators
00 Processing accelerators
For the class of PCI attached devices which perform a function of Deep Learning Neural Network inference
acceleration
01 AI Inference Accelerator
C 13 Non-Essential Instrumentation
C 40 Coprocessor
C ff Unassigned class

Found in path(s):

*/opt/cola/permits/1411688236_1665240125.3823578/0/pci-ids-0-0-2020-03-20-orig-tar-xz/pci.ids-
0.0~2020.03.20/pci.ids

1.197 sbsigntool 0.9.4-2ubuntu2

1.197.1 Available under license :

sbsigntool - utilities for signing UEFI binaries for use with secure boot.

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Version 3, 29 June 2007

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1.198 pygobject 3.42.1-0ubuntu1

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Appendix: How to Apply These Terms to Your New Programs

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To do so, attach the following notices to the program. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

```
<one line to give the program's name and a brief idea of what it does.>  
Copyright (C) 19yy <name of author>
```

```
This program is free software; you can redistribute it and/or modify  
it under the terms of the GNU General Public License as published by  
the Free Software Foundation; either version 1, or (at your option)  
any later version.
```

```
This program is distributed in the hope that it will be useful,  
but WITHOUT ANY WARRANTY; without even the implied warranty of  
MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the  
GNU General Public License for more details.
```

```
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along with this program; if not, write to the Free Software  
Foundation, Inc., 51 Franklin Street,
```

Fifth Floor, Boston MA 02110-1301 USA

Also add information on how to contact you by electronic and paper mail.

If the program is interactive, make it output a short notice like this when it starts in an interactive mode:

```
Gnomovision version 69, Copyright (C) 19xx name of author
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.
```

The hypothetical commands `show w' and `show c' should show the appropriate parts of the General Public License. Of course, the commands you use may be called something other than `show w' and `show c'; they could even be mouse-clicks or menu items--whatever suits your program.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a "copyright disclaimer" for the program, if necessary. Here a sample; alter the names:

```
Yoyodyne, Inc., hereby disclaims all
copyright interest in the
program `Gnomovision' (a program to direct compilers to make passes
at assemblers) written by James Hacker.
```

```
<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
```

That's all there is to it!

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The End

1.202 laZR-uri 1.0.6-2

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Version 3, 29 June 2007

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1.203 tpm2-tss-tcti 3.2.0-1ubuntu1

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1.204 dosfs-tools 4.2-1build3

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The

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1.205 arptables 1.8.7

1.205.1 Available under license :

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Found in path(s):

* /opt/cola/permits/1411689358_1662671706.7037919/0/iptables-1-8-7-r1-tar/sbin/iptables-apply

1.206 json-c 0.15-3~ubuntu1.22.04.1

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1.207 libaio 0.3.112-13build1

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1.210 groff 1.22.4-8build1

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Source Files

. The `grn' preprocessor, written by Barry Roitblat <barry@rentonww.com> and David Slattengren <slatteng@Xinet.COM>. These files have been part of the original Berkeley ditroff distribution, without AT&T code, and are in the public domain.

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```
src/preproc/grn/gprint.h
src/preproc/grn/hdb.cpp
src/preproc/grn/hgraph.cpp
src/preproc/grn/hpoint.cpp
src/preproc/grn/main.cpp
```

. The `gxditview' output device. It is based on X11's `xditview' program and thus has the X license.

src/devices/xditview/DESC.in
src/devices/xditview/Dvi.c
src/devices/xditview/Dvi.h
src/devices/xditview/DviP.h
src/devices/xditview/FontMap
src/devices/xditview/GXditview.ad
src/devices/xditview/Menu.h
src/devices/xditview/ad2c
src/devices/xditview/device.c
src/devices/xditview/device.h
src/devices/xditview/draw.c
src/devices/xditview/font.c
src/devices/xditview/gray1.bm
src/devices/xditview/gray2.bm
src/devices/xditview/gray3.bm
src/devices/xditview/gray4.bm
src/devices/xditview/gray5.bm
src/devices/xditview/gray6.bm
src/devices/xditview/gray7.bm
src/devices/xditview/gray8.bm
src/devices/xditview/gxditview.man
src/devices/xditview/lex.c
src/devices/xditview/page.c
src/devices/xditview/parse.c
src/devices/xditview/xdit.bm
src/devices/xditview/xdit_mask.bm
src/devices/xditview/xditview.c

src/include/DviChar.h
src/include/XFontName.h

src/libs/libxutil/DviChar.c
src/libs/libxutil/XFontName.c

Macro Packages

. The -mdoc macro set, using the BSD license.

tmac/doc.tmac
tmac/doc-old.tmac
tmac/doc-common
tmac/doc-ditroff
tmac/doc-nroff
tmac/doc-syms
tmac/groff_mdoc.man

. The -me macro set, using the BSD license.

```
tmac/e.tmac
tmac/groff_me.man
doc/meintro.me
doc/meintro_fr.me
doc/meref.me
```

Hyphenation Patterns

. The file ``tmac/hyphen.us'` is identical to the file ``hyphen.tex'`, part of the TeX system written by Donald E. Knuth; the master file can be found at

<ftp://labrea.stanford.edu/pub/tex/dist/lib/hyphen.tex> .

It has been renamed for consistency, i.e., to make patterns available under the filenames ``hyphen.<language>'`, e.g. ``hyphen.de'` or ``hyphen.uk'`.

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. The file ``tmac/hyphen.fr'` contains the same patterns as the file ``frhyph.tex'` (for TeX), which can be found at

<http://dante.ctan.org/CTAN/language/hyphenation/frhyph.tex> .

The patterns have been converted to a format groff can understand.

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. The file ``tmac/hyphen.sv'` is identical to the file ``svhyph.tex'`, which can be found at

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. The files ``tmac/hyphen.det'` and ``tmac/hyphen.den'` contain the same patterns as the files ``dehypht-x-2017-03-31.pat'` and ``dehyphn-x-2017-03-31.pat'` (for TeX), respectively, which can be found at

<http://ctan.org/tex-archive/language/hyphenation/dehyph-exptl>

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. The file `tmac/hyphen.cs' contains the same patterns as the file
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1.211 python-launchpadlib 1.10.16-1

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1.212 python-distro 1.7.0-1

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1.213 chardet 0.0.7-1build2

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/opt/cola/permits/1411689152_1665237124.402532/0/chardet-1-0-tar-gz/chardet-1.0/chardet/universaldetector.py
* /opt/cola/permits/1411689152_1665237124.402532/0/chardet-1-0-tar-gz/chardet-1.0/chardet/big5prober.py
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* /opt/cola/permits/1411689152_1665237124.402532/0/chardet-1-0-tar-gz/chardet-1.0/chardet/euckrprober.py
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* /opt/cola/permits/1411689152_1665237124.402532/0/chardet-1-0-tar-gz/chardet-1.0/chardet/euckrfreq.py
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Metadata-Version: 1.0

Name: chardet

Version: 1.0

Summary: Universal encoding detector

Home-page: <http://chardet.feedparser.org/>

Author: Mark Pilgrim

Author-email: mark@diveintomark.org

License: LGPL

Download-URL: <http://chardet.feedparser.org/download/>

Description: Universal character encoding detector

Detects

- ASCII, UTF-8, UTF-16 (2 variants), UTF-32 (4 variants)
- Big5, GB2312, EUC-TW, HZ-GB-2312, ISO-2022-CN (Traditional and Simplified Chinese)
- EUC-JP, SHIFT_JIS, ISO-2022-JP (Japanese)
- EUC-KR, ISO-2022-KR (Korean)
- KOI8-R, MacCyrillic, IBM855, IBM866, ISO-8859-5, windows-1251 (Cyrillic)
- ISO-8859-2, windows-1250 (Hungarian)
- ISO-8859-5, windows-1251 (Bulgarian)
- windows-1252 (English)
- ISO-8859-7, windows-1253 (Greek)
- ISO-8859-8, windows-1255 (Visual and Logical

Hebrew)

- TIS-620 (Thai)

Requires Python 2.1 or later

Keywords: encoding,i18n,xml
Platform: POSIX
Platform: Windows
Classifier: Development Status :: 4 - Beta
Classifier: Environment :: Other Environment
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1.214 source-highlight 3.1.9-4.1build2

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Here is a list of the main contributors to lm-sensors version 3.

* Frodo Looijaard

Original author of libsensors, sensors-detect, sensors and isadump.

* Merlin Hughes

Original author of sensord.

* Bob Schlaermann

Dynamic chip feature detection (a.k.a. generic chip support) in libsensors and sensors.

* Mark M. Hoffman

Many improvements to the libsensors configuration file scanner.

* Jean Delvare

New libsensors API, and migration of sensors and sensord thereto.

Many optimizations in libsensors and sensors.

Configuration file converter.

Rewrite of sensors-detect.

Support for multiple configuration files in libsensors.

1.216 libunwind 1.3.2-2build2

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1.217 libuv 1.43.0-1

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```
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it
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```
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```

```
<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
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1.219 babeltrace 1.5.8-2build1

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Mathieu Desnoyers

September 26, 2010

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```
<one line to give the program's name and a brief idea of what it does.>  
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```

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```
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Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.
```

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```
Yoyodyne, Inc., hereby disclaims all
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program `Gnomovision' (a program to direct compilers to make passes
at assemblers) written by James Hacker.
```

```
<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
```

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1.222 python-idna 3.3-1

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1.223 Imdb 0.9.24-1build2

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1.224 libyami 0.2.2-1build2

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1.225 six 1.16.0-3ubuntu1

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1.226 json-c 0.99.9-1build2

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1.227 log-rotate 3.19.0-1ubuntu1.1

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1.230 python-keyring 23.5.0-1

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Finally, any free program is threatened constantly by software patents. We wish to avoid the danger that redistributors of a free program will individually obtain patent licenses, in effect making the program proprietary. To prevent this, we have made it clear that any patent must be licensed for everyone's free use or not licensed at all.

The precise terms and conditions for copying, distribution and modification follow.

@heading TERMS AND

CONDITIONS FOR COPYING, DISTRIBUTION AND MODIFICATION

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Accompany it with a written offer, valid for at least three years, to give any third party, for a charge no more than your cost of physically performing source distribution, a complete machine-readable copy of the corresponding source code, to be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange; or,

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Accompany it with the information you received as to the offer to distribute corresponding source code. (This alternative is allowed only for noncommercial distribution and only if you received the program in object code or executable form with such an offer, in accord with Subsection b above.)

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The source code for a work means the preferred form of the work for making modifications to it. For an executable work, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the executable. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

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@heading Appendix: How to Apply These Terms to Your New Programs

If you develop a new program, and you want it to be of the greatest possible use to the public, the best way to achieve this is to make it free software which everyone can redistribute and change under these terms.

To do so, attach the following notices to the program. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the ``copyright" line and a pointer to where the full notice is found.

@smallexample

@var{one line to give the program's name
and a brief idea of what it does.}

Copyright (C) @var{yyyy} @var{name of author}

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@end smallexample

Also add information on how to contact you by electronic and paper mail.

If the program is interactive, make it output a short notice like this when it starts in an interactive mode:

```
@smallexample
Gnomovision version
69, Copyright (C) @var{year} @var{name of author}
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.
@end smallexample
```

The hypothetical commands @samp{show w} and @samp{show c} should show the appropriate parts of the General Public License. Of course, the commands you use may be called something other than @samp{show w} and @samp{show c}; they could even be mouse-clicks or menu items---whatever suits your program.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a ``copyright disclaimer" for the program, if necessary. Here is a sample; alter the names:

```
@example
Yoyodyne, Inc., hereby disclaims all copyright interest in the program
`Gnomovision' (which makes passes at compilers) written by James Hacker.
```

```
@var{signature of Ty Coon}, 1 April 1989
Ty Coon, President of Vice
@end example
```

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The gettext-runtime package is partially under the LGPL and partially under the GPL.

The following parts are under the LGPL, see file intl/COPYING.LIB:

- the libintl and libasprintf libraries and their header files,
- the libintl.jar Java library,
- the GNU.Gettext.dll C# library,
- the gettext.sh shells script function library.

The following parts are under the GPL, see file COPYING in the toplevel directory:

- the _programs_ gettext, ngettext, envsubst,
- the documentation.

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Version 2.1, February 1999

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Finally, software patents pose a constant threat to the existence of any free program. We wish to make sure that a company cannot effectively restrict the users of a free program by obtaining a restrictive license from a patent holder. Therefore, we insist that any patent license obtained for a version of the library must be consistent with the full freedom of use specified in this license.

Most GNU software, including some libraries, is covered by the ordinary GNU General Public License. This license, the GNU Lesser General Public License, applies to certain designated libraries, and is quite different from the ordinary General Public License. We use this license for certain libraries in order to permit linking those libraries into non-free programs.

When a program is linked with a library, whether statically or using a shared library, the combination of the two is legally speaking a combined work, a derivative of the original library. The ordinary General Public License therefore permits such linking only if the entire combination fits its criteria of freedom. The Lesser General Public License permits more lax criteria for linking other code with the library.

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For example, on rare occasions, there may be a special need to encourage the widest possible use of a certain library, so that it becomes a de-facto standard. To achieve this, non-free programs must be allowed to use the library. A more frequent case is that a free library does the same job as widely used non-free libraries. In this case, there is little to gain by limiting

the free library to free software only, so we use the Lesser General Public License.

In other cases, permission to use a particular library in non-free programs enables a greater number of people to use a large body of free software. For example, permission to use the GNU C Library in non-free programs enables many more people to use the whole GNU operating system, as well as its variant, the GNU/Linux operating system.

Although the Lesser General Public License is Less protective of the users' freedom, it does ensure that the user of a program that is linked with the Library has the freedom and the wherewithal to run that program using a modified version of the Library.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, whereas the latter must be combined with the library in order to run.

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A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

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"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control

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- b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.
- c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.
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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the

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These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

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However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

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If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.
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a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

e) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything

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1.232 strace 5.16-0ubuntu3

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1.235 fuse3 3.10.5-1build1

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1.236 python-wadllib 1.3.6-1

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1.237 thin-provisioning-tools 0.9.0-2ubuntu1

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If the program is interactive, make it output a short notice like this when it starts in an interactive mode:

```
Gnomovision version 69, Copyright (C) 19yy name of author  
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.  
This is free software, and you are welcome to redistribute it  
under certain conditions; type `show c' for details.
```

The hypothetical commands `show w' and `show c' should show the appropriate parts of the General Public License. Of course, the commands you use may be called something other than `show w' and `show c'; they could even be mouse-clicks or menu items--whatever suits your program.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a "copyright disclaimer" for the program, if necessary. Here is a sample; alter the names:

Yoyodyne, Inc., hereby disclaims all copyright interest in the program
'Gnomovision' (which makes passes at compilers) written by James Hacker.

<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice

This General Public License does not permit incorporating your program into
proprietary programs. If your program is a subroutine library, you may
consider it more useful to permit linking proprietary applications with the
library. If this is what you want to do, use the GNU Library General
Public License instead of this License.

1.239 libio-socket-ssl-perl 2.074-2

1.239.1 Available under license :

No license file was found, but licenses were detected in source scan.

// This Source Code Form is subject to the terms of the Mozilla Public

Found in path(s):

* /opt/cola/permits/1411691043_1662670113.1378503/0/libio-socket-ssl-perl-2-074-orig-tar-gz/IO-Socket-SSL-
2.074/lib/IO/Socket/SSL/PublicSuffix.pm

No license file was found, but licenses were detected in source scan.

abstract: 'Nearly transparent SSL encapsulation for IO::Socket::INET.'

author:

- 'Steffen Ullrich <sullr@cpan.org>, Peter Behroozi, Marko Asplund'

build_requires:

ExtUtils::MakeMaker: '0'

configure_requires:

ExtUtils::MakeMaker: '0'

Net::SSLeay: '1.46'

dynamic_config: 1

generated_by: 'ExtUtils::MakeMaker version 7.34, CPAN::Meta::Converter version 2.150010'

license: perl

meta-spec:

url: <http://module-build.sourceforge.net/META-spec-v1.4.html>

version: '1.4'

name: IO-Socket-SSL

no_index:

directory:

- t

- inc

requires:

Mozilla::CA: '0'

Net::SSLeay: '1.46'

Scalar::Util: '0'
resources:
bugtracker: <https://github.com/noxxi/p5-io-socket-ssl/issues>
homepage: <https://github.com/noxxi/p5-io-socket-ssl>
license: <http://dev.perl.org/licenses/>
repository: <https://github.com/noxxi/p5-io-socket-ssl>
version: '2.074'
x_serialization_backend: 'CPAN::Meta::YAML version 0.018'

Found in path(s):

*

/opt/cola/permits/1411691043_1662670113.1378503/0/libio-socket-ssl-perl-2-074-orig-tar-gz/IO-Socket-SSL-2.074/META.yml

No license file was found, but licenses were detected in source scan.

=head1 NAME

IO::Socket::SSL - SSL sockets with IO::Socket interface

=head1 SYNOPSIS

```
use strict;
use IO::Socket::SSL;

# simple client
my $cl = IO::Socket::SSL->new('www.google.com:443');
print $cl "GET / HTTP/1.0\r\n\r\n";
print <$cl>;

# simple server
my $srv = IO::Socket::SSL->new(
LocalAddr => '0.0.0.0:1234',
Listen => 10,
SSL_cert_file => 'server-cert.pem',
SSL_key_file => 'server-key.pem',
);
$srv->accept;
```

=head1 DESCRIPTION

IO::Socket::SSL makes using SSL/TLS much easier by wrapping the necessary functionality into the familiar L<IO::Socket> interface and providing secure defaults whenever possible.

This way, existing applications can be made SSL-aware without much effort, at least if you do blocking I/O and don't use select or poll.

But, under the hood, SSL is a complex beast.

So there are lots of methods to make it do what you need if the default

behavior is not

adequate.

Because it is easy to inadvertently introduce critical security bugs or just hard to debug problems, I would recommend studying the following documentation carefully.

The documentation consists of the following parts:

=over 4

=item * L</"Essential Information About SSL/TLS">

=item * L</"Basic SSL Client">

=item * L</"Basic SSL Server">

=item * L</"Common Usage Errors">

=item * L</"Common Problems with SSL">

=item * L</"Using Non-Blocking Sockets">

=item * L</"Advanced Usage">

=item * L</"Integration Into Own Modules">

=item * L</"Description Of Methods">

=back

Additional documentation can be found in

=over 4

=item * L<IO::Socket::SSL::Intercept> - Doing Man-In-The-Middle with SSL

=item * L<IO::Socket::SSL::Utils> - Useful functions for certificates etc

=back

=head1 Essential Information About SSL/TLS

SSL (Secure Socket Layer) or its successor TLS (Transport Layer Security) are protocols to facilitate end-to-end security. These protocols are used when accessing

web sites (https), delivering or retrieving email, and in lots of other use cases.

In the following documentation we will refer to both SSL and TLS as simply 'SSL'.

SSL enables end-to-end security by providing two essential functions:

=over 4

=item Encryption

This part encrypts the data for transit between the communicating parties, so that nobody in between can read them. It also provides tamper resistance so that nobody in between can manipulate the data.

=item Identification

This part makes sure that you talk to the right peer.

If the identification is done incorrectly it is easy to mount man-in-the-middle attacks, e.g. if Alice wants to talk to Bob it would be possible for Mallory to put itself in the middle, so that Alice talks to Mallory and Mallory to Bob.

All the data would still be encrypted, but not end-to-end between Alice and Bob, but only between Alice and Mallory and then between Mallory and Bob.

Thus Mallory would be able to read and modify all traffic between Alice and Bob.

=back

Identification is the part which is the hardest to understand and the easiest to get wrong.

With SSL, the Identification is usually done with B<certificates> inside a B<PKI> (Public Key Infrastructure).

These Certificates are comparable to an identity card, which contains information about the owner of the card. The card then is somehow B<signed> by the B<issuer> of the card, the B<CA> (Certificate Agency).

To verify the identity of the peer the following must be done inside SSL:

=over 4

=item *

Get the certificate from the peer.

If the peer does not present a certificate we cannot verify it.

=item *

Check if we trust the certificate, e.g. make sure it's not a forgery.

We believe that a certificate is not a fake if we either know the certificate

already or if we B<trust> the issuer (the CA) and can verify the issuer's signature on the certificate.

In reality there is often a hierarchy of certificate agencies and we only directly trust the root of this hierarchy.

In this case the peer not only sends his own certificate, but also all B<intermediate certificates>.

Verification will be done by building a B<trust path> from the trusted root up to the peer's certificate and checking in each step if we can verify the issuer's signature.

This step often causes problems because the client does not know the necessary trusted root certificates. These are usually stored in a system dependent CA store, but often the browsers have their own CA store.

=item *

Check if the certificate is still valid.

Each certificate has a lifetime and should not be used after that time because it might be compromised or the underlying cryptography got broken in the mean time.

=item *

Check if the subject of the certificate matches the peer.

This is like comparing the picture on the identity card against the person representing the identity card.

When connecting to a server this is usually done by comparing the hostname used for connecting against the names represented in the certificate.

A certificate might contain multiple names or wildcards, so that it can be used for multiple hosts (e.g. *.example.com and *.example.org).

Although nobody sane would accept an identity card where the picture does not match the person we see, it is a common implementation error with SSL to omit this check or get it wrong.

=item *

Check if the certificate was revoked by the issuer.

This might be the case if the certificate was compromised somehow and now somebody else might use it to claim the wrong identity.

Such revocations happened a lot after the heartbleed attack.

For SSL there are two ways to verify a revocation, CRL and OCSP.

With CRLs (Certificate Revocation List) the CA provides a list of serial numbers for revoked certificates. The client somehow has to download the list

(which can be huge) and keep it up to date.

With OCSP (Online Certificate Status Protocol) the client can check a single certificate directly by asking the issuer.

Revocation

is the hardest part of the verification and none of today's browsers get it fully correct. But, they are still better than most other implementations which don't implement revocation checks or leave the hard parts to the developer.

=back

When accessing a web site with SSL or delivering mail in a secure way the identity is usually only checked one way, e.g. the client wants to make sure it talks to the right server, but the server usually does not care which client it talks to.

But, sometimes the server wants to identify the client too and will request a certificate from the client which the server must verify in a similar way.

=head1 Basic SSL Client

A basic SSL client is simple:

```
my $client = IO::Socket::SSL->new('www.example.com:443')
or die "error=$!, ssl_error=$SSL_ERROR";
```

This will take the OpenSSL default CA store as the store for the trusted CA.

This usually works on UNIX systems.

If there are no certificates in the store it will try use L<Mozilla::CA> which provides the default CAs of Firefox.

In the default settings, L<IO::Socket::SSL> will use a safer cipher set and SSL version, do a proper hostname check against the certificate, and use SNI (server name indication) to send the hostname inside the SSL handshake. This is necessary to work with servers which have different certificates behind the same IP address.

It will also check the revocation of the certificate with OCSP, but currently only if the server provides OCSP stapling (for deeper checks see C<ocsp_resolver> method).

Lots of options can be used to change ciphers, SSL version, location of CA and much more. See documentation of methods for details.

With protocols like SMTP it is necessary to upgrade an existing socket to SSL. This can be done like this:


```

my $client = IO::Socket::INET->new('mx.example.com:25') or die $!;
# .. read greeting from server
# .. send EHLO and read response
# .. send STARTTLS command and read response
# .. if response was successful we
can upgrade the socket to SSL now:
IO::Socket::SSL->start_SSL($client,
# explicitly set hostname we should use for SNI
SSL_hostname => 'mx.example.com'
) or die $$SSL_ERROR;

```

A more complete example for a simple HTTP client:

```

my $client = IO::Socket::SSL->new(
# where to connect
PeerHost => "www.example.com",
PeerPort => "https",

# certificate verification - VERIFY_PEER is default
SSL_verify_mode => SSL_VERIFY_PEER,

# location of CA store
# need only be given if default store should not be used
SSL_ca_path => '/etc/ssl/certs', # typical CA path on Linux
SSL_ca_file => '/etc/ssl/cert.pem', # typical CA file on BSD

# or just use default path on system:
IO::Socket::SSL::default_ca(), # either explicitly
# or implicitly by not giving SSL_ca_*

# easy hostname verification
# It will use PeerHost as default name a verification
# scheme as default, which is safe enough for most purposes.
SSL_verifycn_name => 'foo.bar',
SSL_verifycn_scheme => 'http',

# SNI
support - defaults to PeerHost
SSL_hostname => 'foo.bar',

) or die "failed connect or ssl handshake: $!,$$SSL_ERROR";

# send and receive over SSL connection
print $client "GET / HTTP/1.0\r\n\r\n";
print <$client>;

```

And to do revocation checks with OCSP (only available with OpenSSL 1.0.0 or higher and L<Net::SSLeay> 1.59 or higher):

```

# default will try OCSP stapling and check only leaf certificate
my $client = IO::Socket::SSL->new($dst);

# better yet: require checking of full chain
my $client = IO::Socket::SSL->new(
PeerAddr => $dst,
SSL_ocsp_mode => SSL_OCSP_FULL_CHAIN,
);

# even better: make OCSP errors fatal
# (this will probably fail with lots of sites because of bad OCSP setups)
# also use common OCSP response cache
my $ocsp_cache = IO::Socket::SSL::OCSP_Cache->new;
my $client = IO::Socket::SSL->new(
PeerAddr => $dst,
SSL_ocsp_mode => SSL_OCSP_FULL_CHAIN|SSL_OCSP_FAIL_HARD,
SSL_ocsp_cache => $ocsp_cache,
);

#
disable OCSP stapling in case server has problems with it
my $client = IO::Socket::SSL->new(
PeerAddr => $dst,
SSL_ocsp_mode => SSL_OCSP_NO_STAPLE,
);

# check any certificates which are not yet checked by OCSP stapling or
# where we have already cached results. For your own resolving combine
# $ocsp->requests with $ocsp->add_response(uri,response).
my $ocsp = $client->ocsp_resolver();
my $errors = $ocsp->resolve_blocking();
if ($errors) {
warn "OCSP verification failed: $errors";
close($client);
}

```

=head1 Basic SSL Server

A basic SSL server looks similar to other L<IO::Socket> servers, only that it also contains settings for certificate and key:

```

# simple server
my $server = IO::Socket::SSL->new(
# where to listen
LocalAddr => '127.0.0.1',
LocalPort => 8080,
Listen => 10,

```

```
# which certificate to offer
# with SNI support there can be different certificates per hostname
SSL_cert_file => 'cert.pem',
SSL_key_file => 'key.pem',
```

```
) or die "failed to listen: $!";
```

```
# accept client
my $client = $server->accept or die
"failed to accept or ssl handshake: $!, $SSL_ERROR";
```

This will automatically use a secure set of ciphers and SSL version and also supports Forward Secrecy with (Elliptic-Curve) Diffie-Hellmann Key Exchange.

If you are doing a forking or threading server, we recommend that you do the SSL handshake inside the new process/thread so that the master is free for new connections.

We recommend this because a client with improper or slow SSL handshake could make the server block in the handshake which would be bad to do on the listening socket:

```
# inet server
my $server = IO::Socket::INET->new(
# where to listen
LocalAddr => '127.0.0.1',
LocalPort => 8080,
Listen => 10,
);

# accept client
my $client = $server->accept or die;

# SSL upgrade client (in new process/thread)
IO::Socket::SSL->start_SSL($client,
SSL_server => 1,
SSL_cert_file => 'cert.pem',
SSL_key_file =>
'key.pem',
) or die "failed to ssl handshake: $SSL_ERROR";
```

Like with normal sockets, neither forking nor threading servers scale well.

It is recommended to use non-blocking sockets instead, see

[L</"Using Non-Blocking Sockets">](#)

=head1 Common Usage Errors

This is a list of typical errors seen with the use of `L<IO::Socket::SSL>`:

=over 4

=item *

Disabling verification with C<SSL_verify_mode>.

As described in L<"Essential Information About SSL/TLS">, a proper identification of the peer is essential and failing to verify makes Man-In-The-Middle attacks possible.

Nevertheless, lots of scripts and even public modules or applications disable verification, because it is probably the easiest way to make the thing work and usually nobody notices any security problems anyway.

If the verification does not succeed with the default settings, one can do the following:

=over 8

=item *

Make sure the needed CAs are in the store, maybe use C<SSL_ca_file> or C<SSL_ca_path> to specify a different CA store.

=item *

If the validation fails because the certificate is self-signed and that's what you expect, you can use the C<SSL_fingerprint> option to accept specific leaf certificates by their certificate or pubkey fingerprint.

=item *

If the validation failed because the hostname does not match and you cannot access the host with the name given in the certificate, you can use C<SSL_verifycn_name> to specify the hostname you expect in the certificate.

=back

A common error pattern is also to disable verification if they found no CA store (different modules look at different "default" places).

Because L<IO::Socket::SSL> is now able to provide a usable CA store on most platforms (UNIX, Mac OSX and Windows) it is better to use the defaults provided by L<IO::Socket::SSL>.

If necessary these can be checked with the C<default_ca> method.

=item *

Polling of SSL sockets (e.g. select, poll and other event loops).

If you sysread one byte on a normal socket it will result in a syscall to read one byte. Thus, if more than one byte is available on the socket it will be kept in the network stack of your OS and the next select or poll call will return the socket as readable.

But, with SSL you don't deliver single bytes. Multiple data bytes are packaged and encrypted together in an SSL frame. Decryption can only be done on the whole frame, so a sysread for one byte actually reads the complete SSL frame from the socket, decrypts it and returns the first decrypted byte. Further sysreads will return more bytes from the same frame until all bytes are returned and the next SSL frame will be read from the socket.

Thus, in order to decide if you can read more data (e.g. if sysread will block) you must check if there are still data in the current SSL frame by calling `C<pending>` and if there are no data pending you might check the underlying socket with select or poll.

Another way might be if you try to sysread at least 16kByte all the time. 16kByte is the maximum size of an SSL frame and because sysread returns data from only a single SSL frame you can guarantee that there are no pending data.

Additionally, contrary to plain sockets the data delivered on the socket are not necessarily application payload.

It might be a TLS handshake, it might just be the beginning of a TLS record or it might be TLS session tickets which are sent after the TLS handshake in TLS 1.3.

In such situations select will return that data are available for read since it only looks at the plain socket.

A sysread on the `IO::Socket::SSL` socket will not return any data though since it is an abstraction which only returns application data.

This causes the sysread to hang in case the socket was blocking or to return an error with `EAGAIN` on non-blocking sockets.

Applications using select or similar should therefore set the socket to non-blocking and also expect that the sysread might temporarily fail with `EAGAIN`.

See also [L<"/Using Non-Blocking Sockets">](#).

=item *

Expecting exactly the same behavior as plain sockets.

`IO::Socket::SSL` tries to emulate the usual socket behavior as good as possible,

but full emulation can not be done. Specifically a read on the SSL socket might also result in a write on the TCP socket or a write on the SSL socket might result in a read on the TCP socket. Also C<accept> and B<close> on the SSL socket will result in writing and reading data to the TCP socket too.

Especially the hidden writes might result in a connection reset if the underlying TCP socket is already closed by the peer. Unless signal PIPE is explicitly handled by the application this will usually result in the application crashing. It is thus recommended to explicitly IGNORE signal PIPE so that the errors get propagated as EPIPE instead of causing a crash of the application.

=item *

Set 'SSL_version' or 'SSL_cipher_list' to a "better" value.

L<IO::Socket::SSL> tries to set these values to reasonable, secure values which are compatible with the rest of the world.

But,

there are some scripts or modules out there which tried to be smart and get more secure or compatible settings.

Unfortunately, they did this years ago and never updated these values, so they are still forced to do only 'TLSv1' (instead of also using TLSv12 or TLSv11). Or they set 'HIGH' as the cipher list and thought they were secure, but did not notice that 'HIGH' includes anonymous ciphers, e.g. without identification of the peer.

So it is recommended to leave the settings at the secure defaults which L<IO::Socket::SSL> sets and which get updated from time to time to better fit the real world.

=item *

Make SSL settings inaccessible by the user, together with bad builtin settings.

Some modules use L<IO::Socket::SSL>, but don't make the SSL settings available to the user. This is often combined with bad builtin settings or defaults (like switching verification off).

Thus the user needs to hack around these restrictions by using C<set_args_filter_hack> or similar.

=item *

Use
of constants as strings.

Constants like C<SSL_VERIFY_PEER> or C<SSL_WANT_READ> should be used as

constants and not be put inside quotes, because they represent numerical values.

=item *

Forking and handling the socket in parent and child.

A B<fork> of the process will duplicate the internal user space SSL state of the socket. If both master and child interact with the socket by using their own SSL state strange error messages will happen. Such interaction includes explicit or implicit B<close> of the SSL socket. To avoid this the socket should be explicitly closed with B<SSL_no_shutdown>.

=item *

Forking and executing a new process.

Since the SSL state is stored in user space it will be duplicated by a B<fork> but it will be lost when doing B<exec>. This means it is not possible to simply redirect stdin and stdout for the new process to the SSL socket by duplicating the relevant file handles. Instead explicitly exchanging plain data between child-process and SSL socket are needed.

=back

=head1

Common Problems with SSL

SSL is a complex protocol with multiple implementations and each of these has their own quirks. While most of these implementations work together, it often gets problematic with older versions, minimal versions in load balancers, or plain wrong setups.

Unfortunately these problems are hard to debug.

Helpful for debugging are a knowledge of SSL internals, Wireshark and the use of the debug settings of L<IO::Socket::SSL> and L<Net::SSL>, which can both be set with C<\$IO::Socket::SSL::DEBUG>.

The following debug levels are defined, but used not in any consistent way:

=over 4

=item *

0 - No debugging (default).

=item *

1 - Print out errors from L<IO::Socket::SSL> and ciphers from L<Net::SSLay>.

=item *

2 - Print also information about call flow from L<IO::Socket::SSL> and progress information from L<Net::SSLay>.

=item *

3 - Print also some data dumps from L<IO::Socket::SSL> and from L<Net::SSLay>.

=back

Also, C<analyze-ssl.pl>

from the ssl-tools repository at

L<<https://github.com/noxxi/p5-ssl-tools>> might be a helpful tool when debugging SSL problems, as do the C<openssl> command line tool and a check with a different SSL implementation (e.g. a web browser).

The following problems are not uncommon:

=over 4

=item *

Bad server setup: missing intermediate certificates.

It is a regular problem that administrators fail to include all necessary certificates into their server setup, e.g. everything needed to build the trust chain from the trusted root.

If they check the setup with the browser everything looks ok, because browsers work around these problems by caching any intermediate certificates and apply them to new connections if certificates are missing.

But, fresh browser profiles which have never seen these intermediates cannot fill in the missing certificates and fail to verify; the same is true with L<IO::Socket::SSL>.

=item *

Old versions of servers or load balancers which do not understand specific TLS versions or croak on specific data.

From time to time one encounters an SSL peer, which just closes the connection inside the SSL handshake. This can usually be worked around by downgrading the SSL version, e.g. by setting C<SSL_version>. Modern Browsers usually deal with such servers by automatically downgrading the SSL version and repeat the

connection attempt until they succeed.

Worse servers do not close the underlying TCP connection but instead just drop the relevant packet. This is harder to detect because it looks like a stalled connection. But downgrading the SSL version often works here too.

A cause of such problems are often load balancers or security devices, which have hardware acceleration and only a minimal (and less robust) SSL stack. They can often be detected because they support much fewer ciphers than other implementations.

=item *

Bad or old OpenSSL versions.

L<IO::Socket::SSL> uses OpenSSL with the help of the L<Net::SSLay> library. It is recommend to have a recent version of this library, because it has more features and usually fewer known bugs.

=item *

Validation of client certificates fail.

Make sure that the purpose of the certificate allows use as ssl client (check with C<< openssl x509 -purpose >>, that the necessary root certificate is in the path specified by C<SSL_ca*> (or the default path) and that any intermediate certificates needed to build the trust chain are sent by the client.

=item *

Validation of self-signed certificate fails even if it is given with C<SSL_ca*> argument.

The C<SSL_ca*> arguments do not give a general trust store for arbitrary certificates but only specify a store for CA certificates which then can be used to verify other certificates. This especially means that certificates which are not a CA get simply ignored, notably self-signed certificates which do not also have the CA-flag set.

This behavior of OpenSSL differs from the more general trust-store concept which can be found in browsers and where it is possible to simply added arbitrary certificates (CA or not) as trusted.

=back

=head1 Using Non-Blocking Sockets

If you have a non-blocking socket, the expected behavior on read, write, accept or connect is to set C<\$!> to EWOULDBLOCK if the operation cannot be completed immediately. Note that EWOULDBLOCK is the same as EAGAIN on UNIX systems, but is different on Windows.

With SSL, handshakes might occur at any time, even within an established connection. In these cases it is necessary to finish the handshake before you can read or write data. This might result in situations where you want to read but must first finish the write of a handshake or where you want to write but must first finish a read.

In these cases C<\$!> is set to EAGAIN like expected, and additionally C<\$SSL_ERROR> is set to either SSL_WANT_READ or SSL_WANT_WRITE. Thus if you get EWOULDBLOCK on a SSL socket you must check C<\$SSL_ERROR> for SSL_WANT_* and adapt your event mask accordingly.

Using

readline on non-blocking sockets does not make much sense and I would advise against using it.

And, while the behavior is not documented for other L<IO::Socket> classes, it will try to emulate the behavior seen there, e.g. to return the received data instead of blocking, even if the line is not complete. If an unrecoverable error occurs it will return nothing, even if it already received some data.

Also, I would advise against using C<accept> with a non-blocking SSL object because it might block and this is not what most would expect. The reason for this is that C<accept> on a non-blocking TCP socket (e.g. L<IO::Socket::IP>, L<IO::Socket::INET>..) results in a new TCP socket which does not inherit the non-blocking behavior of the master socket. And thus, the initial SSL handshake on the new socket inside C<IO::Socket::SSL::accept> will be done in a blocking way. To work around this you are safer by doing a TCP accept and later upgrade the TCP socket in a non-blocking way with C<start_SSL> and C<accept_SSL>.

```
my $cl = IO::Socket::SSL->new($dst);
$cl->blocking(0);
my $sel = IO::Select->new($cl);
while (1) {
# with SSL a call for reading n bytes does not result in reading of n
# bytes from the socket, but instead it must read at least one full SSL
# frame. If the socket has no new bytes, but there are unprocessed data
# from the SSL frame can_read will block!

# wait for data on socket
$sel->can_read();
```

```

# new data on socket or eof
READ:
# this does not read only 1 byte from socket, but reads the complete SSL
# frame and then just returns one byte. On subsequent calls it than
# returns more byte of the same SSL frame until it needs to read the
# next frame.
my $n = sysread( $cl,my $buf,1);
if ( ! defined $n ) {
    die $! if not $!{EWOULDBLOCK};
    next if $SSL_ERROR == SSL_WANT_READ;
    if ( $SSL_ERROR == SSL_WANT_WRITE ) {
# need to write data on renegotiation
$sel->can_write;
next;
    }
    die "something went wrong:
$SSL_ERROR";
} elsif ( ! $n ) {
    last; # eof
} else {
    # read next bytes
    # we might have still data within the current SSL frame
    # thus first process these data instead of waiting on the underlying
    # socket object
    goto READ if $cl->pending; # goto sysread
    next;          # goto $sel->can_read
}
}

```

Additionally there are differences to plain sockets when using select, poll, kqueue or similar technologies to get notified if data are available.

Relying only on these calls is not sufficient in all cases since unread data might be internally buffered in the SSL stack. To detect such buffering `B<pending()>` need to be used. Alternatively the buffering can be avoided by using `B<sysread>` with the maximum size of an SSL frame. See [L</"Common Usage Errors">](#) for details.

=head1 Advanced Usage

=head2 SNI Support

Newer extensions to SSL can distinguish between multiple hostnames on the same IP address using Server Name Indication (SNI).

Support

for SNI on the client side was added somewhere in the OpenSSL 0.9.8 series, but with 1.0 a bug was fixed when the server could not decide about its hostname. Therefore client side SNI is only supported with OpenSSL 1.0 or higher in L<IO::Socket::SSL>.

With a supported version, SNI is used automatically on the client side, if it can determine the hostname from C<PeerAddr> or C<PeerHost> (which are synonyms in the underlying IO::Socket:: classes and thus should never be set both or at least not to different values).

On unsupported OpenSSL versions it will silently not use SNI.

The hostname can also be given explicitly given with C<SSL_hostname>, but in this case it will throw in error, if SNI is not supported.

To check for support you might call C<< IO::Socket::SSL->can_client_sni() >>.

On the server side, earlier versions of OpenSSL are supported, but only together with L<Net::SSLeay> version >= 1.50.

To check for support you might call C<< IO::Socket::SSL->can_server_sni() >>.

If

server side SNI is supported, you might specify different certificates per host with C<SSL_cert*> and C<SSL_key*>, and check the requested name using C<get_servername>.

=head2 Talk Plain and SSL With The Same Socket

It is often required to first exchange some plain data and then upgrade the socket to SSL after some kind of STARTTLS command. Protocols like FTPS even need a way to downgrade the socket again back to plain.

The common way to do this would be to create a normal socket and use C<start_SSL> to upgrade and stop_SSL to downgrade:

```
my $sock = IO::Socket::INET->new(...) or die $!;
... exchange plain data on $sock until starttls command ...
IO::Socket::SSL->start_SSL($sock,%sslargs) or die $SSL_ERROR;
... now $sock is an IO::Socket::SSL object ...
... exchange data with SSL on $sock until stoptls command ...
$sock->stop_SSL or die $SSL_ERROR;
... now $sock is again an IO::Socket::INET object ...
```

But, lots of modules just derive directly from L<IO::Socket::INET>.

While

this base class can be replaced with L<IO::Socket::SSL>, these modules cannot easily support different base classes for SSL and plain data and switch between these classes on a starttls command.

To help in this case, L<IO::Socket::SSL> can be reduced to a plain socket on startup, and connect_SSL/accept_SSL/start_SSL can be used to enable SSL and C<stop_SSL> to talk plain again:

```

my $sock = IO::Socket::SSL->new(
PeerAddr => ...
SSL_startHandshake => 0,
%sslargs
) or die $!;
... exchange plain data on $sock until starttls command ...
$sock->connect_SSL or die $SSL_ERROR;
... now $sock is an IO::Socket::SSL object ...
... exchange data with SSL on $sock until stoptls command ...
$sock->stop_SSL or die $SSL_ERROR;
... $sock is still an IO::Socket::SSL object ...
... but data exchanged again in plain ...

```

=head1 Integration Into Own Modules

L<IO::Socket::SSL> behaves similarly to other L<IO::Socket> modules and thus could be integrated

in the same way, but you have to take special care when using non-blocking I/O (like for handling timeouts) or using select or poll.

Please study the documentation on how to deal with these differences.

Also, it is recommended to not set or touch most of the C<SSL_*> options, so that they keep their secure defaults. It is also recommended to let the user override these SSL specific settings without the need of global settings or hacks like C<set_args_filter_hack>.

The notable exception is C<SSL_verifycn_scheme>.

This should be set to the hostname verification scheme required by the module or protocol.

=head1 Description Of Methods

L<IO::Socket::SSL> inherits from another L<IO::Socket> module.

The choice of the super class depends on the installed modules:

=over 4

=item *

If L<IO::Socket::IP> with at least version 0.20 is installed it will use this module as super class, transparently providing IPv6 and IPv4 support.

=item *

If L<IO::Socket::INET6> is installed it will use this module as super class, transparently providing IPv6 and IPv4 support.

=item *

Otherwise it will fall back to L<IO::Socket::INET>, which is a perl core module. With L<IO::Socket::INET> you only get IPv4 support.

=back

Please be aware that with the IPv6 capable super classes, it will look first for the IPv6 address of a given hostname. If the resolver provides an IPv6 address, but the host cannot be reached by IPv6, there will be no automatic fallback to IPv4.

To avoid these problems you can enforce IPv4 for a specific socket by using the C<Domain> or C<Family> option with the value AF_INET as described in L<IO::Socket::IP>. Alternatively you can enforce IPv4 globally by loading L<IO::Socket::SSL> with the option 'inet4', in which case it will use the IPv4 only class L<IO::Socket::INET> as the super class.

L<IO::Socket::SSL> will provide all of the methods of its super class, but sometimes it will override them to match the behavior expected from SSL or to provide additional arguments.

The new or changed methods are described below, but please also read the section about SSL specific error handling.

=over 4

=item Error Handling

If an SSL specific error occurs, the global variable C<\$\$SSL_ERROR> will be set.

If the error occurred on an existing SSL socket, the method C<errstr> will give access to the latest socket specific error.

Both C<\$\$SSL_ERROR> and the C<errstr> method give a dualvar similar to C<\$!>, e.g. providing an error number in numeric context or an error description in string context.

=item B<new(...)>

Creates a new L<IO::Socket::SSL> object. You may use all the friendly options that came bundled with the super class (e.g. L<IO::Socket::IP>, L<IO::Socket::INET>, ...) plus (optionally) the ones described below.

If you don't specify any SSL related options it will do its best in using secure defaults, e.g. choosing good ciphers, enabling proper verification, etc.

=over 2

=item SSL_server

Set this option to a true value if the socket should be used as a server.

If this is not explicitly set it is assumed if the C<Listen> parameter is given when creating the socket.

=item SSL_hostname

This can be given to specify the hostname used for SNI, which is needed if you have multiple SSL hostnames on the same IP address. If not given it will try to determine the hostname from C<PeerAddr>, which will fail if only an IP was given or if this argument is used within C<start_SSL>.

If you want to disable SNI, set this argument to "".

Currently only supported for the client side and will be ignored for the server side.

See section "SNI Support" for details of SNI the support.

=item SSL_startHandshake

If this option is set to false (defaults to true) it will not start the SSL handshake yet. This has to be done later with C<accept_SSL> or C<connect_SSL>. Before the handshake is started read/write/etc. can be used to exchange plain data.

=item SSL_keepSocketOnError

If this option is set to true (defaults to false) it will not close the underlying TCP socket on errors. In most cases there is no real use for this behavior since both sides of the TCP connection will probably have a different idea of the current state of the connection.

=item SSL_ca | SSL_ca_file | SSL_ca_path

Usually you want to verify that the peer certificate has been signed by a trusted certificate authority. In this case you should use this option to specify the file (C<SSL_ca_file>) or directory (C<SSL_ca_path>) containing the certificateZ<>(s) of the trusted certificate authorities.

C<SSL_ca_path> can also be an array or a string containing multiple path, where the path are separated by the platform specific separator. This separator is

C<;> on DOS, Windows, Netware, C<;> on VMS and C<:> for all the other systems.

If multiple path are given at least one of these must be accessible.

You can also give a list of X509* certificate handles (like you get from L<Net::SSLLeay> or L<IO::Socket::SSL::Utils::PEM_xxx2cert>) with C<SSL_ca>. These will

be added to the CA store before path and file and thus take precedence.

If neither SSL_ca, nor SSL_ca_file or SSL_ca_path are set it will use

C<default_ca()> to determine the user-set or system defaults.

If you really don't want to set a CA set SSL_ca_file or SSL_ca_path to

C<\undef> or SSL_ca to an empty list. (unfortunately C<"> is used by some modules using L<IO::Socket::SSL> when CA is not explicitly given).

=item SSL_client_ca | SSL_client_ca_file

If verify_mode is VERIFY_PEER on the server side these options can be used to set the list of acceptable CAs for the client. This way the client can select they required certificate from a list of certificates.

The value for these options is similar to C<SSL_ca> and C<SSL_ca_file>.

=item SSL_fingerprint

Sometimes you have a self-signed certificate or a certificate issued by an unknown CA and you really want to accept it, but don't want to disable verification at all. In this case you can specify the fingerprint of the certificate

as C<'algo\$hex_fingerprint'>. C<algo> is a fingerprint algorithm supported by OpenSSL, e.g. 'sha1','sha256'... and C<hex_fingerprint> is the hexadecimal representation of the binary fingerprint. Any colons inside the hex string will be ignored.

If you want to use the fingerprint of the pubkey inside the certificate instead of the certificate use the syntax C<'algo\$pub\$hex_fingerprint'> instead.

To get the fingerprint of an established connection you can use C<get_fingerprint>.

It is also possible to skip C<algo\$>, i.e. only specify the fingerprint. In this case the likely algorithms will be automatically detected based on the length of the digest string.

You can specify a list of fingerprints in case you have several acceptable certificates.

If a fingerprint matches the topmost (i.e. leaf) certificate no additional validations can make the verification fail.

=item SSL_cert_file | SSL_cert | SSL_key_file | SSL_key

If you create a server you usually need to specify a server

certificate which should be verified by the client. Same is true for client certificates, which should be verified by the server.

The certificate can be given as a file with `SSL_cert_file` or as an internal representation of an X509* object (like you get from `L<Net::SSL>` or `L<IO::Socket::SSL::Utils::PEM_xxx2cert>`) with `SSL_cert`.

If given as a file it will automatically detect the format.

Supported file formats are PEM, DER and PKCS#12, where PEM and PKCS#12 can contain the certificate and the chain to use, while DER can only contain a single certificate.

If given as a list of X509* please note, that the all the chain certificates (e.g. all except the first) will be "consumed" by openssl and will be freed if the SSL context gets destroyed - so you should never free them yourself. But the servers certificate (e.g. the first) will not be consumed by openssl and thus must be freed by the application.

For each certificate a key is need, which can either be given as a file with `SSL_key_file`

or as an internal representation of an EVP_PKEY* object with `SSL_key` (like you get from `L<Net::SSL>` or `L<IO::Socket::SSL::Utils::PEM_xxx2key>`).

If a key was already given within the PKCS#12 file specified by `SSL_cert_file` it will ignore any `SSL_key` or `SSL_key_file`.

If no `SSL_key` or `SSL_key_file` was given it will try to use the PEM file given with `SSL_cert_file` again, maybe it contains the key too.

If your SSL server should be able to use different certificates on the same IP address, depending on the name given by SNI, you can use a hash reference instead of a file with `C<<hostname => cert_file>>`.

If your SSL server should be able to use both RSA and ECDSA certificates for the same domain/IP a similar hash reference like with SNI is given. The domain names used to specify the additional certificates should be `C<hostname%whatever>`, i.e. `C<hostname%ecc>` or similar. This needs at least OpenSSL 1.0.2. To let the server pick the certificate based on the clients cipher preference `C<SSL_honor_cipher_order>` should be set to false.

In case certs and keys are needed but not given it might fall back to builtin defaults, see "Defaults for Cert, Key and CA".

Examples:

```
SSL_cert_file => 'mycert.pem',
```

```
SSL_key_file => 'mykey.pem',
```

```
SSL_cert_file => {
```

```

"foo.example.org" => 'foo-cert.pem',
"foo.example.org%ecc" => 'foo-ecc-cert.pem',
"bar.example.org" => 'bar-cert.pem',
# used when nothing matches or client does not support SNI
" => 'default-cert.pem',
'%ecc' => 'default-ecc-cert.pem',
},
SSL_key_file => {
"foo.example.org" => 'foo-key.pem',
"foo.example.org%ecc" => 'foo-ecc-key.pem',
"bar.example.org" => 'bar-key.pem',
# used when nothing matches or client does not support SNI
" => 'default-key.pem',
'%ecc' => 'default-ecc-key.pem',
}
}

=item SSL_passwd_cb

```

If your private key is encrypted, you might not want the default password prompt from Net::SSL. This option takes a reference to a subroutine that should return the password required to decrypt your private key.

```

=item SSL_use_cert

```

If this is true, it forces IO::Socket::SSL to use a certificate and key, even if you are setting up an SSL client. If this is set to 0 (the default), then you will only need a certificate and key if you are setting up a server.

SSL_use_cert will implicitly be set if SSL_server is set. For convenience it is also set if it was not given but a cert was given for use (SSL_cert_file or similar).

```

=item SSL_version

```

Sets the version of the SSL protocol used to transmit data. 'SSLv23' uses a handshake compatible with SSL2.0, SSL3.0 and TLS1.x, while 'SSLv2', 'SSLv3', 'TLSv1', 'TLSv1_1', 'TLSv1_2', or 'TLSv1_3' restrict handshake and protocol to the specified version. All values are case-insensitive. Instead of 'TLSv1_1', 'TLSv1_2', and 'TLSv1_3' one can also use 'TLSv11', 'TLSv12', and 'TLSv13'. Support for 'TLSv1_1', 'TLSv1_2', and 'TLSv1_3' requires recent versions of Net::SSL and openssl.

Independent from the handshake format you can limit to set of accepted SSL versions by adding !version separated by '!':

The default `SSL_version` is `'SSLv23:!SSLv3:!SSLv2'` which means, that the handshake format is compatible to SSL2.0 and higher, but that the successful handshake is limited to TLS1.0 and higher, that is no SSL2.0 or SSL3.0 because both of these versions have serious security issues and should not be used anymore.

You can also use `!TLSv1_1` and `!TLSv1_2` to disable TLS versions 1.1 and 1.2 while still allowing TLS version 1.0.

Setting the version instead to `'TLSv1'` might break interaction with older clients, which need and SSL2.0 compatible handshake. On the other side some clients just close the connection when they receive a TLS version 1.1 request. In this case setting the version to `'SSLv23:!SSLv2:!SSLv3:!TLSv1_1:!TLSv1_2'` might help.

=item `SSL_cipher_list`

If this option is set the cipher list for the connection will be set to the given value, e.g. something like `'ALL:!LOW:!EXP:!aNULL'`.

This will only affect ciphers for TLS 1.2 and lower. See the OpenSSL documentation ([L<https://www.openssl.org/docs/manmaster/man1/openssl-ciphers.html#CIPHER-STRINGS>](https://www.openssl.org/docs/manmaster/man1/openssl-ciphers.html#CIPHER-STRINGS)) for more details.

Unless you fail to contact your peer because of no shared ciphers it is recommended to leave this option at the default setting, which uses the system default but disables some insecure ciphers which might still be enabled on older systems.

In case different cipher lists are needed for different SNI hosts a hash can be given with the host as key and the cipher suite as value, similar to `B<SSL_cert*>`.

=item `SSL_ciphersuites`

If this option is set the TLS 1.3 ciphersuites for the connection will be set to the given value. This is similar to `SSL_cipher_list`, but only for TLS 1.3 ciphers. See argument `C<-ciphersuits>` in the OpenSSL documentation ([L<https://www.openssl.org/docs/manmaster/man1/openssl-ciphers.html>](https://www.openssl.org/docs/manmaster/man1/openssl-ciphers.html)) for details.

Unless you fail to contact your peer because of no shared ciphers it is recommended to leave this option at the default setting, which uses the system default.

In case different cipher lists are needed for different SNI hosts a hash can be given with the host as key and the cipher suite as value, similar to

B<SSL_cert*>.

=item SSL_honor_cipher_order

If this option is true the cipher order the server specified is used instead of the order proposed by the client. This option defaults to true to make use of our secure cipher list setting.

=item SSL_dh_file

To create a server which provides forward secrecy you need to either give the DH parameters or (better, because faster) the ECDH curve. This setting cares about DH parameters.

To support non-elliptic Diffie-Hellman key exchange a suitable file needs to be given here or the SSL_dh should be used with an appropriate value. See dhparam command in openssl for more information.

If neither C<SSL_dh_file> nor C<SSL_dh> are set a builtin DH parameter with a length of 2048 bit is used to offer DH key exchange by default. If you don't want this (e.g. disable DH key exchange) explicitly set this or the C<SSL_dh> parameter to undef.

=item SSL_dh

Like SSL_dh_file, but instead of giving a file you use a preloaded or generated DH*.

=item SSL_ecdh_curve

To create a server which provides forward secrecy you need to either give the DH parameters or (better, because faster) the ECDH curve. This setting cares about the ECDH curve(s).

To support Elliptic Curve Diffie-Hellmann key exchange the OID or NID of at least one suitable curve needs to be provided here.

With OpenSSL 1.1.0+ this parameter defaults to C<auto>, which means that it lets OpenSSL pick the best settings. If support for CTX_set_ecdh_auto is implemented in Net::SSLLeay (needs at least version 1.86) it will use this to implement the same default. Otherwise it will default to C<prime256v1> (builtin of OpenSSL) in order to offer ECDH key exchange by default.

If setting groups or curves is supported by Net::SSLLeay (needs at least version

1.86) then multiple curves can be given here in the order of the preference, i.e. C<P-521:P-384:P-256>. When used at the client side this

will include the supported curves as extension in the TLS handshake.

If you don't want to have ECDH key exchange this could be set to undef or set C<SSL_ciphers> to exclude all of these ciphers.

You can check if ECDH support is available by calling
C<< IO::Socket::SSL->can_ecdh >>.

=item SSL_verify_mode

This option sets the verification mode for the peer certificate.

You may combine SSL_VERIFY_PEER (verify_peer), SSL_VERIFY_FAIL_IF_NO_PEER_CERT (fail verification if no peer certificate exists; ignored for clients), SSL_VERIFY_CLIENT_ONCE (verify client once; ignored for clients). See OpenSSL man page for SSL_CTX_set_verify for more information.

The default is SSL_VERIFY_NONE for server (e.g. no check for client certificate) and SSL_VERIFY_PEER for client (check server certificate).

=item SSL_verify_callback

If you want to verify certificates yourself, you can pass a sub reference along with this parameter to do so. When the callback is called, it will be passed:

=over 4

=item 1.

a true/false value that indicates what OpenSSL thinks of the certificate,

=item 2.

a C-style memory address of the certificate store,

=item 3.

a string containing the certificate's issuer attributes and owner attributes, and

=item 4.

a string containing any errors encountered (0 if no errors).

=item 5.

a C-style memory address of the peer's own certificate (convertible to PEM form with Net::SSLeay::PEM_get_string_X509()).

=item 6.

The depth of the certificate in the chain. Depth 0 is the leaf certificate.

=back

The function should return 1 or 0, depending on whether it thinks the certificate is valid or invalid. The default is to let OpenSSL do all of the busy work.

The callback will be called for each element in the certificate chain.

See the OpenSSL documentation for `SSL_CTX_set_verify` for more information.

=item `SSL_verifycn_scheme`

The

scheme is used to correctly verify the identity inside the certificate by using the hostname of the peer.

See the information about the verification schemes in `B<verify_hostname>`.

If you don't specify a scheme it will use 'default', but only complain loudly if the name verification fails instead of letting the whole certificate verification fail. THIS WILL CHANGE, e.g. it will let the certificate verification fail in the future if the hostname does not match the certificate !!!! To override the name used in verification use `B<SSL_verifycn_name>`.

The scheme 'default' is a superset of the usual schemes, which will accept the hostname in common name and subjectAltName and allow wildcards everywhere. While using this scheme is way more secure than no name verification at all you better should use the scheme specific to your application protocol, e.g. 'http', 'ftp'...

If you are really sure, that you don't want to verify the identity using the hostname you can use 'none' as a scheme. In this case you'd better have alternative forms of verification, like a certificate fingerprint or do a manual verification later by calling `B<verify_hostname>` yourself.

=item `SSL_verifycn_publicsuffix`

This option is used to specify the behavior when checking wildcard certificates for public suffixes, e.g. no wildcard certificates for *.com or *.co.uk should be accepted, while *.example.com or *.example.co.uk is ok.

If not specified it will simply use the builtin default of `L<IO::Socket::SSL::PublicSuffix>`, you can create another object with `from_string` or `from_file` of this module.

To disable verification of public suffix set this option to `C<>`.

=item `SSL_verifycn_name`

Set the name which is used in verification of hostname. If `SSL_verifycn_scheme` is set and no `SSL_verifycn_name` is given it will try to use `SSL_hostname` or `PeerHost` and `PeerAddr` settings and fail if no name can be determined. If `SSL_verifycn_scheme` is not set it will use a default scheme and warn if it cannot determine a hostname, but it will not fail.

Using `PeerHost` or `PeerAddr` works only if you create the connection directly with `C<< IO::Socket::SSL->new >>`, if an `IO::Socket::INET` object is upgraded with `B<start_SSL>` the name has to be given in `B<SSL_verifycn_name>` or `B<SSL_hostname>`.

=item `SSL_check_crl`

If you want to verify that the peer certificate has not been revoked by the signing authority, set this value to true. OpenSSL will search for the CRL in your `SSL_ca_path`, or use the file specified by `SSL_crl_file`. See the `Net::SSLeay` documentation for more details. Note that this functionality appears to be broken with OpenSSL < v0.9.7b, so its use with lower versions will result in an error.

=item `SSL_crl_file`

If you want to specify the CRL file to be used, set this value to the pathname to be used. This must be used in addition to setting `SSL_check_crl`.

=item `SSL_ocsp_mode`

Defines how certificate revocation is done using OCSP (Online Status Revocation Protocol). The default is to send a request for OCSP stapling to the server and if the server sends an OCSP response back the result will be used.

Any other OCSP checking needs to be done manually with `C<ocsp_resolver>`.

The following flags can be combined with `C<|>`:

=over 8

=item `SSL_OCSP_NO_STAPLE`

Don't ask for OCSP stapling. This is the default if `SSL_verify_mode` is `VERIFY_NONE`.

=item `SSL_OCSP_TRY_STAPLE`

Try OCSP stapling, but don't complain if it gets no stapled response back.

This is the default if `SSL_verify_mode` is `VERIFY_PEER` (the default).

=item `SSL_OCSP_MUST_STAPLE`

Consider it a hard error, if the server does not send a stapled OCSP response back. Most servers currently send no stapled OCSP response back.

=item `SSL_OCSP_FAIL_HARD`

Fail hard on response errors, default is to fail soft like the browsers do. Soft errors mean, that the OCSP response is not usable, e.g. no response, error response, no valid signature etc. Certificate revocations inside a verified response are considered hard errors in any case.

Soft errors inside a stapled response are never considered hard, e.g. it is expected that in this case an OCSP request will be send to the responsible OCSP responder.

=item `SSL_OCSP_FULL_CHAIN`

This will set up the `C<ocsp_resolver>` so that all certificates from the peer chain will be checked, otherwise only the leaf certificate will be checked against revocation.

=back

=item `SSL_ocsp_staple_callback`

If this callback is defined, it will be called with the SSL object and the OCSP response handle obtained from the peer, e.g. `C<<$cb->($ssl,$resp)>>`. If the peer did not provide a stapled OCSP response the function will be called with `C<$resp=undef>`. Because the OCSP response handle is no longer valid after leaving this function it should not be copied or freed. If access to the response is necessary after leaving this function it can be serialized with `C<Net::SSLLeay::i2d_OCSP_RESPONSE>`.

If no such callback is provided, it will use the default one, which verifies the response and uses it to check if the certificate(s) of the connection got revoked.

=item `SSL_ocsp_cache`

With this option a cache can be given for caching OCSP responses, which could be shared between different SSL contexts. If not given a cache specific to the

SSL context only will be used.

You can either create a new cache with

`C<< IO::Socket::SSL::OCSP_Cache->new([size]) >>` or implement your own cache, which needs to have methods `C<put($key,%entry)>` and `C<get($key)>` (returning `C<%entry>`) where `entry` is the hash representation of the OCSP response with fields like `C<nextUpdate>`. The default implementation of the cache will consider responses valid as long as `C<nextUpdate>` is less than the current time.

=item SSL_reuse_ctx

If you have already set the above options for a previous instance of `IO::Socket::SSL`, then you can reuse the SSL context of that instance by passing it as the value for the `SSL_reuse_ctx` parameter. You may also create a new instance of the `IO::Socket::SSL::SSL_Context` class, using any context options that you desire without specifying connection options, and pass that here instead.

If you use this option, all other context-related options that you pass in the same call to `new()` will be ignored unless the context supplied was invalid. Note that, contrary to versions of `IO::Socket::SSL` below v0.90, a global SSL context will not be implicitly used unless you use the `set_default_context()` function.

=item SSL_create_ctx_callback

With this callback you can make individual settings to the context after it got created and the default setup was done. The callback will be called with the `CTX` object from `Net::SSL` as the single argument.

Example for limiting the server session cache size:

```
SSL_create_ctx_callback => sub {  
    my $ctx = shift;  
    Net::SSL::CTX_sess_set_cache_size($ctx,128);  
}
```

=item SSL_session_cache_size

If you make repeated connections to the same host/port and the SSL renegotiation time is an issue, you can turn on client-side session caching with this option by specifying a positive cache size. For successive connections, pass the `SSL_reuse_ctx` option to the `new()` calls (or use `set_default_context()`) to make use of the cached sessions. The session cache size refers to the number of unique host/port pairs that can be stored at one time; the oldest sessions in

the cache will be removed if new ones are added.

This option does not effect the session cache a server has for it's clients, e.g. it does not affect SSL objects with `SSL_server` set.

Note that session caching with TLS 1.3 needs at least `Net::SSLeay 1.86`.

=item `SSL_session_cache`

Specifies session cache object which should be used instead of creating a new.

Overrules `SSL_session_cache_size`.

This option is useful if you want to reuse the cache, but not the rest of the context.

A session cache object can be created using

```
C<< IO::Socket::SSL::Session_Cache->new( cachesize ) >>.
```

Use `set_default_session_cache()` to set a global cache object.

=item `SSL_session_key`

Specifies a key to use for lookups and inserts into client-side session cache.

Per default ip:port of destination will be used, but sometimes you want to share the same session over multiple ports on the same server (like with FTPS).

=item `SSL_session_id_context`

This gives an id for the servers session cache. It's necessary if you want clients to connect with a client certificate. If not given but `SSL_verify_mode` specifies the need for client certificate a context unique id will be picked.

=item `SSL_error_trap`

When using the `accept()` or `connect()` methods, it may be the case that the actual socket connection works but the SSL negotiation fails, as in the case of an HTTP client connecting to an HTTPS server. Passing a subroutine ref attached to this parameter allows you to gain control of the orphaned socket instead of having it be closed forcibly.

The subroutine, if called, will be passed two parameters:

a reference to the socket on which the SSL

negotiation failed and the full

text of the error message.

=item `SSL_npn_protocols`

If used on the server side it specifies list of protocols advertised by SSL server as an array ref, e.g. `['spdy/2','http1.1']`.

On the client side it specifies the protocols offered by the client for NPN as an array ref.

See also method C<next_proto_negotiated>.

Next Protocol Negotiation (NPN) is available with Net::SSLey 1.46+ and openssl-1.0.1+. NPN is unavailable in TLSv1.3 protocol.

To check support you might call C<< IO::Socket::SSL->can_npn() >>.

If you use this option with an unsupported Net::SSLey/OpenSSL it will throw an error.

=item SSL_alpn_protocols

If used on the server side it specifies list of protocols supported by the SSL server as an array ref, e.g. ['http/2.0', 'spdy/3.1', 'http/1.1'].

On the client side it specifies the protocols advertised by the client for ALPN as an array ref.

See also method C<alpn_selected>.

Application-Layer Protocol Negotiation (ALPN) is available with Net::SSLey 1.56+

and openssl-1.0.2+. More details about the extension are in RFC7301. To check support you might call C<< IO::Socket::SSL->can_alpn() >>. If you use this option with an unsupported Net::SSLey/OpenSSL it will throw an error.

Note that some client implementations may encounter problems if both NPN and ALPN are specified. Since ALPN is intended as a replacement for NPN, try providing ALPN protocols then fall back to NPN if that fails.

=item SSL_ticket_keycb => [\$sub,\$data] | \$sub

This is a callback used for stateless session reuse (Session Tickets, RFC 5077).

This callback will be called as C<< \$sub->(\$data,[\$key_name]) >> where C<\$data> is the argument given to SSL_ticket_keycb (or undef) and C<\$key_name> depends on the mode:

=over 8

=item encrypt ticket

If a ticket needs to be encrypted the callback will be called without C<\$key_name>. In this case it should return C<(\$current_key,\$current_key_name)> where C<\$current_key> is the current key (32 byte random data) and C<\$current_key_name> the name associated with this key (exactly 16 byte). This C<\$current_key_name> will be incorporated into the ticket.

=item decrypt ticket

If a ticket needs to be decrypted the callback will be called with C<\$key_name> as found in the ticket. It should return C<(\$key,\$current_key_name>) where C<\$key> is the key associated with the given C<\$key_name> and C<\$current_key_name> the name associated with the currently active key. If C<\$current_key_name> is different from the given C<\$key_name> the callback will be called again to re-encrypt the ticket with the currently active key.

If no key can be found which matches the given C<\$key_name> then this function should return nothing (empty list).

This mechanism should be used to limit the life time for each key encrypting the ticket. Compromise of a ticket encryption key might lead to decryption of SSL sessions which used session tickets protected by this key.

=back

Example:

```
Net::SSLeay::RAND_bytes(my $oldkey,32);
Net::SSLeay::RAND_bytes(my $newkey,32);
my $oldkey_name = pack("a16",'oldsecret');
my $newkey_name = pack("a16",'newsecret');

my @keys = (
    [ $newkey_name, $newkey ], # current active key
    [ $oldkey_name, $oldkey ], # already expired
);

my $keycb = [ sub {
    my ($mykeys,$name) = @_;

    # return (current_key, current_key_name) if no name given
    return ($mykeys->[0][1],$mykeys->[0][0]) if ! $name;

    # return (matching_key, current_key_name) if we find a key matching
    # the given name
    for(my $i = 0; $i<@$mykeys; $i++) {
    next if $name ne $mykeys->[$i][0];
    return ($mykeys->[$i][1],$mykeys->[0][0]);
    }

    # no matching key found
    return;
},\@keys ];

my $srv = IO::Socket::SSL->new(..., SSL_ticket_keycb => $keycb);
```

=item SSL_mode_release_buffers 1|0

This enables or disables the `SSL_MODE_RELEASE_BUFFERS` option on the SSL object. With this option the read buffer will be released after each `SSL_read` but will need to be reallocated for each new `SSL_read`. If memory usage is a concern this might save lots of memory in the mean time though, about 34k per idle SSL connection according to the documentation in `SSL_CTX_set_mode(3ssl)`.

=back

=item B<accept>

This behaves similar to the `accept` function of the underlying socket class, but additionally does the initial SSL handshake. But because the underlying socket class does return a blocking file handle even when `accept` is called on a non-blocking socket, the SSL handshake on the new file object will be done in a blocking way. Please see the section about non-blocking I/O for details. If you don't like this behavior you should do `accept` on the TCP socket and then upgrade it with `C<start_SSL>` later.

=item B<connect(...)>

This behaves similar to the `connect` function but also does an SSL handshake. Because you cannot give SSL specific arguments to this function, you should better either use `C<new>` to create a connect SSL socket or `C<start_SSL>` to upgrade an established TCP socket to SSL.

=item B<close(...)>

Contrary to a `close` for a simple INET socket a `close` in SSL also mandates a proper shutdown of the SSL part. This is done by sending a close notify message by both peers.

A naive implementation would thus wait until it receives the close notify message from the peer - which conflicts with the commonly expected semantic that a `close` will not block. The default behavior is thus to only send a close notify but not wait for the close notify of the peer. If this is required `C<SSL_fast_shutdown>` need to be explicitly set to false.

There are also cases where a SSL shutdown should not be done at all. This is true for example when forking to let a child deal with the socket and closing the socket in the parent process. A naive explicit `C<close>` or an implicit close when destroying the socket in the parent would send a close notify to the peer which would make the SSL socket in the client process unusable.

In this case an explicit `C<close>` with `C<SSL_no_shutdown>` set to true should be done in the

parent process.

For more details and other arguments see `C<stop_SSL>` which gets called from `C<close>` to shutdown the SSL state of the socket.

=item B<sysread(BUF, LEN, [OFFSET])>

This function behaves from the outside the same as `B<sysread>` in other `L<IO::Socket>` objects, e.g. it returns at most `LEN` bytes of data.

But in reality it reads not only `LEN` bytes from the underlying socket, but at a single SSL frame. It then returns up to `LEN` bytes it decrypted from this SSL frame. If the frame contained more data than requested it will return only `LEN` data, buffer the rest and return it on further read calls.

This means, that it might be possible to read data, even if the underlying socket is not readable, so using `poll` or `select` might not be sufficient.

`sysread` will only return data from a single SSL frame, e.g. either the pending data from the already buffered frame or it will read a frame from the underlying socket and return the decrypted data. It will not return data spanning several SSL frames in a single call.

Also, calls to `sysread` might fail, because it must first finish an SSL handshake.

To understand these behaviors is essential, if you write applications which use event loops and/or non-blocking sockets. Please read the specific sections in this documentation.

=item B<syswrite(BUF, [LEN, [OFFSET]])>

This functions behaves from the outside the same as `B<syswrite>` in other `L<IO::Socket>` objects, e.g. it will write at most `LEN` bytes to the socket, but there is no guarantee, that all `LEN` bytes are written. It will return the number of bytes written.

Because it basically just calls `SSL_write` from `OpenSSL` `syswrite` will write at most a single SSL frame. This means, that no more than 16.384 bytes, which is the maximum size of an SSL frame, will be written at once.

For non-blocking sockets SSL specific behavior applies.
Please read the specific section in this documentation.

=item B<peek(BUF, LEN, [OFFSET])>

This function has exactly the same syntax as `B<sysread>`, and performs nearly the same task but will not advance the read position so that successive calls to `peek()` with the same arguments will return the same results. This function

requires OpenSSL 0.9.6a or later to work.

=item B<pending()>

This function gives you the number of bytes available without reading from the underlying socket object. This function is essential if you work with event loops, please see the section about polling SSL sockets.

=item B<get_fingerprint([algo,certificate,pubkey])>

This methods returns the fingerprint of the given certificate in the form C<algo\$digest_hex>, where C<algo> is the used algorithm, default 'sha256'. If no certificate is given the peer certificate of the connection is used. If C<pubkey> is true it will not return the fingerprint of the certificate but instead the fingerprint of the pubkey inside the certificate as C<algo\$pub\$digest_hex>.

=item

B<get_fingerprint_bin([algo,certificate,pubkey])>

This methods returns the binary fingerprint of the given certificate by using the algorithm C<algo>, default 'sha256'.

If no certificate is given the peer certificate of the connection is used.

If C<pubkey> is true it will not return the fingerprint of the certificate but instead the fingerprint of the pubkey inside the certificate.

=item B<get_cipher()>

Returns the string form of the cipher that the IO::Socket::SSL object is using.

=item B<get_sslversion()>

Returns the string representation of the SSL version of an established connection.

=item B<get_sslversion_int()>

Returns the integer representation of the SSL version of an established connection.

=item B<get_session_reused()>

This returns true if the session got reused and false otherwise. Note that with a reused session no certificates are send within the handshake and no ciphers are offered and thus functions which rely on this might not work.

=item B<dump_peer_certificate()>

Returns

a parsable string with select fields from the peer SSL certificate.

This method directly returns the result of the `dump_peer_certificate()` method of `Net::SSLay`.

```
=item B<peer_certificate($field;[$refresh])>
```

If a peer certificate exists, this function can retrieve values from it.

If no field is given the internal representation of certificate from `Net::SSLay` is returned.

If refresh is true it will not use a cached version, but check again in case the certificate of the connection has changed due to renegotiation.

The following fields can be queried:

```
=over 8
```

```
=item authority (alias issuer)
```

The certificate authority which signed the certificate.

```
=item owner (alias subject)
```

The owner of the certificate.

```
=item commonName (alias cn) - only for Net::SSLay version >=1.30
```

The common name, usually the server name for SSL certificates.

```
=item subjectAltNames - only for Net::SSLay version >=1.33
```

Alternative names for the subject, usually different names for the same server, like `example.org`, `example.com`, `*.example.com`.

It returns a list of (typ,value) with typ `GEN_DNS`, `GEN_IPADD` etc (these constants are exported from `IO::Socket::SSL`).

See `Net::SSLay::X509_get_subjectAltNames`.

```
=back
```

```
=item B<sock_certificate($field)>
```

This is similar to `C<peer_certificate>` but will return the sites own certificate. The same arguments for `B<$field>` can be used.

If no `B<$field>` is given the certificate handle from the underlying OpenSSL will be returned. This handle will only be valid as long as the SSL connection exists and if used afterwards it might result in strange crashes of the application.

=item B<peer_certificates>

This returns all the certificates send by the peer, e.g. first the peers own certificate and then the rest of the chain. You might use B<CERT_asHash> from L<IO::Socket::SSL::Utils> to inspect each of the certificates.

This function depends on a version of Net::SSLey >= 1.58 .

=item B<get_servername>

This gives the name requested by the client if Server Name Indication (SNI) was used.

=item B<verify_hostname(\$hostname,\$scheme,\$publicsuffix)>

This verifies the given hostname against the peer certificate using the given scheme. Hostname is usually what you specify within the PeerAddr. See the C<SSL_verifycn_publicsuffix> parameter for an explanation of suffix checking and for the possible values.

Verification of hostname against a certificate is different between various applications and RFCs. Some scheme allow wildcards for hostnames, some only in subjectAltNames, and even their different wildcard schemes are possible. RFC 6125 provides a good overview.

To ease the verification the following schemes are predefined (both protocol name and rfcXXXX name can be used):

=over 8

=item rfc2818, xmpp (rfc3920), ftp (rfc4217)

Extended wildcards in subjectAltNames and common name are possible, e.g. *.example.org or even www*.example.org. The common name will be only checked if no DNS names are given in subjectAltNames.

=item
http (alias www)

While name checking is defined in rfc2818 the current browsers usually accept also an IP address (w/o wildcards) within the common name as long as no subjectAltNames are defined. Thus this is rfc2818 extended with this feature.

=item smtp (rfc2595), imap, pop3, acap (rfc4642), netconf (rfc5538), syslog (rfc5425), snmp (rfc5953)

Simple wildcards in subjectAltNames are possible, e.g. *.example.org matches

www.example.org but not lala.www.example.org. If nothing from subjectAltNames match it checks against the common name, where wildcards are also allowed to match the full leftmost label.

=item ldap (rfc4513)

Simple wildcards are allowed in subjectAltNames, but not in common name. Common name will be checked even if subjectAltNames exist.

=item sip (rfc5922)

No wildcards are allowed and common name is checked even if subjectAltNames exist.

=item gist (rfc5971)

Simple wildcards are allowed in subjectAltNames and common name, but common name will only be checked if there are no DNS names in subjectAltNames.

=item default

This is a superset of all the rules and is automatically used if no scheme is given but a hostname (instead of IP) is known. Extended wildcards are allowed in subjectAltNames and common name and common name is checked always.

=item none

No verification will be done. Actually it does not make any sense to call verify_hostname in this case.

=back

The scheme can be given either by specifying the name for one of the above predefined schemes, or by using a hash which can have the following keys and values:

=over 8

=item check_cn: 0|'always'|'when_only'

Determines if the common name gets checked. If 'always' it will always be checked (like in ldap), if 'when_only' it will only be checked if no names are given in subjectAltNames (like in http), for any other values the common name will not be checked.

=item wildcards_in_alt: 0|'full_label'|'anywhere'

Determines if and where wildcards in subjectAltNames are possible. If 'full_label' only cases like *.example.org will be possible (like in ldap), for 'anywhere' www*.example.org is possible too (like http), dangerous things like but www.*.org or even '*' will not be allowed. For compatibility with older versions 'leftmost' can be given instead of 'full_label'.

```
=item wildcards_in_cn: 0|'full_label'|'anywhere'
```

Similar to wildcards_in_alt, but checks the common name. There is no predefined scheme which allows wildcards in common names.

```
=item ip_in_cn: 0|1|4|6
```

Determines if an IP address is allowed in the common name (no wildcards are allowed). If set to 4 or 6 it only allows IPv4 or IPv6 addresses, any other true value allows both.

```
=item callback: \&coderef
```

If you give a subroutine for verification it will be called with the arguments (\$hostname,\$commonName,@subjectAltNames), where hostname is the name given for verification, commonName is the result from peer_certificate('cn') and subjectAltNames is the result from peer_certificate('subjectAltNames').

All

other arguments for the verification scheme will be ignored in this case.

```
=back
```

```
=item B<next_proto_negotiated(>>
```

This method returns the name of negotiated protocol - e.g. 'http/1.1'. It works for both client and server side of SSL connection.

NPN support is available with Net::SSLey 1.46+ and openssl-1.0.1+. To check support you might call C<< IO::Socket::SSL->can_npn() >>.

```
=item B<alpn_selected(>>
```

Returns the protocol negotiated via ALPN as a string, e.g. 'http/1.1', 'http/2.0' or 'spdy/3.1'.

ALPN support is available with Net::SSLey 1.56+ and openssl-1.0.2+. To check support, use C<< IO::Socket::SSL->can_alpn() >>.

=item B<errstr()>

Returns the last error (in string form) that occurred. If you do not have a real object to perform this method on, call `IO::Socket::SSL::errstr()` instead.

For read and write errors on non-blocking sockets, this method may include the string `C<SSL wants a read first!>` or `C<SSL wants a write first!>` meaning that the other side

is expecting to read from or write to the socket and wants to be satisfied before you get to do anything. But with version 0.98 you are better comparing the global exported variable `$$SSL_ERROR` against the exported symbols `SSL_WANT_READ` and `SSL_WANT_WRITE`.

=item B<opened()>

This returns false if the socket could not be opened, 1 if the socket could be opened and the SSL handshake was successful done and -1 if the underlying `IO::Handle` is open, but the SSL handshake failed.

=item B<< IO::Socket::SSL->start_SSL(\$socket, ...) >>

This will convert a glob reference or a socket that you provide to an `IO::Socket::SSL` object. You may also pass parameters to specify context or connection options as with a call to `new()`. If you are using this function on an `accept()`ed socket, you must set the parameter "SSL_server" to 1, i.e. `IO::Socket::SSL->start_SSL($socket, SSL_server => 1)`. If you have a class that inherits from `IO::Socket::SSL` and you want the `$socket` to be blessed into your own class instead, use `MyClass->start_SSL($socket)` to achieve the desired effect.

Note that if `start_SSL()` fails in SSL negotiation, `$socket` will remain blessed in its original class. For non-blocking sockets you better just upgrade the socket to `IO::Socket::SSL` and call `accept_SSL` or `connect_SSL` and the upgraded object. To just upgrade the socket set `B<SSL_startHandshake>` explicitly to 0. If you call `start_SSL` w/o this parameter it will revert to blocking behavior for `accept_SSL` and `connect_SSL`.

If given the parameter "Timeout" it will stop if after the timeout no SSL connection was established. This parameter is only used for blocking sockets, if it is not given the default Timeout from the underlying `IO::Socket` will be used.

=item B<stop_SSL(...)>

This is the opposite of `start_SSL()`, `connect_SSL()` and `accept_SSL()`, e.g. it will shutdown the SSL connection and return to the class before `start_SSL()`. It gets the same arguments as `close()`, in fact `close()` calls `stop_SSL()` (but

without
downgrading the class).

Will return true if it succeeded and undef if failed. This might be the case for non-blocking sockets. In this case \$! is set to EWOULDBLOCK and the ssl error to SSL_WANT_READ or SSL_WANT_WRITE. In this case the call should be retried again with the same arguments once the socket is ready.

For calling from C<stop_SSL> C<SSL_fast_shutdown> default to false, e.g. it waits for the close_notify of the peer. This is necessary in case you want to downgrade the socket and continue to use it as a plain socket.

After stop_SSL the socket can again be used to exchange plain data.

=item B<connect_SSL>, B<accept_SSL>

These functions should be used to do the relevant handshake, if the socket got created with C<new> or upgraded with C<start_SSL> and C<SSL_startHandshake> was set to false.

They will return undef until the handshake succeeded or an error got thrown.

As long as the function returns undef and \$! is set to EWOULDBLOCK one could retry the call after the socket

got readable (SSL_WANT_READ) or writeable (SSL_WANT_WRITE).

=item B<ocsp_resolver>

This will create an OCSP resolver object, which can be used to create OCSP requests for the certificates of the SSL connection. Which certificates are verified depends on the setting of C<SSL_ocsp_mode>: by default only the leaf certificate will be checked, but with SSL_OCSP_FULL_CHAIN all chain certificates will be checked.

Because to create an OCSP request the certificate and its issuer certificate need to be known it is not possible to check certificates when the trust chain is incomplete or if the certificate is self-signed.

The OCSP resolver gets created by calling C<< \$ssl->ocsp_resolver >> and provides the following methods:

=over 8

=item hard_error

This returns the hard error when checking the OCSP response.

Hard errors are certificate revocations. With the C<SSL_ocsp_mode> of SSL_OCSP_FAIL_HARD any soft error (e.g. failures to get signed information about the certificates) will be considered

a hard error too.

The OCSP resolving will stop on the first hard error.

The method will return undef as long as no hard errors occurred and still requests to be resolved. If all requests got resolved and no hard errors occurred the method will return C<">.

=item soft_error

This returns the soft error(s) which occurred when asking the OCSP responders.

=item requests

This will return a hash consisting of C<(url,request)>-tuples, e.g. which contain the OCSP request string and the URL where it should be sent too. The usual way to send such a request is as HTTP POST request with a content-type of C<application/ocsp-request> or as a GET request with the base64 and url-encoded request is added to the path of the URL.

After you've handled all these requests and added the response with C<add_response> you should better call this method again to make sure, that no more requests are outstanding. IO::Socket::SSL will combine multiple OCSP requests for the same server inside a single request, but some server don't give a response to all these requests, so that one has to ask again with the remaining requests.

=item add_response(\$uri,\$response)

This method takes the HTTP body of the response which got received when sending the OCSP request to C<\$uri>. If no response was received or an error occurred one should either retry or consider C<\$response> as empty which will trigger a soft error.

The method returns the current value of C<hard_error>, e.g. a defined value when no more requests need to be done.

=item resolve_blocking(%args)

This combines C<requests> and C<add_response> which L<HTTP::Tiny> to do all necessary requests in a blocking way. C<%args> will be given to L<HTTP::Tiny> so that you can put proxy settings etc here. L<HTTP::Tiny> will be called with C<verify_ssl> of false, because the OCSP responses have their own signatures so no extra SSL verification is needed.

If you don't want to use blocking requests you need to roll your own user agent with C<requests>

and C<add_response>.

=back

=item B<< IO::Socket::SSL->new_from_fd(\$fd, [mode], %sslargs) >>

This will convert a socket identified via a file descriptor into an SSL socket. Note that the argument list does not include a "MODE" argument; if you supply one, it will be thoughtfully ignored (for compatibility with IO::Socket::INET). Instead, a mode of '+<' is assumed, and the file descriptor passed must be able to handle such I/O because the initial SSL handshake requires bidirectional communication.

Internally the given \$fd will be upgraded to a socket object using the C<new_from_fd> method of the super class (L<IO::Socket::INET> or similar) and then C<start_SSL> will be called using the given C<%sslargs>. If C<\$fd> is already an IO::Socket object you should better call C<start_SSL> directly.

=item B<IO::Socket::SSL::default_ca([path|dir| SSL_ca_file => ..., SSL_ca_path => ...])>

Determines or sets the default CA path.

If existing path or dir or a hash is given it will set the default CA path to

this value and never try to detect it automatically.

If C<undef> is given it will forget any stored defaults and continue with detection of system defaults.

If no arguments are given it will start detection of system defaults, unless it has already stored user-set or previously detected values.

The detection of system defaults works similar to OpenSSL, e.g. it will check the directory specified in environment variable SSL_CERT_DIR or the path OPENSSLDIR/certs (SSLCERTS: on VMS) and the file specified in environment variable SSL_CERT_FILE or the path OPENSSLDIR/cert.pem (SSLCERTS:cert.pem on VMS). Contrary to OpenSSL it will check if the SSL_ca_path contains PEM files with the hash as file name and if the SSL_ca_file looks like PEM.

If no usable system default can be found it will try to load and use

L<Mozilla::CA> and if not available give up detection.

The result of the detection will be saved to speed up future calls.

The function returns the saved default

CA as hash with SSL_ca_file and SSL_ca_path.

=item B<IO::Socket::SSL::set_default_context(...)>

You may use this to make IO::Socket::SSL automatically re-use a given context (unless specifically overridden in a call to new()).

It accepts one argument, which should be either an `IO::Socket::SSL` object or an `IO::Socket::SSL::SSL_Context` object.

See the `SSL_reuse_ctx` option of `new()` for more details.

Note that this sets the default context globally, so use with caution (esp. in `mod_perl` scripts).

=item B<`IO::Socket::SSL::set_default_session_cache(...)`>

You may use this to make `IO::Socket::SSL` automatically re-use a given session cache (unless specifically overridden in a call to `new()`).

It accepts one argument, which should be an `IO::Socket::SSL::Session_Cache` object or similar (e.g. something which implements `get_session`, `add_session` and `del_session` like `IO::Socket::SSL::Session_Cache` does).

See the `SSL_session_cache` option of `new()` for more details.

Note that this sets the default cache globally, so use with caution.

=item B<`IO::Socket::SSL::set_defaults(%args)`>

With this function one can set defaults for all `SSL_*` parameter used for creation of the context, like the `SSL_verify*` parameter. Any `SSL_*` parameter can be given or the following short versions:

=over 8

=item mode - `SSL_verify_mode`

=item callback - `SSL_verify_callback`

=item scheme - `SSL_verifcyn_scheme`

=item name - `SSL_verifcyn_name`

=back

=item B<`IO::Socket::SSL::set_client_defaults(%args)`>

Similar to `C<set_defaults>`, but only sets the defaults for client mode.

=item B<`IO::Socket::SSL::set_server_defaults(%args)`>

Similar to `C<set_defaults>`, but only sets the defaults for server mode.

=item B<`IO::Socket::SSL::set_args_filter_hack(\&code|'use_defaults')`>

Sometimes one has to use code which uses unwanted or invalid arguments for SSL, typically disabling SSL verification or setting wrong ciphers or SSL versions.

With this hack it is possible to override these settings and restore sanity.

Example:

```
IO::Socket::SSL::set_args_filter_hack( sub {
my ($is_server,$args) = @_ ;
if ( ! $is_server ) {
    # client settings - enable verification with default CA
    # and fallback hostname verification etc
    delete @{$args}{qw(
SSL_verify_mode
SSL_ca_file
SSL_ca_path
SSL_verifycn_scheme
SSL_version
)};
    # and add some fingerprints for known certs which are signed by
    # unknown CAs or are self-signed
    $args->{SSL_fingerprint} = ...
}
});
```

With the short setting `C<set_args_filter_hack('use_defaults')>` it will prefer the default settings in all cases. These default settings can be modified with `C<set_defaults>`, `C<set_client_defaults>` and `C<set_server_defaults>`.

=back

The following methods are unsupported (not to mention futile!) and `IO::Socket::SSL` will emit a large `CROAK()` if you are silly enough to use them:

=over 4

=item truncate

=item stat

=item ungetc

=item setbuf

=item setvbuf

=item fdopen

=item send/recv

Note that `send()` and `recv()` cannot be reliably trapped by a tied filehandle (such as that used by `IO::Socket::SSL`) and so may send unencrypted data over the

socket. Object-oriented calls to these functions will fail, telling you to use the print/printf/syswrite and read/sysread families instead.

=back

=head1 DEPRECATIONS

The following functions are deprecated and are only retained for compatibility:

=over 2

=item context_init()

use the SSL_reuse_ctx option if you want to re-use a context

=item socketToSSL() and socket_to_SSL()

use IO::Socket::SSL->start_SSL() instead

=item kill_socket()

use close() instead

=item get_peer_certificate()

use the peer_certificate() function instead.

Used to return X509_Certificate with methods subject_name and issuer_name.

Now simply returns \$self which has these methods (although deprecated).

=item issuer_name()

use peer_certificate('issuer') instead

=item subject_name()

use peer_certificate('subject') instead

=back

=head1 EXAMPLES

See the 'example' directory,
the tests in 't' and also the tools in 'util'.

=head1 BUGS

If you use `IO::Socket::SSL` together with threads you should load it (e.g. use or require) inside the main thread before creating any other threads which use it. This way it is much faster because it will be initialized only once. Also there are reports that it might crash the other way.

Creating an `IO::Socket::SSL` object in one thread and closing it in another thread will not work.

`IO::Socket::SSL` does not work together with `Storable::fd_retrieve/fd_store`. See `BUGS` file for more information and how to work around the problem.

Non-blocking and timeouts (which are based on non-blocking) are not supported on Win32, because the underlying `IO::Socket::INET` does not support non-blocking on this platform.

If you have a server and it looks like you have a memory leak you might check the size of your session cache. Default for `Net::SSL` seems to be 20480, see the example for `SSL_create_ctx_callback` for how to limit it.

TLS

1.3 support regarding session reuse is incomplete.

=head1 SEE ALSO

`IO::Socket::INET`, `IO::Socket::INET6`, `IO::Socket::IP`, `Net::SSL`.

=head1 THANKS

Many thanks to all who added patches or reported bugs or helped `IO::Socket::SSL` another way. Please keep reporting bugs and help with patches, even if they just fix the documentation.

Special thanks to the team of `Net::SSL` for the good cooperation.

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Patches incorporated from various people, see file `Changes`.

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1.240 boost1.74 1.74.0-14ubuntu3

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////

```
[#mpl]
```

```
# MPL Support, <boost/mp11/mpl.hpp>
```

```
:toc:
```

```
:toc-title:
```

```
:idprefix:
```

The header `<boost/mp11/mpl.hpp>`, when included, defines the necessary support infrastructure for `mp_list` and `std::tuple` to be valid link:../../../../libs/mpl[MPL] sequences.

NOTE: `mpl.hpp` is not included by `<boost/mp11.hpp>`.

It's also possible to only enable support for `mp_list` by including `<boost/mp11/mpl_list.hpp>`, and for `std::tuple` by including `<boost/mp11/mpl_tuple.hpp>`. This may be required because some libraries, such as Boost.Fusion, contain their own MPL support for `std::tuple`, which conflicts with Mp11's one.

```
<!DOCTYPE html>
```

```
<html>
```

```
<head></head>
```

```
<body>
```

```
<h3>
```

```
  Copyright Test
```

```
</h3>
```

```
<p class="copyright">
```

```
  1963, 1964, 1965 Jane Doe
```

```
</p>
```

```
<p class="copyright">
```

```
  2018 Joe Blow, John Coe
```

```
</p>
```

```
<p class="copyright">
```

```
  1977, 1985 Someone else
```

```
</p>
```

```
</body>
```

```
</html>
```

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```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE article PUBLIC "-//Boost//DTD BoostBook XML V1.0//EN"
"http://www.boost.org/tools/boostbook/dtd/boostbook.dtd">
<article id="copyright_test" last-revision="DEBUG MODE Date: 2000/12/20 12:00:00 $"
xmlns:xi="http://www.w3.org/2001/XInclude">
  <title>Copyright Test</title>
  <articleinfo>
    <copyright>
      <year>1963</year> <year>1964</year> <year>1965</year> <holder>Jane Doe</holder>
    </copyright>
    <copyright>
      <year>2018</year> <holder>Joe Blow, John Coe</holder>
    </copyright>
    <copyright>
      <year>1977</year> <year>1985</year> <holder>Someone else</holder>
    </copyright>
  </articleinfo>
</article>
```

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1.242 libhttp-daemon-perl 6.13-1ubuntu0.1

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```

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1.243 pexpect 4.8.0-2ubuntu1

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1.244 xmlsec 1.2.33-1build2

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1.245 argon2 0~20171227-0.3

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1.246 Izo 2.10-2build3

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1.247 libdata-dump-perl 1.25-1

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=head1 NAME

Data::Dump - Pretty printing of data structures

=head1 SYNOPSIS

```
use Data::Dump qw(dump);
```

```
$str = dump(@list);
```

```
@copy_of_list = eval $str;
```

```
# or use it for easy debug printout
```

```
use Data::Dump; dd localtime;
```

=head1 DESCRIPTION

This module provides a few functions that traverse their argument list and return a string containing Perl code that, when C<eval>ed, produces a deep copy of the original arguments.

The main feature of the module is that it strives to produce output that is easy to read. Example:

```
@a = (1, [2, 3], {4 => 5});  
dump(@a);
```

Produces:

```
"(1, [2, 3], { 4 => 5 })"
```

If you dump just a little data, it is output on a single line. If you dump data that is more complex or there is a lot of it, line breaks are automatically added to keep it easy to read.

The following functions are provided (only the dd* functions are exported by default):

=over

=item dump(...)

=item pp(
...)

Returns a string containing a Perl expression. If you pass this string to Perl's built-in eval() function it should return a copy of the arguments you passed to dump().

If you call the function with multiple arguments then the output will be wrapped in parenthesis "(..., ...)". If you call the function with a single argument the output will not have the wrapping. If you call the function with a single scalar (non-reference) argument it will just return the

scalar quoted if needed, but never break it into multiple lines. If you pass multiple arguments or references to arrays of hashes then the return value might contain line breaks to format it for easier reading. The returned string will never be "\n" terminated, even if contains multiple lines. This allows code like this to place the semicolon in the expected place:

```
print '$obj = ', dump($obj), ";\n";
```

If `dump()` is called in void context, then the dump is printed on `STDERR` and then "\n" terminated. You might find this useful for quick debug printouts, but the `dd*`() functions might be better alternatives for this.

There is no difference between `dump()` and `pp()`, except that `dump()` shares its name with a not-so-useful perl builtin. Because of this some might want to avoid using that name.

```
=item quote( $string )
```

Returns a quoted version of the provided string.

It differs from `C<dump($string)>` in that it will quote even numbers and not try to come up with clever expressions that might shorten the output. If a non-scalar argument is provided then it's just stringified instead of traversed.

```
=item dd( ... )
```

```
=item ddx( ... )
```

These functions will call `dump()` on their argument and print the result to `STDOUT` (actually, it's the currently selected output handle, but `STDOUT` is the default for that).

The difference between them is only that `ddx()` will prefix the lines it prints with "# " and mark the first line with the file and line number where it was called. This is meant to be useful for debug printouts of state within programs.

```
=item dumpf( ..., \&filter )
```

Short hand for calling the `dump_filtered()` function of `L<Data::Dump::Filtered>`. This works like `dump()`, but the last argument should be a filter callback function. As objects are visited the filter callback is invoked and it can modify how the objects are dumped.

=back

=head1 CONFIGURATION

There are a few global variables that can be set to modify the output generated by the dump functions. It's wise to localize the setting of these.

=over

=item \$Data::Dump::INDENT

This holds the string that's used for indenting multiline data structures. It's default value is " " (two spaces). Set it to "" to suppress indentation. Setting it to "| " makes for nice visuals even if the dump output then fails to be valid Perl.

=item \$Data::Dump::TRY_BASE64

How long must a binary string be before we try to use the base64 encoding for the dump output. The default is 50. Set it to 0 to disable base64 dumps.

=item \$Data::Dump::LINEWIDTH

This controls how wide the string should be before we add a line break. The default is 60.

=back

=head1 LIMITATIONS

Code references will be dumped as `C<< sub { ... } >>`. Thus, `C<eval>`ing them will not reproduce the original routine. The `C<...>`-operator used will also require perl-5.12 or better to be eval'd.

If you forget to explicitly import the `C<dump>` function, your code will core dump. That's because you just called the builtin `C<dump>` function by accident, which intentionally dumps core. Because of this you can also import the same function as `C<pp>`, mnemonic for "pretty-print".

=head1 HISTORY

The `C<Data::Dump>` module grew out of frustration with Sarathy's in-most-cases-excellent `C<Data::Dumper>`. Basic ideas and some code are shared with Sarathy's module.

The `C<Data::Dump>` module provides a much simpler interface than `C<Data::Dumper>`. No OO interface is available and there are fewer configuration options to worry about. The other benefit is that the dump produced does not try to set any variables. It only returns what is needed to produce a copy of the arguments. This means that `C<dump("foo")>` simply returns `C<"foo">`, and `C<dump(1..3)>` simply returns `C<'(1, 2, 3)>`.

=head1 SEE ALSO

`L<Data::Dump::Filtered>`, `L<Data::Dump::Trace>`, `L<Data::Dumper>`, `L<JSON>`,
`L<Storable>`

=head1 AUTHORS

The `C<Data::Dump>` module is written by Gisle Aas <gisle@aas.no>, based on `C<Data::Dumper>` by Gurusamy Sarathy <gsar@umich.edu>.

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```
* /opt/cola/permits/1411693707_1662668421.1110098/0/libdata-dump-perl-1-25-orig-tar-gz/Data-Dump-1.25/lib/Data/Dump.pm
```

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`Data::Dump`

=====

This module provides a few functions that traverse their argument list and return a string containing Perl code that, when `C<eval>`ed, produces a deep copy of the original arguments.

The main feature of the module is that it strives to produce output that is easy to read. Example:

```
```perl
@a = (1, [2, 3], {4 => 5});
dump(@a);
```

```

Produces:

```
```perl
 "(1, [2, 3], { 4 => 5 })"
```
```

If you dump just a little data, it is output on a single line. If you dump data that is more complex or there is a lot of it, line breaks are automatically added to keep it easy to read.

Please refer to [Data::Dump's complete documentation](<https://metacpan.org/pod/Data::Dump>) for details on how to use this module, including which functions it exports. Or (after installation) type:

```
perldoc Data::Dump
```

To view the complete docs on your terminal.

Installation

To install this module via cpanm:

```
> cpanm Data::Dump
```

Or, at the cpan shell:

```
cpan> install Data::Dump
```

If you wish to install it manually, download and unpack the tarball and run the following commands:

```
perl Makefile.PL
make
make test
make install
```

Of course, instead of downloading the tarball you may simply clone the git repository:

```
$ git clone git://github.com/garu/Data-Dump.git
```

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abstract: 'Pretty printing of data structures'

author:

- 'Gisle Aas <gisle@activestate.com>'

build_requires:

Test: '0'

configure_requires:

ExtUtils::MakeMaker: '0'

dynamic_config: 1

generated_by: 'ExtUtils::MakeMaker version 7.62, CPAN::Meta::Converter version 2.150010'

license: perl

meta-spec:

url: <http://module-build.sourceforge.net/META-spec-v1.4.html>

version: '1.4'

name: Data-Dump

no_index:

directory:

- t

- inc

recommends:

MIME::Base64: '0'

requires:

Symbol: '0'

perl: '5.006'

resources:

bugtracker: <https://github.com/garu/data-dump/issues/>

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version: '1.25'
x_serialization_backend: 'CPAN::Meta::YAML version 0.018'

Found in path(s):

* /opt/cola/permits/1411693707_1662668421.1110098/0/libdata-dump-perl-1-25-orig-tar-gz/Data-Dump-1.25/META.yml

1.248 klibc 2.0.10-4

1.248.1 Available under license :

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Version 2, June 1991

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```
<one line to give the program's name and a brief idea of what it does.>  
Copyright (C) 19yy <name of author>
```

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```
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This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.
```

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```
Yoyodyne, Inc., hereby disclaims all copyright interest in the program
`Gnomovision' (which makes passes at compilers) written by James Hacker.
```

```
<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
```

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1.249 fonts-ubuntu 0.83-6ubuntu1

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Ubuntu Font Family Licensing FAQ

Stylistic Foundations

The Ubuntu Font Family is the first time that a libre typeface has been designed professionally and explicitly with the intent of developing a public and long-term community-based development process.

When developing an open project, it is generally necessary to have firm foundations: a font needs to maintain harmony within itself even across many type designers and writing systems. For the [1]Ubuntu Font Family, the process has been guided with the type foundry Dalton Maag setting the project up with firm stylistic foundation covering several left-to-right scripts: Latin, Greek and Cyrillic; and right-to-left scripts: Arabic and Hebrew (due in 2011).

With this starting point the community will, under the supervision of [2]Canonical and [3]Dalton Maag, be able to build on the existing font sources to expand their character coverage. Ultimately everybody will be able to use the Ubuntu Font Family in their own written languages across the whole of Unicode (and this will take some time!).

Licensing

The licence chosen by any free software project is one of the foundational decisions that sets out how derivatives and contributions

can occur, and in turn what kind of community will form around the project.

Using a licence that is compatible with other popular licences is a powerful constraint because of the [4]network effects: the freedom to share improvements between projects allows free software to reach high-quality over time. Licence-proliferation leads to many incompatible licences, undermining the network effect, the freedom to share and ultimately making the libre movement that Ubuntu is a part of less effective. For all kinds of software, writing a new licence is not to be taken lightly and is a choice that needs to be thoroughly justified if this path is taken.

Today it is not clear to Canonical what the best licence for a font project like the Ubuntu Font Family is: one that starts life designed by professionals and continues with the full range of community development, from highly commercial work in new directions to curious beginners' experimental contributions. The fast and steady pace of the Ubuntu release cycle means that an interim libre licence has been necessary to enable the consideration of the font family as part of Ubuntu 10.10 operating system release.

Before taking any decision on licensing, Canonical as sponsor and backer of the project has reviewed the many existing licenses used for libre/open fonts and engaged the stewards of the most popular licenses in detailed discussions. The current interim licence is the first step in progressing the state-of-the-art in licensing for libre/open font development.

The public discussion must now involve everyone in the (comparatively new) area of the libre/open font community; including font users, software freedom advocates, open source supporters and existing libre font developers. Most importantly, the minds and wishes of professional type designers considering entering the free software business community must be taken on board.

Conversations and discussion has taken place, privately, with individuals from the following groups (generally speaking personally on behalf of themselves, rather than their affiliations):

- * [5]SIL International
- * [6]Open Font Library
- * [7]Software Freedom Law Center
- * [8]Google Font API

Document embedding

One issue highlighted early on in the survey of existing font licences is that of document embedding. Almost all font licences, both free and unfree, permit embedding a font into a document to a certain degree. Embedding a font with other works that make up a document creates a "combined work" and copyleft would normally require the whole document to be distributed under the terms of the font licence. As beautiful as the font might be, such a licence makes a font too restrictive for useful general purpose digital publishing.

The situation is not entirely unique to fonts and is encountered also with tools such as GNU Bison: a vanilla GNU GPL licence would require anything generated with Bison to be made available under the terms of the GPL as well. To avoid this, Bison is [9]published with an additional permission to the GPL which allows the output of Bison to be made available under any licence.

The conflict between licensing of fonts and licensing of documents, is addressed in two popular libre font licences, the SIL OFL and GNU GPL:

- * [10]SIL Open Font Licence: When OFL fonts are embedded in a document, the OFL's terms do not apply to that document. (See [11]OFL-FAQ for details.
- * [12]GPL Font Exception: The situation is resolved by granting an additional permission to allow documents to not be covered by the GPL. (The exception is being reviewed).

The Ubuntu Font Family must also resolve this conflict, ensuring that if the font is embedded and then extracted it is once again clearly under the terms of its libre licence.

Long-term licensing

Those individuals involved, especially from Ubuntu and Canonical, are interested in finding a long-term libre licence that finds broad favour across the whole libre/open font community. The deliberation during the past months has been on how to licence the Ubuntu Font Family in the short-term, while knowingly encouraging everyone to pursue a long-term goal.

- * [13]Copyright assignment will be required so that the Ubuntu Font Family's licensing can be progressively expanded to one (or more) licences, as best practice continues to evolve within the libre/open font community.
- * Canonical will support and fund legal work on libre font licensing.

It is recognised that the cost and time commitments required are likely to be significant. We invite other capable parties to join in supporting this activity.

The GPL version 3 (GPLv3) will be used for Ubuntu Font Family build scripts and the CC-BY-SA for associated documentation and non-font content: all items which do not end up embedded in general works and documents.

Ubuntu Font Licence

For the short-term only, the initial licence is the [14]Ubuntu Font License (UFL). This is loosely inspired from the work on the SIL OFL 1.1, and seeks to clarify the issues that arose during discussions and legal review, from the perspective of the backers, Canonical Ltd. Those already using established licensing models such as the GPL, OFL or Creative Commons licensing should have no worries about continuing to use them. The Ubuntu Font Licence (UFL) and the SIL Open Font Licence (SIL OFL) are not identical and should not be confused with each other. Please read the terms precisely. The UFL is only intended as an interim license, and the overriding aim is to support the creation of a more suitable and generic libre font licence. As soon as such a licence is developed, the Ubuntu Font Family will migrate to it made possible by copyright assignment in the interim. Between the OFL 1.1, and the UFL 1.0, the following changes are made to produce the Ubuntu Font Licence:

* Clarification:

1. Document embedding (see [15]embedding section above).
2. Apply at point of distribution, instead of receipt
3. Author vs. copyright holder disambiguation (type designers are authors, with the copyright holder normally being the funder)
4. Define "Propagate" (for internationalisation, similar to the GPLv3)
5. Define "Substantially Changed"
6. Trademarks are explicitly not transferred
7. Refine renaming requirement

Streamlining:

8. Remove "not to be sold separately" clause
9. Remove "Reserved Font Name(s)" declaration

A visual demonstration of how these points were implemented can be found in the accompanying coloured diff between SIL OFL 1.1 and the Ubuntu Font Licence 1.0: [16]ofl-1.1-uf1-1.0.diff.html

References

1. <http://font.ubuntu.com/>
2. <http://www.canonical.com/>
3. <http://www.daltonmaag.com/>
4. http://en.wikipedia.org/wiki/Network_effect

5. <http://scripts.sil.org/>
 6. <http://openfontlibrary.org/>
 7. <http://www.softwarefreedom.org/>
 8. <http://code.google.com/webfonts>
 9. <http://www.gnu.org/licenses/gpl-faq.html#CanIUseGPLToolsForNF>
 10. http://scripts.sil.org/OFL_web
 11. http://scripts.sil.org/OFL-FAQ_web
 12. <http://www.gnu.org/licenses/gpl-faq.html#FontException>
 13. <https://launchpad.net/~uff-contributors>
 14. <http://font.ubuntu.com/ufl/ubuntu-font-licence-1.0.txt>
 15. <http://font.ubuntu.com/ufl/FAQ.html#embedding>
 16. <http://font.ubuntu.com/ufl/ofl-1.1-ufl-1.0.diff.html>
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1.250 python-debian 0.1.43ubuntu1

1.250.1 Available under license :

Format: <https://www.debian.org/doc/packaging-manuals/copyright-format/1.0/>

Upstream-Name: python-debian

Upstream-Contact: pkg-python-debian-maint@lists.ubuntu.com

Source: <https://salsa.debian.org/python-debian-team/python-debian>

Files: *

Copyright: Debian python-debian Maintainers (see debian/control for maintainer names)

License: GPL-2+

Files: lib/deb822.py lib/debian/deb822.py lib/debian/tests/test_deb822.py

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Files:

examples/changelog/*

lib/debian/changelog.py

setup.py

lib/debian/tests/test_changelog.py

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1.255 usb-modeswitch 2.6.1-3ubuntu2

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3. Object Code Incorporating Material from Library Header Files.

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If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

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Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

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b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

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1.257 libpcap 1.10.1-4build1

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1.258 python-cffi 1.15.0-1build2

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1.259 tcl 8.6.12+dfsg-1build1

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1.260 pciutils 3.7.0-6

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1.263 python-importlib-metadata 4.6.4-1

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1.265 net-tools 1.60+git20181103.0eebece-1ubuntu5

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1.268 gcc-12 12.1.0-2ubuntu1~22.04

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bzip2/libbzip2 version 1.0.6 of 6 September 2010

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Preamble

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a.

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b. Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of

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SIGNATURE OF TY COON, 1 April 1990
Ty Coon, President of Vice

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Version 3, 29 June 2007

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<!-- Creator : groff version 1.20.1 -->

<!-- CreationDate: Fri Jan 14 19:57:50 2011 -->

<!DOCTYPE html PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN"

"<http://www.w3.org/TR/html4/loose.dtd>">

```

<html>
<head>
<meta name="generator" content="groff -Thtml, see www.gnu.org">
<meta http-equiv="Content-Type" content="text/html; charset=US-ASCII">
<meta name="Content-Style" content="text/css">
<link rel="stylesheet" type="text/css" href="texi2tr.css" />
<title>GNU Modula-2</title>
</head>

<body>
<!-- site wide top running header menu -->

<ul id="overview">
  <li class="home">
    HOME_HREF
  </li>
  <li class="release">
    12_HREF
  </li>

  <li>
    <a href="news.html" title="News">News</a>
  </li>
  <li>
    <a href="development.html" title="Development">Development</a>
  </li>
  <li>
    <a href="community.html" title="Community">Community</a>
  </li>
</ul>

<div id="header">
  <h1>
    <span style="display:inline-block; vertical-align:middle">

    </span>
    <span style="display:inline-block; vertical-align:middle; font-size: 50px">
GNU Modula-2
    </span>
  </h1>

  <!-- homepage tab menu -->

  <div id="tabmenu">
    <ul id="tab">
      <li><a href="about.html"><span>About</span></a></li>
      <li><a href="download.html"><span>Download</span></a></li>

```

```
<li><a href="release.html"><span>Latest Release</span></a></li>
<li class="selected"><a href="license.html"><span>License</span></a></li>
<li><a href="platforms.html"><span>Platforms</span></a></li>
<li><a href="users.html"><span>Users</span></a></li>
</ul>
</div>
</div>
```

```
<div id="page">
<div class="plain">
<h2>The home of the GNU Modula-2 compiler</h2>
<p>The compiler is held under the GNU Public Licence v3.</p>
<p>The ISO and PIM libraries are under the GPL v3.1 with GCC runtime extensions. Copies of the
licences can be found on the
<a href="http://www.gnu.org/licenses">GNU</a>
web site.</p>
</div>
</div>
</body>
</html>
```

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1.269 pyjwt 2.3.0-1ubuntu0.2

1.269.1 Available under license :

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1.270 pcre 10.39-3ubuntu0.1

1.270.1 Available under license :

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THE BASIC LIBRARY FUNCTIONS

Written by: Philip Hazel

Email local part: ph10

Email domain: cam.ac.uk

University of Cambridge Computing Service,
Cambridge, England.

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1.271 libproc-processtable-perl 0.634-1build1

1.271.1 Available under license :

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Found in path(s):

* /opt/cola/permits/1424481720_1663911171.3100908/0/libproc-processtable-perl-0-634-orig-tar-gz/Proc-ProcessTable-0.634/os/obstack.h

No license file was found, but licenses were detected in source scan.

/*alan.martin@oracle.com

* Copyright (c) 1998 by Mike Romberg (romberg@fsl.noaa.gov)

* This file may be distributed under the same terms as Perl.

*

* This will probably only work under HP-UX-10 or later.

*

* 8/26/99 Added "fname" field for consistency with other OS's - D. Urist

*

*/

Found in path(s):

* /opt/cola/permits/1424481720_1663911171.3100908/0/libproc-processtable-perl-0-634-orig-tar-gz/Proc-ProcessTable-0.634/os/HPUX.c

No license file was found, but licenses were detected in source scan.

port of Proc::ProcessTable under AIX

New files

=====

os/aix.c

os/aix.h

hints/aix.pl

README.aix

Sample (low effort) application (please don't laugh ;)

=====

minitop.pl

xminitop

Blah

=====

o Documentation under AIX is rather cryptic and incomplete. I managed to read the process table using undocumented calls : getproc, getuser, getargs.

I've read C code from Vic Abell <abe@purdue.edu> in lsof-4.36, Jussi Maki <Jussi.Maki@csc.fi> and Marcel J.E. Mol <marcel@mesa.nl> in monitor-2.1.2

as well as a usenet news posted by Michael Wojcik <mike@raederle.mfltd.co.uk> (Article: 63164 of comp.unix.aix, Date: 04/04/95)

[lsof is a really nice tool and provides C examples to read low-level structures under nearly any UNIX system on earth.]

o my port was only tested under the following conditions :

AIX 4.1.5

perl 5.005_02

o I am not a C programming terminator, so consider this

as really ALPHA
software.

o I wanted this tool to be usable by a non root user. This is why I don't read
/dev/kmem unlike Vic and Jussi.

Bugs

=====

o When mapping tty device numbers to names, I get a 'permission denied' message
due to the /dev/.SRC-unix directory whose perms are as follows :

```
drwxrwx--- 2 root system 512 Aug 12 11:26 .SRC-unix/
```

This dir contains only a few unix domain socket files used by IBM's System
Resource Controller, so it is of no interest for getting ttynames.

Maybe we should bind STDERR to /dev/null

o I sometimes get :

```
"Can't access `pctmem' field in class Proc::ProcessTable::Process"
```

It comes from the AUTOLOAD function defined in Process.pm. How come we are
able to access fields like "pctcpu" but not "pctmem" ? I am puzzled.

We may change the 'croak' statement to a 'warn' but it'd be better if we
knew where this error comes from.

o Hidden ones ? I bet there is some ...

Thanks

=====

Daniel J. Urist <durist@world.std.com>

Vic

Abell <abe@purdue.edu>

Jussi Maki <Jussi.Maki@csc.fi>

Cedric Le Goater <LE-GOATER_Cedric@stna.dgac.fr>

Gregory Kurz <KURZ_Gregory@stna.dgac.fr>

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package is free software; you can redistribute it and/or modify it under the same terms as Perl itself.

--

David Paquet
david-paquet@usa.net

Found in path(s):

* /opt/cola/permits/1424481720_1663911171.3100908/0/libproc-processtable-perl-0-634-orig-tar-gz/Proc-ProcessTable-0.634/README.aix

No license file was found, but licenses were detected in source scan.

=head1 NAME

killall - Kill all instances of a process by pattern matching the command-line

=head1 SYNOPSIS

use Proc::Killall;

```
killall('HUP', 'xterm'); # SIGHUP all xterms  
killall('KILL', '^netscape$'); # SIGKILL to "netscape"
```

=head1 DESCRIPTION

This module provides one function, C<killall()>, which takes two parameters: a signal name or number (see C<kill()>) and a process pattern. This pattern is matched against the process' command-line as the C<ps> command would show it (C<ps> is not used internally, instead a package called C<Proc::ProcessTable> is used).

C<killall> searches the process table and sends that signal to all processes which match the pattern. The return value is the number of processes that were successfully signaled. If any kills failed, the C<\$!> variable will be set based on that last one that failed (even if a successful kill happened afterward).

=head1 AUTHOR

Written in 2000 by Aaron
Sherman E<lt>ajs@ajs.comE<gt>

C<Proc::Killall> is copyright 2000 by Aaron Sherman, and may be distributed under the same terms as Perl itself.

=head1 PREREQUISITES

C<Proc::ProcessTable> is required for C<Proc::Killall> to function.

=head1 SEE ALSO

L<perl>, L<perlfunc>, L<perlvar>, L<Proc::ProcessTable>

Found in path(s):

* /opt/cola/permits/1424481720_1663911171.3100908/0/libproc-processtable-perl-0-634-orig-tar-gz/Proc-ProcessTable-0.634/lib/Proc/Killall.pm

No license file was found, but licenses were detected in source scan.

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*

* Author: James FitzGibbon <james.fitzgibbon@target.com>

*

* based on aix.c distributed with Proc::ProcessTable v0.35, which

* is Copyright (c) 1998, David Paquet.

*

*/

Found in path(s):

* /opt/cola/permits/1424481720_1663911171.3100908/0/libproc-processtable-perl-0-634-orig-tar-gz/Proc-ProcessTable-0.634/os/aix_getprocs.c

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/*

Adapted from ps.cc by J Robert Ray <jrray@jrray.org>

ps.cc

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This file is part of Cygwin.

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* /opt/cola/permits/1424481720_1663911171.3100908/0/libproc-processtable-perl-0-634-orig-tar-gz/Proc-ProcessTable-0.634/os/MSWin32.c

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Proc::ProcessTable

![CircleCI](https://circleci.com/gh/jwbargsten/perl-proc-processtable/tree/master.svg?style=svg)(https://circleci.com/gh/jwbargsten/perl-proc-processtable/tree/master)

Please use github or [rt.cpan.org](https://rt.cpan.org/Public/Dist/Display.html?Name=Proc-ProcessTable) to submit bugs and patches.

MAINTENANCE STATUS

This module is maintained by Joachim Bargsten. I have nearly zero knowledge of the implementation within but wanted to rescue the distribution from abandonment and try to get critical bug fixes out. This will need to be a community effort.

The source is in github -

<https://github.com/jwbargsten/perl-proc-processtable>

Commit bits will be generously granted, send me your github id.

STATUS

This is BETA software; it seems to work, but use at your own risk :)

Currently works on darwin, nonstop-ux, Windows (both native MSWin32 and Cygwin), linux, solaris, aix, hpux, freebsd, irix, dec_osf, bsdi, netbsd, unixware 7.x, SunOS and openbsd. Please see the "README.osname" files for details on individual os implementations. Please see the file PORTING if you are interested in making it work on something else. Please see the file TODO for a list of issues that need to be addressed (and send me patches!).

Please note that the Windows port is derived from Cygwin code and is therefore covered by the Cygwin license (<http://cygwin.com/licensing.html>).

Multithread support is now available for Solaris; please see README.solaris for info. It may work under other OS's as well; please let me know if it does.

Comments, bug reports, patches and especially ports are greatly appreciated. If you want to submit a patch, *please* use standard context-diff format; if you're submitting a port, a tarball of the new files is great.

DESCRIPTION

This module is a first crack at providing a consistent interface to

Unix (and maybe other multitasking OS's) process table information.

The

impetus for this came about with my frustration at having to parse the output of various systems' ps commands to check whether specific processes were running on different boxes at a larged mixed Unix site. The output format of ps was different on each OS, and sometimes changed with each new release of an OS. Also, running a ps subprocess from within a perl or shell script and parsing the output was not a very efficient or aesthetic way to do things.

With this module, you can do things like this:

```
# kill memory pigs
use Proc::ProcessTable;

my $t = Proc::ProcessTable->new;
foreach my $p ( @{$t->table} ) {
    if( $p->pctmem > 95 ){
        $p->kill(9);
    }
}
```

There is another short example in the file "example.pl" in the distribution. For a more elaborate example (in German), see <http://www.linux-magazin.de/ausgabe.1999.02/Proc/proc.html>. <shameless plug> If you can't read German, try my other module, WWW::Babelfish!</shameless plug>

There

are also two contributed modules: a module called Proc::Killall contributed by Aaron Sherman to kill all processes whose command-lines match a given pattern, and a module called Proc::Killfam by Stephen Lidie to kill a list of processes and their children. These modules are installed along with Proc::ProcessTable. Pod documentation is included in both of them.

INSTALLATION

This module needs the File::Find and Storable modules in order to work. File::Find is generally included with perl distributions; Storable is available from CPAN.

After unpacking the tar file, do:

```
perl Makefile.PL
make
make test
```

make install

There is embedded POD documentation in ProcessTable.pm and Process/Process.pm.

ACKNOWLEDGEMENTS

Thanks to the many people who have sent in ports and patches. Without them this module would be impossible to support on so many platforms. Patches are noted in the Changes file.

- * David Paquet <David.Paquet@cnes.fr>: AIX port
- * Mike Romberg
<romberg@fsl.noaa.gov>: HPUX port
- * Slaven Rezic <eserte@cs.tu-berlin.de>: FreeBSD port
- * W. Phillip Moore <wpm@ms.com>: IRIX port
- * Peter ? <hooft@natlab.research.philips.com>: IRIX version patch
- * Bernhard Schmalhofer <Bernhard.Schmalhofer@gmx.de>: dec_osf port
- * Sean Eskins <sean@gilasoft.com>: bsdi port
- * Peter Reich <pr@alles.prima.de>: netbsd port
- * Aaron Sherman <ajs@ajs.com>: Proc::Killall module
- * Steve Lidie <sol0@Lehigh.EDU>: Killfam.pm module
- * Martin Lucina <mato@catalyst.net.nz>: Unixware 7.x port
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- * J Robert Ray <jrray@jrray.org>: Windows (Cygwin) port.
- * Tom Wyant <twyant3@comcast.net>: Darwin port.
- * Mike Steinert <mike.steinert@motorola.com>: Nonstop-UX port.
- * <bsd@openbsd.rutgers.edu>: Openbsd port.

Please note that Bernard Schmalhofer is no longer able to provide support for the dec_osf port.

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Found in path(s):

* /opt/cola/permits/1424481720_1663911171.3100908/0/libproc-processtable-perl-0-634-orig-tar-gz/Proc-ProcessTable-0.634/README.md

No license file was found, but licenses were detected in source scan.

/*

- * Copyright (c) 2001 by Shawn A. Clifford <shawn.a.clifford@lmco.com>
- * This file may be distributed under the same terms as Perl.
- *

* Modification History:

*

* Who When Description

* -----

* SAC 30July2001 Original code

*/

Found in path(s):

* /opt/cola/permits/1424481720_1663911171.3100908/0/libproc-processtable-perl-0-634-orig-tar-gz/Proc-ProcessTable-0.634/os/SunOS.c

* /opt/cola/permits/1424481720_1663911171.3100908/0/libproc-processtable-perl-0-634-orig-tar-gz/Proc-ProcessTable-0.634/os/SunOS.h

No license file was found, but licenses were detected in source scan.

abstract: 'Perl extension to access the unix process table'

author:

- 'Joachim Bargsten <jw@bargsten.org>'

build_requires:

ExtUtils::MakeMaker: '0'

Test::More: '0'

configure_requires:

ExtUtils::MakeMaker: '0'

dynamic_config: 1

generated_by: 'ExtUtils::MakeMaker version 7.44, CPAN::Meta::Converter version 2.150010'

license: artistic_2

meta-spec:

url: <http://module-build.sourceforge.net/META-spec-v1.4.html>

version: '1.4'

name: Proc-ProcessTable

no_index:

directory:

- t

- inc

requires:

File::Find: '0'

Storable: '0'

perl: '5.006'

resources:

repository: <https://github.com/jwbargsten/perl-proc-processtable>

version: '0.634'

x_serialization_backend: 'CPAN::Meta::YAML version 0.018'

Found in path(s):

* /opt/cola/permits/1424481720_1663911171.3100908/0/libproc-processtable-perl-0-634-orig-tar-gz/Proc-ProcessTable-0.634/META.yml

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```
* /opt/cola/permits/1424481720_1663911171.3100908/0/libproc-processtable-perl-0-634-orig-tar-gz/Proc-ProcessTable-0.634/os/bsd.c
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```

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```
/*
 * Copyright (c) 2006, William Yodlowsky <bsd@openbsd.rutgers.edu>
 * This file is free software; it can be modified and/or
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 */
```

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```
* /opt/cola/permits/1424481720_1663911171.3100908/0/libproc-processtable-perl-0-634-orig-tar-gz/Proc-ProcessTable-0.634/os/OpenBSD.c
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Proc::ProcessTable

Please use rt.cpan.org to submit bugs and patches.

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W. Phillip Moore <wpm@ms.com> IRIX port
Peter ? <hooft@natlab.research.philips.com> IRIX
version patch
Bernhard Schmalhofer <Bernhard.Schmalhofer@gmx.de> dec_osf port
Sean Eskins <sean@gilasoft.com> bsd port
Peter Reich <pr@alles.prima.de> netbsd port
Aaron Sherman <ajs@ajs.com> Proc::Killall module
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Daniel J. Urist
durist@frii.com

Found in path(s):

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Found in path(s):

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```
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ProcessTable-0.634/os/aix.h
```

```
* /opt/cola/permits/1424481720_1663911171.3100908/0/libproc-processtable-perl-0-634-orig-tar-gz/Proc-
ProcessTable-0.634/os/aix.c
```

No license file was found, but licenses were detected in source scan.

```
/*-
```

```
* This code relies heavily on the Darwin "ps" command, which is available
* from Apple in the adv_cmds portion of the Darwin distribution. The portions
* of this code which were included from that source are:
```

```
*
```

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*
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```
*
```

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Found in path(s):

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ProcessTable-0.634/os/darwin.c

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Found in path(s):

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ProcessTable-0.634/os/darwin.h

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*

* Author: James FitzGibbon <james.fitzgibbon@target.com>

*

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*

*/

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* /opt/cola/permits/1424481720_1663911171.3100908/0/libproc-processtable-perl-0-634-orig-tar-gz/Proc-
ProcessTable-0.634/os/aix_getprocs.h

1.272 python-attrs 21.2.0-1

1.272.1 Available under license :

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1.273 markupsafe 2.0.1-2build1

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Found in path(s):

* /opt/cola/permits/1424481237_1663911127.8118522/0/markupsafe-2-0-1-orig-1-tar-gz/MarkupSafe-2.0.1/LICENSE.rst

No license file was found, but licenses were detected in source scan.

[metadata]

name = MarkupSafe

version = attr: markupsafe.__version__

url = <https://palletsprojects.com/p/markupsafe/>

project_urls =

Donate = <https://palletsprojects.com/donate>

Documentation = <https://markupsafe.palletsprojects.com/>

Changes = <https://markupsafe.palletsprojects.com/changes/>

Source Code = <https://github.com/pallets/markupsafe/>

Issue Tracker = <https://github.com/pallets/markupsafe/issues/>

Twitter = <https://twitter.com/PalletsTeam>

Chat = <https://discord.gg/pallets>

license = BSD-3-Clause

license_files = LICENSE.rst

author = Armin Ronacher

author_email = armin.ronacher@active-4.com

maintainer = Pallets

maintainer_email = contact@palletsprojects.com

description = Safely add untrusted strings to HTML/XML markup.

long_description = file: README.rst

long_description_content_type = text/x-rst

classifiers =

Development Status :: 5 - Production/Stable

Environment :: Web Environment

Intended Audience ::

Developers

License :: OSI Approved :: BSD License

Operating System :: OS Independent

Programming Language :: Python

Topic :: Internet :: WWW/HTTP :: Dynamic Content

Topic :: Text Processing :: Markup :: HTML

[options]

packages = find:

package_dir = = src

include_package_data = true

python_requires = >= 3.6

[options.packages.find]

where = src

[tool:pytest]

testpaths = tests


```
filterwarnings =  
error
```

```
[coverage:run]  
branch = true  
source =  
markupsafe  
tests
```

```
[coverage:paths]  
source =  
src  
*/site-packages
```

```
[flake8]  
select = B, E, F, W, B9  
ignore =  
E203  
E501  
E722  
W503  
max-line-length = 80
```

```
[mypy]  
files = src/markupsafe  
python_version = 3.6  
disallow_subclassing_any = True  
disallow_untyped_calls = True  
disallow_untyped_defs = True  
disallow_incomplete_defs = True  
no_implicit_optional = True  
local_partial_types = True  
no_implicit_reexport = True  
strict_equality = True  
warn_redundant_casts = True  
warn_unused_configs = True  
warn_unused_ignores = True  
warn_return_any = True  
warn_unreachable  
= True
```

```
[egg_info]  
tag_build =  
tag_date = 0
```

Found in path(s):

```
* /opt/cola/permits/1424481237_1663911127.8118522/0/markupsafe-2-0-1-orig-1-tar-gz/MarkupSafe-2.0.1/setup.cfg
```

No license file was found, but licenses were detected in source scan.

Metadata-Version: 2.1

Name: MarkupSafe

Version: 2.0.1

Summary: Safely add untrusted strings to HTML/XML markup.

Home-page: <https://palletsprojects.com/p/markupsafe/>

Author: Armin Ronacher

Author-email: armin.ronacher@active-4.com

Maintainer: Pallets

Maintainer-email: contact@palletsprojects.com

License: BSD-3-Clause

Project-URL: Donate, <https://palletsprojects.com/donate>

Project-URL: Documentation, <https://markupsafe.palletsprojects.com/>

Project-URL: Changes, <https://markupsafe.palletsprojects.com/changes/>

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Project-URL: Issue Tracker, <https://github.com/pallets/markupsafe/issues/>

Project-URL: Twitter, <https://twitter.com/PalletsTeam>

Project-URL: Chat, <https://discord.gg/pallets>

Description: MarkupSafe

=====

MarkupSafe implements a text object that escapes characters so it is safe to use in HTML and XML. Characters that have special meanings are replaced so that they display as the actual characters. This mitigates injection attacks, meaning untrusted user input can safely be displayed on a page.

Installing

Install and update using `pip`_``:

.. code-block:: text

```
pip install -U MarkupSafe
```

.. `_pip`: <https://pip.pypa.io/en/stable/quickstart/>

Examples

.. code-block:: pycon

```
>>> from markupsafe import Markup, escape
```

```

>>> # escape replaces special characters and wraps in Markup
>>> escape("<script>alert(document.cookie);</script>")
Markup('&lt;script&gt;alert(document.cookie);&lt;/script&gt;')

>>> # wrap in Markup to mark text "safe" and prevent escaping
>>> Markup("<strong>Hello</strong>")
Markup('<strong>hello</strong>')

>>> escape(Markup("<strong>Hello</strong>"))
Markup('<strong>hello</strong>')

>>> # Markup is a str subclass
>>> # methods and operators escape their arguments
>>> template = Markup("Hello <em>{name}</em>")
>>> template.format(name="World")
Markup('Hello <em>&#34;World&#34;</em>')

```

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Platform: UNKNOWN

Classifier: Development Status :: 5 - Production/Stable

Classifier: Environment :: Web Environment

Classifier: Intended Audience :: Developers

Classifier: License :: OSI Approved :: BSD License

Classifier: Operating System :: OS Independent
Classifier: Programming Language :: Python
Classifier: Topic :: Internet :: WWW/HTTP :: Dynamic Content
Classifier: Topic :: Text Processing :: Markup :: HTML
Requires-Python: >=3.6
Description-Content-Type: text/x-rst

Found in path(s):

* /opt/cola/permits/1424481237_1663911127.8118522/0/markupsafe-2-0-1-orig-1-tar-gz/MarkupSafe-2.0.1/PKG-INFO
* /opt/cola/permits/1424481237_1663911127.8118522/0/markupsafe-2-0-1-orig-1-tar-gz/MarkupSafe-2.0.1/src/MarkupSafe.egg-info/PKG-INFO

1.274 pyrsistent 0.18.1-1build1

1.274.1 Available under license :

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1.275 libutempter 1.2.1-2build2

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Version 2.1, February 1999

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1.276 mdadm 4.2-0ubuntu1

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```

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```
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```

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1.280 jinja2 3.0.3-1

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* /opt/cola/permits/1424481804_1663911106.3617206/0/jinja2-3-0-3-orig-1-tar-gz/Jinja2-3.0.3/LICENSE.rst

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Metadata-Version: 2.1

Name: Jinja2

Version: 3.0.3

Summary: A very fast and expressive template engine.

Home-page: <https://palletsprojects.com/p/jinja/>

Author: Armin Ronacher

Author-email: armin.ronacher@active-4.com

Maintainer: Pallets

Maintainer-email: contact@palletsprojects.com
License: BSD-3-Clause
Project-URL: Donate, <https://palletsprojects.com/donate>
Project-URL: Documentation, <https://jinja.palletsprojects.com/>
Project-URL: Changes, <https://jinja.palletsprojects.com/changes/>
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Platform: UNKNOWN
Classifier: Development Status :: 5 - Production/Stable
Classifier: Environment :: Web Environment
Classifier: Intended Audience :: Developers
Classifier: License :: OSI Approved :: BSD License
Classifier:
Operating System :: OS Independent
Classifier: Programming Language :: Python
Classifier: Topic :: Internet :: WWW/HTTP :: Dynamic Content
Classifier: Topic :: Text Processing :: Markup :: HTML
Requires-Python: >=3.6
Description-Content-Type: text/x-rst
Provides-Extra: i18n
License-File: LICENSE.rst

Jinja

=====

Jinja is a fast, expressive, extensible templating engine. Special placeholders in the template allow writing code similar to Python syntax. Then the template is passed data to render the final document.

It includes:

- Template inheritance and inclusion.
- Define and import macros within templates.
- HTML templates can use autoescaping to prevent XSS from untrusted user input.
- A sandboxed environment can safely render untrusted templates.
- AsyncIO support for generating templates and calling async functions.
- I18N support with Babel.
- Templates are compiled to optimized Python code just-in-time and cached, or can be compiled ahead-of-time.
-
- Exceptions point to the correct line in templates to make debugging easier.
- Extensible filters, tests, functions, and even syntax.

Jinja's philosophy is that while application logic belongs in Python if possible, it shouldn't make the template designer's job difficult by restricting functionality too much.

Installing

Install and update using `pip`_:

.. code-block:: text

```
$ pip install -U Jinja2
```

.. _pip: <https://pip.pypa.io/en/stable/getting-started/>

In A Nutshell

.. code-block:: jinja

```
{% extends "base.html" %}
{% block title %}Members{% endblock %}
{% block content %}
<ul>
  {% for user in users %}
    <li><a href="{{ user.url }}">{{ user.username }}</a></li>
  {% endfor %}
</ul>
{% endblock %}
```

Donate

The Pallets organization develops and supports Jinja and other popular packages. In order to grow the community of contributors and users, and allow the maintainers to devote more time to the projects, `please donate today`_.

.. _please donate today: <https://palletsprojects.com/donate>

Links

- Documentation: <https://jinja.palletsprojects.com/>
- Changes: <https://jinja.palletsprojects.com/changes/>
- PyPI Releases: <https://pypi.org/project/Jinja2/>
- Source Code: <https://github.com/pallets/jinja/>
- Issue Tracker: <https://github.com/pallets/jinja/issues/>
- Website: <https://palletsprojects.com/p/jinja/>
- Twitter: <https://twitter.com/PalletsTeam>
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Found in path(s):

* /opt/cola/permits/1424481804_1663911106.3617206/0/jinja2-3-0-3-orig-1-tar-gz/Jinja2-3.0.3/PKG-INFO

* /opt/cola/permits/1424481804_1663911106.3617206/0/jinja2-3-0-3-orig-1-tar-gz/Jinja2-3.0.3/src/Jinja2.egg-info/PKG-INFO

No license file was found, but licenses were detected in source scan.

[metadata]

name = Jinja2

version = attr: jinja2.__version__

url = <https://palletsprojects.com/p/jinja/>

project_urls =

Donate = <https://palletsprojects.com/donate>

Documentation = <https://jinja.palletsprojects.com/>

Changes = <https://jinja.palletsprojects.com/changes/>

Source Code = <https://github.com/pallets/jinja/>

Issue Tracker = <https://github.com/pallets/jinja/issues/>

Twitter = <https://twitter.com/PalletsTeam>

Chat = <https://discord.gg/pallets>

license = BSD-3-Clause

license_files = LICENSE.rst

author = Armin Ronacher

author_email = armin.ronacher@active-4.com

maintainer = Pallets

maintainer_email = contact@palletsprojects.com

description = A very fast and expressive template engine.

long_description = file: README.rst

long_description_content_type = text/x-rst

classifiers =

Development Status :: 5 - Production/Stable

Environment :: Web Environment

Intended Audience :: Developers

License :: OSI Approved ::

BSD License

Operating System :: OS Independent

Programming Language :: Python

Topic :: Internet :: WWW/HTTP :: Dynamic Content

Topic :: Text Processing :: Markup :: HTML

[options]

```
packages = find:
package_dir == src
include_package_data = true
python_requires = >= 3.6

[options.packages.find]
where = src

[options.entry_points]
babel.extractors =
jinja2 = jinja2.ext:babel_extract[i18n]

[tool:pytest]
testpaths = tests
filterwarnings =
error
ignore:The loop argument:DeprecationWarning:asyncio[.]base_events:542

[coverage:run]
branch = True
source =
jinja2
tests

[coverage:paths]
source =
src
*/site-packages

[flake8]
select = B, E, F, W, B9, ISC
ignore =
E203
E501
E722
W503
max-line-length = 80
per-file-ignores =
src/jinja2/__init__.py: F401

[mypy]
files = src/jinja2
python_version = 3.6
disallow_subclassing_any = True
disallow_untyped_calls = True
disallow_untyped_defs = True
disallow_incomplete_defs = True
no_implicit_optional = True
```

```
local_partial_types = True
no_implicit_reexport
= True
strict_equality = True
warn_redundant_casts = True
warn_unused_configs = True
warn_unused_ignores = True
warn_return_any = True
warn_unreachable = True
```

```
[mypy-jinja2.defaults]
no_implicit_reexport = False
```

```
[mypy-markupsafe]
no_implicit_reexport = False
```

```
[egg_info]
tag_build =
tag_date = 0
```

Found in path(s):

```
* /opt/cola/permits/1424481804_1663911106.3617206/0/jinja2-3-0-3-orig-1-tar-gz/Jinja2-3.0.3/setup.cfg
```

1.281 libmodule-scandeps-perl 1.31-1

1.281.1 Available under license :

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The hypothetical commands

```
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```

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it under the terms of the GNU General Public License as published by  
the Free Software Foundation; either version 2 of  
the License, or  
(at your option) any later version.
```

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```
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Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
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```

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```
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```

```
<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
```

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1.285 zerofree 1.1.1-1build3

1.285.1 Available under license :

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Version 2, June 1991

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```
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```

```
<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
```

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1.286 libmspack 0.10.1-2build2

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Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6.

Any executables

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1.287 pyopenssl 21.0.0-1

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In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see <http://www.cnri.reston.va.us>) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations, which became Zope Corporation. In 2001, the Python Software Foundation (PSF, see <https://www.python.org/psf/>) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation was a sponsoring member of the PSF.

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1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
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2.0	1.6	2000	BeOpen.com	no
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2.1.1	2.1+2.0.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes
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1.292 python-oauthlib 3.2.0-1ubuntu0.1

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1.293 libnsl 1.3.0-2build2

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1.294 python-stdlib-extensions 3.10.6-1~22.04

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A. HISTORY OF THE SOFTWARE

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Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see <http://www.cwi.nl>) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see <http://www.cnri.reston.va.us>) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations, which became Zope Corporation. In 2001, the Python Software Foundation (PSF, see <https://www.python.org/psf/>) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation was a sponsoring member of the PSF.

All

Python releases are Open Source (see <http://www.opensource.org> for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

Release	Derived from	Year	Owner	GPL-compatible? (1)
0.9.0 thru 1.2		1991-1995	CWI	yes
1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
1.6	1.5.2	2000	CNRI	no
2.0	1.6	2000	BeOpen.com	no
1.6.1	1.6	2001	CNRI	yes (2)
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2.0.1	2.0+1.6.1	2001	PSF	yes
2.1.1	2.1+2.0.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes
2.1.3	2.1.2	2002	PSF	yes
2.2 and above	2.1.1	2001-now	PSF	yes

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```
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This is free software, and you are welcome to redistribute it
under certain conditions; type `show c'
for details.
```

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```
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```

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<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
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1.299 scowl 2020.12.07-2

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The author has also released the source code to "anagram" and "multi" (multiple word anagram) into the Public Domain. He had previously posted these utilities on the "alt.sources" newsgroup in shar archive form.

Please feel free to use the word list and/or source code in your own projects. It is, in fact, the intent of the author that this package inspire word game software for the Linux platform. If you use any portion of YAWL, please, as a courtesy, give credit to its author.

1.300 zlib 1.2.11.dfsg-2ubuntu9.2

1.300.1 Available under license :

No license file was found, but licenses were detected in source scan.

```
/* gzlog.h
```

```
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version 2.2, 14 Aug 2012
```

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Mark Adler madler@alumni.caltech.edu

*/

Found in path(s):

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/examples/gzlog.h

No license file was found, but licenses were detected in source scan.

/* inflate.c -- zlib decompression

* Copyright (C) 1995-2016 Mark Adler

* For conditions of distribution and use, see copyright notice in zlib.h

*/

Found in path(s):

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/inflate.c

No license file was found, but licenses were detected in source scan.

/* unzip.c -- IO for uncompress .zip files using zlib

Version 1.1, February 14h, 2010

part of the MiniZip project - (<http://www.winimage.com/zLibDll/minizip.html>)

Copyright (C) 1998-2010 Gilles Vollant (minizip) (<http://www.winimage.com/zLibDll/minizip.html>)

Modifications of Unzip for Zip64

Copyright (C) 2007-2008 Even Rouault

Modifications for Zip64 support on both zip and unzip

Copyright (C) 2009-2010 Mathias Svensson (<http://result42.com>)

For more info read MiniZip_info.txt

Decryption code comes from crypt.c by Info-ZIP but has been greatly reduced in terms of compatibility with older software. The following is from the original crypt.c.

Code woven in by Terry Thorsen 1/2003.

Copyright (c) 1990-2000 Info-ZIP. All rights reserved.

See the accompanying
file LICENSE, version 2000-Apr-09 or later
(the contents of which are also included in zip.h) for terms of use.
If, for some reason, all these files are missing, the Info-ZIP license
also may be found at: <ftp://ftp.info-zip.org/pub/infozip/license.html>

crypt.c (full version) by Info-ZIP. Last revised: [see crypt.h]

The encryption/decryption parts of this source code (as opposed to the
non-echoing password parts) were originally written in Europe. The
whole source package can be freely distributed, including from the USA.
(Prior to January 2000, re-export from the US was a violation of US law.)

This encryption code is a direct transcription of the algorithm from
Roger Schlafly, described by Phil Katz in the file appnote.txt. This
file (appnote.txt) is distributed with the PKZIP program (even in the
version without encryption capabilities).

Changes in unzip.c

2007-2008 - Even Rouault - Addition of cpl_unzGetCurrentFileZStreamPos
2007-2008 - Even Rouault - Decoration of symbol names unz* -> cpl_unz*
2007-2008 - Even Rouault - Remove old C style function prototypes
2007-2008 - Even Rouault - Add unzip support for ZIP64

Copyright (C) 2007-2008 Even Rouault

Oct-2009 - Mathias Svensson - Removed cpl_* from symbol names (Even Rouault added them but since this is
now moved to a new project (minizip64) I renamed them again).

Oct-2009 - Mathias Svensson - Fixed problem if uncompressed size was > 4G and compressed size was <4G
should only read the compressed/uncompressed size from the Zip64 format if
the size from normal header was 0xFFFFFFFF

Oct-2009 - Mathias Svensson - Applied some bug fixes from patches received from Gilles Vollant

Oct-2009 - Mathias Svensson - Applied support to unzip files with compression method
BZIP2 (bzip2 lib is required)

Patch created by Daniel Borca

Jan-2010 - back to unzip and minizip 1.0 name scheme, with compatibility layer

Copyright (C) 1998 - 2010 Gilles Vollant, Even Rouault, Mathias Svensson

*/

Found in path(s):

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/contrib/minizip/unzip.c

No license file was found, but licenses were detected in source scan.

/* zip.h -- IO on .zip files using zlib

Version 1.1, February 14h, 2010

part of the MiniZip project - (<http://www.winimage.com/zLibDll/minizip.html>)

Copyright (C) 1998-2010 Gilles Vollant (minizip) (<http://www.winimage.com/zLibDll/minizip.html>)

Modifications for Zip64 support

Copyright (C) 2009-2010 Mathias Svensson (<http://result42.com>)

For more info read MiniZip_info.txt

Condition of use and distribution are the same than zlib :

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Changes

See header of zip.h

*/

Found in path(s):

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/contrib/minizip/zip.h

No license file was found, but licenses were detected in source scan.

```
/* trees.c -- output deflated data using Huffman coding
* Copyright (C) 1995-2017 Jean-loup Gailly
* detect_data_type() function provided freely by Cosmin Truta, 2006
* For conditions of distribution and use, see copyright notice in zlib.h
*/
```

Found in path(s):

```
* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfs/trees.c
```

No license file was found, but licenses were detected in source scan.

```
/* fitblk.c: example of fitting compressed output to a specified size
Not copyrighted -- provided to the public domain
Version 1.1 25 November 2004 Mark Adler */
```

Found in path(s):

```
* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfs/examples/fitblk.c
```

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Found in path(s):

```
* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfs/zlib.3
```

No license file was found, but licenses were detected in source scan.

```
/* inftrees.c -- generate Huffman trees for efficient decoding
* Copyright (C) 1995-2017 Mark Adler
* For conditions of distribution and use, see copyright notice in zlib.h
*/
```

Found in path(s):

```
* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfs/inftrees.c
```

No license file was found, but licenses were detected in source scan.

```
/* gzwrite.c -- zlib functions for writing gzip files
* Copyright (C) 2004-2017 Mark Adler
* For conditions of distribution and use, see copyright notice in zlib.h
*/
```

Found in path(s):

```
* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfs/gzwrite.c
```

No license file was found, but licenses were detected in source scan.

Not copyrighted -- provided to the public domain

Found in path(s):

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/examples/zlib_how.html

No license file was found, but licenses were detected in source scan.

/* uncompr.c -- decompress a memory buffer

* Copyright (C) 1995-2003, 2010, 2014, 2016 Jean-loup Gailly, Mark Adler

* For conditions of distribution and use, see copyright notice in zlib.h

*/

Found in path(s):

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/uncompr.c

No license file was found, but licenses were detected in source scan.

/*

Additional tools for Minizip

Code: Xavier Roche '2004

License: Same as ZLIB (www.gzip.org)

*/

Found in path(s):

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/contrib/minizip/mztools.h

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/contrib/minizip/mztools.c

No license file was found, but licenses were detected in source scan.

/* zran.c -- example of zlib/gzip stream indexing and random access

* Copyright (C) 2005, 2012 Mark Adler

* For conditions of distribution and use, see copyright notice in zlib.h

Version 1.1 29 Sep 2012 Mark Adler */

Found in path(s):

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/examples/zran.c

No license file was found, but licenses were detected in source scan.

/* gzguts.h -- zlib internal header definitions for gz* operations

* Copyright (C) 2004, 2005, 2010, 2011, 2012, 2013, 2016 Mark Adler

* For conditions of distribution and use, see copyright notice in zlib.h

*/

Found in path(s):

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/gzguts.h

No license file was found, but licenses were detected in source scan.

/* gzappend -- command to append to a gzip file

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version 1.2, 11 Oct 2012

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Mark Adler madler@alumni.caltech.edu

*/

Found in path(s):

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/examples/gzappend.c

No license file was found, but licenses were detected in source scan.

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Found in path(s):

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/msdos/Makefile.dj2

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/old/os2/Makefile.os2

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/old/Makefile.emx

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/msdos/Makefile.emx

No license file was found, but licenses were detected in source scan.

/* Adler32.c -- compute the Adler-32 checksum of a data stream

* Copyright (C) 1995-2011, 2016 Mark Adler

* For conditions of distribution and use, see copyright notice in zlib.h

*/

Found in path(s):

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/adler32.c

No license file was found, but licenses were detected in source scan.

/* inflate.h -- internal inflate state definition

* Copyright (C) 1995-2016 Mark Adler

* For conditions of distribution and use, see copyright notice in zlib.h

*/

Found in path(s):

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/inflate.h

No license file was found, but licenses were detected in source scan.

/* zconf.h -- configuration of the zlib compression library

* Copyright (C) 1995-2016 Jean-loup Gailly, Mark Adler

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*/

Found in path(s):

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/zconf.h

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/zconf.h.in

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-

1.2.11.dfsg/zconf.h.cmakein

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/*

* gzlog.c

* Copyright (C) 2004, 2008, 2012, 2016 Mark Adler, all rights reserved

* For conditions of distribution and use, see copyright notice in gzlog.h

* version 2.2, 14 Aug 2012

*/

Found in path(s):

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-

1.2.11.dfsg/examples/gzlog.c

No license file was found, but licenses were detected in source scan.

/* infcover.c -- test zlib's inflate routines with full code coverage

* Copyright (C) 2011, 2016 Mark Adler

* For conditions of distribution and use, see copyright notice in zlib.h

*/

Found in path(s):

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-

1.2.11.dfsg/test/infcover.c

No license file was found, but licenses were detected in source scan.

/* gzlib.c -- zlib functions common to reading and writing gzip files

- * Copyright (C) 2004-2017 Mark Adler
- * For conditions of distribution and use, see copyright notice in zlib.h
- */

Found in path(s):

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/gzlib.c

No license file was found, but licenses were detected in source scan.

MiniZip - Copyright (c) 1998-2010 - by Gilles Vollant - version 1.1 64 bits from Mathias Svensson

Introduction

MiniZip 1.1 is built from MiniZip 1.0 by Gilles Vollant (<http://www.winimage.com/zLibDll/minizip.html>)

When adding ZIP64 support into minizip it would result into risk of breaking compatibility with minizip 1.0.
All possible work was done for compatibility.

Background

When adding ZIP64 support Mathias Svensson found that Even Rouault have added ZIP64 support for unzip.c into minizip for a open source project called gdal (<http://www.gdal.org/>)

That was used as a starting point. And after that ZIP64 support was added to zip.c
some refactoring and code cleanup was also done.

Changed from MiniZip 1.0 to MiniZip 1.1

- * Added ZIP64 support for unzip (by Even Rouault)
- * Added ZIP64 support for zip (by Mathias Svensson)
- * Reverted some changed that Even Rouault did.
- * Bunch of patches received from Guller Vollant that he received for MiniZip from various users.
- * Added unzip patch for BZIP Compression method (patch create by Daniel Borca)
- * Added BZIP Compress method for zip
- * Did some refactoring and code cleanup

Credits

Gilles Vollant - Original MiniZip author
Even Rouault - ZIP64 unzip Support
Daniel Borca - BZip Compression method support in unzip
Mathias Svensson - ZIP64 zip support
Mathias Svensson - BZip Compression method support in zip

Resources

ZipLayout <http://result42.com/projects/ZipFileLayout>

Command line tool for Windows that shows the layout and information of the headers in a zip archive.

Used when debugging and validating the creation of zip files using MiniZip64

ZIP App Note <http://www.pkware.com/documents/casestudies/APPNOTE.TXT>

Zip File specification

Notes.

* To be able to use BZip compression method in zip64.c or unzip64.c the BZIP2 lib is needed and HAVE_BZIP2 need to be defined.

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Found in path(s):

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/contrib/minizip/MiniZip64_info.txt

No license file was found, but licenses were detected in source scan.

/* zutil.c -- target dependent utility functions for the compression library

* Copyright (C) 1995-2017 Jean-loup Gailly

* For conditions of distribution and use, see copyright notice in zlib.h

*/

Found in path(s):

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/zutil.c
No license file was found, but licenses were detected in source scan.

/* zpipe.c: example of proper use of zlib's inflate() and deflate()
Not copyrighted -- provided to the public domain
Version 1.4 11 December 2005 Mark Adler */

Found in path(s):

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/examples/zpipe.c
No license file was found, but licenses were detected in source scan.

/* gzjoin -- command to join gzip files into one gzip file

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version 1.2, 14 Aug 2012

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*/

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* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/examples/gzjoin.c
No license file was found, but licenses were detected in source scan.

/* zutil.h -- internal interface and configuration of the compression library
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*/

Found in path(s):

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/zutil.h
No license file was found, but licenses were detected in source scan.

```
/* gzread.c -- zlib functions for reading gzip files
 * Copyright (C) 2004, 2005, 2010, 2011, 2012, 2013, 2016 Mark Adler
 * For conditions of distribution and use, see copyright notice in zlib.h
 */
```

Found in path(s):

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/gzread.c
No license file was found, but licenses were detected in source scan.

```
/* gzclos.c -- zlib gzclos() function
 * Copyright (C) 2004, 2010 Mark Adler
 * For conditions of distribution and use, see copyright notice in zlib.h
 */
```

Found in path(s):

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/gzclos.c
No license file was found, but licenses were detected in source scan.

```
/* inftrees.h -- header to use inftrees.c
 * Copyright (C) 1995-2005, 2010 Mark Adler
 * For conditions of distribution and use, see copyright notice in zlib.h
 */
```

Found in path(s):

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/inftrees.h
No license file was found, but licenses were detected in source scan.

```
/* zlib.h -- interface of the 'zlib' general purpose compression library
 version 1.2.11, January 15th, 2017
```

Copyright (C) 1995-2017 Jean-loup Gailly and Mark Adler

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Jean-loup Gailly Mark Adler
jloup@gzip.org madler@alumni.caltech.edu

The data format used by the zlib library is described by RFCs (Request for Comments) 1950 to 1952 in the files <http://tools.ietf.org/html/rfc1950> (zlib format), [rfc1951](http://tools.ietf.org/html/rfc1951) (deflate format) and [rfc1952](http://tools.ietf.org/html/rfc1952) (gzip format).

*/

Found in path(s):

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/zlib.h

No license file was found, but licenses were detected in source scan.

/* infback.c -- inflate using a call-back interface

* Copyright (C) 1995-2016 Mark Adler

* For conditions of distribution and use, see copyright notice in zlib.h

*/

Found in path(s):

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/infback.c

No license file was found, but licenses were detected in source scan.

/* minigzip.c -- simulate gzip using the zlib compression library

* Copyright (C) 1995-2006, 2010, 2011, 2016 Jean-loup Gailly

* For conditions of distribution and use, see copyright notice in zlib.h

*/

Found in path(s):

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/test/minigzip.c

No license file was found, but licenses were detected in source scan.

Frequently Asked Questions about zlib

If your question is not there, please check the zlib home page

<http://zlib.net/> which may have more recent information.

The latest zlib FAQ is at http://zlib.net/zlib_faq.html

1. Is zlib Y2K-compliant?

Yes. zlib doesn't handle dates.

2. Where can I get a Windows DLL version?

The zlib sources can be compiled without change to produce a DLL. See the file win32/DLL_FAQ.txt in the zlib distribution. Pointers to the precompiled DLL are found in the zlib web site at <http://zlib.net/> .

3. Where can I get a Visual Basic interface to zlib?

See

- * <http://marknelson.us/1997/01/01/zlib-engine/>
- * win32/DLL_FAQ.txt in the zlib distribution

4. compress() returns Z_BUF_ERROR.

Make sure that before the call of compress(), the length of the compressed buffer is equal to the available size of the compressed buffer and not zero. For Visual Basic, check that this parameter is passed by reference ("as any"), not by value ("as long").

5. deflate() or inflate() returns Z_BUF_ERROR.

Before making the call, make sure that avail_in and avail_out are not zero. When setting the parameter flush equal to Z_FINISH, also make sure that avail_out is big enough to allow processing all pending input. Note that a Z_BUF_ERROR is not fatal--another call to deflate() or inflate() can be made with more input or output space. A Z_BUF_ERROR may in fact be unavoidable depending on how the functions are used, since it is not possible to tell whether or not there is more output pending when strm.avail_out returns with zero. See http://zlib.net/zlib_how.html for a heavily annotated example.

6. Where's the zlib documentation (man pages, etc.)?

It's in zlib.h . Examples of zlib usage are in the files test/example.c and test/minigzip.c, with more in examples/ .

7. Why don't you use GNU autoconf or libtool or ...?

Because we would like to keep zlib as a very small and simple package. zlib is rather portable and doesn't need much configuration.

8. I found a bug in zlib.

Most of the time, such problems are due to an incorrect usage of zlib. Please try to reproduce the problem with a small program and send the corresponding source to us at zlib@gzip.org . Do not send multi-megabyte data files without prior agreement.

9. Why do I get "undefined reference to gzputc"?

If "make test" produces something like

```
example.o(.text+0x154): undefined reference to `gzputc'
```

check that you don't have old files libz.* in /usr/lib, /usr/local/lib or /usr/X11R6/lib. Remove any old versions, then do "make install".

10. I need a Delphi interface to zlib.

See the contrib/delphi directory in the zlib distribution.

11. Can zlib handle .zip archives?

Not by itself, no. See the directory contrib/minizip in the zlib distribution.

12.

Can zlib handle .Z files?

No, sorry. You have to spawn an uncompress or gunzip subprocess, or adapt the code of uncompress on your own.

13. How can I make a Unix shared library?

By default a shared (and a static) library is built for Unix. So:

```
make distclean
./configure
make
```

14. How do I install a shared zlib library on Unix?

After the above, then:

```
make install
```

However, many flavors of Unix come with a shared zlib already installed. Before going to the trouble of compiling a shared version of zlib and trying to install it, you may want to check if it's already there! If you can `#include <zlib.h>`, it's there. The `-lz` option will probably link to it. You can check the version at the top of `zlib.h` or with the `ZLIB_VERSION` symbol defined in `zlib.h`.

15. I have a question about OttoPDF.

We are not the authors of OttoPDF. The real author is on the OttoPDF web site: Joel Hainley, jhainley@myndkryme.com.

16.

Can zlib decode Flate data in an Adobe PDF file?

Yes. See <http://www.pdflib.com/> . To modify PDF forms, see <http://sourceforge.net/projects/acroformtool/> .

17. Why am I getting this "register_frame_info not found" error on Solaris?

After installing zlib 1.1.4 on Solaris 2.6, running applications using zlib generates an error such as:

```
ld.so.1: rpm: fatal: relocation error: file /usr/local/lib/libz.so:
symbol __register_frame_info: referenced symbol not found
```

The symbol `__register_frame_info` is not part of zlib, it is generated by the C compiler (cc or gcc). You must recompile applications using zlib which have this problem. This problem is specific to Solaris. See <http://www.sunfreeware.com> for Solaris versions of zlib and applications using zlib.

18. Why does gzip give an error on a file I make with compress/deflate?

The compress and deflate functions produce data in the zlib format, which is different and incompatible with the gzip format. The `gz*` functions in zlib on the other hand use the gzip format. Both the zlib and gzip formats use the same compressed data format internally, but have different headers and trailers around the compressed data.

19. Ok, so why are there two different formats?

The gzip format was designed to retain the directory information about a single file, such as the name and last modification date. The zlib format on the other hand was designed for in-memory and communication channel applications, and has a much more compact header and trailer and uses a faster integrity check than gzip.

20. Well that's nice, but how do I make a gzip file in memory?

You can request that deflate write the gzip format instead of the zlib format using `deflateInit2()`. You can also request that inflate decode the gzip format using `inflateInit2()`. Read `zlib.h` for more details.

21. Is zlib thread-safe?

Yes. However any library routines that zlib uses and any application-provided memory allocation routines must also be thread-safe. zlib's gz* functions use stdio library routines, and most of zlib's functions use the library memory allocation routines by default. zlib's *Init* functions allow for the application to provide custom memory allocation routines.

Of course, you should only operate on any given zlib or gzip stream from a single thread at a time.

22. Can I use zlib in my commercial application?

Yes. Please read the license in zlib.h.

23. Is zlib under the GNU license?

No. Please read the license in zlib.h.

24. The license says that altered source versions must be "plainly marked". So what exactly do I need to do to meet that requirement?

You need to change the ZLIB_VERSION and ZLIB_VERNUM #defines in zlib.h. In particular, the final version number needs to be changed to "f", and an identification string should be appended to ZLIB_VERSION. Version numbers x.x.x.f are reserved for modifications to zlib by others than the zlib maintainers. For example, if the version of the base zlib you are altering is "1.2.3.4", then in zlib.h you should change ZLIB_VERNUM to 0x123f, and ZLIB_VERSION to something like "1.2.3.f-zachary-mods-v3". You can also update the version strings in deflate.c and infrees.c.

For altered source distributions, you should also note the origin and nature of the changes in zlib.h, as well as in ChangeLog and README, along with the dates of the alterations. The origin should include at least your name (or your company's name), and an email address to contact for help or issues with the library.

Note that distributing a compiled zlib library along with zlib.h and zconf.h is also a source distribution, and so you should change ZLIB_VERSION and ZLIB_VERNUM and note the origin and nature of the changes in zlib.h as you would for a full source distribution.

25.

Will zlib work on a big-endian or little-endian architecture, and can I exchange compressed data between them?

Yes and yes.

26. Will zlib work on a 64-bit machine?

Yes. It has been tested on 64-bit machines, and has no dependence on any data types being limited to 32-bits in length. If you have any difficulties, please provide a complete problem report to zlib@gzip.org

27. Will zlib decompress data from the PKWare Data Compression Library?

No. The PKWare DCL uses a completely different compressed data format than does PKZIP and zlib. However, you can look in zlib's contrib/blast directory for a possible solution to your problem.

28. Can I access data randomly in a compressed stream?

No, not without some preparation. If when compressing you periodically use `Z_FULL_FLUSH`, carefully write all the pending data at those points, and keep an index of those locations, then you can start decompression at those points. You have to be careful to not use `Z_FULL_FLUSH` too often, since it can significantly degrade compression. Alternatively, you can scan a deflate stream once to generate an index, and then use that index for random access. See `examples/zran.c`.

29. Does zlib work on MVS, OS/390, CICS, etc.?

It has in the past, but we have not heard of any recent evidence. There were working ports of zlib 1.1.4 to MVS, but those links no longer work. If you know of recent, successful applications of zlib on these operating systems, please let us know. Thanks.

30. Is there some simpler, easier to read version of inflate I can look at to understand the deflate format?

First off, you should read RFC 1951. Second, yes. Look in zlib's contrib/puff directory.

31. Does zlib infringe on any patents?

As far as we know, no. In fact, that was originally the whole point behind zlib. Look here for some more information:

<http://www.gzip.org/#faq11>

32. Can zlib work with greater than 4 GB of data?

Yes. `inflate()` and `deflate()` will process any amount of data correctly. Each call of `inflate()` or `deflate()` is limited to input and output chunks of the maximum value that can be stored in the compiler's "unsigned int"

type, but there is no limit to the number of chunks. Note however that the `strm.total_in` and `strm_total_out` counters may be limited to 4 GB. These counters are provided as a convenience and are not used internally by `inflate()` or `deflate()`. The application can easily set up its own counters updated after each call of `inflate()` or `deflate()` to count beyond 4 GB. `compress()` and `uncompress()` may be limited to 4 GB, since they operate in a single call. `gzseek()` and `gztell()` may be limited to 4 GB depending on how `zlib` is compiled. See the `zlibCompileFlags()` function in `zlib.h`.

The word "may" appears several times above since there is a 4 GB limit only if the compiler's "long" type is 32 bits. If the compiler's "long" type is 64 bits, then the limit is 16 exabytes.

33. Does `zlib` have any security vulnerabilities?

The only one that we are aware of is potentially in `gzprintf()`. If `zlib` is compiled to use `sprintf()` or `vsprintf()`, then there is no protection against a buffer overflow of an 8K string space (or other value as set by `gzbuffer()`), other than the caller of `gzprintf()` assuring that the output will not exceed 8K. On the other hand, if `zlib` is compiled to use `snprintf()` or `vsnprintf()`, which should normally be the case, then there is no vulnerability. The `./configure` script will display warnings if an insecure variation of `sprintf()` will be used by `gzprintf()`. Also the `zlibCompileFlags()` function will return information on what variant of `sprintf()` is used by `gzprintf()`.

If you don't have `snprintf()` or `vsnprintf()` and would like one, you can find a portable implementation here:

<http://www.ijs.si/software/snprintf/>

Note that you should be using the most recent version of `zlib`. Versions 1.1.3 and before were subject to a double-free vulnerability, and versions 1.2.1 and 1.2.2 were subject to an access exception when decompressing invalid compressed data.

34. Is there a Java version of `zlib`?

Probably what you want is to use `zlib` in Java. `zlib` is already included as part of the Java SDK in the `java.util.zip` package. If you really want a version of `zlib` written in the Java language, look on the `zlib` home page for links: <http://zlib.net/>.

35. I get this or that compiler or source-code scanner warning when I crank it up to maximally-pedantic. Can't you guys write proper code?

Many years ago, we gave up attempting to avoid warnings on every compiler

in the universe. It just got to be a waste of time, and some compilers were downright silly as well as contradicted each other. So now, we simply make sure that the code always works.

36. Valgrind (or some similar memory access checker) says that deflate is performing a conditional jump that depends on an uninitialized value. Isn't that a bug?

No. That is intentional for performance reasons, and the output of deflate is not affected. This only started showing up recently since zlib 1.2.x uses malloc() by default for allocations, whereas earlier versions used calloc(), which zeros out the allocated memory. Even though the code was correct, versions 1.2.4 and later was changed to not stimulate these checkers.

37. Will zlib read the (insert any ancient or arcane format here) compressed data format?

Probably not. Look in the comp.compression FAQ for pointers to various formats and associated software.

38. How can I encrypt/decrypt zip files with zlib?

zlib doesn't support encryption. The original PKZIP encryption is very weak and can be broken with freely available programs. To get strong encryption, use GnuPG, <http://www.gnupg.org/>, which already includes zlib compression. For PKZIP compatible "encryption", look at <http://www.info-zip.org/>

39. What's the difference between the "gzip" and "deflate" HTTP 1.1 encodings?

"gzip" is the gzip format, and "deflate" is the zlib format. They should probably have called the second one "zlib" instead to avoid confusion with the raw deflate compressed data format. While the HTTP 1.1 RFC 2616 correctly points to the zlib specification in RFC 1950 for the "deflate" transfer encoding, there have been reports of servers and browsers that incorrectly produce or expect raw deflate data per the deflate specification in RFC 1951, most notably Microsoft. So even though the "deflate" transfer encoding using the zlib format would be the more efficient approach (and in fact exactly what the zlib format was designed for), using the "gzip" transfer encoding is probably more reliable due to an unfortunate choice of name on the part of the HTTP 1.1 authors.

Bottom line: use the gzip format for HTTP 1.1 encoding.

40. Does zlib support the new "Deflate64" format introduced by PKWare?

No. PKWare has apparently decided to keep that format proprietary, since they have not documented it as they have previous compression formats. In any case, the compression improvements are so modest compared to other more modern approaches, that it's not worth the effort to implement.

41. I'm having a problem with the zip functions in zlib, can you help?

There are no zip functions in zlib. You are probably using minizip by Giles Vollant, which is found in the contrib directory of zlib. It is not part of zlib. In fact none of the stuff in contrib is part of zlib. The files in there are not supported by the zlib authors. You need to contact the authors of the respective contribution for help.

42. The match.asm code in contrib is under the GNU General Public License.

Since it's part of zlib, doesn't that mean that all of zlib falls under the GNU GPL?

No. The files in contrib are not part of zlib. They were contributed by other authors and are provided as a convenience to the user within the zlib distribution. Each item in contrib has its own license.

43. Is zlib subject to export controls? What is its ECCN?

zlib is not subject to export controls, and so is classified as EAR99.

44. Can you please sign these lengthy legal documents and fax them back to us so that we can use your software in our product?

No. Go away. Shoo.

Found in path(s):

```
* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/FAQ
No license file was found, but licenses were detected in source scan.
```

```
/* compress.c -- compress a memory buffer
* Copyright (C) 1995-2005, 2014, 2016 Jean-loup Gailly, Mark Adler
* For conditions of distribution and use, see copyright notice in zlib.h
*/
```

Found in path(s):

```
* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/compress.c
No license file was found, but licenses were detected in source scan.
```

```
/* inffast.h -- header to use inffast.c
* Copyright (C) 1995-2003, 2010 Mark Adler
```

* For conditions of distribution and use, see copyright notice in zlib.h

*/

Found in path(s):

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/inffast.h

No license file was found, but licenses were detected in source scan.

/* gun.c -- simple gunzip to give an example of the use of inflateBack()

* Copyright (C) 2003, 2005, 2008, 2010, 2012 Mark Adler

* For conditions of distribution and use, see copyright notice in zlib.h

Version 1.7 12 August 2012 Mark Adler */

Found in path(s):

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-

1.2.11.dfsg/examples/gun.c

No license file was found, but licenses were detected in source scan.

/* example.c -- usage example of the zlib compression library

* Copyright (C) 1995-2006, 2011, 2016 Jean-loup Gailly

* For conditions of distribution and use, see copyright notice in zlib.h

*/

Found in path(s):

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-

1.2.11.dfsg/test/example.c

No license file was found, but licenses were detected in source scan.

/* deflate.c -- compress data using the deflation algorithm

* Copyright (C) 1995-2017 Jean-loup Gailly and Mark Adler

* For conditions of distribution and use, see copyright notice in zlib.h

*/

Found in path(s):

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/deflate.c

No license file was found, but licenses were detected in source scan.

/* crc32.c -- compute the CRC-32 of a data stream

* Copyright (C) 1995-2006, 2010, 2011, 2012, 2016 Mark Adler

* For conditions of distribution and use, see copyright notice in zlib.h

*

* Thanks to Rodney Brown <rbrown64@csc.com.au> for his contribution of faster

* CRC methods: exclusive-oring 32 bits of data at a time, and pre-computing

* tables for updating the shift register in one step with three exclusive-ors

* instead of four steps with four exclusive-ors. This results in about a

* factor of two increase in speed on a Power PC G4 (PPC7455) using gcc -O3.

*/

Found in path(s):

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/crc32.c
No license file was found, but licenses were detected in source scan.

/* deflate.h -- internal compression state
* Copyright (C) 1995-2016 Jean-loup Gailly
* For conditions of distribution and use, see copyright notice in zlib.h
*/

Found in path(s):

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/deflate.h
No license file was found, but licenses were detected in source scan.

/* unzip.h -- IO for uncompress .zip files using zlib
Version 1.1, February 14h, 2010
part of the MiniZip project - (<http://www.winimage.com/zLibDll/minizip.html>)

Copyright (C) 1998-2010 Gilles Vollant (minizip) (<http://www.winimage.com/zLibDll/minizip.html>)

Modifications of Unzip for Zip64
Copyright (C) 2007-2008 Even Rouault

Modifications for Zip64 support on both zip and unzip
Copyright (C) 2009-2010 Mathias Svensson (<http://result42.com>)

For more info read MiniZip_info.txt

Condition of use and distribution are the same than zlib :

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2. Altered source versions must be plainly marked as such, and must not be misrepresented as being the original software.
3. This notice may not be removed or altered from any source distribution.

Changes

See header of unzip64.c

*/

Found in path(s):

* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/contrib/minizip/unzip.h

No license file was found, but licenses were detected in source scan.

ZLIB DATA COMPRESSION LIBRARY

zlib 1.2.11 is a general purpose data compression library. All the code is thread safe. The data format used by the zlib library is described by RFCs (Request for Comments) 1950 to 1952 in the files <http://tools.ietf.org/html/rfc1950> (zlib format), [rfc1951](http://tools.ietf.org/html/rfc1951) (deflate format) and [rfc1952](http://tools.ietf.org/html/rfc1952) (gzip format).

All functions of the compression library are documented in the file `zlib.h` (volunteer to write man pages welcome, contact zlib@gzip.org). A usage example of the library is given in the file `test/example.c` which also tests that the library is working correctly. Another example is given in the file `test/minigzip.c`. The compression library itself is composed of all source files in the root directory.

To compile all files and run the test program, follow the instructions given at the top of `Makefile.in`. In short `./configure; make test`, and if that goes well, `make install` should work for most flavors of Unix. For Windows, use one of the special makefiles in `win32/` or `contrib/vstudio/`. For VMS, use `make_vms.com`.

Questions about zlib should be sent to [<zlib@gzip.org>](mailto:zlib@gzip.org), or to Gilles Vollant [<info@winimage.com>](mailto:info@winimage.com) for the Windows DLL version. The zlib home page is <http://zlib.net/>. Before reporting a problem, please check this site to verify that you have the latest version of zlib; otherwise get the latest version and check whether the problem still exists or not.

PLEASE read the zlib FAQ http://zlib.net/zlib_faq.html before asking for help.

Mark Nelson [<markn@ieee.org>](mailto:markn@ieee.org) wrote an article about zlib for the Jan. 1997 issue of Dr. Dobbs's Journal; a copy of the article is available at <http://marknelson.us/1997/01/01/zlib-engine/>.

The changes made in version 1.2.11 are documented in the file `ChangeLog`.

Unsupported third party contributions are provided in directory contrib/ .

zlib is available in Java using the java.util.zip package, documented at <http://java.sun.com/developer/technicalArticles/Programming/compression/>

A Perl interface to zlib written by Paul Marquess <pmqs@cpan.org> is available at CPAN (Comprehensive Perl Archive Network) sites, including <http://search.cpan.org/~pmqs/IO-Compress-Zlib/> .

A Python interface to zlib written by A.M. Kuchling <amk@amk.ca> is available in Python 1.5 and later versions, see <http://docs.python.org/library/zlib.html> .

zlib is built into tcl: <http://wiki.tcl.tk/4610> .

An experimental package to read and write files in .zip format, written on top of zlib by Gilles Vollant <info@winimage.com>, is available in the contrib/minizip directory of zlib.

Notes for some targets:

- For Windows DLL versions, please see win32/DLL_FAQ.txt
- For 64-bit Irix, deflate.c must be compiled without any optimization. With -O, one libpng test fails. The test works in 32 bit mode (with the -n32 compiler flag). The compiler bug has been reported to SGI.
- zlib doesn't work with gcc 2.6.3 on a DEC 3000/300LX under OSF/1 2.1 it works when compiled with cc.
- On Digital Unix 4.0D (formely OSF/1) on AlphaServer, the cc option -std1 is necessary to get gzprintf working correctly. This is done by configure.
- zlib doesn't work on HP-UX 9.05 with some versions of /bin/cc. It works with other compilers. Use "make test" to check your compiler.
- gzdopen is not supported on RISCOS or BEOS.
- For PalmOs, see <http://palmzlib.sourceforge.net/>

Acknowledgments:

The deflate format used by zlib was defined by Phil Katz. The deflate and zlib specifications were written by L. Peter Deutsch. Thanks to all the

people who reported problems and suggested various improvements in zlib; they are too numerous to cite here.

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Jean-loup Gailly Mark Adler
jloup@gzip.org madler@alumni.caltech.edu

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```
* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/README
No license file was found, but licenses were detected in source scan.
```

```
/* inffast.c -- fast decoding
* Copyright (C) 1995-2017 Mark Adler
* For conditions of distribution and use, see copyright notice in zlib.h
*/
```

Found in path(s):

```
* /opt/cola/permits/1444731281_1666176765.8222194/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/inffast.c
```

1.301 d-bus 1.12.20-2ubuntu4.1

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1.302 x-crypto 0.0.0-20220829220503-c86fa9a7ed90

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%define name sqlite

```

%define version SQLITE_VERSION
%define release 1

Name: % {name}
Summary: SQLite is a C library that implements an embeddable SQL database engine
Version: % {version}
Release: % {release}
Source: % {name}-% {version}.tar.gz
Group: System/Libraries
URL: http://www.hwaci.com/sw/sqlite/
License: Public Domain
BuildRoot: % {_tmppath}/% {name}-% {version}-root

%description
SQLite is a C library that implements an embeddable SQL database engine.
Programs that link with the SQLite library can have SQL database access
without running a separate RDBMS process. The distribution comes with a
standalone command-line access program (sqlite) that can be used to
administer an SQLite database and which serves as an example of how to
use the SQLite library.

%package -n % {name}-devel
Summary: Header files and libraries for developing apps which will use sqlite
Group: Development/C
Requires: % {name} = % {version}-% {release}

%description
-n % {name}-devel
The sqlite-devel package contains the header files and libraries needed
to develop programs that use the sqlite database library.

%prep
%setup -q -n % {name}

%build
CFLAGS="%optflags -DNDEBUG=1" CXXFLAGS="%optflags -DNDEBUG=1" ./configure --prefix=% {_prefix}

make
make doc

%install
install -d $RPM_BUILD_ROOT/% {_prefix}
install -d $RPM_BUILD_ROOT/% {_prefix}/bin
install -d $RPM_BUILD_ROOT/% {_prefix}/include
install -d $RPM_BUILD_ROOT/% {_prefix}/lib
make install prefix=$RPM_BUILD_ROOT/% {_prefix}

%clean

```

```
rm -fr $RPM_BUILD_ROOT
```

```
%files
%defattr(-, root, root)
%{_libdir}/*.so*
%{_bindir}/*

%files -n %{name}-devel
%defattr(-, root, root)
%{_libdir}/pkgconfig/sqlite.pc
%{_libdir}/*.a
%{_libdir}/*.la
%{_includedir}/*
%doc doc/*
```

Found in path(s):

```
* /opt/cola/permits/1466915998_1670280069.1681254/0/sqlite-2-8-17-orig-tar-gz/sqlite-2.8.17/spec.template
No license file was found, but licenses were detected in source scan.
```

public domain.

Found in path(s):

```
* /opt/cola/permits/1466915998_1670280069.1681254/0/sqlite-2-8-17-orig-tar-gz/sqlite-2.8.17/www/changes.tcl
No license file was found, but licenses were detected in source scan.
```

```
/* The IncrKey opcode is only applied to keys generated by
** MakeKey or MakeIdxKey and the results of those operands
** are always dynamic strings or zShort[] strings. So we
** are always free to modify the string in place.
*/
```

Found in path(s):

```
* /opt/cola/permits/1466915998_1670280069.1681254/0/sqlite-2-8-17-orig-tar-gz/sqlite-2.8.17/src/vdbe.c
No license file was found, but licenses were detected in source scan.
```

```
/*
** The "printf" code that follows dates from the 1980's. It is in
** the public domain. The original comments are included here for
** completeness. They are very out-of-date but might be useful as
** an historical reference. Most of the "enhancements" have been backed
** out so that the functionality is now the same as standard printf().
**
*****
**
** The following modules is an enhanced replacement for the "printf" subroutines
** found in the standard C library. The following enhancements are
** supported:
**
```

```

** + Additional functions. The standard set of "printf" functions
** includes printf, fprintf, sprintf, vprintf, vfprintf, and
** vsprintf. This module adds the following:
**
** * snprintf -- Works like sprintf, but has an extra argument
**           which is the size of the buffer written
to.
**
** * mprintf -- Similar to sprintf. Writes output to memory
**           obtained from malloc.
**
** * xprintf -- Calls a function to dispose of output.
**
** * nprintf -- No output, but returns the number of characters
**           that would have been output by printf.
**
** * A v- version (ex: vsnprintf) of every function is also
**   supplied.
**
** + A few extensions to the formatting notation are supported:
**
** * The "=" flag (similar to "-") causes the output to be
**   be centered in the appropriately sized field.
**
** * The %b field outputs an integer in binary notation.
**
** * The %c field now accepts a precision. The character output
**   is repeated by the number of times the precision specifies.
**
** * The %' field works like %c, but takes as its character the
**   next character of the
format string, instead of the next
**   argument. For example, printf("%.78'-") prints 78 minus
**   signs, the same as printf("%.78c",'-').
**
** + When compiled using GCC on a SPARC, this version of printf is
**   faster than the library printf for SUN OS 4.1.
**
** + All functions are fully reentrant.
**
**/

```

Found in path(s):

* /opt/cola/permits/1466915998_1670280069.1681254/0/sqlite-2-8-17-orig-tar-gz/sqlite-2.8.17/src/printf.c

No license file was found, but licenses were detected in source scan.

/*

* This code implements the MD5 message-digest algorithm.

```

* The algorithm is due to Ron Rivest. This code was
* written by Colin Plumb in 1993, no copyright is claimed.
* This code is in the public domain; do with it what you wish.
*
* Equivalent code is available from RSA Data Security, Inc.
* This code has been tested against that, and is equivalent,
* except that you don't need to include two pages of legalese
* with every copy.
*
* To compute the message digest of a chunk of bytes, declare an
* MD5Context structure, pass it to MD5Init, call MD5Update as
* needed on buffers full of bytes, and then call MD5Final, which
* will fill a supplied 16-byte array with the digest.
*/

```

Found in path(s):

```

* /opt/cola/permits/1466915998_1670280069.1681254/0/sqlite-2-8-17-orig-tar-gz/sqlite-2.8.17/src/md5.c
No license file was found, but licenses were detected in source scan.

```

```

# 2001 September 15
#
# The author disclaims copyright to this source code. In place of
# a legal notice, here is a blessing:
#
#   May you do good and not evil.
#   May you find forgiveness for yourself and forgive others.
#   May you share freely, never taking more than you give.
#
*****
# This file implements regression tests for SQLite library. The
# focus of this file is testing built-in functions.
#
# $Id: func.test,v 1.16.2.2 2004/07/18 21:14:05 drh Exp $

```

```

set testdir [file dirname $argv0]
source $testdir/tester.tcl

```

```

# Create a table to work with.
#
do_test func-0.0 {
  execsql {CREATE TABLE tbl1(t1 text)}
  foreach word {this program is free software} {
    execsql "INSERT INTO tbl1 VALUES('$word')"
  }
  execsql {SELECT t1 FROM tbl1 ORDER BY t1}
} {free is program software this}
do_test func-0.1 {
  execsql {

```



```

CREATE TABLE t2(a);

INSERT INTO t2 VALUES(1);
INSERT INTO t2 VALUES(NULL);
INSERT INTO t2 VALUES(345);
INSERT INTO t2 VALUES(NULL);
INSERT INTO t2 VALUES(67890);
SELECT * FROM t2;
}
} {1 {} 345 {} 67890}

# Check out the length() function
#
do_test func-1.0 {
execsql {SELECT length(t1) FROM tbl1 ORDER BY t1}
} {4 2 7 8 4}
do_test func-1.1 {
set r [catch {execsql {SELECT length(*) FROM tbl1 ORDER BY t1}} msg]
lappend r $msg
} {1 {wrong number of arguments to function length()}}
do_test func-1.2 {
set r [catch {execsql {SELECT length(t1,5) FROM tbl1 ORDER BY t1}} msg]
lappend r $msg
} {1 {wrong number of arguments to function length()}}
do_test func-1.3 {
execsql {SELECT length(t1), count(*) FROM tbl1 GROUP BY length(t1)
ORDER BY length(t1)}
} {2 1 4 2 7 1 8 1}
do_test func-1.4 {
execsql {SELECT coalesce(length(a),-1) FROM t2}
} {1 -1 3 -1 5}

# Check out the substr() function
#
do_test func-2.0 {
execsql {SELECT substr(t1,1,2) FROM tbl1 ORDER BY t1}
}
{fr is pr so th}
do_test func-2.1 {
execsql {SELECT substr(t1,2,1) FROM tbl1 ORDER BY t1}
} {r s r o h}
do_test func-2.2 {
execsql {SELECT substr(t1,3,3) FROM tbl1 ORDER BY t1}
} {ee {} ogr ftw is}
do_test func-2.3 {
execsql {SELECT substr(t1,-1,1) FROM tbl1 ORDER BY t1}
} {e s m e s}
do_test func-2.4 {

```

```

execsql {SELECT substr(t1,-1,2) FROM tbl1 ORDER BY t1}
} {e s m e s}
do_test func-2.5 {
execsql {SELECT substr(t1,-2,1) FROM tbl1 ORDER BY t1}
} {e i a r i}
do_test func-2.6 {
execsql {SELECT substr(t1,-2,2) FROM tbl1 ORDER BY t1}
} {ee is am re is}
do_test func-2.7 {
execsql {SELECT substr(t1,-4,2) FROM tbl1 ORDER BY t1}
} {fr {} gr wa th}
do_test func-2.8 {
execsql {SELECT t1 FROM tbl1 ORDER BY substr(t1,2,20)}
} {this software free program is}
do_test func-2.9 {
execsql {SELECT substr(a,1,1) FROM t2}
} {1 {} 3 {} 6}
do_test func-2.10 {
execsql {SELECT substr(a,2,2) FROM t2}
} {{{} {} 45 {} 78}

```

```

# Only do the following tests if TCL has UTF-8 capabilities and
# the

```

```

UTF-8 encoding is turned on in the SQLite library.

```

```

#
if {[sqlite -encoding]==="UTF-8" && "\u1234"!="u1234"} {

```

```

# Put some UTF-8 characters in the database

```

```

#
do_test func-3.0 {
execsql {DELETE FROM tbl1}
foreach word "contains UTF-8 characters hi\u1234ho" {
execsql "INSERT INTO tbl1 VALUES('$word')"
}
execsql {SELECT t1 FROM tbl1 ORDER BY t1}
} "UTF-8 characters contains hi\u1234ho"
do_test func-3.1 {
execsql {SELECT length(t1) FROM tbl1 ORDER BY t1}
} {5 10 8 5}
do_test func-3.2 {
execsql {SELECT substr(t1,1,2) FROM tbl1 ORDER BY t1}
} {UT ch co hi}
do_test func-3.3 {
execsql {SELECT substr(t1,1,3) FROM tbl1 ORDER BY t1}
} "UTF cha con hi\u1234"
do_test func-3.4 {
execsql {SELECT substr(t1,2,2) FROM tbl1 ORDER BY t1}
} "TF ha on i\u1234"

```

```

do_test func-3.5 {
    execsql {SELECT substr(t1,2,3) FROM tbl1 ORDER BY t1}
} "TF- har ont i\u1234h"
do_test func-3.6 {
    execsql {SELECT substr(t1,3,2) FROM tbl1 ORDER BY t1}
} "F- ar nt \u1234h"
do_test func-3.7 {
    execsql {SELECT
substr(t1,4,2) FROM tbl1 ORDER BY t1}
} "-8 ra ta ho"
do_test func-3.8 {
    execsql {SELECT substr(t1,-1,1) FROM tbl1 ORDER BY t1}
} "8 s s o"
do_test func-3.9 {
    execsql {SELECT substr(t1,-3,2) FROM tbl1 ORDER BY t1}
} "F- er in \u1234h"
do_test func-3.10 {
    execsql {SELECT substr(t1,-4,3) FROM tbl1 ORDER BY t1}
} "TF- ter ain i\u1234h"
do_test func-3.99 {
    execsql {DELETE FROM tbl1}
    foreach word {this program is free software} {
        execsql "INSERT INTO tbl1 VALUES('$word')"
    }
    execsql {SELECT t1 FROM tbl1}
} {this program is free software}

} ;# End [sqlite -encoding]==UTF-8 and \u1234!=u1234

# Test the abs() and round() functions.
#
do_test func-4.1 {
    execsql {
        CREATE TABLE t1(a,b,c);
        INSERT INTO t1 VALUES(1,2,3);
        INSERT INTO t1 VALUES(2,1.2345678901234,-12345.67890);
        INSERT INTO t1 VALUES(3,-2,-5);
    }
    catchsql {SELECT abs(a,b) FROM t1}
} {1 {wrong number of arguments to function abs()}}
do_test func-4.2 {
    catchsql {SELECT abs() FROM t1}
} {1 {wrong number
of arguments to function abs()}}
do_test func-4.3 {
    catchsql {SELECT abs(b) FROM t1 ORDER BY a}
} {0 {2 1.2345678901234 2}}
do_test func-4.4 {

```

```

catchsql {SELECT abs(c) FROM t1 ORDER BY a}
} {0 {3 12345.67890 5}}
do_test func-4.4.1 {
execsql {SELECT abs(a) FROM t2}
} {1 {} 345 {} 67890}
do_test func-4.4.2 {
execsql {SELECT abs(t1) FROM tbl1}
} {this program is free software}

do_test func-4.5 {
catchsql {SELECT round(a,b,c) FROM t1}
} {1 {wrong number of arguments to function round()}}
do_test func-4.6 {
catchsql {SELECT round(b,2) FROM t1 ORDER BY b}
} {0 {-2.00 1.23 2.00}}
do_test func-4.7 {
catchsql {SELECT round(b,0) FROM t1 ORDER BY a}
} {0 {2 1 -2}}
do_test func-4.8 {
catchsql {SELECT round(c) FROM t1 ORDER BY a}
} {0 {3 -12346 -5}}
do_test func-4.9 {
catchsql {SELECT round(c,a) FROM t1 ORDER BY a}
} {0 {3.0 -12345.68 -5.000}}
do_test func-4.10 {
catchsql {SELECT 'x' || round(c,a) || 'y' FROM t1 ORDER BY a}
} {0 {x3.0y x-12345.68y x-5.000y}}
do_test func-4.11
{
catchsql {SELECT round() FROM t1 ORDER BY a}
} {1 {wrong number of arguments to function round()}}
do_test func-4.12 {
execsql {SELECT coalesce(round(a,2),'nil') FROM t2}
} {1.00 nil 345.00 nil 67890.00}
do_test func-4.13 {
execsql {SELECT round(t1,2) FROM tbl1}
} {0.00 0.00 0.00 0.00 0.00}

# Test the upper() and lower() functions
#
do_test func-5.1 {
execsql {SELECT upper(t1) FROM tbl1}
} {THIS PROGRAM IS FREE SOFTWARE}
do_test func-5.2 {
execsql {SELECT lower(upper(t1)) FROM tbl1}
} {this program is free software}
do_test func-5.3 {
execsql {SELECT upper(a), lower(a) FROM t2}
}

```

```

} {1 1 {} {} 345 345 {} {} 67890 67890}
do_test func-5.4 {
  catchsql {SELECT upper(a,5) FROM t2}
} {1 {wrong number of arguments to function upper()}}
do_test func-5.5 {
  catchsql {SELECT upper(*) FROM t2}
} {1 {wrong number of arguments to function upper()}}

# Test the coalesce() and nullif() functions
#
do_test func-6.1 {
  execsql {SELECT coalesce(a,'xyz') FROM t2}
} {1 xyz 345 xyz 67890}
do_test
func-6.2 {
  execsql {SELECT coalesce(upper(a),'nil') FROM t2}
} {1 nil 345 nil 67890}
do_test func-6.3 {
  execsql {SELECT coalesce(nullif(1,1),'nil')}
} {nil}
do_test func-6.4 {
  execsql {SELECT coalesce(nullif(1,2),'nil')}
} {1}
do_test func-6.5 {
  execsql {SELECT coalesce(nullif(1,NULL),'nil')}
} {1}

# Test the last_insert_rowid() function
#
do_test func-7.1 {
  execsql {SELECT last_insert_rowid()}
} [db last_insert_rowid]

# Tests for aggregate functions and how they handle NULLs.
#
do_test func-8.1 {
  execsql {
    SELECT sum(a), count(a), round(avg(a),2), min(a), max(a), count(*) FROM t2;
  }
} {68236 3 22745.33 1 67890 5}
do_test func-8.2 {
  execsql {
    SELECT max('z+'||a||'abcdefghijklmnopqrstuvwxyzaBCDEFGHIJKLMNOP') FROM t2;
  }
} {z+67890abcdefghijklmnopqrstuvwxyzaBCDEFGHIJKLMNOP}
do_test func-8.3 {
  execsql {

```

```

CREATE TEMP TABLE t3 AS SELECT a FROM t2 ORDER BY a DESC;
SELECT min('z+'||a||'abcdefghijklmnopqrstuvwxyABCDEFGHIJKLMNOPQRSTUVWXYZ') FROM t3;
}
} {z+1abcdefghijklmnopqrstuvwxyABCDEFGHIJKLMNOPQRSTUVWXYZ}
do_test
func-8.4 {
execsql {
SELECT max('z+'||a||'abcdefghijklmnopqrstuvwxyABCDEFGHIJKLMNOPQRSTUVWXYZ') FROM t3;
}
} {z+67890abcdefghijklmnopqrstuvwxyABCDEFGHIJKLMNOPQRSTUVWXYZ}

```

How do you test the random() function in a meaningful, deterministic way?

```

#
do_test func-9.1 {
execsql {
SELECT random() is not null;
}
} {1}

```

Use the "sqlite_register_test_function" TCL command which is part of
the text fixture in order to verify correct operation of some of
the user-defined SQL function APIs that are not used by the built-in
functions.

```

#
db close
set ::DB [sqlite db test.db]
sqlite_register_test_function $::DB testfunc
do_test func-10.1 {
catchsql {
SELECT testfunc(NULL,NULL);
}
} {1 {first argument to test function may not be NULL}}
do_test func-10.2 {
execsql {
SELECT testfunc(
'string', 'abcdefghijklmnopqrstuvwxyABCDEFGHIJKLMNOPQRSTUVWXYZ',
'int', 1234
);
}
} {1234}
do_test func-10.3 {
execsql {
SELECT
testfunc(
'string', 'abcdefghijklmnopqrstuvwxyABCDEFGHIJKLMNOPQRSTUVWXYZ',
'string', NULL
);
}
}

```

```

} {}
do_test func-10.4 {
execsql {
SELECT testfunc(
  'string', 'abcdefghijklmnopqrstuvwxyzaBCDEFGHIJKLMNOPQRSTUVWXYZ',
  'double', 1.234
);
}
} {1.234}
do_test func-10.5 {
execsql {
SELECT testfunc(
  'string', 'abcdefghijklmnopqrstuvwxyzaBCDEFGHIJKLMNOPQRSTUVWXYZ',
  'int', 1234,
  'string', 'abcdefghijklmnopqrstuvwxyzaBCDEFGHIJKLMNOPQRSTUVWXYZ',
  'string', NULL,
  'string', 'abcdefghijklmnopqrstuvwxyzaBCDEFGHIJKLMNOPQRSTUVWXYZ',
  'double', 1.234,
  'string', 'abcdefghijklmnopqrstuvwxyzaBCDEFGHIJKLMNOPQRSTUVWXYZ',
  'int', 1234,
  'string', 'abcdefghijklmnopqrstuvwxyzaBCDEFGHIJKLMNOPQRSTUVWXYZ',
  'string', NULL,
  'string', 'abcdefghijklmnopqrstuvwxyzaBCDEFGHIJKLMNOPQRSTUVWXYZ',
  'double', 1.234
);
}
} {1.234}

```

Test the built-in sqlite_version(*) SQL function.

#

```

do_test func-11.1 {
execsql {

```

```

SELECT sqlite_version(*)

```

```

}

```

```

} [sqlite -version]

```

finish_test

Found in path(s):

* /opt/cola/permits/1466915998_1670280069.1681254/0/sqlite-2-8-17-orig-tar-gz/sqlite-2.8.17/test/func.test

1.304 distro-info-data 0.52ubuntu0.2

1.304.1 Available under license :

Format: <https://www.debian.org/doc/packaging-manuals/copyright-format/1.0/>

Upstream-Name: distro-info-data

Upstream-Contact: Benjamin Drung <bdrung@debian.org>

Files: *

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1.305 fwupd-signed 1.44

1.305.1 Available under license :

Format: <http://www.debian.org/doc/packaging-manuals/copyright-format/1.0/>

Upstream-Name: fwupd

Source: <https://github.com/hughsie/fwupd>

Comment:

This package exists to download a signed binary from the Ubuntu archive and publish it in .deb format. The actual bootloader source code may be found in the fwupd source package: 'apt-get source fwupd'.

Files: *

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1.306 needrestart 3.5-5ubuntu2.1

1.306.1 Available under license :

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Version 2, June 1991

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1.307 cloud-utils 0.32-22-g45fe84a5-0ubuntu1

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Upstream-Name: cloud-utils

Source: <https://code.launchpad.net/cloud-utils>

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1.312 python-magic 0.4.24-2

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1.320 glib 2.72.4-0ubuntu1

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the work with the complete corresponding

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b) Use a suitable shared library mechanism for linking with the

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1.321 libbpf 0.5.0-1ubuntu22.04.1

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1.323 multipath-tools 0.8.8-1ubuntu1.22.04.1

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The

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b) Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by a written offer, valid for at least three years and valid for as long as you offer spare parts or customer support for that product model, to give anyone who possesses the object code either (1) a copy of the Corresponding Source for all the software in the product that is covered by this License, on a durable physical medium customarily used for software interchange, for a price no more than your reasonable cost of physically performing this conveying of source, or (2) access to copy the Corresponding Source from a network server at no charge.

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d) Convey the object code by offering access from a designated place (gratis or for a charge), and offer equivalent access to the Corresponding Source in the same way through the same place at no further charge. You need not require recipients to copy the Corresponding Source along with the object code. If the place to copy the object code is a network server, the Corresponding Source may be on a different server (operated by you or a third party) that supports equivalent copying facilities, provided you maintain clear directions next to the object code saying where to find the Corresponding Source. Regardless of what server hosts the Corresponding Source, you remain obligated to ensure that it is available for as long as needed to satisfy these requirements.

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A separable portion of the object code, whose source code is excluded from the Corresponding Source

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1.325 media-types 7.0.0

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1.327 libcpanel-json-xs-perl 4.27-1build1

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1.328 libnet-netmask-perl 2.0001-1

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```
* @version 3.0 (December 2000)
*
* Optimised ANSI C code for the Rijndael cipher (now AES)
*
* @author Vincent Rijmen <vincent.rijmen@esat.kuleuven.ac.be>
* @author Antoon Bosselaers <antoon.bosselaers@esat.kuleuven.ac.be>
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1.338 python-setuptools 59.6.0-

1.2ubuntu0.22.04.1

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1.339 kerberos 1.19.2-2ubuntu0.1

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The implementations of GSSAPI mechglue in GSSAPI-SPNEGO in
"src/lib/gssapi", including the following files:

lib/gssapi/generic/gssapi_err_generic.et
lib/gssapi/mechglue/g_accept_sec_context.c
lib/gssapi/mechglue/g_acquire_cred.c
lib/gssapi/mechglue/g_canon_name.c
lib/gssapi/mechglue/g_compare_name.c
lib/gssapi/mechglue/g_context_time.c
lib/gssapi/mechglue/g_delete_sec_context.c
lib/gssapi/mechglue/g_dsp_name.c
lib/gssapi/mechglue/g_dsp_status.c
lib/gssapi/mechglue/g_dup_name.c
lib/gssapi/mechglue/g_exp_sec_context.c
lib/gssapi/mechglue/g_export_name.c
lib/gssapi/mechglue/g_glue.c
lib/gssapi/mechglue/g_imp_name.c
lib/gssapi/mechglue/g_imp_sec_context.c
lib/gssapi/mechglue/g_init_sec_context.c
lib/gssapi/mechglue/g_initialize.c
lib/gssapi/mechglue/g_inquire_context.c
lib/gssapi/mechglue/g_inquire_cred.c
lib/gssapi/mechglue/g_inquire_names.c
lib/gssapi/mechglue/g_process_context.c
lib/gssapi/mechglue/g_rel_buffer.c
lib/gssapi/mechglue/g_rel_cred.c
lib/gssapi/mechglue/g_rel_name.c
lib/gssapi/mechglue/g_rel_oid_set.c
lib/gssapi/mechglue/g_seal.c

lib/gssapi/mechglue/g_sign.c
lib/gssapi/mechglue/g_store_cred.c
lib/gssapi/mechglue/g_unseal.c
lib/gssapi/mechglue/g_userok.c
lib/gssapi/mechglue/g_utils.c
lib/gssapi/mechglue/g_verify.c
lib/gssapi/mechglue/gssd_pname_to_uid.c
lib/gssapi/mechglue/mglueP.h
lib/gssapi/mechglue/oid_ops.c
lib/gssapi/spnego/gssapiP_spnego.h
lib/gssapi/spnego/spnego_mech.c

and the initial implementation of incremental propagation, including the following new or changed files:

include/iprop_hdr.h
kadmin/server/ipropd_svc.c
lib/kdb/iprop.x
lib/kdb/kdb_convert.c
lib/kdb/kdb_log.c
lib/kdb/kdb_log.h
lib/krb5/error_tables/kdb5_err.et
slave/kpropd_rpc.c
slave/kproplog.c

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2.4.113/tests/util/pattern.c

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/tests/util/common.h

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/tests/util/format.h

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2.4.113/tests/util/format.c

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/util/kms.c

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*

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/xf86drmRandom.h

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When new ioctl definitions are merged into drm-next, we will add support to libdrm, at which point we typically create a new release. However, this is up to whoever is driving the feature in question.

Follow these steps to release a new version of libdrm:

- 1) Bump the version number in meson.build. We seem to have settled for 2.4.x as the versioning scheme for libdrm, so just bump the micro version.
- 2) Run `ninja -C builddir/ dist` to generate the tarballs. Make sure that the version number of the tarball name in builddir/meson-dist/ matches the number you bumped to. Move that tarball to the libdrm repo root for the release script to pick up.
- 3) Push the updated main branch with the bumped version number:

git push origin main

assuming the remote for the upstream libdrm repo is called origin.

- 4) Use the release.sh script from the xorg/util/modular repo to upload the tarballs to the freedesktop.org download area and create an announce email template. The script takes one argument: the path to the libdrm checkout. So, if a checkout of modular is at the same level than the libdrm repo:

```
./modular/release.sh libdrm
```

This copies the two tarballs to freedesktop.org and creates libdrm-2.4.16.announce which has a detailed summary of the changes, links to the tarballs, MD5 and SHA1 sums and pre-filled out email headers. Fill out the blank between the email headers and the list of changes with a brief message of what changed or what prompted this release. Send out the email and you're done!

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```
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/RELEASING
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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-

2.4.113/intel/intel_bufmgr_gem.c

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/* radeon_drm.h -- Public header for the radeon driver *- linux-c *-

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* Authors:

* Kevin E. Martin <martin@valinux.com>
* Gareth Hughes <gareth@valinux.com>
* Keith Whitwell <keith@tungstengraphics.com>

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
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* Authors:

* Christian Gmeiner <christian.gmeiner@gmail.com>

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2.4.113/tests/etnaviv/etnaviv_bo_cache_test.c

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/etnaviv/etnaviv_bo_cache.c

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/tests/amdgpu/vce_tests.c
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
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/* xf86drmHash.c -- Small hash table support for integer -> integer mapping

* Created: Sun Apr 18 09:35:45 1999 by faith@precisioninsight.com

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* Authors: Rickard E. (Rik) Faith <faith@valinux.com>

*

* DESCRIPTION

*

* This file contains a straightforward implementation of a fixed-sized
* hash table using self-organizing linked lists [Knuth73, pp. 398-399] for
* collision resolution. There are two potentially interesting things
* about this implementation:

*

* 1) The table is power-of-two sized. Prime sized tables are more

* traditional, but do not have a significant advantage over power-of-two
* sized table, especially when double hashing is not used for collision
* resolution.

*

* 2) The hash computation
uses a table of random integers [Hanson97,
* pp. 39-41].

*

* FUTURE ENHANCEMENTS

*

* With a table size of 512, the current implementation is sufficient for a
* few hundred keys. Since this is well above the expected size of the
* tables for which this implementation was designed, the implementation of
* dynamic hash tables was postponed until the need arises. A common (and
* naive) approach to dynamic hash table implementation simply creates a
* new hash table when necessary, rehashes all the data into the new table,
* and destroys the old table. The approach in [Larson88] is superior in
* two ways: 1) only a portion of the table is expanded when needed,
* distributing the expansion cost over several insertions, and 2) portions
* of the table can be locked, enabling a scalable thread-safe
* implementation.

*

* REFERENCES

*

* [Hanson97] David R. Hanson. C Interfaces and Implementations:
* Techniques for Creating Reusable Software. Reading, Massachusetts:
* Addison-Wesley, 1997.

*

* [Knuth73] Donald E. Knuth. The Art of Computer Programming. Volume 3:
* Sorting and Searching. Reading, Massachusetts: Addison-Wesley, 1973.

*

* [Larson88] Per-Ake Larson. "Dynamic Hash Tables". CACM 31(4), April
* 1988, pp. 446-457.

*

*/

Found in path(s):

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/xf86drmHash.c

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/hash.c

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/omap/omap_drmif.h
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
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2.4.113/tests/etnaviv/write_bmp.h
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/amdgpu/bo_tests.c
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/amdgpu/basic_tests.c
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/amdgpu/amdgpu_test.c
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/amdgpu/cs_tests.c
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/amdgpu/amdgpu_test.h

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/amdgpu/hotunplug_tests.c

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=====

Submitting Patches

Patches should be sent to dri-devel@lists.freedesktop.org, using `git send-email`. For patches only touching driver specific code one of the driver mailing lists (like amd-gfx@lists.freedesktop.org) is also appropriate. See `git` documentation for help:

<http://git-scm.com/documentation>

Since `dri-devel` is a very busy mailing list please use `--subject-prefix="PATCH libdrm"` to make it easier to find `libdrm` patches. This is best done by running

```
git config --local format.subjectprefix "PATCH libdrm"
```

The first line of a commit message should contain a prefix indicating what part is affected by the patch followed by one sentence that describes the change. For examples:

```
amdgpu: Use uint32_t i in amdgpu_find_bo_by_cpu_mapping
```

The body of the commit message should describe what the patch changes and why, and also note any particular side effects. For a recommended reading on writing commit messages, see:

<http://who-t.blogspot.de/2009/12/on-commit-messages.html>

Your patches should also include a Signed-off-by line with your name and email address. If you're not the patch's original author, you should also gather S-o-b's by them (and/or whomever gave the patch to you.) The significance of this is that it certifies that you created the patch, that it was created under an appropriate open source license, or provided to you under those terms. This lets us indicate a chain of responsibility for the copyright status of the code. For more details:

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We won't reject patches that lack S-o-b, but it is strongly recommended.

Review and Merging

Patches should have at least one positive review (`Reviewed-by: tag`) or indication of approval (`Acked-by: tag`) before merging. For any code shared between drivers this is mandatory.

Please note that kernel/userspace API header files have special rules, see `include/drm/README`.

Coding style in the project loosely follows the CodingStyle of the linux kernel:

<https://www.kernel.org/doc/html/latest/process/coding-style.html?highlight=coding%20style>

Commit Rights

Commit rights will be granted to anyone who requests them and fulfills the below criteria:

- Submitted a few (5-10 as a rule of thumb) non-trivial (not just simple spelling fixes and whitespace adjustment) patches that have been merged already. Since libdrm is just a glue library between the kernel and userspace drivers, merged patches to those components also count towards the commit criteria.
- Are actively participating on discussions about their work (on the mailing list or IRC). This should not be interpreted as a requirement to review other peoples patches but just make sure that patch submission isn't one-way communication. Cross-review is still highly encouraged.
- Will be regularly contributing further patches. This includes regular contributors to other parts of the open source graphics stack who only do the oddball rare patch within libdrm itself.
- Agrees to use their commit rights in accordance with the documented merge criteria, tools, and processes.

To apply for commit rights ("Developer" role in gitlab) send a mail to dri-devel@lists.freedesktop.org and please ping the maintainers if your request is stuck.

Committers are encouraged to request their commit rights get removed when they no longer contribute to the project. Commit rights will be reinstated when they come back to the project.

Maintainers and committers should encourage contributors to request commit rights, as especially junior contributors tend to underestimate their skills.

Code of Conduct

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See the gitlab project owners for contact details of the libdrm maintainers.

Abuse of commit

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Happy hacking!

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/nouveau/abi16.c
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* Rob Clark <robclark@freedesktop.org>

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/amdgpu/amdgpu.h
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/amdgpu/amdgpu_vamgr.c
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
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/* xf86drmRandom.c -- "Minimal Standard" PRNG Implementation

* Created: Mon Apr 19 08:28:13 1999 by faith@precisioninsight.com

*

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*

* Authors: Rickard E. (Rik) Faith <faith@valinux.com>

*

* DESCRIPTION

*

* This file contains a simple, straightforward implementation of the Park

* & Miller "Minimal Standard" PRNG [PM88, PMS93], which is a Lehmer

* multiplicative linear congruential generator (MLCG) with a period of

* $2^{31}-1$.

*

* This implementation is intended to provide a reliable, portable PRNG
* that is suitable for testing a hash table implementation and for
* implementing skip lists.

*

* FUTURE ENHANCEMENTS

*

* If initial seeds are not selected randomly, two instances of the PRNG
* can be correlated.

[Knuth81, pp. 32-33] describes a shuffling technique

* that can eliminate this problem.

*

* If PRNGs are used for simulation, the period of the current
* implementation may be too short. [LE88] discusses methods of combining
* MLCGs to produce much longer periods, and suggests some alternative
* values for A and M. [LE90 and Sch92] also provide information on
* long-period PRNGs.

*

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*

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*

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*

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* [Sch92] Bruce Schneier. "Pseudo-Ransom Sequence
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*

* [PMS93] Stephen K. Park, Keith W. Miller, and Paul K. Stockmeyer. In
* "Technical Correspondence: Remarks on Choosing and Implementing Random
* Number Generators". CACM 36(7), July 1993, pp. 105-110.

*

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
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* Eric Anholt <eric@anholt.net>

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* Authors:

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* Joonyoung Shim <jy0922.shim@samsung.com>

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/exynos/exynos_drm.h

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* Authors:

* Christian Gmeiner <christian.gmeiner@gmail.com>

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/etnaviv/etnaviv_perfmon.c

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/tegra/vic40.h

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/*

* DRM based mode setting test program

* Copyright 2008 Tungsten Graphics

* Jakob Bornecrantz <jakob@tungstengraphics.com>

* Copyright 2008 Intel Corporation

* Jesse Barnes <jesse.barnes@intel.com>

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/tests/modetest/buffers.h
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/tests/modetest/buffers.c
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/tests/modetest/modetest.c

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tegra/syncpt.c

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/* savage_drm.h -- Public header for the savage driver

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/tests/exynos/exynos_fimg2d_event.c
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/tests/exynos/exynos_fimg2d_perf.c

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* Authors:

* Ben Widawsky <ben@bwidawsk.net>

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/xf86drmMode.c

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/xf86drmMode.h

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* DRM based vblank test program

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* Jakob Bornecrantz <jakob@tungstengraphics.com>

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* Jesse Barnes <jesse.barnes@intel.com>

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
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2.4.113/exynos/exynos_fimg2d.h

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/exynos/fimg2d_reg.h
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/exynos/exynos_fimg2d.c
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/exynos/exynos_fimg2d_test.c

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/amdgpu/jpeg_tests.c
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/amdgpu/decode_messages.h

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/*

* Arm Framebuffer Compression (AFBC) modifiers

*

- * AFBC is a proprietary lossless image compression protocol and format.
- * It provides fine-grained random access and minimizes the amount of data transferred between IP blocks.
- *
- * AFBC has several features which may be supported and/or used, which are represented using bits in the modifier. Not all combinations are valid, and different devices or use-cases may support different combinations.
- *
- * Further information on the use of AFBC modifiers can be found in Documentation/gpu/afbc.rst
- */
- /*
- * Arm Fixed-Rate Compression (AFRC) modifiers
- *
- * AFRC is a proprietary fixed rate image compression protocol and format, designed to provide guaranteed bandwidth and memory footprint reductions in graphics and media use-cases.
- *
- * AFRC buffers consist of one or more planes, with the same components and meaning as an uncompressed buffer using the same pixel format.
- *
- * Within each plane, the pixel/luma/chroma values are grouped into "coding unit" blocks which are individually compressed to a fixed size (in bytes). All coding units within a given plane of a buffer store the same number of values, and have the same compressed size.
- *
- * The coding unit size is configurable, allowing different rates of compression.
- *
- * The start of each AFRC buffer plane must be aligned to an alignment granule which depends on the coding unit size.
- *
- * Coding Unit Size Plane Alignment
- * ----- -----
- * 16 bytes 1024 bytes
- * 24 bytes 512 bytes
- * 32 bytes 2048 bytes
- *
- * Coding units are grouped into paging tiles. AFRC buffer dimensions must be aligned to a multiple of the paging tile dimensions.
- * The dimensions of each paging tile depend on whether the buffer is optimised for scanline (SCAN layout) or rotated (ROT layout) access.
- *
- * Layout Paging Tile Width Paging Tile Height
- * ----- -----
- * SCAN 16 coding units 4 coding units
- * ROT 8 coding units 8 coding units

*
 * The dimensions of each coding unit depend on the number of components
 * in the compressed plane and whether the buffer is optimised for
 * scanline (SCAN layout) or rotated (ROT layout) access.
 *
 * Number of Components in Plane Layout Coding Unit Width Coding Unit Height
 * -----
 * 1 SCAN 16 samples 4 samples
 * Example: 16x4 luma samples in a 'Y' plane
 * 16x4 chroma 'V' values, in the 'V' plane of a fully-planar YUV buffer
 * -----
 * 1
 * ROT 8 samples 8 samples
 * Example: 8x8 luma samples in a 'Y' plane
 * 8x8 chroma 'V' values, in the 'V' plane of a fully-planar YUV buffer
 * -----
 * 2 DONT CARE 8 samples 4 samples
 * Example: 8x4 chroma pairs in the 'UV' plane of a semi-planar YUV buffer
 * -----
 * 3 DONT CARE 4 samples 4 samples
 * Example: 4x4 pixels in an RGB buffer without alpha
 * -----
 * 4 DONT CARE 4 samples 4 samples
 * Example: 4x4 pixels in an RGB buffer with alpha
 */
 /*
 * Amlogic Video Framebuffer Compression modifiers
 *
 * Amlogic uses a proprietary lossless image compression protocol and format
 * for their hardware video codec accelerators, either video decoders or
 * video input encoders.
 *
 * It considerably reduces memory bandwidth while writing and reading
 * frames in memory.
 *
 * The underlying storage is considered to be 3 components, 8bit or 10-bit
 * per component YCbCr 420, single plane :
 * - DRM_FORMAT_YUV420_8BIT
 * - DRM_FORMAT_YUV420_10BIT
 *
 * The first 8 bits of the mode defines the layout, then the following 8 bits
 * defines the options changing the layout.
 *
 * Not all combinations are valid, and different SoCs may support different
 * combinations of layout and options.
 */
 /*
 * 64K_S is the same for GFX9/GFX10/GFX10_RBPLUS and hence has GFX9 as canonical

* version.

*/

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/include/drm/drm_fourcc.h

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/radeon/rbo.c

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/radeon/radeon_ttm.c

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/radeon/rbo.h

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/amdgpu/handle_table.h

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/amdgpu/handle_table.c

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/* drmsl.c -- Skip list test

* Created: Mon May 10 09:28:13 1999 by faith@precisioninsight.com

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*

* Authors: Rickard E. (Rik) Faith <faith@valinux.com>

*

* DESCRIPTION

*

* This file contains a straightforward skip list implementation.n

*

* FUTURE ENHANCEMENTS

*

* REFERENCES

*

* [Pugh90] William Pugh. Skip Lists: A Probabilistic Alternative to

* Balanced Trees. CACM 33(6), June 1990, pp. 668-676.

*

*/

Found in path(s):

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/drmsl.c

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/tests/util/Android.mk

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/intel/Android.mk

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/Android.mk

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/* mga_drm.h -- Public header for the Matrox g200/g400 driver -*- linux-c -*-

* Created: Tue Jan 25 01:50:01 1999 by jhartmann@precisioninsight.com

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
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* Authors:

* Christian Gmeiner <christian.gmeiner@gmail.com>

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/etnaviv/etnaviv_gpu.c

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/tests/etnaviv/etnaviv_cmd_stream_test.c

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* Authors:

* Christian Gmeiner <christian.gmeiner@gmail.com>

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-

2.4.113/etnaviv/etnaviv_cmd_stream.c

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-

2.4.113/tests/etnaviv/etnaviv_2d_test.c

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-

2.4.113/etnaviv/etnaviv_pipe.c

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-

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* Authors:

* Chris Wilson <chris@chris-wilson.co.uk>

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/radeon/radeon_bo.h

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/exynos/exynos_drm.c

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tegra/private.h
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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tegra/tegra.h
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tegra/pushbuf.c

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/freedreno/freedreno_priv.h

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/freedreno/freedreno_pipe.c

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/freedreno/freedreno_ringbuffer.c

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/freedreno/freedreno_bo.c

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/freedreno/freedreno_device.c

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/freedreno/freedreno_drmif.h

*

/opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/freedreno/freedreno_ringbuffer.h

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/tests/amdgpu/cp_dma_tests.c

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/tests/amdgpu/shader_code_hang.h

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/tests/amdgpu/shader_code_gfx11.h

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/tests/amdgpu/shader_code_gfx10.h

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/tests/amdgpu/shader_code_gfx9.h

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
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* Authors:

* Eric Anholt <eric@anholt.net>

*

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/intel/intel_bufmgr.c

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 * /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/amdgpu/syncobj_tests.c
 * /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/amdgpu/vm_tests.c
 * /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/amdgpu/uve_ib.h
 * /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/amdgpu/uvd_enc_tests.c
 * /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/amdgpu/vcn_tests.c
 * /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/amdgpu/deadlock_tests.c

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 * Authors:
 * Gareth Hughes <gareth@valinux.com>
 * Frank C. Earl <fearl@airmail.net>
 * Leif Delgass <ldelgass@retinalburn.net>
 */

Found in path(s):

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
 2.4.113/include/drm/mach64_drm.h

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/* amdgpu_drm.h -- Public header for the amdgpu driver *- linux-c *-

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* Authors:

* Kevin E. Martin <martin@valinux.com>
* Gareth Hughes <gareth@valinux.com>
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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-

2.4.113/include/drm/amdgpu_drm.h

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/tests/tegra/vic41.h
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/tests/tegra/host1x.h
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/tegra/vic.h
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/tests/tegra/vic40.c
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/tests/tegra/syncpt-wait.c
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/tegra/vic-
clear.c
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/tegra/vic-
blit.c
*
/opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/tests/tegra/vic30.h
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/tests/tegra/vic30.c
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/tegra/vic-
flip.c
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
```

2.4.113/tests/tegra/vic42.h

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-

2.4.113/tests/tegra/syncpt-timeout.c

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/tegra/vic.c

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-

2.4.113/tests/tegra/vic41.c

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-

2.4.113/tests/tegra/vic42.c

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/radeon/radeon_bo_gem.h

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/* xf86drmSL.c -- Skip list support

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* Authors: Rickard E. (Rik) Faith <faith@valinux.com>

*

* DESCRIPTION

*

* This file contains a straightforward skip list implementation.n

*

* FUTURE ENHANCEMENTS

*

* REFERENCES

*

* [Pugh90] William Pugh. Skip Lists: A Probabilistic Alternative to
* Balanced Trees. CACM 33(6), June 1990, pp. 668-676.

*

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Found in path(s):

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/xf86drmSL.c

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/tmtest/src/xf86distr.h
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/tmtest/src/xf86dri.h
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/tmtest/src/xf86dri.c

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/radeon/bof.h
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/radeon/bof.c

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* sync abstraction

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/libsync.h

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
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- copyright.xml (1597 bytes, from 2016-09-06 14:44:16)
- state_2d.xml (51552 bytes, from 2016-09-06 14:44:16)

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- * /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/etnaviv/state_2d.xml.h
- * /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/etnaviv/state.xml.h

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/amdgpu/amdgpu_bo.c
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/amdgpu/amdgpu_gpu_info.c

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/freedreno/kgsl/kgsl_pipe.c

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/freedreno/msm/msm_pipe.c

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/freedreno/msm/msm_device.c

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/freedreno/kgsl/kgsl_bo.c

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/freedreno/kgsl/kgsl_device.c

*

/opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/freedreno/msm/msm_priv.h

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/freedreno/kgsl/kgsl_ringbuffer.c

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/freedreno/msm/msm_ringbuffer.c

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- * /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/tegra/gr2d-fill.c
- * /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/tegra/drm-test.h
- * /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/tegra/openclose.c
- * /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/tegra/drm-test-tegra.c
- * /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/tegra/drm-test-tegra.h
- * /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/tegra/drm-test.c

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```
*/opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/vc4/meson.build
*/opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/tests/etnaviv/meson.build
*/opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/nouveau/meson.build
*/opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/tests/radeon/meson.build
*/opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/amdgpu/meson.build
*
/opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/tests/modeprint/meson.build
*/opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/tests/amdgpu/meson.build
*/opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/tests/nouveau/meson.build
*/opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/tegra/meson.build
```

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/tegra/meson.build
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/meson.build
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/exynos/meson.build
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/modetest/meson.build
*
/opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/freedreno/meson.build
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/exynos/meson.build
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/omap/meson.build
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/data/meson.build
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/meson.build
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/intel/meson.build
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/etnaviv/meson.build
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/util/meson.build
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/meson_options.txt
*
/opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/proptest/meson.build
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/radeon/meson.build
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/tests/vbltest/meson.build
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/man/meson.build
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* Authors:
* Eric Anholt <eric@anholt.net>
*
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Found in path(s):

* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/intel/intel_bufmgr_priv.h

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/util_double_list.h

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* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-2.4.113/include/drm/drm_mode.h

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```
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/etnaviv/etnaviv_device.c
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/etnaviv/etnaviv_bo.c
```

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Found in path(s):

```
* /opt/cola/permits/1548424904_1675148664.5691304/0/libdrm-2-4-113-orig-tar-xz/libdrm-
2.4.113/gen_table_fourcc.py
```

1.341 libcgi-pm-perl 4.54-1

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1.342 go-flags 1.5.1-0.20210607101731-3927b71304df

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```
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```

1.345 pam 1.4.0-11ubuntu2.3

1.345.1 Available under license :

Patch for Ubuntu bug #399071

Display the contents of /etc/legal as part of the MOTD, the first time the user logs in, and set a flag in the user's homedir if possible to prevent repeat displays.

Authors: Dustin Kirkland <kirkland@canonical.com>

Upstream status: Ubuntu-specific, maybe submit to Debian

Index: pam/modules/pam_motd/pam_motd.c

```
=====
--- pam.orig/modules/pam_motd/pam_motd.c
+++ pam/modules/pam_motd/pam_motd.c
@@ -282,6 +282,65 @@ static void try_to_display_directories_w
    _pam_drop(dirscans);
}

+int display_legal(pam_handle_t *pamh)
+{
+  int retval = PAM_IGNORE, rc;
+  char *user = NULL;
+  char *dir = NULL;
+  char *flag = NULL;
+  struct passwd *pwd = NULL;
+  struct stat s;
+  int f;
+  /* Get the user name to determine if we need to print the disclaimer */
+  rc = pam_get_item(pamh, PAM_USER, &user);
+  if (rc == PAM_SUCCESS && user != NULL && *(const char *)user != '\0')
+  {
+
+    PAM_MODUTIL_DEF_PRIVS(privs);
+
+    /* Get the password entry */
+    pwd = pam_modutil_getpwnam (pamh, user);
+    if (pwd != NULL)
+    {
+      if (pam_modutil_drop_priv(pamh, &privs, pwd)) {
+        pam_syslog(pamh, LOG_ERR,
+          "Unable to change UID to %d temporarily\n",
+          pwd->pw_uid);
+        retval = PAM_SESSION_ERR;
+        goto finished;
+      }
+
+      if (asprintf(&dir, "%s/.cache", pwd->pw_dir) == -1 || !dir)

```

```

+     goto finished;
+     if (asprintf(&flag, "%s/motd.legal-displayed", dir) == -1 || !flag)
+         goto finished;
+
+     if (stat(flag, &s) != 0)
+     {
+         int fd = open("/etc/legal", O_RDONLY, 0);
+         if (fd >= 0) {
+             try_to_display_fd(pamh, fd);
+             close(fd);
+         }
+         mkdir(dir, 0700);
+         f = open(flag,
O_WRONLY|O_CREAT|O_EXCL,
+             S_IRUSR|S_IWUSR|S_IRGRP|S_IROTH);
+         if (f>=0) close(f);
+     }
+
+finished:
+     if (pam_modutil_regain_priv(pamh, &privs)) {
+         pam_syslog(pamh, LOG_ERR,
+             "Unable to change UID back to %d\n", privs.old_uid);
+         retval = PAM_SESSION_ERR;
+     }
+
+     _pam_drop(flag);
+     _pam_drop(dir);
+ }
+ }
+ return retval;
+ }
+

```

```

int pam_sm_open_session(pam_handle_t *pamh, int flags,
    int argc, const char **argv)
{
@@ -396,6 +455,9 @@ int pam_sm_open_session(pam_handle_t *pa
try_to_display_directories_with_overrides(pamh, motd_dir_path_split,
    num_motd_dir_paths, report_missing);

```

```

+ /* Display the legal disclaimer only if necessary */

```

```

+     retval = display_legal(pamh);

```

```

+

```

```

    out:

```

```

        _pam_drop(motd_path_copy);

```

```

        _pam_drop(motd_path_split);

```

This package was debianized by J.H.M. Dassen (Ray) jdassen@debian.org on

Wed, 23 Sep 1998 20:29:32 +0200.

It was downloaded from <ftp://ftp.kernel.org/pub/linux/libs/pam/pre/>

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1.346 openssl 3.0.8-1

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```
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```
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```

The hypothetical commands `show w' and `show c' should show the

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<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice

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```
#####
## Constant-time SSSE3 AES core implementation.
## version 0.1
##
```

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#####

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1.352 libsemanage-common 3.3-1build2

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Any

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The

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Version 3, 29 June 2007

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@c Set file name and title for man page.

@setfilename gpl

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@c man begin SEEALSO

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@center Version 3, 29 June 2007

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1.357 bind 9.18.12-0ubuntu0.22.04.1

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1.358 tcpdump 4.99.1-3ubuntu0.1

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```
# -*- perl -*-
```

```
$testlist = [  
  # This specific test fails on OpenBSD because the .pcap file uses DLT_RAW,  
  # which OpenBSD treats as DLT_LOOP. The macro is set on all three BSDs.  
  {  
    config_unset => 'HAVE_NET_IF_PFLOG_H',  
    name => 'heap-overflow-1',  
    input => 'heap-overflow-1.pcap',  
    output => 'heap-overflow-1.out',  
    args => '-v'  
  },  
];  
  
1;  
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```

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1.359 systemd 249.11-0ubuntu3.9

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1.360 sudo 1.9.9-1ubuntu2.4

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Ackeret, Matt
Adler, Mark
Allbery, Russ
Anderson, Jamie
Andrew, Nick
Andric, Dimitry
Barron, Danny
Bates, Tom
Behan, Zdenk
Bellis, Ray
Benali, Elias
Beverly, Jamie
Boardman, Spider
Bos, Sander
Bostley, P.J.
Bowes, Keith
Boyce, Keith Garry
Brantley, Michael
Braun, Rob
Bezina, Pavel
Brooks, Piete
Brown, Jerry
Burr, Michael E
Burton, Ross
Bussjaeger, Andreas
Calvin, Gary
Campbell, Aaron
Chazelas, Stephane
Cheloha, Scott
ek, Vtislav
Coleman, Chris
Corzine, Deven T.
Cusack, Frank

Dai, Wei
Dill, David
Earickson, Jeff
Eckhardt, Drew
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Esipovich, Marc
Espie, Marc

Faigon, Ariel
Farrell, Brian
Fobes, Steve
Frysinger, Mike
G., Daniel Richard
Gailly, Jean-loup
Gelman, Stephen
Gerraty, Simon J.
Graber, Stephane
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Hayman, Randy M.
Henke, Joachim
Hideaki, Yoshifuji
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Hoover, Adam
Hunter, Michael T.
Hutchings, Ben
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Jackson, Richard L., Jr.
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Jepeway, Chris
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Jover, Guillem
Juhani, Timo
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Kadow, Kevin
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Komarnitsky, Alek O.
Kondrashov, Nikolai
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Krause, David
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Lobbes, Phillip E.
McIntyre, Jason
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McLaughlin, Tom
Makey, Jeff
Mallayya, Sangamesh
Manner, Rbert
Marchionna, Michael D.
Markham, Paul
Martinian, Emin
Meskes, Michael
Michael, David
Miller, Todd C.
Minier, Loc
Moffat, Darren
Moldung, Jan Thomas
Morris, Charles
Mueller, Andreas
Mller, Dworkin
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Nikitser, Peter A.
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Ouellet, Jean-Philippe
Paquet, Eric
Paradis, Chantal
Pasteleurs, Frederic
Percival, Ted
Perera, Andres
Peron, Christian S.J.
Peschel, Aaron
Peslyak, Alexander
Peterson, Toby
Petten, Diego Elio
Pickett, Joel
Plotnick, Alex
de Raadt, Theo
Rasch, Gudleik
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Richards, Matt
Rossum, Guido van
Rouillard, John P.
Rowe, William A., Jr.

Roy, Alain
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Sato, Yuichi
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Sanders, Miguel
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Saucier, Jean-Francois
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Schuring, Arno
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Webb, Kirk
Wetzel, Timm
Wieringen, Marco van
Wilk, Jakub
Winiger, Gary
Wood, David

Zacarias, Gustavo
Zolnowsky, John

The following people have worked to translate sudo into other languages as part of the Translation Project, see <https://translationproject.org> for more details.

Albuquerque, Pedro
Blttermann, Mario
Bogusz, Jakub
Buo-ren, Lin
Casagrande, Milo
Castro, Felipe
Cho, Seong-ho
Chornoivan, Yuri
Diguez, Francisco
Fontenelle, Rafael
Garca-Fontes, Walter
Gezer, Volkan
Hamasaki, Takeshi
Hamming, Peter
Hansen, Joe
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Hein, Jochen
Hufthammer, Karl Ove
Jerovek, Damir
Karvonen, Jorma
Kazik, Duan
Kelemen, Gbor
Keeci, Mehmet
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Kramer, Jakob
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Margeviius, Algimantas
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1.361 apt 2.4.9

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#

builds/unix/pkg.m4

#

docs/FTL.TXT

docs/GPLv2.TXT

#

include/freetype/internal/fthash.h

#

src/base/fthash.c

src/base/md5.c

src/base/md5.h

#

src/bdf/bdf.c

src/bdf/bdf.h

src/bdf/bdfdrivr.c

src/bdf/bdfdrivr.h

src/bdf/bdferror.h

src/bdf/bdflib.c

src/bdf/module.mk

src/bdf/README

src/bdf/rules.mk

#

src/pcf/module.mk

src/pcf/pcf.c

src/pcf/pcf.h

src/pcf/pcfdrivr.c

src/pcf/pcfdrivr.h

src/pcf/pcferror.h

src/pcf/pcfread.c

src/pcf/pcfread.h

src/pcf/pcfutil.c

src/pcf/pcfutil.h

src/pcf/README

src/pcf/rules.mk

```
#
src/gzip/adler32.c
src/gzip/infblock.c
src/gzip/infblock.h
src/gzip/infcodes.c
src/gzip/infcodes.h
src/gzip/inffixed.h
src/gzip/inflate.c
src/gzip/inftrees.c
src/gzip/inftrees.h
src/gzip/infutil.c
src/gzip/infutil.h
src/gzip/zconf.h
src/gzip/zlib.h
src/gzip/zutil.c
src/gzip/zutil.h
#
src/tools/apinames.c
src/tools/ftrandom/ftrandom.c
#
subprojects/dlg
#
#
```

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```
Gnomovision version 69, Copyright (C) year name of author  
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.  
This is free software, and you are welcome to redistribute it  
under certain conditions; type `show c' for details.
```

The hypothetical commands `show w'
and `show c' should show the appropriate
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mouse-clicks or menu items--whatever suits your program.

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necessary. Here is a sample; alter the names:

```
Yoyodyne, Inc., hereby disclaims all copyright interest in the program  
'Gnomovision' (which makes passes at compilers) written by James Hacker.
```

```
<signature of Ty Coon>, 1 April 1989  
Ty Coon, President of Vice
```

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1.365 libtest-differences-perl 0.69-1

1.365.1 Available under license :

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abstract: 'Test strings and data structures and show differences if not ok'

author:

- 'David Cantrell <david@cantrell.org.uk>'

build_requires:

ExtUtils::MakeMaker: '0'

configure_requires:

ExtUtils::MakeMaker: '0'

dynamic_config: 1

generated_by: 'ExtUtils::MakeMaker version 7.56, CPAN::Meta::Converter version 2.150010'

license: unknown

meta-spec:

url: <http://module-build.sourceforge.net/META-spec-v1.4.html>

version: '1.4'

name: Test-Differences

no_index:

directory:

- t

- inc

requires:

Capture::Tiny: '0.24'

Data::Dumper: '2.126'

Test::More: '0.88'

Text::Diff: '1.43'

resources:

bugtracker: <https://github.com/DrHyde/Test-Differences/issues>

repository: <https://github.com/DrHyde/Test-Differences>

version: '0.69'

x_serialization_backend: 'CPAN::Meta::YAML version 0.018'

Found in path(s):

* /opt/cola/permits/1673388166_1683929573.1142707/0/libtest-differences-perl-0-69-orig-tar-gz/Test-Differences-0.69/META.yml

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=head1 LIMITATIONS

=head2 C<Test> or C<Test::More>

This module "mixes in" with Test.pm or any of the test libraries based on Test::Builder (Test::Simple, Test::More, etc). It does this by peeking to see whether Test.pm or Test/Builder.pm is in %INC, so if you are not using one of those, it will print a warning and play dumb by not emitting test numbers (or incrementing them). If you are using one of these, it should interoperate nicely.

=head2 Exporting

Exports all 3 functions by default (and by design). Use

```
use Test::Differences ();
```

to suppress this behavior if you don't like the namespace pollution.

This module will not override functions like `ok()`, `is()`, `is_deeply()`, etc. If it did, then you could `C<eval "use Test::Differences qw(is_deeply);">` to get automatic upgrading to diffing behaviors without the `C<sub my_ok>` shown above.

`Test::Differences` intentionally does not provide this behavior because this

would mean that `Test::Differences` would need to emulate every popular test module out there, which would require far more coding and maintenance than I'm willing to do. Use the `eval` and `my_ok` deployment shown above if you want some level of automation.

=head2 Unicode

Perls before 5.6.0 don't support characters > 255 at all, and 5.6.0 seems broken. This means that you might get odd results using `perl5.6.0` with unicode strings.

=head2 `C<Data::Dumper>` and older Perls.

Relies on `Data::Dumper` (for now), which, prior to `perl5.8`, will not always report hashes in the same order. `C< $Data::Dumper::Sortkeys >` `I<is>` set to 1, so on more recent versions of `Data::Dumper`, this should not occur. Check CPAN to see if it's been peeled out of the main perl distribution and backported. Reported by Ilya Martynov ilya@martynov.org, although the `Sortkeys` "future perfect" workaround has been set in anticipation of a new `Data::Dumper` for a while. Note that the two hashes should report the same here:

```
not ok 5
# Failed test (t/ctrl/05-home.t at line 51)
# +-----+-----+-----+-----+
# | Elt|Got          | Elt|Expected      |
# +-----+-----+-----+-----+
# | 0|{              | 0|{              |
# | 1| 'password' => ", | 1| 'password' => ", |
# * 2| 'method' => 'login', * |
# | 3| 'ctrl' => 'home', | 2| 'ctrl' => 'home', |
# | | * 3| 'method' => 'login', *
# | 4| 'email' => 'test' | 4| 'email' => 'test' |
# | 5|}              | 5|}              |
```

+---+-----+---+-----+

Data::Dumper also overlooks the difference between

```
$a[0] = $a[1];  
$a[1] = $a[0]; # $a[0] = $a[1]
```

and

```
$x = $y;  
$y = $x;  
@a = ( $x, $y ); # $a[0] =  
$y, not $a[1]
```

The former involves two scalars, the latter 4: \$x, \$y, and @a[0,1].

This was carefully explained to me in words of two syllables or less by Yves Orton <demerphq@hotmail.com>. The plan to address this is to allow you to select Data::Denter or some other module of your choice as an option.

=head2 Code-refs

Test::Differences turns on C<\$Data::Dumper::Deparse>, so any code-refs in your data structures will be turned into text before they are examined, using L<B::Deparse>. The precise text generated for a sub-ref might not be what you expect as it is generated from the compiled version of the code, but it should at least be consistent and spot differences correctly.

You can turn this behaviour off by setting C<\$Test::Differences::NoDeparse>.

=head1 AUTHORS

Barrie Slaymaker <barries@slaysys.com> - original author

Curtis "Ovid" Poe <ovid@cpan.org>

David Cantrell <david@cantrell.org.uk>

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=cut

Found in path(s):

* /opt/cola/permits/1673388166_1683929573.1142707/0/libtest-differences-perl-0-69-orig-tar-gz/Test-Differences-0.69/lib/Test/Differences.pm

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Test-Differences

INSTALLATION

To install this module, run the following commands:

```
perl Makefile.PL
make
make test
make install
```

SUPPORT AND DOCUMENTATION

After installing, you can find documentation for this module with the perldoc command.

```
perldoc Test::Differences
```

You can also look for information at:

The bug tracker:

<https://github.com/DrHyde/perl-modules-Test-Differences/issues>

CPAN Ratings

<http://cpanratings.perl.org/d/Test-Differences>

MetaCPAN:

<https://metacpan.org/pod/Test::Differences>

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Found in path(s):

* /opt/cola/permits/1673388166_1683929573.1142707/0/libtest-differences-perl-0-69-orig-tar-gz/Test-Differences-0.69/README

1.366 libmath-random-isaac-xs-perl 1.004-2build7

1.366.1 Available under license :

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1.367 initramfs-tools 0.140ubuntu13.1

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Thu, 27 Jan 2005 15:23:52 -0500.

The current Debian maintainers are maximilian attems <maks@debian.org>
and Michael Prokop <mika@debian.org>.

The current ubuntu release can be found at:
<http://archive.ubuntu.com/ubuntu/pool/main/i/initramfs-tools/>

The Debian tree is maintained with "git" at:
<https://anonscm.debian.org/git/kernel/initramfs-tools.git>
<https://anonscm.debian.org/cgit/kernel/initramfs-tools.git>

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1.368 libjson-xs-perl 4.030-1build3

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1.369 libhttp-server-simple-perl 0.52-1.1

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1.370 libcurses-ui-perl 0.9609-1.1

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1.372 x-sys 0.0.0-20220829200755-d48e67d00261

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1.373 vim 8.2.3995-1ubuntu2.7

1.374 arping 2.22-1

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```
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```

```
<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
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1.375 opendns-openssl 3.0.8-19

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```

```
<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
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1.377 libnet-dns-sec-perl 1.19-1build2

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1.378 walinuxagent 2.2.46-0ubuntu5.1

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```

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```
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```
Gnomovision version 69, Copyright (C) 19xx name of author
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This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.
```

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```
Yoyodyne, Inc., hereby disclaims
all copyright interest in the
program `Gnomovision' (a program to direct compilers to make passes
at assemblers) written by James Hacker.
```

```
<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
```

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The End

1.382 ubuntu-advantage-tools 27.13.3~22.04.1

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Version 3, 29 June 2007

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```
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Source: <https://github.com/CanonicalLtd/ubuntu-advantage-script>

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1.383 ubuntu-release-upgrader 22.04.15

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```

```
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Source: <https://code.launchpad.net/~ubuntu-core-dev/ubuntu-release-upgrader/trunk>

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1.385 libtest-json-perl 0.11-2.1

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Test-JSON

This module allows for easy testing of JSON data.

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```
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./Build install
```

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```
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L<<http://rt.cpan.org/NoAuth/ReportBug.html?Queue=Test-JSON>>.
I will be notified, and then you'll automatically be notified of progress on
your bug as I make changes.

=head1 SEE ALSO

This test module uses L<JSON::Any> and L<Test::Differences>.

=head1 ACKNOWLEDGEMENTS

The development of this module was sponsored by Kineticode,
L<<http://www.kineticode.com/>>, the leading provider of services for the
Bricolage content management system, L<<http://www.bricolage.cc/>>.

Thanks to Makamaka Hannyaharamitu C<makamaka@cpan.org> for a patch to make
this work with JSON 2.0.

Thanks to Stevan Little for suggesting a switch to L<JSON::Any>. This makes it easier for this module to work with whatever JSON module you have installed.

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No license file was found, but licenses were detected in source scan.

name: Test-JSON

version: 0.11

author:

- 'Curtis "Ovid" Poe <ovid@cpan.org>'

abstract: Test JSON data

license: perl

resources:

license: ~

requires:

JSON::Any: 1.2

Test::Differences: 0.47

Test::Simple: 0.62

Test::Tester: 0.107

provides:

Test::JSON:

file: lib/Test/JSON.pm

version: 0.11

generated_by: Module::Build version 0.32

meta-spec:

url: <http://module-build.sourceforge.net/META-spec-v1.2.html>

version: 1.2

Found in path(s):

* /opt/cola/permits/1673388174_1683929588.1263692/0/libtest-json-perl-0-11-orig-1-tar-gz/Test-JSON-0.11/META.yml

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1.389 mingetty 1.08-4

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1.392 systemd-hwe 249.11.2

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1.393 libdigest-bubblebabble-perl 0.02-2.1

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1.394 update-manager 22.04.10

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It was downloaded from <http://code.launchpad.net/~ubuntu-core-dev/update-manager/main>

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1.395 libjson-perl 4.04000-1

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=pod

=head1 NAME

JSON::PP - JSON::XS compatible pure-Perl module.

=head1 SYNOPSIS

```
use JSON::PP;
```

```
# exported functions, they croak on error
```

```
# and expect/generate UTF-8
```

```
$utf8_encoded_json_text = encode_json $perl_hash_or_arrayref;
```

```
$perl_hash_or_arrayref = decode_json $utf8_encoded_json_text;
```

```
# OO-interface
```

```
$json = JSON::PP->new->ascii->pretty->allow_nonref;
```

```
$pretty_printed_json_text = $json->encode( $perl_scalar );
```

```
$perl_scalar = $json->decode( $json_text );
```

```
# Note that JSON version 2.0 and above will automatically use
```

```
# JSON::XS or JSON::PP, so you should be able to just:
```

use JSON;

=head1 DESCRIPTION

JSON::PP is a pure perl JSON decoder/encoder, and (almost) compatible to much faster L<JSON::XS> written by Marc Lehmann in C. JSON::PP works as a fallback module when you use L<JSON> module without having installed JSON::XS.

Because of this fallback feature of JSON.pm, JSON::PP tries not to be

more JavaScript-friendly than JSON::XS (i.e. not to escape extra characters such as U+2028 and U+2029, etc), in order for you not to lose such JavaScript-friendliness silently when you use JSON.pm and install JSON::XS for speed or by accident. If you need JavaScript-friendly RFC7159-compliant pure perl module, try L<JSON::Tiny>, which is derived from L<Mojolicious> web framework and is also smaller and faster than JSON::PP.

JSON::PP has been in the Perl core since Perl 5.14, mainly for CPAN toolchain modules to parse META.json.

=head1 FUNCTIONAL INTERFACE

This section is taken from JSON::XS almost verbatim. C<encode_json> and C<decode_json> are exported by default.

=head2 encode_json

```
$json_text = encode_json $perl_scalar
```

Converts the given Perl data structure to a UTF-8 encoded, binary string (that is, the string contains octets only). Croaks on error.

This function call is functionally identical to:

```
$json_text = JSON::PP->new->utf8->encode($perl_scalar)
```

Except being faster.

=head2 decode_json

```
$perl_scalar = decode_json $json_text
```

The opposite of C<encode_json>: expects an UTF-8 (binary) string and tries to parse that as an UTF-8 encoded JSON text, returning the resulting

reference. Croaks on error.

This function call is functionally identical to:

```
$perl_scalar = JSON::PP->new->utf8->decode($json_text)
```

Except being faster.

```
=head2 JSON::PP::is_bool
```

```
$is_boolean = JSON::PP::is_bool($scalar)
```

Returns true if the passed scalar represents either `JSON::PP::true` or `JSON::PP::false`, two constants that act like `C<1>` and `C<0>` respectively and are also used to represent JSON `C<true>` and `C<>false>` in Perl strings.

See [L<MAPPING>](#), below, for more information on how JSON values are mapped to Perl.

```
=head1 OBJECT-ORIENTED INTERFACE
```

This section is also taken from `JSON::XS`.

The object oriented interface lets you configure your own encoding or decoding style, within the limits of supported formats.

```
=head2 new
```

```
$json = JSON::PP->new
```

Creates

a new `JSON::PP` object that can be used to de/encode JSON strings. All boolean flags described below are by default `I<disabled>` (with the exception of `C<allow_nonref>`, which defaults to `I<enabled>` since version `C<4.0>`).

The mutators for flags all return the `JSON::PP` object again and thus calls can be chained:

```
my $json = JSON::PP->new->utf8->space_after->encode({a => [1,2]})
=> {"a": [1, 2]}
```

```
=head2 ascii
```

```
$json = $json->ascii([$enable])
```

```
$enabled = $json->get_ascii
```

If C<\$enable> is true (or missing), then the C<encode> method will not generate characters outside the code range C<0..127> (which is ASCII). Any Unicode characters outside that range will be escaped using either a single \uXXXX (BMP characters) or a double \uHHHH\uLLLLL escape sequence, as per RFC4627. The resulting encoded JSON text can be treated as a native Unicode string, an ascii-encoded, latin1-encoded or UTF-8 encoded string, or any other superset of ASCII.

If C<\$enable> is false, then the C<encode> method will not escape Unicode characters unless required by the JSON syntax or other flags. This results in a faster and more compact format.

See also the section I<ENCODING/CODESET FLAG NOTES> later in this document.

The main use for this flag is to produce JSON texts that can be transmitted over a 7-bit channel, as the encoded JSON texts will not contain any 8 bit characters.

```
JSON::PP->new->ascii(1)->encode([chr 0x10401])
=> ["\ud801\udc01"]
```

```
=head2 latin1
```

```
$json = $json->latin1([$enable])
```

```
$enabled = $json->get_latin1
```

If C<\$enable> is true (or missing), then the C<encode> method will encode the resulting JSON text as latin1 (or iso-8859-1), escaping any characters outside the code range C<0..255>. The resulting string can be treated as a latin1-encoded JSON text or a native Unicode string. The C<decode> method will not be affected in any way by this flag, as C<decode> by default expects Unicode, which is a strict superset of latin1.

If C<\$enable> is false, then the C<encode> method will not escape Unicode characters unless required by the JSON syntax or other flags.

See also the section I<ENCODING/CODESET FLAG NOTES> later in this document.

The main use for this flag is efficiently encoding binary data as JSON text, as most octets will not be escaped, resulting in a smaller encoded size. The disadvantage is that the resulting JSON text is encoded in latin1 (and must correctly be treated as such when storing and transferring), a rare encoding for JSON. It is therefore most useful when you want to store data structures known to contain binary data efficiently in files or databases, not when talking to other JSON encoders/decoders.

```
JSON::PP->new->latin1->encode (["\x{89}\x{abc}"])
=> ["\x{89}\u0abc"] # (perl syntax, U+abc escaped, U+89 not)
```

```
=head2 utf8
```

```
$json = $json->utf8([$enable])
```

```
$enabled = $json->get_utf8
```

If C<\$enable> is true (or missing), then the C<encode> method will encode the JSON result into UTF-8, as required by many protocols, while the C<decode> method expects to be handled an UTF-8-encoded string. Please note that UTF-8-encoded strings do not contain any characters outside the range C<0..255>, they are thus useful for bitwise/binary I/O. In future versions, enabling this option might enable autodetection of the UTF-16 and UTF-32 encoding families, as described in RFC4627.

If C<\$enable> is false, then the C<encode> method will return the JSON string as a (non-encoded) Unicode string, while C<decode> expects thus a Unicode string. Any decoding or encoding (e.g. to UTF-8 or UTF-16) needs to be done yourself, e.g. using the Encode module.

See also the section I<ENCODING/CODESET FLAG NOTES> later in this document.

Example, output UTF-16BE-encoded JSON:

```
use Encode;
$json_text = encode "UTF-16BE", JSON::PP->new->encode ($object);
```

Example, decode UTF-32LE-encoded JSON:

```
use Encode;
$object = JSON::PP->new->decode (decode "UTF-32LE", $json_text);
```

```
=head2 pretty
```

```
$json
= $json->pretty([$enable])
```

This enables (or disables) all of the C<indent>, C<space_before> and C<space_after> (and in the future possibly more) flags in one call to generate the most readable (or most compact) form possible.

```
=head2 indent
```

```
$json = $json->indent([$enable])
```

```
$enabled = $json->get_indent
```

If C<\$enable> is true (or missing), then the C<encode> method will use a multiline format as output, putting every array member or object/hash key-value pair into its own line, indenting them properly.

If C<\$enable> is false, no newlines or indenting will be produced, and the resulting JSON text is guaranteed not to contain any C<newlines>.

This setting has no effect when decoding JSON texts.

The default indent space length is three.

You can use C<indent_length> to change the length.

```
=head2 space_before
```

```
$json = $json->space_before([$enable])
```

```
$enabled = $json->get_space_before
```

If C<\$enable> is true (or missing), then the C<encode> method will add an extra optional space before the C<:> separating keys from values in JSON objects.

If C<\$enable> is false, then the C<encode> method will not add any extra space at those places.

This setting has no effect when decoding JSON texts. You will also most likely combine this setting with C<space_after>.

Example, space_before enabled, space_after and indent disabled:

```
{"key" : "value" }
```

```
=head2 space_after
```

```
$json = $json->space_after([$enable])
```

```
$enabled = $json->get_space_after
```

If C<\$enable> is true (or missing), then the C<encode> method will add an extra optional space after the C<:> separating keys from values in JSON objects and extra whitespace after the C<,> separating key-value pairs and array members.

If C<\$enable> is false, then the C<encode> method will not add any extra space at those places.

This setting has no effect when decoding JSON texts.

Example, `space_before` and `indent` disabled, `space_after` enabled:

```
{"key": "value" }
```

=head2 relaxed

```
$json = $json->relaxed([$enable])
```

```
$enabled = $json->get_relaxed
```

If `C<$enable>` is true (or missing), then `C<decode>` will accept some extensions to normal JSON syntax (see below). `C<encode>` will not be affected in anyway. I<Be aware that this option makes you accept invalid JSON texts as if they were valid!>. I suggest only to use this option to parse application-specific files written by humans (configuration files, resource files etc.)

If `C<$enable>` is false (the default), then `C<decode>` will only accept valid JSON texts.

Currently accepted extensions are:

=over 4

=item * list items can have an end-comma

JSON I<separates> array elements and key-value pairs with commas. This can be annoying if you write JSON texts manually and want to be able to quickly append elements, so this extension accepts comma at the end of such items not just between them:

```
[
  1,
  2, <- this comma not normally allowed
]
{
  "k1": "v1",
  "k2": "v2", <- this comma not normally allowed
}
```

=item * shell-style '#'-comments

Whenever JSON allows whitespace, shell-style comments are additionally allowed. They are terminated by the first carriage-return or line-feed

character, after which more white-space and comments are allowed.

```
[
  1, # this comment not allowed in JSON
     # neither this one...
]
```

=item * C-style multiple-line `/* */`-comments (JSON::PP only)

Whenever JSON allows whitespace, C-style multiple-line comments are additionally allowed. Everything between `C</*>` and `C<*/>` is a comment, after which more white-space and comments are allowed.

```
[
  1, /* this comment not allowed in JSON */
     /* neither this one... */
]
```

=item * C++-style one-line `//`-comments (JSON::PP only)

Whenever JSON allows whitespace, C++-style one-line comments are additionally allowed. They are terminated by the first carriage-return or line-feed character, after which more white-space and comments are allowed.

```
[
  1, // this comment not allowed in JSON
     // neither this one...
]
```

=item * literal ASCII TAB characters in strings

Literal ASCII TAB characters are now allowed in strings (and treated as `C<\t>`).

```
[
  "Hello\tWorld",
  "Hello<TAB>World", # literal <TAB> would not normally be allowed
]
```

=back

=head2 canonical

```
$json = $json->canonical([$enable])
```

```
$enabled = $json->get_canonical
```

If `C<$enable>` is true (or missing), then the `C<encode>` method will output JSON objects

by sorting their keys. This is adding a comparatively high overhead.

If C<\$enable> is false, then the C<encode> method will output key-value pairs in the order Perl stores them (which will likely change between runs of the same script, and can change even within the same run from 5.18 onwards).

This option is useful if you want the same data structure to be encoded as the same JSON text (given the same overall settings). If it is disabled, the same hash might be encoded differently even if contains the same data, as key-value pairs have no inherent ordering in Perl.

This setting has no effect when decoding JSON texts.

This setting has currently no effect on tied hashes.

```
=head2 allow_nonref
```

```
$json = $json->allow_nonref([$enable])
```

```
$enabled = $json->get_allow_nonref
```

Unlike other boolean options, this option is enabled by default beginning with version C<4.0>.

If C<\$enable> is true (or missing), then the C<encode> method can convert a non-reference into its corresponding string, number or null JSON value, which is an extension to RFC4627. Likewise, C<decode> will accept those JSON values instead of croaking.

If C<\$enable> is false, then the C<encode> method will croak if it isn't passed an arrayref or hashref, as JSON texts must either be an object or array. Likewise, C<decode> will croak if given something that is not a JSON object or array.

Example, encode a Perl scalar as JSON value without enabled C<allow_nonref>, resulting in an error:

```
JSON::PP->new->allow_nonref(0)->encode ("Hello, World!")  
=> hash- or arrayref expected...
```

```
=head2 allow_unknown
```

```
$json = $json->allow_unknown([$enable])
```

```
$enabled = $json->get_allow_unknown
```

If C<\$enable> is true (or missing), then C<encode> will I<not> throw an exception when it encounters values it cannot represent in JSON (for example, filehandles) but instead will encode a JSON C<null> value. Note that blessed objects are not included here and are handled separately by c<allow_blessed>.

If C<\$enable> is false (the default), then C<encode> will throw an exception when it encounters anything it cannot encode as JSON.

This option does not affect C<decode> in any way, and it is recommended to leave it off unless you know your communications partner.

```
=head2 allow_blessed
```

```
$json = $json->allow_blessed([$enable])
```

```
$enabled = $json->get_allow_blessed
```

See L<OBJECT SERIALISATION> for details.

If C<\$enable> is true (or missing), then the C<encode> method will not barf when it encounters a blessed reference that it cannot convert otherwise. Instead, a JSON C<null> value is encoded instead of the object.

If C<\$enable> is false (the default), then C<encode> will throw an exception when it encounters a blessed object that it cannot convert otherwise.

This setting has no effect on C<decode>.

```
=head2 convert_blessed
```

```
$json = $json->convert_blessed([$enable])
```

```
$enabled = $json->get_convert_blessed
```

See L<OBJECT SERIALISATION> for details.

If C<\$enable> is true (or missing), then C<encode>, upon encountering a blessed object, will check for the availability of the C<TO_JSON> method on the object's class. If found, it will be called in scalar context and the resulting scalar will be encoded instead of the object.

The C<TO_JSON> method may safely call die if it wants. If C<TO_JSON> returns other blessed objects, those will be handled in the same way. C<TO_JSON> must take care of not causing an endless recursion cycle (== crash) in this case. The name of C<TO_JSON> was chosen because other

methods

called by the Perl core (== not by the user of the object) are usually in upper case letters and to avoid collisions with any C<to_json> function or method.

If C<\$enable> is false (the default), then C<encode> will not consider this type of conversion.

This setting has no effect on C<decode>.

=head2 allow_tags

```
$json = $json->allow_tags([$enable])
```

```
$enabled = $json->get_allow_tags
```

See L<OBJECT SERIALISATION> for details.

If C<\$enable> is true (or missing), then C<encode>, upon encountering a blessed object, will check for the availability of the C<FREEZE> method on the object's class. If found, it will be used to serialise the object into a nonstandard tagged JSON value (that JSON decoders cannot decode).

It also causes C<decode> to parse such tagged JSON values and deserialise them via a call to the C<THAW> method.

If C<\$enable> is false (the default), then C<encode> will not consider this type of conversion, and tagged JSON values will cause a parse error in

C<decode>, as if tags were not part of the grammar.

=head2 boolean_values

```
$json->boolean_values([$false, $true])
```

```
($false, $true) = $json->get_boolean_values
```

By default, JSON booleans will be decoded as overloaded C<\$JSON::PP::false> and C<\$JSON::PP::true> objects.

With this method you can specify your own boolean values for decoding - on decode, JSON C<false> will be decoded as a copy of C<\$false>, and JSON C<true> will be decoded as C<\$true> ("copy" here is the same thing as assigning a value to another variable, i.e. C<\$copy = \$false>).

This is useful when you want to pass a decoded data structure directly to other serialisers like YAML, Data::MessagePack and so on.

Note that this works only when you C<decode>. You can set incompatible boolean objects (like L<boolean>), but when you C<encode> a data structure with such boolean objects, you still need to enable C<convert_blessed> (and add a C<TO_JSON> method if necessary).

Calling this method without any arguments will reset the booleans to their default values.

C<get_boolean_values> will return both C<\$false> and C<\$true> values, or the empty list when they are set to the default.

```
=head2 filter_json_object
```

```
$json = $json->filter_json_object([$coderef])
```

When C<\$coderef> is specified, it will be called from C<decode> each time it decodes a JSON object. The only argument is a reference to the newly-created hash. If the code references returns a single scalar (which need not be a reference), this value (or rather a copy of it) is inserted into the deserialised data structure. If it returns an empty list (NOTE: I<not> C<undef>, which is a valid scalar), the original deserialised hash will be inserted. This setting can slow down decoding considerably.

When C<\$coderef> is omitted or undefined, any existing callback will be removed and C<decode> will not change the deserialised hash in any way.

Example, convert all JSON objects into the integer 5:

```
my $js = JSON::PP->new->filter_json_object(sub
{ 5 });
# returns [5]
$json->decode('[]');
# returns 5
$json->decode('{"a":1, "b":2}');
```

```
=head2 filter_json_single_key_object
```

```
$json = $json->filter_json_single_key_object($key [=> $coderef])
```

Works remotely similar to C<filter_json_object>, but is only called for JSON objects having a single key named C<\$key>.

This C<\$coderef> is called before the one specified via C<filter_json_object>, if any. It gets passed the single value in the JSON object. If it returns a single value, it will be inserted into the data

structure. If it returns nothing (not even C<undef> but the empty list), the callback from C<filter_json_object> will be called next, as if no single-key callback were specified.

If C<\$coderef> is omitted or undefined, the corresponding callback will be disabled. There can only ever be one callback for a given key.

As this callback gets called less often than the C<filter_json_object> one, decoding speed will not usually suffer as much. Therefore, single-key objects

make excellent targets to serialise Perl objects into, especially as single-key JSON objects are as close to the type-tagged value concept as JSON gets (it's basically an ID/VALUE tuple). Of course, JSON does not support this in any way, so you need to make sure your data never looks like a serialised Perl hash.

Typical names for the single object key are C<__class_whatever__>, or C<\$__dollars_are_rarely_used__\$> or C<}ugly_brace_placement>, or even things like C<__class_md5sum(classname)__>, to reduce the risk of clashing with real hashes.

Example, decode JSON objects of the form C<< { "__widget__" => <id> } >> into the corresponding C<< \$WIDGET{<id>} >> object:

```
# return whatever is in $WIDGET{5}:
JSON::PP
->new
->filter_json_single_key_object (__widget__ => sub {
    $WIDGET{ $_[0] }
})
->decode ('{"__widget__": 5')

# this can be used with a TO_JSON method in some "widget" class
# for serialisation to json:
sub WidgetBase::TO_JSON
{
    my ($self) = @_;

    unless ($self->{id}) {
        $self->{id} = ..get..some..id..;
        $WIDGET{$self->{id}} = $self;
    }

    { __widget__ => $self->{id} }
}

=head2 shrink
```

```
$json = $json->shrink([$enable])
```

```
$enabled = $json->get_shrink
```

If C<\$enable> is true (or missing), the string returned by C<encode> will be shrunk (i.e. downgraded if possible).

The actual definition of what shrink does might change in future versions, but it will always try to save space at the expense of time.

If C<\$enable> is false, then JSON::PP does nothing.

```
=head2 max_depth
```

```
$json = $json->max_depth([$maximum_nesting_depth])
```

```
$max_depth = $json->get_max_depth
```

Sets the maximum nesting level (default C<512>) accepted while encoding or decoding. If a higher nesting level is detected in JSON text or a Perl data structure, then the encoder and decoder will stop and croak at that point.

Nesting level is defined by number of hash- or arrayrefs that the encoder needs to traverse to reach a given point or the number of C<{> or C<[> characters without their matching closing parenthesis crossed to reach a given character in a string.

Setting the maximum depth to one disallows any nesting, so that ensures that the object is only a single hash/object or array.

If no argument is given, the highest possible setting will be used, which is rarely useful.

See L<JSON::XS/SECURITY CONSIDERATIONS> for more info on why this is useful.

```
=head2 max_size
```

```
$json = $json->max_size([$maximum_string_size])
```

```
$max_size = $json->get_max_size
```

Set the maximum length a JSON text may have (in bytes) where decoding is being attempted. The default is C<0>, meaning no limit. When C<decode> is called on a string that is longer than this many bytes, it will not attempt to decode the string but throw an exception. This setting has no effect on C<encode> (yet).

If no argument is given, the limit check will be deactivated (same as when `C<0>` is specified).

See

[L<JSON::XS/SECURITY CONSIDERATIONS>](#) for more info on why this is useful.

=head2 encode

```
$json_text = $json->encode($perl_scalar)
```

Converts the given Perl value or data structure to its JSON representation. Croaks on error.

=head2 decode

```
$perl_scalar = $json->decode($json_text)
```

The opposite of `C<encode>`: expects a JSON text and tries to parse it, returning the resulting simple scalar or reference. Croaks on error.

=head2 decode_prefix

```
($perl_scalar, $characters) = $json->decode_prefix($json_text)
```

This works like the `C<decode>` method, but instead of raising an exception when there is trailing garbage after the first JSON object, it will silently stop parsing there and return the number of characters consumed so far.

This is useful if your JSON texts are not delimited by an outer protocol and you need to know where the JSON text ends.

```
JSON::PP->new->decode_prefix ("[1] the tail")  
=> ([1], 3)
```

=head1 FLAGS FOR JSON::PP ONLY

The following flags and properties are for `JSON::PP` only. If you use any of these, you can't make your application run faster by replacing `JSON::PP` with `JSON::XS`. If you need these and also speed boost, you might want to try [L<Cpanel::JSON::XS>](#), a fork of `JSON::XS` by Reini Urban, which supports some of these (with a different set of incompatibilities). Most of these historical flags are only kept for backward compatibility, and should not be used in a new application.

=head2 allow_singlequote


```
$json = $json->allow_singlequote([$enable])
$enabled = $json->get_allow_singlequote
```

If C<\$enable> is true (or missing), then C<decode> will accept invalid JSON texts that contain strings that begin and end with single quotation marks. C<encode> will not be affected in any way. I<Be aware that this option makes you accept invalid JSON texts as if they were valid!>. I suggest only to use this option to parse application-specific files written by humans (configuration files, resource files etc.)

If C<\$enable> is false (the default), then C<decode> will only accept valid JSON texts.

```
$json->allow_singlequote->decode(qq{"foo":'bar'});
$json->allow_singlequote->decode(qq{"foo":"bar"});
$json->allow_singlequote->decode(qq{'foo':'bar'});
```

=head2 allow_barekey

```
$json = $json->allow_barekey([$enable])
$enabled = $json->get_allow_barekey
```

If C<\$enable> is true (or missing), then C<decode> will accept invalid JSON texts that contain JSON objects whose names don't begin and end with quotation marks. C<encode> will not be affected in any way. I<Be aware that this option makes you accept invalid JSON texts as if they were valid!>. I suggest only to use this option to parse application-specific files written by humans (configuration files, resource files etc.)

If C<\$enable> is false (the default), then C<decode> will only accept valid JSON texts.

```
$json->allow_barekey->decode(qq{foo:"bar"});
```

=head2 allow_bignum

```
$json = $json->allow_bignum([$enable])
$enabled = $json->get_allow_bignum
```

If

C<\$enable> is true (or missing), then C<decode> will convert big integers Perl cannot handle as integer into L<Math::BigInt> objects and convert floating numbers into L<Math::BigFloat> objects. C<encode> will convert C<Math::BigInt> and C<Math::BigFloat>

objects into JSON numbers.

```
$json->allow_nonref->allow_bignum;  
$bigfloat = $json->decode('2.00000000000000000000000000000001');  
print $json->encode($bigfloat);  
# => 2.00000000000000000000000000000001
```

See also L<MAPPING>.

=head2 loose

```
$json = $json->loose([$enable])  
$enabled = $json->get_loose
```

If C<\$enable> is true (or missing), then C<decode> will accept invalid JSON texts that contain unescaped [`\x00-\x1f\x22\x5c`] characters. C<encode> will not be affected in any way.

I<Be aware that this option makes you accept invalid JSON texts as if they were valid!>. I suggest only to use this option to parse application-specific files written by humans (configuration files, resource files etc.)

If C<\$enable>

is false (the default), then C<decode> will only accept valid JSON texts.

```
$json->loose->decode(qq["abc  
def"]);
```

=head2 escape_slash

```
$json = $json->escape_slash([$enable])  
$enabled = $json->get_escape_slash
```

If C<\$enable> is true (or missing), then C<encode> will explicitly escape I<slash> (solidus; C<U+002F>) characters to reduce the risk of XSS (cross site scripting) that may be caused by C<< </script> >> in a JSON text, with the cost of bloating the size of JSON texts.

This option may be useful when you embed JSON in HTML, but embedding arbitrary JSON in HTML (by some HTML template toolkit or by string interpolation) is risky in general. You must escape necessary characters in correct order, depending on the context.

C<decode> will not be affected in any way.

=head2 indent_length

```
$json = $json->indent_length($number_of_spaces)
$length = $json->get_indent_length
```

This option is only useful when you also enable C<indent> or C<pretty>.

JSON::XS indents with three spaces when you C<encode> (if requested by C<indent> or C<pretty>), and the number cannot be changed.

JSON::PP allows you to change/get the number of indent spaces with these mutator/accessor. The default number of spaces is three (the same as JSON::XS), and the acceptable range is from C<0> (no indentation; it'd be better to disable indentation by C<indent(0)>) to C<15>.

```
=head2 sort_by
```

```
$json = $json->sort_by($code_ref)
$json = $json->sort_by($subroutine_name)
```

If you just want to sort keys (names) in JSON objects when you C<encode>, enable C<canonical> option (see above) that allows you to sort object keys alphabetically.

If you do need to sort non-alphabetically for whatever reasons, you can give a code reference (or a subroutine name) to C<sort_by>, then the argument will be passed to Perl's C<sort> built-in function.

As the sorting is done in the JSON::PP scope, you usually need to prepend C<JSON::PP::> to the subroutine name, and the special variables C<\$a> and C<\$b> used in the subroutine used by C<sort> function.

Example:

```
my %ORDER = (id => 1, class => 2, name => 3);
$json->sort_by(sub {
    ($ORDER{$JSON::PP::a} // 999) <=> ($ORDER{$JSON::PP::b} // 999)
    or $JSON::PP::a cmp $JSON::PP::b
});
print $json->encode([
    {name => 'CPAN', id => 1, href => 'http://cpan.org'}
]);
# [{"id":1,"name":"CPAN","href":"http://cpan.org"}]
```

Note that C<sort_by> affects all the plain hashes in the data structure. If you need finer control, C<tie> necessary hashes with a module that implements ordered hash (such as L<Hash::Ordered> and L<Tie::IxHash>). C<canonical> and C<sort_by> don't affect the key order in C<tie>d hashes.

```

use Hash::Ordered;
tie my %hash, 'Hash::Ordered',
    (name => 'CPAN', id => 1, href => 'http://cpan.org');
print $json->encode([\%hash]);
# [{"name":"CPAN","id":1,"href":"http://cpan.org"}] # order is kept

```

=head1 INCREMENTAL PARSING

This section is also
taken from JSON::XS.

In some cases, there is the need for incremental parsing of JSON texts. While this module always has to keep both JSON text and resulting Perl data structure in memory at one time, it does allow you to parse a JSON stream incrementally. It does so by accumulating text until it has a full JSON object, which it then can decode. This process is similar to using `C<decode_prefix>` to see if a full JSON object is available, but is much more efficient (and can be implemented with a minimum of method calls).

JSON::PP will only attempt to parse the JSON text once it is sure it has enough text to get a decisive result, using a very simple but truly incremental parser. This means that it sometimes won't stop as early as the full parser, for example, it doesn't detect mismatched parentheses. The only thing it guarantees is that it starts decoding as soon as a syntactically valid JSON text has been seen. This means you need to set resource limits (e.g. `C<max_size>`) to ensure the parser will stop parsing in the presence of syntax errors.

The following methods implement this incremental parser.

=head2 incr_parse

```
$json->incr_parse( [$string] ) # void context
```

```
$obj_or_undef = $json->incr_parse( [$string] ) # scalar context
```

```
@obj_or_empty = $json->incr_parse( [$string] ) # list context
```

This is the central parsing function. It can both append new text and extract objects from the stream accumulated so far (both of these functions are optional).

If `C<$string>` is given, then this string is appended to the already existing JSON fragment stored in the `C<$json>` object.

After that, if the function is called in void context, it will simply return without doing anything further. This can be used to add more text in as many chunks as you want.

If the method is called in scalar context, then it will try to extract exactly I<one> JSON object. If that is successful, it will return this object, otherwise it will return C<undef>. If there is a parse error, this method will croak just as C<decode> would do (one can then use C<incr_skip> to skip the erroneous part). This is the most common way of using the method.

And finally, in list context, it will try to extract as many objects from the stream as it can find and return them, or the empty list otherwise. For this to work, there must be no separators (other than whitespace) between the JSON objects or arrays, instead they must be concatenated back-to-back. If an error occurs, an exception will be raised as in the scalar context case. Note that in this case, any previously-parsed JSON texts will be lost.

Example: Parse some JSON arrays/objects in a given string and return them.

```
my @objs = JSON::PP->new->incr_parse ("[5][7][1,2]");

=head2 incr_text

$value_string = $json->incr_text
```

This method returns the currently stored JSON fragment as an lvalue, that is, you can manipulate it. This I<only> works when a preceding call to C<incr_parse> in I<scalar context> successfully returned an object. Under all other circumstances you must not call this function (I mean it. although in simple tests it might actually work, it I<will> fail under real world conditions). As a special exception, you can also call this method before having parsed anything.

That means you can only use this function to look at or manipulate text before or after complete JSON objects, not while the parser is in the middle of parsing a JSON object.

This function is useful in two cases: a) finding the trailing text after a JSON object or b) parsing multiple JSON objects separated by non-JSON text (such as commas).

```
=head2 incr_skip
```

`$json->incr_skip`

This will reset the state of the incremental parser and will remove the parsed text from the input buffer so far. This is useful after `C<incr_parse>` died, in which case the input buffer and incremental parser state is left unchanged, to skip the text parsed so far and to reset the parse state.

The difference to `C<incr_reset>` is that only text until the parse error occurred is removed.

=head2 `incr_reset`

`$json->incr_reset`

This completely resets the incremental parser, that is, after this call, it will be as if the parser had never parsed anything.

This is useful if you want to repeatedly parse JSON objects and want to ignore any trailing data, which means you have to reset the parser after each successful decode.

=head1 MAPPING

Most of this section is also taken from `JSON::XS`.

This section describes how `JSON::PP` maps Perl values to JSON values and vice versa. These mappings are designed to "do the right thing" in most circumstances automatically, preserving round-tripping characteristics (what you put in comes out as something equivalent).

For the more enlightened: note that in the following descriptions, lowercase `I<perl>` refers to the Perl interpreter, while uppercase `I<Perl>` refers to the abstract Perl language itself.

=head2 `JSON -> PERL`

=over 4

=item object

A JSON object becomes a reference to a hash in Perl. No ordering of object keys is preserved (JSON does not preserve object key ordering itself).

=item array

A JSON array becomes a reference to an array in Perl.

=item string

A JSON string becomes a string scalar in Perl - Unicode codepoints in JSON are represented by the same codepoints in the Perl string, so no manual decoding is necessary.

=item number

A JSON number becomes either an integer, numeric (floating point) or string scalar in perl, depending on its range and any fractional parts. On the Perl level, there is no difference between those as Perl handles all the conversion details, but an integer may take slightly less memory and might represent more values exactly than floating point numbers.

If the number consists of digits only, JSON::PP will try to represent it as an integer value. If that fails, it will try to represent it as a numeric (floating point) value if that is possible without loss of precision. Otherwise it will preserve the number as a string value (in which case you lose roundtripping ability, as the JSON number will be re-encoded to a JSON string).

Numbers containing a fractional or exponential part will always be represented as numeric (floating point) values, possibly at a loss of precision (in which case you might lose perfect roundtripping ability, but the JSON number will still be re-encoded as a JSON number).

Note that precision is not accuracy - binary floating point values cannot represent most decimal fractions exactly, and when converting from and to floating point, JSON::PP only guarantees precision up to but not including the least significant bit.

When C<allow_bignum> is enabled, big integer values and any numeric values will be converted into L<Math::BigInt> and L<Math::BigFloat> objects respectively, without becoming string scalars or losing precision.

=item true, false

These JSON atoms become C<JSON::PP::true> and C<JSON::PP::false>, respectively. They are overloaded to act almost exactly like the numbers C<1> and C<0>. You can check whether a scalar is a JSON boolean by using the C<JSON::PP::is_bool> function.

=item null

A JSON null atom becomes C<undef> in Perl.

=item shell-style comments (C<< # I<text> >>)

As a nonstandard extension to the JSON syntax that is enabled by the C<relaxed> setting, shell-style comments are allowed. They can start anywhere outside strings and go till the end of the line.

=item tagged values (C<< (I<tag>)I<value> >>).

Another nonstandard extension to the JSON syntax, enabled with the C<allow_tags> setting, are tagged values. In this implementation, the I<tag> must be a perl package/class name encoded as a JSON string, and the I<value> must be a JSON array encoding optional constructor arguments.

See L<OBJECT SERIALISATION>, below, for details.

=back

=head2 PERL -> JSON

The mapping from Perl to JSON is slightly more difficult, as Perl is a truly typeless language, so we can only guess which JSON type is meant by a Perl value.

=over 4

=item

hash references

Perl hash references become JSON objects. As there is no inherent ordering in hash keys (or JSON objects), they will usually be encoded in a pseudo-random order. JSON::PP can optionally sort the hash keys (determined by the I<canonical> flag and/or I<sort_by> property), so the same data structure will serialise to the same JSON text (given same settings and version of JSON::PP), but this incurs a runtime overhead and is only rarely useful, e.g. when you want to compare some JSON text against another for equality.

=item array references

Perl array references become JSON arrays.

=item other references

Other unblessed references are generally not allowed and will cause an

exception to be thrown, except for references to the integers C<0> and C<1>, which get turned into C<>false> and C<>true> atoms in JSON. You can also use C<JSON::PP::false> and C<JSON::PP::true> to improve readability.

```
to_json [0, JSON::PP::true] # yields [false,true]
```

```
=item JSON::PP::true,  
JSON::PP::false
```

These special values become JSON true and JSON false values, respectively. You can also use C<\1> and C<\0> directly if you want.

```
=item JSON::PP::null
```

This special value becomes JSON null.

```
=item blessed objects
```

Blessed objects are not directly representable in JSON, but C<JSON::PP> allows various ways of handling objects. See L<OBJECT SERIALISATION>, below, for details.

```
=item simple scalars
```

Simple Perl scalars (any scalar that is not a reference) are the most difficult objects to encode: JSON::PP will encode undefined scalars as JSON C<>null> values, scalars that have last been used in a string context before encoding as JSON strings, and anything else as number value:

```
# dump as number  
encode_json [2] # yields [2]  
encode_json [-3.0e17] # yields [-3e+17]  
my $value = 5; encode_json [$value] # yields [5]
```

```
# used as string, so dump as string  
print $value;  
encode_json [$value] # yields ["5"]
```

```
# undef becomes null  
encode_json [undef] # yields [null]
```

You can force the type to be a JSON string by stringifying it:

```
my $x = 3.1; # some variable containing a number  
"$x"; # stringified  
$x .= ""; # another, more awkward way to stringify
```

```
print $x; # perl does it for you, too, quite often
          # (but for older perls)
```

You can force the type to be a JSON number by numifying it:

```
my $x = "3"; # some variable containing a string
$x += 0;    # numify it, ensuring it will be dumped as a number
$x *= 1;    # same thing, the choice is yours.
```

You can not currently force the type in other, less obscure, ways.

Since version 2.91_01, JSON::PP uses a different number detection logic that converts a scalar that is possible to turn into a number safely.

The new logic is slightly faster, and tends to help people who use older perl or who want to encode complicated data structure. However, this may results in a different JSON text

from the one JSON::XS encodes (and thus may break tests that compare entire JSON texts). If you do need the previous behavior for compatibility or for finer control, set PERL_JSON_PP_USE_B environmental variable to true before you C<use> JSON::PP (or JSON.pm).

Note that numerical precision has the same meaning as under Perl (so binary to decimal conversion follows the same rules as in Perl, which can differ to other languages). Also, your perl interpreter might expose extensions to the floating point numbers of your platform, such as infinities or NaN's - these cannot be represented in JSON, and it is an error to pass those in.

JSON::PP (and JSON::XS) trusts what you pass to C<encode> method (or C<encode_json> function) is a clean, validated data structure with values that can be represented as valid JSON values only, because it's not from an external data source (as opposed to JSON texts you pass to C<decode> or C<decode_json>, which JSON::PP considers tainted and doesn't trust).

As JSON::PP doesn't know exactly what you and consumers of your JSON texts want the unexpected values to be (you may want to convert them into null, or to stringify them with or without normalisation (string representation of infinities/NaN may vary depending on platforms), or to croak without conversion), you're advised to do what you and your consumers need before you encode, and also not to numify values that may start with values that look like a number (including infinities/NaN), without validating.

=back

=head2 OBJECT SERIALISATION

As JSON cannot directly represent Perl objects, you have to choose between a pure JSON representation (without the ability to deserialise the object automatically again), and a nonstandard extension to the JSON syntax, tagged values.

=head3 SERIALISATION

What happens when C<JSON::PP> encounters a Perl object depends on the C<allow_blessed>, C<convert_blessed>, C<allow_tags> and C<allow_bignum> settings, which are used in this order:

=over 4

=item

1. C<allow_tags> is enabled and the object has a C<FREEZE> method.

In this case, C<JSON::PP> creates a tagged JSON value, using a nonstandard extension to the JSON syntax.

This works by invoking the C<FREEZE> method on the object, with the first argument being the object to serialise, and the second argument being the constant string C<JSON> to distinguish it from other serialisers.

The C<FREEZE> method can return any number of values (i.e. zero or more). These values and the package/classname of the object will then be encoded as a tagged JSON value in the following format:

```
("classname")[FREEZE return values...]
```

e.g.:

```
("URI")["http://www.google.com/"]  
("MyDate")[2013,10,29]  
("ImageData::JPEG")["Z3...VICg=="]
```

For example, the hypothetical C<My::Object> C<FREEZE> method might use the objects C<type> and C<id> members to encode the object:

```
sub My::Object::FREEZE {  
    my ($self, $serialiser) = @_;  
  
    ($self->{type}, $self->{id})  
}
```

=item 2. C<convert_blessed>

is enabled and the object has a C<TO_JSON> method.

In this case, the C<TO_JSON> method of the object is invoked in scalar

context. It must return a single scalar that can be directly encoded into JSON. This scalar replaces the object in the JSON text.

For example, the following `C<TO_JSON>` method will convert all `L<URI>` objects to JSON strings when serialised. The fact that these values originally were `L<URI>` objects is lost.

```
sub URI::TO_JSON {
    my ($uri) = @_;
    $uri->as_string
}
```

=item 3. `C<allow_bignum>` is enabled and the object is a `C<Math::BigInt>` or `C<Math::BigFloat>`.

The object will be serialised as a JSON number value.

=item 4. `C<allow_blessed>` is enabled.

The object will be serialised as a JSON null value.

=item 5. none of the above

If none of the settings are enabled or the respective methods are missing, `C<JSON::PP>` throws an exception.

=back

=head3 DESERIALISATION

For deserialisation there are only two cases to consider: either nonstandard tagging was used, in which case `C<allow_tags>` decides, or objects cannot be automatically be deserialised, in which case you can use postprocessing or the `C<filter_json_object>` or `C<filter_json_single_key_object>` callbacks to get some real objects out of your JSON.

This section only considers the tagged value case: a tagged JSON object is encountered during decoding and `C<allow_tags>` is disabled, a parse error will result (as if tagged values were not part of the grammar).

If `C<allow_tags>` is enabled, `C<JSON::PP>` will look up the `C<THAW>` method of the package/classname used during serialisation (it will not attempt to load the package as a Perl module). If there is no such method, the decoding will fail with an error.

Otherwise, the `C<THAW>` method is invoked with the classname as first argument, the constant string `C<JSON>` as second argument, and all the

values from the JSON array (the values originally returned by the C<FREEZE> method) as remaining arguments.

The method must then return the object. While technically you can return any Perl scalar, you might have to enable the C<allow_nonref> setting to make that work in all cases, so better return an actual blessed reference.

As an example, let's implement a C<THAW> function that regenerates the C<My::Object> from the C<FREEZE> example earlier:

```
sub My::Object::THAW {  
    my ($class, $serialiser, $type, $id) = @_;  
  
    $class->new (type => $type, id => $id)  
}
```

=head1 ENCODING/CODESET FLAG NOTES

This section is taken from JSON::XS.

The interested reader might have seen a number of flags that signify encodings or codesets - C<utf8>, C<latin1> and C<ascii>. There seems to be some confusion on what these do, so here is a short comparison:

C<utf8> controls whether the JSON text created by C<encode> (and expected by C<decode>) is UTF-8 encoded or not, while C<latin1> and C<ascii> only control whether C<encode> escapes character values outside their respective codeset range. Neither of these flags conflict with each other, although some combinations make less sense than others.

Care has been taken to make all flags symmetrical with respect to C<encode> and C<decode>, that is, texts encoded with any combination of these flag values will be correctly decoded when the same flags are used - in general, if you use different flag settings while encoding vs. when decoding you likely have a bug somewhere.

Below comes a verbose discussion of these flags. Note that a "codeset" is simply an abstract set of character-codepoint pairs, while an encoding takes those codepoint numbers and I<encodes> them, in our case into octets. Unicode is (among other things) a codeset, UTF-8 is an encoding, and ISO-8859-1 (= latin 1) and ASCII are both codesets I<and> encodings at the same time, which can be confusing.

=over 4

=item C<utf8> flag disabled

When C<utf8> is disabled (the default), then C<encode>/C<decode> generate and expect Unicode strings, that is, characters with high ordinal Unicode values (>

255) will be encoded as such characters, and likewise such characters are decoded as-is, no changes to them will be done, except "(re-)interpreting" them as Unicode codepoints or Unicode characters, respectively (to Perl, these are the same thing in strings unless you do funny/weird/dumb stuff).

This is useful when you want to do the encoding yourself (e.g. when you want to have UTF-16 encoded JSON texts) or when some other layer does the encoding for you (for example, when printing to a terminal using a filehandle that transparently encodes to UTF-8 you certainly do NOT want to UTF-8 encode your data first and have Perl encode it another time).

=item C<utf8> flag enabled

If the C<utf8>-flag is enabled, C<encode>/C<decode> will encode all characters using the corresponding UTF-8 multi-byte sequence, and will expect your input strings to be encoded as UTF-8, that is, no "character" of the input string must have any value > 255, as UTF-8 does not allow that.

The C<utf8> flag therefore switches between two modes: disabled means you will get a Unicode string in Perl, enabled means you get an UTF-8 encoded octet/binary string in Perl.

=item C<latin1> or C<ascii> flags enabled

With C<latin1> (or C<ascii>) enabled, C<encode> will escape characters with ordinal values > 255 (> 127 with C<ascii>) and encode the remaining characters as specified by the C<utf8> flag.

If C<utf8> is disabled, then the result is also correctly encoded in those character sets (as both are proper subsets of Unicode, meaning that a Unicode string with all character values < 256 is the same thing as a ISO-8859-1 string, and a Unicode string with all character values < 128 is the same thing as an ASCII string in Perl).

If C<utf8> is enabled, you still get a correct UTF-8-encoded string, regardless of these flags, just some more characters will be escaped using C<\uXXXX> then before.

Note that ISO-8859-1-I<encoded> strings are not compatible with UTF-8 encoding, while ASCII-encoded strings are.

That is because the ISO-8859-1 encoding is NOT a subset of UTF-8 (despite the ISO-8859-1 I<codeset> being a subset of Unicode), while ASCII is.

Surprisingly, C<decode> will ignore these flags and so treat all input values as governed by the C<utf8> flag. If it is disabled, this allows you to decode ISO-8859-1- and ASCII-encoded strings, as both strict subsets of Unicode. If it is enabled, you can correctly decode UTF-8 encoded strings.

So neither C<latin1> nor C<ascii> are incompatible with the C<utf8> flag - they only govern when the JSON output engine escapes a character or not.

The main use for C<latin1> is to relatively efficiently store binary data as JSON, at the expense of breaking compatibility with most JSON decoders.

The main use for C<ascii> is to force the output to not contain characters with values > 127, which means you can interpret the resulting string as UTF-8, ISO-8859-1, ASCII, KOI8-R or most about any character set and 8-bit-encoding, and still get the same data structure back. This is useful when your channel for JSON transfer is not 8-bit clean or the encoding might be mangled in between (e.g. in mail), and works because ASCII is a proper subset of most 8-bit and multibyte encodings in use in the world.

=back

=head1 BUGS

Please report bugs on a specific behavior of this module to RT or GitHub issues (preferred):

L<<https://github.com/makamaka/JSON-PP/issues>>

L<<https://rt.cpan.org/Public/Dist/Display.html?Queue=JSON-PP>>

As for new features and requests to change common behaviors, please ask the author of JSON::XS (Marc Lehmann, E<lt>schmorp[at]schmorp.deE<gt>) first, by email (important!), to keep compatibility among JSON.pm backends.

Generally speaking, if you need something special for you, you are advised to create a new module, maybe based on L<JSON::Tiny>, which is smaller and written in a much cleaner way than this module.

=head1 SEE ALSO

The F<json_pp> command line utility for quick experiments.

L<JSON::XS>, L<Cpanel::JSON::XS>,

and L<JSON::Tiny> for faster alternatives.
L<JSON> and L<JSON::MaybeXS> for easy migration.

L<JSON::backportPP::Compat5005> and L<JSON::backportPP::Compat5006> for older perl users.

RFC4627 (L<<http://www.ietf.org/rfc/rfc4627.txt>>)

RFC7159 (L<<http://www.ietf.org/rfc/rfc7159.txt>>)

RFC8259 (L<<http://www.ietf.org/rfc/rfc8259.txt>>)

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=head1 COPYRIGHT AND LICENSE

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Most of the documentation is taken from JSON::XS by Marc Lehmann

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it under the same terms as Perl itself.

=cut

Found in path(s):

* /opt/cola/permits/1673388252_1683929510.8585129/0/libjson-perl-4-04000-orig-tar-gz/JSON-4.04/lib/JSON/backportPP.pm

No license file was found, but licenses were detected in source scan.

=head1 NAME

JSON::PP::Boolean - dummy module providing JSON::PP::Boolean

=head1 SYNOPSIS

do not "use" yourself

=head1 DESCRIPTION

This module exists only to provide overload resolution for Storable and similar modules. See
L<JSON::PP> for more info about this class.

=head1 AUTHOR

This idea is from L<JSON::XS::Boolean> written by Marc Lehmann <schmorp[at]schmorp.de>

=head1 LICENSE

This library is free software; you can redistribute it and/or modify it under the same terms as Perl itself.

=cut

Found in path(s):

```
* /opt/cola/permits/1673388252_1683929510.8585129/0/libjson-perl-4-04000-orig-tar-gz/JSON-4.04/lib/JSON/backportPP/Boolean.pm
```

No license file was found, but licenses were detected in source scan.

=head1 NAME

JSON - JSON (JavaScript Object Notation) encoder/decoder

=head1 SYNOPSIS

```
use JSON; # imports encode_json, decode_json, to_json and from_json.
```

```
# simple and fast interfaces (expect/generate UTF-8)
```

```
$utf8_encoded_json_text = encode_json $perl_hash_or_arrayref;  
$perl_hash_or_arrayref = decode_json $utf8_encoded_json_text;
```

```
# OO-interface
```

```
$json = JSON->new->allow_nonref;
```

```
$json_text = $json->encode( $perl_scalar );  
$perl_scalar = $json->decode( $json_text );
```

```
$pretty_printed = $json->pretty->encode( $perl_scalar ); # pretty-printing
```

=head1 VERSION

4.02

=head1 DESCRIPTION

This module is a thin wrapper for L<JSON::XS>-compatible modules with a few additional features. All the backend modules convert a Perl data structure to a JSON text and vice versa. This module uses L<JSON::XS> by default, and when JSON::XS is not available, falls back on L<JSON::PP>, which is

in the Perl core since

5.14. If `JSON::PP` is not available either, this module then falls back on `JSON::backportPP` (which is actually `JSON::PP` in a different `.pm` file) bundled in the same distribution as this module. You can also explicitly specify to use `L<Cpanel::JSON::XS>`, a fork of `JSON::XS` by Reini Urban.

All these backend modules have slight incompatibilities between them, including extra features that other modules don't support, but as long as you use only common features (most important ones are described below), migration from backend to backend should be reasonably easy. For details, see each backend module you use.

=head1 CHOOSING BACKEND

This module respects an environmental variable called `C<PERL_JSON_BACKEND>` when it decides a backend module to use. If this environmental variable is not set, it tries to load `JSON::XS`, and if `JSON::XS` is not available, it falls back on `JSON::PP`, and then `JSON::backportPP` if `JSON::PP` is not available either.

If you always don't want it to fall back on pure perl modules, set the variable like this (`C<export>` may be `C<setenv>`, `C<set>` and the likes, depending on your environment):

```
> export PERL_JSON_BACKEND=JSON::XS
```

If you prefer `Cpanel::JSON::XS` to `JSON::XS`, then:

```
> export PERL_JSON_BACKEND=Cpanel::JSON::XS,JSON::XS,JSON::PP
```

You may also want to set this variable at the top of your test files, in order not to be bothered with incompatibilities between backends (you need to wrap this in `C<BEGIN>`, and set before actually `C<use>`-ing JSON module, as it decides its backend as soon as it's loaded):

```
BEGIN { $ENV{PERL_JSON_BACKEND}='JSON::backportPP'; }  
use JSON;
```

=head1 USING OPTIONAL FEATURES

There are a few options you can set when you `C<use>` this module. These historical options are only kept for backward compatibility, and should not be used in a new application.

=over

=item -support_by_pp

```
BEGIN { $ENV{PERL_JSON_BACKEND} = 'JSON::XS' }
```

```
use JSON -support_by_pp;
```

```
my $json = JSON->new;
```

```
# escape_slash is for
```

```
JSON::PP only.
```

```
$json->allow_nonref->escape_slash->encode("");
```

With this option, this module loads its pure perl backend along with its XS backend (if available), and lets the XS backend to watch if you set a flag only JSON::PP supports. When you do, the internal JSON::XS object is replaced with a newly created JSON::PP object with the setting copied from the XS object, so that you can use JSON::PP flags (and its slower C<decode>/C<encode> methods) from then on. In other words, this is not something that allows you to hook JSON::XS to change its behavior while keeping its speed. JSON::XS and JSON::PP objects are quite different (JSON::XS object is a blessed scalar reference, while JSON::PP object is a blessed hash reference), and can't share their internals.

To avoid needless overhead (by copying settings), you are advised not to use this option and just to use JSON::PP explicitly when you need JSON::PP features.

=item -convert_blessed_universally

```
use JSON -convert_blessed_universally;
```

```
my $json = JSON->new->allow_nonref->convert_blessed;
```

```
my $object = bless {foo => 'bar'}, 'Foo';
```

```
$json->encode($object); # => {"foo":"bar"}
```

JSON::XS-compatible backend modules don't encode blessed objects by default (except for their boolean values, which are typically blessed JSON::PP::Boolean objects). If you need to encode a data structure that may contain objects, you usually need to look into the structure and replace objects with alternative non-blessed values, or enable C<convert_blessed> and provide a C<TO_JSON> method for each object's (base) class that may be found in the structure, in order to let the methods replace the objects with whatever scalar values the methods return.

If you need to serialise data structures that may contain arbitrary objects, it's probably better to use other serialisers (such as L<Sereal> or L<Storable> for example), but if you do want to use this module for that purpose, C<-convert_blessed_universally> option

may help, which tweaks

`C<encode>` method of the backend to install `C<UNIVERSAL::TO_JSON>` method (locally) before encoding, so that all the objects that don't have their own `C<TO_JSON>` method can fall back on the method in the `C<UNIVERSAL>` namespace. Note that you still need to enable `C<convert_blessed>` flag to actually encode objects in a data structure, and `C<UNIVERSAL::TO_JSON>` method installed by this option only converts blessed hash/array references into their unblessed clone (including private keys/values that are not supposed to be exposed). Other blessed references will be converted into null.

This feature is experimental and may be removed in the future.

=item -no_export

When you don't want to import functional interfaces from a module, you usually supply `C<()>` to its `C<use>` statement.

```
use JSON (); # no functional interfaces
```

If you don't want to import functional interfaces, but you also want to use any of the above options, add `C<-no_export>` to the option list.

```
# no functional interfaces,  
while JSON::PP support is enabled.  
use JSON -support_by_pp, -no_export;
```

=back

=head1 FUNCTIONAL INTERFACE

This section is taken from `JSON::XS`. `C<encode_json>` and `C<decode_json>` are exported by default.

This module also exports `C<to_json>` and `C<from_json>` for backward compatibility. These are slower, and may expect/generate different stuff from what `C<encode_json>` and `C<decode_json>` do, depending on their options. It's better just to use Object-Oriented interfaces than using these two functions.

=head2 encode_json

```
$json_text = encode_json $perl_scalar
```

Converts the given Perl data structure to a UTF-8 encoded, binary string (that is, the string contains octets only). Croaks on error.

This function call is functionally identical to:

```
$json_text = JSON->new->utf8->encode($perl_scalar)
```

Except being faster.

```
=head2 decode_json
```

```
$perl_scalar = decode_json $json_text
```

The opposite of `C<encode_json>`: expects an UTF-8 (binary) string and tries to parse that as an

UTF-8 encoded JSON text, returning the resulting reference. Croaks on error.

This function call is functionally identical to:

```
$perl_scalar = JSON->new->utf8->decode($json_text)
```

Except being faster.

```
=head2 to_json
```

```
$json_text = to_json($perl_scalar[, $optional_hashref])
```

Converts the given Perl data structure to a Unicode string by default. Croaks on error.

Basically, this function call is functionally identical to:

```
$json_text = JSON->new->encode($perl_scalar)
```

Except being slower.

You can pass an optional hash reference to modify its behavior, but that may change what `C<to_json>` expects/generates (see `C<ENCODING/CODESET FLAG NOTES>` for details).

```
$json_text = to_json($perl_scalar, {utf8 => 1, pretty => 1})  
# => JSON->new->utf8(1)->pretty(1)->encode($perl_scalar)
```

```
=head2 from_json
```

```
$perl_scalar = from_json($json_text[, $optional_hashref])
```

The opposite of `C<to_json>`: expects a Unicode string and tries to parse it, returning the resulting reference. Croaks on error.

Basically,
this function call is functionally identical to:

```
$perl_scalar = JSON->new->decode($json_text)
```

You can pass an optional hash reference to modify its behavior, but that may change what C<from_json> expects/generates (see C<ENCODING/CODESET FLAG NOTES> for details).

```
$perl_scalar = from_json($json_text, {utf8 => 1})  
# => JSON->new->utf8(1)->decode($json_text)
```

=head2 JSON::is_bool

```
$is_boolean = JSON::is_bool($scalar)
```

Returns true if the passed scalar represents either JSON::true or JSON::false, two constants that act like C<1> and C<0> respectively and are also used to represent JSON C<>true> and C<>false> in Perl strings.

See L<MAPPING>, below, for more information on how JSON values are mapped to Perl.

=head1 COMMON OBJECT-ORIENTED INTERFACE

This section is also taken from JSON::XS.

The object oriented interface lets you configure your own encoding or decoding style, within the limits of supported formats.

=head2 new

```
$json = JSON->new
```

Creates

a new JSON::XS-compatible backend object that can be used to de/encode JSON strings. All boolean flags described below are by default I<disabled> (with the exception of C<allow_nonref>, which defaults to I<enabled> since version C<4.0>).

The mutators for flags all return the backend object again and thus calls can be chained:

```
my $json = JSON->new->utf8->space_after->encode({a => [1,2]})  
=> {"a": [1, 2]}
```

=head2 ascii

```
$json = $json->ascii([$enable])
```

```
$enabled = $json->get_ascii
```

If C<\$enable> is true (or missing), then the C<encode> method will not generate characters outside the code range C<0..127> (which is ASCII). Any Unicode characters outside that range will be escaped using either a single \uXXXX (BMP characters) or a double \uHHHH\uLLLL escape sequence, as per RFC4627. The resulting encoded JSON text can be treated as a native Unicode string, an ascii-encoded, latin1-encoded or UTF-8 encoded string, or any other superset of ASCII.

If C<\$enable> is false, then the C<encode> method will not escape Unicode characters unless required by the JSON syntax or other flags. This results in a faster and more compact format.

See also the section I<ENCODING/CODESET FLAG NOTES> later in this document.

The main use for this flag is to produce JSON texts that can be transmitted over a 7-bit channel, as the encoded JSON texts will not contain any 8 bit characters.

```
JSON->new->ascii(1)->encode([chr 0x10401])  
=> ["\ud801\udc01"]
```

```
=head2 latin1
```

```
$json = $json->latin1([$enable])
```

```
$enabled = $json->get_latin1
```

If C<\$enable> is true (or missing), then the C<encode> method will encode the resulting JSON text as latin1 (or iso-8859-1), escaping any characters outside the code range C<0..255>. The resulting string can be treated as a latin1-encoded JSON text or a native Unicode string. The C<decode> method will not be affected in any way by this flag, as C<decode> by default expects Unicode, which is a strict superset of latin1.

If C<\$enable> is false, then the C<encode> method will not escape Unicode characters unless required by the JSON syntax or other flags.

See also the section I<ENCODING/CODESET FLAG NOTES> later in this document.

The main use for this flag is efficiently encoding binary data as JSON text, as most octets will not be escaped, resulting in a smaller encoded size. The disadvantage is that the resulting JSON text is encoded

in latin1 (and must correctly be treated as such when storing and transferring), a rare encoding for JSON. It is therefore most useful when you want to store data structures known to contain binary data efficiently in files or databases, not when talking to other JSON encoders/decoders.

```
JSON->new->latin1->encode(["\x{89}\x{abc}"])
=> ["\x{89}\u0abc"] # (perl syntax, U+abc escaped, U+89 not)
```

```
=head2 utf8
```

```
$json = $json->utf8([$enable])
```

```
$enabled = $json->get_utf8
```

If C<\$enable> is true (or missing), then the C<encode> method will encode the JSON result into UTF-8, as required by many protocols, while the C<decode> method expects to be handled an UTF-8-encoded string. Please note that UTF-8-encoded strings do not contain any characters outside the range C<0..255>, they are thus useful for bitwise/binary I/O. In future versions, enabling this option might enable autodetection of the UTF-16 and UTF-32 encoding families, as described in RFC4627.

If C<\$enable> is false, then the C<encode> method will return the JSON string as a (non-encoded) Unicode string, while C<decode> expects thus a Unicode string. Any decoding or encoding (e.g. to UTF-8 or UTF-16) needs to be done yourself, e.g. using the Encode module.

See also the section I<ENCODING/CODESET FLAG NOTES> later in this document.

Example, output UTF-16BE-encoded JSON:

```
use Encode;
$jsoncontext = encode "UTF-16BE", JSON->new->encode ($object);
```

Example, decode UTF-32LE-encoded JSON:

```
use Encode;
$object = JSON->new->decode (decode "UTF-32LE", $jsoncontext);
```

```
=head2 pretty
```

```
$json =
$json->pretty([$enable])
```

This enables (or disables) all of the C<indent>, C<space_before> and C<space_after> (and in the future possibly more) flags in one call to generate the most readable (or most compact) form possible.

=head2 indent

```
$json = $json->indent([$enable])
```

```
$enabled = $json->get_indent
```

If C<\$enable> is true (or missing), then the C<encode> method will use a multiline format as output, putting every array member or object/hash key-value pair into its own line, indenting them properly.

If C<\$enable> is false, no newlines or indenting will be produced, and the resulting JSON text is guaranteed not to contain any C<newlines>.

This setting has no effect when decoding JSON texts.

=head2 space_before

```
$json = $json->space_before([$enable])
```

```
$enabled = $json->get_space_before
```

If C<\$enable> is true (or missing), then the C<encode> method will add an extra optional space before the C<:> separating keys from values in JSON objects.

If C<\$enable> is false, then the C<encode> method will not add any extra space at those places.

This setting has no effect when decoding JSON texts. You will also most likely combine this setting with C<space_after>.

Example, space_before enabled, space_after and indent disabled:

```
{ "key" : "value" }
```

=head2 space_after

```
$json = $json->space_after([$enable])
```

```
$enabled = $json->get_space_after
```

If C<\$enable> is true (or missing), then the C<encode> method will add an extra optional space after the C<:> separating keys from values in JSON objects and extra whitespace after the C<,> separating key-value pairs and array members.

If C<\$enable> is false, then the C<encode> method will not add any extra

space at those places.

This setting has no effect when decoding JSON texts.

Example, `space_before` and `indent` disabled, `space_after` enabled:

```
{"key": "value"}
```

`=head2 relaxed`

```
$json = $json->relaxed([$enable])
```

```
$enabled = $json->get_relaxed
```

If `C<$enable>` is true (or missing), then

`C<decode>` will accept some extensions to normal JSON syntax (see below). `C<encode>` will not be affected in any way. **I<Be aware that this option makes you accept invalid JSON texts as if they were valid!>. I suggest only to use this option to parse application-specific files written by humans (configuration files, resource files etc.)**

If `C<$enable>` is false (the default), then `C<decode>` will only accept valid JSON texts.

Currently accepted extensions are:

`=over 4`

`=item * list items can have an end-comma`

JSON **I<separates>** array elements and key-value pairs with commas. This can be annoying if you write JSON texts manually and want to be able to quickly append elements, so this extension accepts comma at the end of such items not just between them:

```
[
  1,
  2, <- this comma not normally allowed
]
{
  "k1": "v1",
  "k2": "v2", <- this comma not normally allowed
}
```

`=item * shell-style '#'-comments`

Whenever JSON allows whitespace, shell-style comments are

additionally
allowed. They are terminated by the first carriage-return or line-feed
character, after which more white-space and comments are allowed.

```
[  
  1, # this comment not allowed in JSON  
    # neither this one...  
]
```

=back

=head2 canonical

```
$json = $json->canonical([$enable])
```

```
$enabled = $json->get_canonical
```

If C<\$enable> is true (or missing), then the C<encode> method will output JSON objects
by sorting their keys. This is adding a comparatively high overhead.

If C<\$enable> is false, then the C<encode> method will output key-value
pairs in the order Perl stores them (which will likely change between runs
of the same script, and can change even within the same run from 5.18
onwards).

This option is useful if you want the same data structure to be encoded as
the same JSON text (given the same overall settings). If it is disabled,
the same hash might be encoded differently even if contains the same data,
as key-value pairs have no inherent ordering in Perl.

This
setting has no effect when decoding JSON texts.

This setting has currently no effect on tied hashes.

=head2 allow_nonref

```
$json = $json->allow_nonref([$enable])
```

```
$enabled = $json->get_allow_nonref
```

Unlike other boolean options, this option is enabled by default beginning
with version C<4.0>.

If C<\$enable> is true (or missing), then the C<encode> method can convert a
non-reference into its corresponding string, number or null JSON value,
which is an extension to RFC4627. Likewise, C<decode> will accept those JSON
values instead of croaking.

If C<\$enable> is false, then the C<encode> method will croak if it isn't passed an arrayref or hashref, as JSON texts must either be an object or array. Likewise, C<decode> will croak if given something that is not a JSON object or array.

Example, encode a Perl scalar as JSON value with enabled C<allow_nonref>, resulting in an invalid JSON text:

```
JSON->new->allow_nonref->encode ("Hello, World!")  
=> "Hello, World!"
```

```
=head2  
allow_unknown
```

```
$json = $json->allow_unknown ([$enable])
```

```
$enabled = $json->get_allow_unknown
```

If C<\$enable> is true (or missing), then C<encode> will I<not> throw an exception when it encounters values it cannot represent in JSON (for example, filehandles) but instead will encode a JSON C<null> value. Note that blessed objects are not included here and are handled separately by c<allow_blessed>.

If C<\$enable> is false (the default), then C<encode> will throw an exception when it encounters anything it cannot encode as JSON.

This option does not affect C<decode> in any way, and it is recommended to leave it off unless you know your communications partner.

```
=head2 allow_blessed
```

```
$json = $json->allow_blessed([$enable])
```

```
$enabled = $json->get_allow_blessed
```

See L<OBJECT SERIALISATION> for details.

If C<\$enable> is true (or missing), then the C<encode> method will not barf when it encounters a blessed reference that it cannot convert otherwise. Instead, a JSON C<null> value is encoded instead of the object.

If C<\$enable> is false (the default), then C<encode> will throw an exception when it encounters a blessed object that it cannot convert otherwise.

This setting has no effect on C<decode>.

```
=head2 convert_blessed
```

```
$json = $json->convert_blessed([$enable])
```

```
$enabled = $json->get_convert_blessed
```

See L<OBJECT SERIALISATION> for details.

If C<\$enable> is true (or missing), then C<encode>, upon encountering a blessed object, will check for the availability of the C<TO_JSON> method on the object's class. If found, it will be called in scalar context and the resulting scalar will be encoded instead of the object.

The C<TO_JSON> method may safely call die if it wants. If C<TO_JSON> returns other blessed objects, those will be handled in the same way. C<TO_JSON> must take care of not causing an endless recursion cycle (== crash) in this case. The name of C<TO_JSON> was chosen because other methods called by the Perl core (== not by the user of the object) are usually in upper case letters and to avoid collisions with any C<to_json> function or method.

If C<\$enable> is false (the default), then C<encode> will not consider this type of conversion.

This setting has no effect on C<decode>.

```
=head2 allow_tags (since version 3.0)
```

```
$json = $json->allow_tags([$enable])
```

```
$enabled = $json->get_allow_tags
```

See L<OBJECT SERIALISATION> for details.

If C<\$enable> is true (or missing), then C<encode>, upon encountering a blessed object, will check for the availability of the C<FREEZE> method on the object's class. If found, it will be used to serialise the object into a nonstandard tagged JSON value (that JSON decoders cannot decode).

It also causes C<decode> to parse such tagged JSON values and deserialise them via a call to the C<THAW> method.

If C<\$enable> is false (the default), then C<encode> will not consider this type of conversion, and tagged JSON values will cause a parse error in C<decode>, as if tags were

not part of the grammar.

=head2 boolean_values (since version 4.0)

```
$json->boolean_values([$false, $true])
```

```
($false, $true) = $json->get_boolean_values
```

By default, JSON booleans will be decoded as overloaded C<\$JSON::false> and C<\$JSON::true> objects.

With this method you can specify your own boolean values for decoding - on decode, JSON C<false> will be decoded as a copy of C<\$false>, and JSON C<true> will be decoded as C<\$true> ("copy" here is the same thing as assigning a value to another variable, i.e. C<\$copy = \$false>).

This is useful when you want to pass a decoded data structure directly to other serialisers like YAML, Data::MessagePack and so on.

Note that this works only when you C<decode>. You can set incompatible boolean objects (like L<boolean>), but when you C<encode> a data structure with such boolean objects, you still need to enable C<convert_blessed> (and add a C<TO_JSON> method if necessary).

Calling this method without any arguments will reset the booleans to their default values.

C<get_boolean_values> will return both C<\$false> and C<\$true> values, or the empty list when they are set to the default.

=head2 filter_json_object

```
$json = $json->filter_json_object([$coderef])
```

When C<\$coderef> is specified, it will be called from C<decode> each time it decodes a JSON object. The only argument is a reference to the newly-created hash. If the code references returns a single scalar (which need not be a reference), this value (or rather a copy of it) is inserted into the deserialised data structure. If it returns an empty list (NOTE: I<not> C<undef>, which is a valid scalar), the original deserialised hash will be inserted. This setting can slow down decoding considerably.

When C<\$coderef> is omitted or undefined, any existing callback will be removed and C<decode> will not change the deserialised hash in any way.

Example, convert all JSON objects into the integer 5:

```
my $js = JSON->new->filter_json_object(sub { 5 });
#
returns [5]
$js->decode('{}');
# returns 5
$js->decode '{"a":1, "b":2}');

=head2 filter_json_single_key_object

$json = $json->filter_json_single_key_object($key [=> $coderef])
```

Works remotely similar to `C<filter_json_object>`, but is only called for JSON objects having a single key named `C<$key>`.

This `C<$coderef>` is called before the one specified via `C<filter_json_object>`, if any. It gets passed the single value in the JSON object. If it returns a single value, it will be inserted into the data structure. If it returns nothing (not even `C<undef>` but the empty list), the callback from `C<filter_json_object>` will be called next, as if no single-key callback were specified.

If `C<$coderef>` is omitted or undefined, the corresponding callback will be disabled. There can only ever be one callback for a given key.

As this callback gets called less often than the `C<filter_json_object>` one, decoding speed will not usually suffer as much. Therefore, single-key objects make excellent targets to serialise Perl objects into, especially as single-key JSON objects are as close to the type-tagged value concept as JSON gets (it's basically an ID/VALUE tuple). Of course, JSON does not support this in any way, so you need to make sure your data never looks like a serialised Perl hash.

Typical names for the single object key are `C<__class_whatever__>`, or `C<$_dollars_are_rarely_used_$>` or `C<}ugly_brace_placement>`, or even things like `C<__class_md5sum(classname)__>`, to reduce the risk of clashing with real hashes.

Example, decode JSON objects of the form `C<< { "__widget__" => <id> } >>` into the corresponding `C<< $WIDGET{<id>} >>` object:

```
# return whatever is in $WIDGET{5}:
JSON
->new
->filter_json_single_key_object (__widget__ => sub {
    $WIDGET{ $_[0] }
```

```

    })
    ->decode ('{"__widget__": 5')

# this can be used with a TO_JSON method in some "widget" class
# for serialisation to json:
sub WidgetBase::TO_JSON {
    my ($self)
= @_;

    unless ($self->{id}) {
        $self->{id} = ..get..some..id..;
        $WIDGET{$self->{id}} = $self;
    }

    { __widget__ => $self->{id} }
}

=head2 max_depth

$json = $json->max_depth([$maximum_nesting_depth])

$max_depth = $json->get_max_depth

```

Sets the maximum nesting level (default C<512>) accepted while encoding or decoding. If a higher nesting level is detected in JSON text or a Perl data structure, then the encoder and decoder will stop and croak at that point.

Nesting level is defined by number of hash- or arrayrefs that the encoder needs to traverse to reach a given point or the number of C<{> or C<[> characters without their matching closing parenthesis crossed to reach a given character in a string.

Setting the maximum depth to one disallows any nesting, so that ensures that the object is only a single hash/object or array.

If no argument is given, the highest possible setting will be used, which is rarely useful.

See L<JSON::XS/SECURITY CONSIDERATIONS> for more info on why this is useful.

```

=head2 max_size

$json = $json->max_size([$maximum_string_size])

$max_size = $json->get_max_size

```


Set the maximum length a JSON text may have (in bytes) where decoding is being attempted. The default is C<0>, meaning no limit. When C<decode> is called on a string that is longer than this many bytes, it will not attempt to decode the string but throw an exception. This setting has no effect on C<encode> (yet).

If no argument is given, the limit check will be deactivated (same as when C<0> is specified).

See L<JSON::XS/SECURITY CONSIDERATIONS> for more info on why this is useful.

=head2 encode

```
$json_text = $json->encode($perl_scalar)
```

Converts the given Perl value or data structure to its JSON representation. Croaks on error.

=head2 decode

```
$perl_scalar = $json->decode($json_text)
```

The opposite of C<encode>: expects a JSON text and tries to parse it, returning the resulting simple scalar or reference.

Croaks on error.

=head2 decode_prefix

```
($perl_scalar, $characters) = $json->decode_prefix($json_text)
```

This works like the C<decode> method, but instead of raising an exception when there is trailing garbage after the first JSON object, it will silently stop parsing there and return the number of characters consumed so far.

This is useful if your JSON texts are not delimited by an outer protocol and you need to know where the JSON text ends.

```
JSON->new->decode_prefix ("[1] the tail")  
=> ([1], 3)
```

=head1 ADDITIONAL METHODS

The following methods are for this module only.

=head2 backend

```
$backend = $json->backend
```

Since 2.92, `C<backend>` method returns an abstract backend module used currently, which should be `JSON::Backend::XS` (which inherits `JSON::XS` or `Cpanel::JSON::XS`), or `JSON::Backend::PP` (which inherits `JSON::PP`), not to monkey-patch the actual backend module globally.

If you need to know what is used actually, use `C<isa>`, instead of string comparison.

```
=head2
```

```
is_xs
```

```
$boolean = $json->is_xs
```

Returns true if the backend inherits `JSON::XS` or `Cpanel::JSON::XS`.

```
=head2 is_pp
```

```
$boolean = $json->is_pp
```

Returns true if the backend inherits `JSON::PP`.

```
=head2 property
```

```
$settings = $json->property()
```

Returns a reference to a hash that holds all the common flag settings.

```
$json = $json->property('utf8' => 1)
```

```
$value = $json->property('utf8') # 1
```

You can use this to get/set a value of a particular flag.

```
=head2 boolean
```

```
$boolean_object = JSON->boolean($scalar)
```

Returns `JSON::true` if `$scalar` contains a true value, `JSON::false` otherwise.

You can use this as a full-qualified function (`C<JSON::boolean($scalar)>`).

```
=head1 INCREMENTAL PARSING
```

This section is also taken from `JSON::XS`.

In some cases, there is the need for incremental parsing of JSON texts. While this module always has to keep both JSON text and resulting Perl data structure in memory at one time, it does allow you to parse a JSON stream incrementally. It does so by

accumulating text until it has a full JSON object, which it then can decode. This process is similar to using `C<decode_prefix>` to see if a full JSON object is available, but is much more efficient (and can be implemented with a minimum of method calls).

This module will only attempt to parse the JSON text once it is sure it has enough text to get a decisive result, using a very simple but truly incremental parser. This means that it sometimes won't stop as early as the full parser, for example, it doesn't detect mismatched parentheses. The only thing it guarantees is that it starts decoding as soon as a syntactically valid JSON text has been seen. This means you need to set resource limits (e.g. `C<max_size>`) to ensure the parser will stop parsing in the presence of syntax errors.

The following methods implement this incremental parser.

```
=head2 incr_parse
```

```
$json->incr_parse( [$string] ) # void context
```

```
$obj_or_undef = $json->incr_parse( [$string] ) # scalar context
```

```
@obj_or_empty = $json->incr_parse( [$string] ) # list context
```

This is the central parsing function. It can both append new text and extract objects from the stream accumulated so far (both of these functions are optional).

If `C<$string>` is given, then this string is appended to the already existing JSON fragment stored in the `C<$json>` object.

After that, if the function is called in void context, it will simply return without doing anything further. This can be used to add more text in as many chunks as you want.

If the method is called in scalar context, then it will try to extract exactly `I<one>` JSON object. If that is successful, it will return this object, otherwise it will return `C<undef>`. If there is a parse error, this method will croak just as `C<decode>` would do (one can then use `C<incr_skip>` to skip the erroneous part). This is the most common way of using the method.

And finally, in list context, it will try to extract as many objects from the stream as it can find and return them, or the empty list otherwise. For this to work, there must be no separators (other than whitespace) between the JSON objects or arrays, instead they must be

concatenated back-to-back. If an error occurs, an exception will be raised as in the scalar context case. Note that in this case, any previously-parsed JSON texts will be lost.

Example: Parse some JSON arrays/objects in a given string and return them.

```
my @objs = JSON->new->incr_parse ("[5][7][1,2]");
```

```
=head2 incr_text
```

```
$lvalue_string = $json->incr_text
```

This method returns the currently stored JSON fragment as an lvalue, that is, you can manipulate it. This I<only> works when a preceding call to C<incr_parse> in I<scalar context> successfully returned an object. Under all other circumstances you must not call this function (I mean it, although in simple tests it might actually work, it I<will> fail under real world conditions). As a special exception, you can also call this method before having parsed anything.

That

means you can only use this function to look at or manipulate text before or after complete JSON objects, not while the parser is in the middle of parsing a JSON object.

This function is useful in two cases: a) finding the trailing text after a JSON object or b) parsing multiple JSON objects separated by non-JSON text (such as commas).

```
=head2 incr_skip
```

```
$json->incr_skip
```

This will reset the state of the incremental parser and will remove the parsed text from the input buffer so far. This is useful after C<incr_parse> died, in which case the input buffer and incremental parser state is left unchanged, to skip the text parsed so far and to reset the parse state.

The difference to C<incr_reset> is that only text until the parse error occurred is removed.

```
=head2 incr_reset
```

```
$json->incr_reset
```

This completely resets the incremental parser, that is, after this call,

it will be as if the parser had never parsed anything.

This is useful if you want to repeatedly parse JSON objects and want to ignore any trailing data, which means you have to reset the parser after each successful decode.

=head1 MAPPING

Most of this section is also taken from JSON::XS.

This section describes how the backend modules map Perl values to JSON values and vice versa. These mappings are designed to "do the right thing" in most circumstances automatically, preserving round-tripping characteristics (what you put in comes out as something equivalent).

For the more enlightened: note that in the following descriptions, lowercase I<perl> refers to the Perl interpreter, while uppercase I<Perl> refers to the abstract Perl language itself.

=head2 JSON -> PERL

=over 4

=item object

A JSON object becomes a reference to a hash in Perl. No ordering of object keys is preserved (JSON does not preserve object key ordering itself).

=item array

A JSON array becomes a reference to an array in Perl.

=item string

A JSON string becomes a string scalar in Perl - Unicode codepoints in JSON are represented by the same codepoints in the Perl string, so no manual decoding is necessary.

=item number

A JSON number becomes either an integer, numeric (floating point) or string scalar in perl, depending on its range and any fractional parts. On the Perl level, there is no difference between those as Perl handles all the conversion details, but an integer may take slightly less memory and might represent more values exactly than floating point numbers.

If the number consists of digits only, this module will try to represent it as an integer value. If that fails, it will try to represent it as a numeric (floating point) value if that is possible without loss of precision. Otherwise it will preserve the number as a string value (in which case you lose roundtripping ability, as the JSON number will be re-encoded to a JSON string).

Numbers containing a fractional or exponential part will always be represented as numeric (floating point) values, possibly at a loss of precision

(in which case you might lose perfect roundtripping ability, but the JSON number will still be re-encoded as a JSON number).

Note that precision is not accuracy - binary floating point values cannot represent most decimal fractions exactly, and when converting from and to floating point, this module only guarantees precision up to but not including the least significant bit.

=item true, false

These JSON atoms become `C<JSON::true>` and `C<JSON::false>`, respectively. They are overloaded to act almost exactly like the numbers `C<1>` and `C<0>`. You can check whether a scalar is a JSON boolean by using the `C<JSON::is_bool>` function.

=item null

A JSON null atom becomes `C<undef>` in Perl.

=item shell-style comments (`C<< # I<text> >>`)

As a nonstandard extension to the JSON syntax that is enabled by the `C<relaxed>` setting, shell-style comments are allowed. They can start anywhere outside strings and go till the end of the line.

=item tagged values (`C<< (I<tag>)I<value> >>`).

Another nonstandard extension to the JSON syntax, enabled with the `C<allow_tags>` setting, are tagged values. In this implementation, the `I<tag>` must be a perl package/class name encoded as a JSON string, and the `I<value>` must be a JSON array encoding optional constructor arguments.

See [L<OBJECT SERIALISATION>](#), below, for details.

=back

=head2 PERL -> JSON

The mapping from Perl to JSON is slightly more difficult, as Perl is a truly typeless language, so we can only guess which JSON type is meant by a Perl value.

=over 4

=item hash references

Perl hash references become JSON objects. As there is no inherent ordering in hash keys (or JSON objects), they will usually be encoded in a pseudo-random order. This module can optionally sort the hash keys (determined by the `I<canonical>` flag), so the same data structure will serialise to the same JSON text (given same settings and version of the same backend), but this incurs a runtime overhead and is only rarely useful, e.g. when you want to compare some JSON text against another for equality.

=item array references

Perl array references become JSON arrays.

=item other references

Other unblessed references are generally not allowed and will cause an exception to be thrown, except for references to the integers `C<0>` and `C<1>`, which get turned into `C<false>` and `C<true>` atoms in JSON. You can also use `C<JSON::false>` and `C<JSON::true>` to improve readability.

```
encode_json [\0,JSON::true] # yields [false,true]
```

=item `JSON::true`, `JSON::false`, `JSON::null`

These special values become JSON true and JSON false values, respectively. You can also use `C<1>` and `C<0>` directly if you want.

=item blessed objects

Blessed objects are not directly representable in JSON, but `C<JSON::XS>` allows various ways of handling objects. See [L<OBJECT SERIALISATION>](#), below, for details.

=item simple scalars

Simple Perl scalars (any scalar that is not a reference) are the most difficult objects to encode: this module will encode undefined scalars as JSON

C<null> values, scalars that have last been used in a string context before encoding as JSON strings, and anything else as number value:

```
# dump as number
encode_json [2]          # yields [2]
encode_json [-3.0e17]    # yields [-3e+17]
my $value = 5; encode_json [$value] # yields [5]

# used as string, so dump as string
print $value;
encode_json [$value]     # yields ["5"]

# undef becomes null
encode_json [undef]     # yields [null]
```

You can force the type to be a string by stringifying it:

```
my $x = 3.1; # some variable containing a number
"$x";      # stringified
$x .= "";  # another, more awkward way to stringify
print $x;  # perl does it for you, too, quite often
```

You can force the type to be a number by numifying it:

```
my $x = "3"; # some variable containing a string
$x += 0;    # numify it, ensuring it will be dumped as a number
$x *= 1;    # same thing, the choice is yours.
```

You

can not currently force the type in other, less obscure, ways. Tell me if you need this capability (but don't forget to explain why it's needed :).

Since version 2.91_01, JSON::PP uses a different number detection logic that converts a scalar that is possible to turn into a number safely.

The new logic is slightly faster, and tends to help people who use older perl or who want to encode complicated data structure. However, this may results in a different JSON text from the one JSON::XS encodes (and thus may break tests that compare entire JSON texts). If you do need the previous behavior for better compatibility or for finer control, set PERL_JSON_PP_USE_B environmental variable to true before you C<use> JSON.

Note that numerical precision has the same meaning as under Perl (so binary to decimal conversion follows the same rules as in Perl, which can differ to other languages). Also, your perl interpreter might expose extensions to the floating point numbers of your platform,

such as
infinities or NaN's - these cannot be represented in JSON, and it is an error to pass those in.

JSON.pm backend modules trust what you pass to C<encode> method (or C<encode_json> function) is a clean, validated data structure with values that can be represented as valid JSON values only, because it's not from an external data source (as opposed to JSON texts you pass to C<decode> or C<decode_json>, which JSON backends consider tainted and don't trust). As JSON backends don't know exactly what you and consumers of your JSON texts want the unexpected values to be (you may want to convert them into null, or to stringify them with or without normalisation (string representation of infinities/NaN may vary depending on platforms), or to croak without conversion), you're advised to do what you and your consumers need before you encode, and also not to numify values that may start with values that look like a number (including infinities/NaN), without validating.

=back

=head2 OBJECT
SERIALISATION

As JSON cannot directly represent Perl objects, you have to choose between a pure JSON representation (without the ability to deserialise the object automatically again), and a nonstandard extension to the JSON syntax, tagged values.

=head3 SERIALISATION

What happens when this module encounters a Perl object depends on the C<allow_blessed>, C<convert_blessed> and C<allow_tags> settings, which are used in this order:

=over 4

=item 1. C<allow_tags> is enabled and the object has a C<FREEZE> method.

In this case, C<JSON> creates a tagged JSON value, using a nonstandard extension to the JSON syntax.

This works by invoking the C<FREEZE> method on the object, with the first argument being the object to serialise, and the second argument being the constant string C<JSON> to distinguish it from other serialisers.

The C<FREEZE> method can return any number of values (i.e. zero or more). These values and the package/classname of the object will then be encoded as a tagged

JSON value in the following format:

```
("classname")[FREEZE return values...]
```

e.g.:

```
("URI")["http://www.google.com/"]  
("MyDate")["2013,10,29"]  
("ImageData::JPEG")["Z3...VICg=="]
```

For example, the hypothetical C<My::Object> C<FREEZE> method might use the objects C<type> and C<id> members to encode the object:

```
sub My::Object::FREEZE {  
    my ($self, $serialiser) = @_;  
  
    ($self->{type}, $self->{id})  
}
```

=item 2. C<convert_blessed> is enabled and the object has a C<TO_JSON> method.

In this case, the C<TO_JSON> method of the object is invoked in scalar context. It must return a single scalar that can be directly encoded into JSON. This scalar replaces the object in the JSON text.

For example, the following C<TO_JSON> method will convert all L<URI> objects to JSON strings when serialised. The fact that these values originally were L<URI> objects is lost.

```
sub URI::TO_JSON {  
    my ($uri) = @_;  
    $uri->as_string  
}
```

=item 3. C<allow_blessed> is enabled.

The
object will be serialised as a JSON null value.

=item 4. none of the above

If none of the settings are enabled or the respective methods are missing, this module throws an exception.

=back

=head3 DESERIALISATION

For deserialisation there are only two cases to consider: either nonstandard tagging was used, in which case `C<allow_tags>` decides, or objects cannot be automatically be deserialised, in which case you can use postprocessing or the `C<filter_json_object>` or `C<filter_json_single_key_object>` callbacks to get some real objects out of your JSON.

This section only considers the tagged value case: a tagged JSON object is encountered during decoding and `C<allow_tags>` is disabled, a parse error will result (as if tagged values were not part of the grammar).

If `C<allow_tags>` is enabled, this module will look up the `C<THAW>` method of the package/classname used during serialisation (it will not attempt to load the package as a Perl module). If there is no such method, the decoding will fail with an error.

Otherwise, the `C<THAW>` method is invoked with the classname as first argument, the constant string `C<JSON>` as second argument, and all the values from the JSON array (the values originally returned by the `C<FREEZE>` method) as remaining arguments.

The method must then return the object. While technically you can return any Perl scalar, you might have to enable the `C<allow_nonref>` setting to make that work in all cases, so better return an actual blessed reference.

As an example, let's implement a `C<THAW>` function that regenerates the `C<My::Object>` from the `C<FREEZE>` example earlier:

```
sub My::Object::THAW {
    my ($class, $serialiser, $type, $id) = @_;

    $class->new (type => $type, id => $id)
}
```

=head1 ENCODING/CODESET FLAG NOTES

This section is taken from `JSON::XS`.

The interested reader might have seen a number of flags that signify encodings or codesets - `C<utf8>`, `C<latin1>` and `C<ascii>`. There seems to be some confusion on what these do, so here is a short comparison:

`C<utf8>` controls whether the JSON text created by `C<encode>` (and expected by `C<decode>`) is UTF-8 encoded or not, while `C<latin1>` and `C<ascii>` only control whether `C<encode>` escapes character values outside their respective

codeset range. Neither of these flags conflict with each other, although some combinations make less sense than others.

Care has been taken to make all flags symmetrical with respect to C<encode> and C<decode>, that is, texts encoded with any combination of these flag values will be correctly decoded when the same flags are used - in general, if you use different flag settings while encoding vs. when decoding you likely have a bug somewhere.

Below comes a verbose discussion of these flags. Note that a "codeset" is simply an abstract set of character-codepoint pairs, while an encoding takes those codepoint numbers and I<encodes> them, in our case into octets. Unicode is (among other things) a codeset, UTF-8 is an encoding, and ISO-8859-1

(= latin 1) and ASCII are both codesets I<and> encodings at the same time, which can be confusing.

=over 4

=item C<utf8> flag disabled

When C<utf8> is disabled (the default), then C<encode>/C<decode> generate and expect Unicode strings, that is, characters with high ordinal Unicode values (> 255) will be encoded as such characters, and likewise such characters are decoded as-is, no changes to them will be done, except "(re-)interpreting" them as Unicode codepoints or Unicode characters, respectively (to Perl, these are the same thing in strings unless you do funny/weird/dumb stuff).

This is useful when you want to do the encoding yourself (e.g. when you want to have UTF-16 encoded JSON texts) or when some other layer does the encoding for you (for example, when printing to a terminal using a filehandle that transparently encodes to UTF-8 you certainly do NOT want to UTF-8 encode your data first and have Perl encode it another time).

=item C<utf8> flag enabled

If the C<utf8>-flag is enabled, C<encode>/C<decode> will encode all characters using the corresponding UTF-8 multi-byte sequence, and will expect your input strings to be encoded as UTF-8, that is, no "character" of the input string must have any value > 255, as UTF-8 does not allow that.

The C<utf8> flag therefore switches between two modes: disabled means you will get a Unicode string in Perl, enabled means you get an UTF-8 encoded octet/binary string in Perl.

=item C<latin1> or C<ascii> flags enabled

With C<latin1> (or C<ascii>) enabled, C<encode> will escape characters with ordinal values > 255 (> 127 with C<ascii>) and encode the remaining characters as specified by the C<utf8> flag.

If C<utf8> is disabled, then the result is also correctly encoded in those character sets (as both are proper subsets of Unicode, meaning that a Unicode string with all character values < 256 is the same thing as a ISO-8859-1 string, and a Unicode string with all character values < 128 is the same thing as an ASCII string in Perl).

If C<utf8> is enabled, you still get a correct UTF-8-encoded string, regardless of these flags, just some more characters will be escaped using C<\uXXXX> then before.

Note that ISO-8859-1-I<encoded> strings are not compatible with UTF-8 encoding, while ASCII-encoded strings are. That is because the ISO-8859-1 encoding is NOT a subset of UTF-8 (despite the ISO-8859-1 I<codeset> being a subset of Unicode), while ASCII is.

Surprisingly, C<decode> will ignore these flags and so treat all input values as governed by the C<utf8> flag. If it is disabled, this allows you to decode ISO-8859-1- and ASCII-encoded strings, as both strict subsets of Unicode. If it is enabled, you can correctly decode UTF-8 encoded strings.

So neither C<latin1> nor C<ascii> are incompatible with the C<utf8> flag - they only govern when the JSON output engine escapes a character or not.

The main use for C<latin1> is to relatively efficiently store binary data as JSON, at the expense of breaking compatibility with most JSON decoders.

The main use for C<ascii> is to force the output to not contain characters with values > 127, which means you can interpret the resulting string as UTF-8, ISO-8859-1, ASCII, KOI8-R or most about any character set and 8-bit-encoding, and still get the same data structure back. This is useful when your channel for JSON transfer is not 8-bit clean or the encoding might be mangled in between (e.g. in mail), and works because ASCII is a proper subset of most 8-bit and multibyte encodings in use in the world.

=back

=head1 BACKWARD INCOMPATIBILITY

Since version 2.90, stringification (and string comparison) for C<JSON::true> and C<JSON::false> has not been overloaded. It shouldn't

matter as long as you treat them as boolean values, but a code that expects they are stringified as "true" or "false" doesn't work as you have expected any more.

```
if (JSON::true eq 'true') { # now fails

print "The result is $JSON::true now."; # => The result is 1
now.
```

And now these boolean values don't inherit JSON::Boolean, either. When you need to test a value is a JSON boolean value or not, use C<JSON::is_bool> function, instead of testing the value inherits a particular boolean class or not.

=head1 BUGS

Please report bugs on backend selection and additional features this module provides to RT or GitHub issues for this module:

L<<https://rt.cpan.org/Public/Dist/Display.html?Queue=JSON>>

L<<https://github.com/makamaka/JSON/issues>>

As for bugs on a specific behavior, please report to the author of the backend module you are using.

As for new features and requests to change common behaviors, please ask the author of JSON::XS (Marc Lehmann, E<lt>schmorp[at]schmorp.deE<gt>) first, by email (important!), to keep compatibility among JSON.pm backends.

=head1 SEE ALSO

L<JSON::XS>, L<Cpanel::JSON::XS>, L<JSON::PP> for backends.

L<JSON::MaybeXS>, an alternative that prefers Cpanel::JSON::XS.

C<RFC4627>(L<<http://www.ietf.org/rfc/rfc4627.txt>>)

RFC7159

(L<<http://www.ietf.org/rfc/rfc7159.txt>>)

RFC8259 (L<<http://www.ietf.org/rfc/rfc8259.txt>>)

=head1 AUTHOR

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JSON::XS was written by Marc Lehmann E<lt>schmorp[at]schmorp.deE<gt>

The release of this new version owes to the courtesy of Marc Lehmann.

=head1 CURRENT MAINTAINER

Kenichi Ishigaki, E<lt>ishigaki[at]cpan.orgE<gt>

=head1 COPYRIGHT AND LICENSE

Copyright 2005-2013 by Makamaka Hannyaharamitu

Most of the documentation is taken from JSON::XS by Marc Lehmann

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=cut

Found in path(s):

* /opt/cola/permits/1673388252_1683929510.8585129/0/libjson-perl-4-04000-orig-tar-gz/JSON-4.04/lib/JSON.pm

No license file was found, but licenses were detected in source scan.

=pod

=head1 NAME

JSON::PP56 - Helper module in using JSON::PP in Perl 5.6

=head1 DESCRIPTION

JSON::PP calls internally.

=head1 AUTHOR

Makamaka Hannyaharamitu, E<lt>makamaka[at]cpan.orgE<gt>

=head1 COPYRIGHT AND LICENSE

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=cut

Found in path(s):

```
* /opt/cola/permits/1673388252_1683929510.8585129/0/libjson-perl-4-04000-orig-tar-gz/JSON-4.04/lib/JSON/backportPP/Compat5006.pm
```

No license file was found, but licenses were detected in source scan.

abstract: 'JSON (JavaScript Object Notation) encoder/decoder'

author:

- 'Makamaka Hannyaharamitu, E<lt>makamaka[at]cpan.orgE<gt>'

build_requires:

ExtUtils::MakeMaker: '0'

configure_requires:

ExtUtils::MakeMaker: '0'

dynamic_config: 1

generated_by: 'ExtUtils::MakeMaker version 7.34, CPAN::Meta::Converter version 2.150010'

license: perl

meta-spec:

url: <http://module-build.sourceforge.net/META-spec-v1.4.html>

version: '1.4'

name: JSON

no_index:

directory:

- t

- inc

recommends:

JSON::XS: '2.34'

requires:

Test::More: '0'

resources:

bugtracker: <https://github.com/makamaka/JSON/issues>

repository: <https://github.com/makamaka/JSON>

version: '4.04'

x_serialization_backend: 'CPAN::Meta::YAML version 0.018'

Found in path(s):

```
* /opt/cola/permits/1673388252_1683929510.8585129/0/libjson-perl-4-04000-orig-tar-gz/JSON-4.04/META.yml
```

No license file was found, but licenses were detected in source scan.

NAME

JSON - JSON (JavaScript Object Notation) encoder/decoder

SYNOPSIS

```
use JSON; # imports encode_json, decode_json, to_json and from_json.
```

```
# simple and fast interfaces (expect/generate UTF-8)
```

```
$utf8_encoded_json_text = encode_json $perl_hash_or_arrayref;
```

```
$perl_hash_or_arrayref = decode_json $utf8_encoded_json_text;
```



```
# OO-interface

$json = JSON->new->allow_nonref;

$json_text = $json->encode( $perl_scalar );
$perl_scalar = $json->decode( $json_text );

$pretty_printed = $json->pretty->encode( $perl_scalar ); # pretty-printing
```

VERSION

2.93

DESCRIPTION

This module is a thin wrapper for JSON::XS-compatible modules with a few additional features. All the backend modules convert a Perl data structure to a JSON text as of RFC4627 (which we know is obsolete but we still stick to; see below for an option to support part of RFC7159) and vice versa. This module uses JSON::XS by default, and when JSON::XS is not available, this module falls back on JSON::PP, which is in the Perl core since 5.14. If JSON::PP is not available either, this module then falls back on JSON::backportPP (which is actually JSON::PP in a different .pm file) bundled in the same distribution as this module. You can also explicitly specify to use Cpanel::JSON::XS, a fork of JSON::XS by Reini Urban.

All these backend modules have slight incompatibilities between them, including extra features that other modules don't support, but as long as you use only common features (most important ones are described below), migration from backend to backend should be reasonably easy. For details, see each backend module you use.

CHOOSING BACKEND

This module respects an environmental variable called "PERL_JSON_BACKEND" when it decides a backend module to use. If this environmental variable is not set, it tries to load JSON::XS, and if JSON::XS is not available, it falls back on JSON::PP, and then JSON::backportPP if JSON::PP is not available either.

If you always don't want it to fall back on pure perl modules, set the variable like this ("export" may be "setenv", "set" and the likes, depending on your environment):

```
> export PERL_JSON_BACKEND=JSON::XS
```

If you prefer Cpanel::JSON::XS to JSON::XS, then:

```
> export PERL_JSON_BACKEND=Cpanel::JSON::XS,JSON::XS,JSON::PP
```

You may also want to set this variable at the top of your test files, in order not to be bothered with incompatibilities between backends (you need to wrap this in "BEGIN", and set before actually "use"-ing JSON module, as it decides its backend as soon as it's loaded):

```
BEGIN { $ENV{PERL_JSON_BACKEND}='JSON::backportPP'; }  
use JSON;
```

USING OPTIONAL FEATURES

There are a few options you can set when you "use" this module:

-support_by_pp

```
BEGIN { $ENV{PERL_JSON_BACKEND} = 'JSON::XS' }  
  
use JSON -support_by_pp;
```

```
my $json = JSON->new;  
# escape_slash is for JSON::PP only.  
$json->allow_nonref->escape_slash->encode("/");
```

With this option, this module loads its pure perl backend along with its XS backend (if available), and lets the XS backend to watch if you set a flag only JSON::PP supports. When you do, the internal JSON::XS object is replaced with a newly created JSON::PP object with the setting copied from the XS object, so that you can use JSON::PP flags (and its slower "decode"/"encode" methods) from then on. In other words, this is not something that allows you to hook JSON::XS to change its behavior while keeping its speed. JSON::XS and JSON::PP objects are quite different (JSON::XS object is a blessed scalar reference, while JSON::PP object is a blessed hash reference), and can't share their internals.

To avoid needless overhead (by copying settings), you are advised not to use this option and just to use JSON::PP explicitly when you need JSON::PP features.

-convert_blessed_universally

```
use JSON -convert_blessed_universally;  
  
my $json = JSON->new->allow_nonref->convert_blessed;  
my $object = bless {foo => 'bar'}, 'Foo';
```

```
$json->encode($object); # => {"foo":"bar" }
```

JSON::XS-compatible backend modules don't encode blessed objects by default (except for their boolean values, which are typically blessed JSON::PP::Boolean objects). If you need to encode a data structure that may contain objects, you usually need to look into the structure and replace objects with alternative non-blessed values, or enable "convert_blessed" and provide a "TO_JSON" method for each object's (base) class that may be found in the structure, in order to let the methods replace the objects with whatever scalar values the methods return.

If you need to serialise data structures that may contain arbitrary objects, it's probably better to use other serialisers (such as Sereal or Storable for example), but if you do want to use this module for that purpose, "-convert_blessed_universally" option may help, which tweaks "encode" method of the backend to install "UNIVERSAL::TO_JSON" method (locally) before encoding, so that all the objects that don't have their own "TO_JSON" method can fall back on the method in the "UNIVERSAL" namespace. Note that you still need to enable "convert_blessed" flag to actually encode objects in a data structure, and "UNIVERSAL::TO_JSON" method installed by this option only converts blessed hash/array references into their unblessed clone (including private keys/values that are not supposed to be exposed). Other blessed references will be converted into null.

This feature is experimental and may be removed in the future.

-no_export

When you don't want to import functional interfaces from a module, you usually supply "()" to its "use" statement.

```
use JSON (); # no functional interfaces
```

If you don't want to import functional interfaces, but you also want to use any of the above options, add "-no_export" to the option list.

```
# no functional interfaces, while JSON::PP support is enabled.  
use JSON -support_by_pp, -no_export;
```

FUNCTIONAL INTERFACE

This section is taken from JSON::XS. "encode_json" and "decode_json" are exported by default.

This module also exports "to_json" and "from_json" for backward compatibility. These are slower, and may expect/generate different stuff from what "encode_json" and "decode_json" do, depending on their options. It's better just to use Object-Oriented interfaces than using these two functions.

`encode_json`

```
$json_text = encode_json $perl_scalar
```

Converts the given Perl data structure to a UTF-8 encoded, binary string (that is, the string contains octets only). Croaks on error.

This function call is functionally identical to:

```
$json_text = JSON->new->utf8->encode($perl_scalar)
```

Except being faster.

`decode_json`

```
$perl_scalar = decode_json $json_text
```

The opposite of "encode_json": expects an UTF-8 (binary) string and tries to parse that as an UTF-8 encoded JSON text, returning the resulting reference. Croaks on error.

This function call is functionally identical to:

```
$perl_scalar = JSON->new->utf8->decode($json_text)
```

Except being faster.

`to_json`

```
$json_text = to_json($perl_scalar[, $optional_hashref])
```

Converts the given Perl data structure to a Unicode string by default. Croaks on error.

Basically, this function call is functionally identical to:

```
$json_text = JSON->new->encode($perl_scalar)
```

Except being slower.

You can pass an optional hash reference to modify its behavior, but that may change what "to_json" expects/generates (see

"ENCODING/CODESET
FLAG NOTES" for details).

```
$json_text = to_json($perl_scalar, {utf8 => 1, pretty => 1})  
# => JSON->new->utf8(1)->pretty(1)->encode($perl_scalar)
```

from_json

```
$perl_scalar = from_json($json_text[, $optional_hashref])
```

The opposite of "to_json": expects a Unicode string and tries to parse it, returning the resulting reference. Croaks on error.

Basically, this function call is functionally identical to:

```
$perl_scalar = JSON->new->decode($json_text)
```

You can pass an optional hash reference to modify its behavior, but that may change what "from_json" expects/generates (see "ENCODING/CODESET FLAG NOTES" for details).

```
$perl_scalar = from_json($json_text, {utf8 => 1})  
# => JSON->new->utf8(1)->decode($json_text)
```

JSON::is_bool

```
$is_boolean = JSON::is_bool($scalar)
```

Returns true if the passed scalar represents either JSON::true or JSON::false, two constants that act like 1 and 0 respectively and are also used to represent JSON "true" and "false" in Perl strings.

See MAPPING, below, for more information on how JSON values are mapped to Perl.

COMMON OBJECT-ORIENTED INTERFACE

This section is also taken from JSON::XS.

The object oriented interface lets you configure your own encoding or decoding style, within the limits of supported formats.

new

```
$json = JSON->new
```

Creates a new JSON::XS-compatible backend object that can be used to de/encode JSON strings. All boolean flags described below are by default *disabled*.

The mutators for flags all return the backend object again and thus calls can be chained:

```
my $json = JSON->new->utf8->space_after->encode({ a => [1,2]})
=> {"a": [1, 2]}
```

ascii

```
$json = $json->ascii([$enable])
```

```
$enabled = $json->get_ascii
```

If `$enable` is true (or missing), then the "encode" method will not generate characters outside the code range 0..127 (which is ASCII). Any Unicode characters outside that range will be escaped using

either a single `\uXXXX` (BMP characters) or a double `\uHHHH\uLLLL` escape sequence, as per RFC4627. The resulting encoded JSON text can be treated as a native Unicode string, an ascii-encoded, latin1-encoded or UTF-8 encoded string, or any other superset of ASCII.

If `$enable` is false, then the "encode" method will not escape Unicode characters unless required by the JSON syntax or other flags. This results in a faster and more compact format.

See also the section **ENCODING/CODESET FLAG NOTES** later in this document.

The main use for this flag is to produce JSON texts that can be transmitted over a 7-bit channel, as the encoded JSON texts will not contain any 8 bit characters.

```
JSON->new->ascii(1)->encode([chr 0x10401])
=> ["\ud801\udc01"]
```

latin1

```
$json = $json->latin1([$enable])
```

```
$enabled = $json->get_latin1
```

If `$enable` is true (or missing), then the "encode" method will encode the resulting JSON text as latin1 (or iso-8859-1), escaping any characters outside the code range 0..255. The resulting string can be treated as a latin1-encoded JSON text or a native Unicode string. The "decode" method will not be affected in any way by this flag, as "decode" by default expects Unicode, which is a strict superset of latin1.

If `$enable` is false, then the "encode" method will not escape Unicode characters unless required by the JSON syntax or other flags.

See also the section **ENCODING/CODESET FLAG NOTES** later in this document.

The main use for this flag is efficiently encoding binary data as JSON text, as most octets will not be escaped, resulting in a smaller encoded size. The disadvantage is that the resulting JSON text is encoded in latin1 (and must correctly be treated as such when storing and transferring), a rare encoding for JSON. It is therefore most useful when you want to store data structures known to contain binary data efficiently in files or databases, not when talking to other JSON encoders/decoders.

```
JSON->new->latin1->encode(["\x{89}\x{abc}"])
=> ["\x{89}\u0abc"] # (perl syntax, U+abc escaped, U+89 not)
```

utf8

```
$json = $json->utf8([$enable])
```

```
$enabled = $json->get_utf8
```

If `$enable` is true (or missing), then the "encode" method will encode the JSON result into UTF-8, as required by many protocols, while the "decode" method expects to be handled an UTF-8-encoded string. Please note that UTF-8-encoded strings do not contain any characters outside the range 0..255, they are thus useful for bitwise/binary I/O. In future versions, enabling this option might enable autodetection of the UTF-16 and UTF-32 encoding families, as described in RFC4627.

If `$enable` is false, then the "encode" method will return the JSON string as a (non-encoded) Unicode string, while "decode" expects thus a Unicode string. Any decoding or encoding (e.g. to UTF-8 or UTF-16) needs to be done yourself, e.g. using the Encode module.

See also the section **ENCODING/CODESET FLAG NOTES** later in this document.

Example, output UTF-16BE-encoded JSON:

```
use Encode;
$json_text = encode "UTF-16BE", JSON->new->encode ($object);
```

Example, decode UTF-32LE-encoded JSON:

```
use Encode;
$object = JSON->new->decode (decode "UTF-32LE", $jsontext);
```

pretty

```
$json = $json->pretty([$enable])
```

This enables (or disables) all of the "indent", "space_before" and "space_after" (and in the future possibly more) flags in one call to generate the most readable (or most compact) form possible.

indent

```
$json = $json->indent([$enable])
```

```
$enabled = $json->get_indent
```

If \$enable is true (or missing), then the "encode" method will use a multiline format as output, putting every array member or object/hash key-value pair into its own line, indenting them properly.

If \$enable is false, no newlines or indenting will be produced, and the resulting JSON text is guaranteed not to contain any "newlines".

This setting has no effect when decoding JSON texts.

space_before

```
$json = $json->space_before([$enable])
```

```
$enabled = $json->get_space_before
```

If \$enable is true (or missing), then the "encode" method will add an extra optional space before the ":" separating keys from values in JSON objects.

If \$enable is false, then the "encode" method will not add any extra space at those places.

This setting has no effect when decoding JSON texts. You will also most likely combine this setting with "space_after".

Example, space_before enabled, space_after and indent disabled:

```
{"key" : "value" }
```

space_after


```
$json = $json->space_after([$enable])
```

```
$enabled = $json->get_space_after
```

If `$enable` is true (or missing), then the "encode" method will add an extra optional space after the ":" separating keys from values in JSON objects and extra whitespace after the "," separating key-value pairs and array members.

If `$enable` is false, then the "encode" method will not add any extra space at those places.

This setting has no effect when decoding JSON texts.

Example, `space_before` and `indent` disabled, `space_after` enabled:

```
{"key": "value"}
```

relaxed

```
$json = $json->relaxed([$enable])
```

```
$enabled = $json->get_relaxed
```

If `$enable` is true (or missing), then "decode" will accept some extensions to normal JSON syntax (see below). "encode" will not be affected in anyway. *Be aware that this option makes you accept invalid JSON texts as if they were valid!*. I suggest only to use this option to parse application-specific files written by humans (configuration files, resource files etc.)

If `$enable` is false (the default), then "decode" will only accept valid JSON texts.

Currently accepted extensions are:

- * list items can have an end-comma

JSON *separates* array elements and key-value pairs with commas. This can be annoying if you write JSON texts manually

and want to be able to quickly append elements, so this extension accepts comma at the end of such items not just between them:

```
[  
  1,  
  2, <- this comma not normally allowed
```

```
]
{
  "k1": "v1",
  "k2": "v2", <- this comma not normally allowed
}
```

* shell-style '#'-comments

Whenever JSON allows whitespace, shell-style comments are additionally allowed. They are terminated by the first carriage-return or line-feed character, after which more white-space and comments are allowed.

```
[
  1, # this comment not allowed in JSON
  # neither this one...
]
```

canonical

```
$json = $json->canonical([$enable])
```

```
$enabled = $json->get_canonical
```

If `$enable` is true (or missing), then the "encode" method will output JSON objects by sorting their keys. This is adding a comparatively high overhead.

If `$enable` is false, then the "encode" method will output key-value pairs in the order Perl stores them (which will likely change between runs of the same script, and can change even within the same run from 5.18 onwards).

This option is useful if you want the same data structure to be encoded as the same JSON text (given the same overall settings). If it is disabled, the same hash might be encoded differently even if contains the same data, as key-value pairs have no inherent ordering in Perl.

This setting has no effect when decoding JSON texts.

This setting has currently no effect on tied hashes.

allow_nonref

```
$json = $json->allow_nonref([$enable])
```

```
$enabled = $json->get_allow_nonref
```

If `$enable` is true (or missing), then the "encode" method can convert a non-reference into its corresponding string, number or null JSON value, which is an extension to RFC4627. Likewise, "decode" will accept those JSON values instead of croaking.

If `$enable` is false, then the "encode" method will croak if it isn't passed an arrayref or hashref, as JSON texts must either be an object or array. Likewise, "decode" will croak if given something that is not a JSON object or array.

Example, encode a Perl scalar as JSON value with enabled "allow_nonref", resulting in an invalid JSON text:

```
JSON->new->allow_nonref->encode ("Hello, World!")  
=> "Hello, World!"
```

allow_unknown

```
$json = $json->allow_unknown ([$enable])
```

```
$enabled = $json->get_allow_unknown
```

If `$enable` is true (or missing), then "encode" will *not* throw an exception when it encounters values it cannot represent in JSON (for example, filehandles) but instead will encode a JSON "null" value. Note that blessed objects are not included here and are handled separately by `<allow_nonref>`.

If `$enable` is false (the default), then "encode" will throw an exception when it encounters anything it cannot encode as JSON.

This option does not affect "decode" in any way, and it is recommended to leave it off unless you know your communications partner.

allow_blessed

```
$json = $json->allow_blessed ([$enable])
```

```
$enabled = $json->get_allow_blessed
```

See "OBJECT SERIALISATION" for details.

If `$enable` is true (or missing), then the "encode" method will not barf when it encounters a blessed reference that it cannot convert otherwise. Instead, a JSON "null" value is encoded instead of the object.

If `$enable` is false (the default), then "encode" will throw an exception when it encounters a blessed object that it cannot convert otherwise.

This setting has no effect on "decode".

`convert_blessed`

```
$json = $json->convert_blessed([$enable])
```

```
$enabled = $json->get_convert_blessed
```

See "OBJECT SERIALISATION" for details.

If `$enable` is true (or missing), then "encode", upon encountering a blessed object, will check for the availability of the "TO_JSON" method on the object's class. If found, it will be called in scalar context and the resulting scalar will be encoded instead of the object.

The "TO_JSON" method may safely call die if it wants. If "TO_JSON" returns other blessed objects, those will be handled in the same way. "TO_JSON" must take care of not causing an endless recursion cycle (== crash) in this case. The name of "TO_JSON" was chosen because other methods called by the Perl core (== not by the user of the object) are usually in upper case letters and to avoid collisions with any "to_json" function or method.

If `$enable` is false (the default), then "encode" will not consider this type of conversion.

This setting has no effect on "decode".

`filter_json_object`

```
$json = $json->filter_json_object([$coderef])
```

When `$coderef` is specified, it will be called from "decode" each time it decodes a JSON object. The only argument is a reference to the newly-created hash. If the code references returns a single scalar (which need not be a reference), this value (i.e. a copy of that scalar to avoid aliasing) is inserted into the deserialised data structure. If it returns an empty list (NOTE: *not* "undef", which is a valid scalar), the original deserialised hash will be inserted. This setting can slow down decoding considerably.

When `$coderef` is omitted or undefined, any existing callback will be removed and "decode" will not change the deserialised hash in

any way.

Example, convert all JSON objects into the integer 5:

```
my $js = JSON->new->filter_json_object (sub { 5 });
# returns [5]
$js->decode ('[{}]); # the given subroutine takes a hash reference.
# throw an exception because allow_nonref is not enabled
# so a lone 5 is not allowed.
$js->decode ('{"a":1, "b":2}');
```

`filter_json_single_key_object`

```
$json = $json->filter_json_single_key_object($key [=] $coderef)
```

Works remotely similar to "filter_json_object", but is only called for JSON objects having a single key named \$key.

This \$coderef is called before the one specified via "filter_json_object", if any. It gets passed the single value in the JSON object. If it returns a single value, it will be inserted into the data structure. If it returns nothing (not even "undef" but the empty list), the callback from "filter_json_object" will be called next, as if no single-key callback were specified.

If \$coderef is omitted or undefined, the corresponding callback will be disabled. There can only ever be one callback for a given key.

As this callback gets called less often than the "filter_json_object" one, decoding speed will not usually suffer as much. Therefore, single-key objects make excellent targets to serialise Perl objects into, especially as single-key JSON objects are as close to the type-tagged value concept as JSON gets (it's basically an ID/VALUE tuple). Of course, JSON does not support this in any way, so you need to make sure your data never looks like a serialised Perl hash.

Typical names for the single object key are "__class_whatever__", or "\$__dollars_are_rarely_used__\$" or "}ugly_brace_placement", or even things like "__class_md5sum(classname)__", to reduce the risk of clashing with real hashes.

Example, decode JSON objects of the form "{ "__widget__" => <id> }" into the corresponding \$WIDGET{<id>} object:

```
# return whatever is in $WIDGET{5}:
JSON
```

```

->new
->filter_json_single_key_object (__widget__ => sub {
    $WIDGET{ $_[0] }
})
->decode ('{"__widget__": 5}')

# this can be used with a TO_JSON method in some "widget" class
# for serialisation to json:
sub WidgetBase::TO_JSON {
    my ($self) = @_ ;

    unless ($self->{id}) {
        $self->{id} = ..get..some..id..;
        $WIDGET{$self->{id}} = $self;
    }

    { __widget__ => $self->{id} }
}

```

max_depth

```
$json = $json->max_depth([$maximum_nesting_depth])
```

```
$max_depth = $json->get_max_depth
```

Sets the maximum nesting level (default 512) accepted while encoding or decoding. If a higher nesting level is detected in JSON text or a Perl data structure, then the encoder and decoder will stop and croak at that point.

Nesting level is defined by number of hash- or arrayrefs that the encoder needs to traverse to reach a given point or the number of "{" or "[" characters without their matching closing parenthesis crossed to reach a given character in a string.

Setting the maximum depth to one disallows any nesting, so that ensures that the object is only a single hash/object or array.

If no argument is given, the highest possible setting will be used, which is rarely useful.

max_size

```
$json = $json->max_size([$maximum_string_size])
```

```
$max_size = $json->get_max_size
```

Set the maximum length a JSON text may have (in bytes) where decoding is being attempted. The default is 0, meaning no limit.

When "decode" is called on a string that is longer than this many bytes, it will not attempt to decode the string but throw an exception. This setting has no effect on "encode" (yet).

If no argument is given, the limit check will be deactivated (same as when 0 is specified).

encode

```
$json_text = $json->encode($perl_scalar)
```

Converts the given Perl value or data structure to its JSON representation. Croaks on error.

decode

```
$perl_scalar = $json->decode($json_text)
```

The opposite of "encode": expects a JSON text and tries to parse it, returning the resulting simple scalar or reference. Croaks on error.

decode_prefix

```
($perl_scalar, $characters) = $json->decode_prefix($json_text)
```

This works like the "decode" method, but instead of raising an exception when there is trailing garbage after the first JSON object, it will silently stop parsing there and return the number of characters consumed so far.

This is useful if your JSON texts are not delimited by an outer protocol and you need to know where the JSON text ends.

```
JSON->new->decode_prefix("[1] the tail")  
=> ([1], 3)
```

ADDITIONAL METHODS

The following methods are for this module only.

backend

```
$backend = $json->backend
```

Since 2.92, "backend" method returns an abstract backend module used currently, which should be `JSON::Backend::XS` (which inherits `JSON::XS` or `Cpanel::JSON::XS`), or `JSON::Backend::PP` (which inherits `JSON::PP`), not to monkey-patch the actual backend module globally.

If you need to know what is used actually, use "isa", instead of

string comparison.

is_xs

```
$boolean = $json->is_xs
```

Returns true if the backend inherits JSON::XS or Cpanel::JSON::XS.

is_pp

```
$boolean = $json->is_pp
```

Returns true if the backend inherits JSON::PP.

property

```
$settings = $json->property()
```

Returns a reference to a hash that holds all the common flag settings.

```
$json = $json->property('utf8' => 1)  
$value  
= $json->property('utf8') # 1
```

You can use this to get/set a value of a particular flag.

INCREMENTAL PARSING

This section is also taken from JSON::XS.

In some cases, there is the need for incremental parsing of JSON texts. While this module always has to keep both JSON text and resulting Perl data structure in memory at one time, it does allow you to parse a JSON stream incrementally. It does so by accumulating text until it has a full JSON object, which it then can decode. This process is similar to using "decode_prefix" to see if a full JSON object is available, but is much more efficient (and can be implemented with a minimum of method calls).

This module will only attempt to parse the JSON text once it is sure it has enough text to get a decisive result, using a very simple but truly incremental parser. This means that it sometimes won't stop as early as the full parser, for example, it doesn't detect mismatched parentheses. The only thing it guarantees is that it starts decoding as soon as a syntactically valid JSON text has been seen. This means you need to set resource limits (e.g. "max_size") to ensure the parser will stop parsing in the presence of syntax errors.

The following methods implement this incremental parser.

incr_parse

```
$json->incr_parse( [$string] ) # void context
```

```
$obj_or_undef = $json->incr_parse( [$string] ) # scalar context
```

```
@obj_or_empty = $json->incr_parse( [$string] ) # list context
```

This is the central parsing function. It can both append new text and extract objects from the stream accumulated so far (both of these functions are optional).

If `$string` is given, then this string is appended to the already existing JSON fragment stored in the `$json` object.

After that, if the function is called in void context, it will simply return without doing anything further. This can be used to add more text in as many chunks as you want.

If the method is called in scalar context, then it will try to extract exactly *one* JSON object. If that is successful, it will return this object, otherwise it will return "undef". If there is a parse error, this method will croak just as "decode" would do (one can then use "incr_skip" to skip the erroneous part). This is the most common way of using the method.

And finally, in list context, it will try to extract as many objects from the stream as it can find and return them, or the empty list otherwise. For this to work, there must be no separators (other than whitespace) between the JSON objects or arrays, instead they must be concatenated back-to-back. If an error occurs, an exception will be raised as in the scalar context case. Note that in this case, any previously-parsed JSON texts will be lost.

Example: Parse some JSON arrays/objects in a given string and return them.

```
my @objs = JSON->new->incr_parse ("[5][7][1,2]");
```

incr_text

```
$lvalue_string = $json->incr_text
```

This method returns the currently stored JSON fragment as an lvalue, that is, you can manipulate it. This *only* works when a preceding call to "incr_parse" in *scalar context* successfully returned an object. Under all other circumstances you must not

call this function (I mean it. although in simple tests it might actually work, it *will* fail under real world conditions). As a special exception, you can also call this method before having parsed anything.

That means you can only use this function to look at or manipulate text before or after complete JSON objects, not while the parser is in the middle of parsing a JSON object.

This function is useful in two cases: a) finding the trailing text after a JSON object or b) parsing multiple JSON objects separated by non-JSON text (such as commas).

`incr_skip`

```
$json->incr_skip
```

This will reset the state of the incremental parser and will remove the parsed text from the input buffer so far.

This is

useful after "incr_parse" died, in which case the input buffer and incremental parser state is left unchanged, to skip the text parsed so far and to reset the parse state.

The difference to "incr_reset" is that only text until the parse error occurred is removed.

`incr_reset`

```
$json->incr_reset
```

This completely resets the incremental parser, that is, after this call, it will be as if the parser had never parsed anything.

This is useful if you want to repeatedly parse JSON objects and want to ignore any trailing data, which means you have to reset the parser after each successful decode.

MAPPING

Most of this section is also taken from JSON::XS.

This section describes how the backend modules map Perl values to JSON values and vice versa. These mappings are designed to "do the right thing" in most circumstances automatically, preserving round-tripping characteristics (what you put in comes out as something equivalent).

For the more enlightened:

note that in the following descriptions,

lowercase **perl** refers to the Perl interpreter, while uppercase

Perl refers to the abstract Perl language itself.

JSON -> PERL

object

A JSON object becomes a reference to a hash in Perl. No ordering of object keys is preserved (JSON does not preserve object key ordering itself).

array

A JSON array becomes a reference to an array in Perl.

string

A JSON string becomes a string scalar in Perl - Unicode codepoints in JSON are represented by the same codepoints in the Perl string, so no manual decoding is necessary.

number

A JSON number becomes either an integer, numeric (floating point) or string scalar in perl, depending on its range and any fractional parts. On the Perl level, there is no difference between those as Perl handles all the conversion details, but an integer may take slightly less memory and might represent more values exactly

than floating point

numbers.

If the number consists of digits only, this module will try to represent it as an integer value. If that fails, it will try to represent it as a numeric (floating point) value if that is possible without loss of precision. Otherwise it will preserve the number as a string value (in which case you lose roundtripping ability, as the JSON number will be re-encoded to a JSON string).

Numbers containing a fractional or exponential part will always be represented as numeric (floating point) values, possibly at a loss of precision (in which case you might lose perfect roundtripping ability, but the JSON number will still be re-encoded as a JSON number).

Note that precision is not accuracy - binary floating point values cannot represent most decimal fractions exactly, and when converting from and to floating point, this module only guarantees precision up to but

not including the least

significant bit.

true, false

These JSON atoms become "JSON::true" and "JSON::false", respectively. They are overloaded to act almost exactly like the numbers 1 and 0. You can check whether a scalar is a JSON boolean by using the "JSON::is_bool" function.

null

A JSON null atom becomes "undef" in Perl.

shell-style comments ("# *text*")

As a nonstandard extension to the JSON syntax that is enabled by the "relaxed" setting, shell-style comments are allowed.

They can start anywhere outside strings and go till the end of the line.

PERL -> JSON

The mapping from Perl to JSON is slightly more difficult, as Perl is a truly typeless language, so we can only guess which JSON type is meant by a Perl value.

hash references

Perl hash references become JSON objects. As there is no inherent ordering in hash keys (or JSON objects), they will usually be encoded in a pseudo-random order.

This module can

optionally sort the hash keys (determined by the *canonical* flag), so the same data structure will serialise to the same JSON text (given same settings and version of the same backend), but this incurs a runtime overhead and is only rarely useful, e.g. when you want to compare some JSON text against another for equality.

array references

Perl array references become JSON arrays.

other references

Other unblest references are generally not allowed and will cause an exception to be thrown, except for references to the integers 0 and 1, which get turned into "false" and "true" atoms in JSON. You can also use "JSON::false" and "JSON::true" to improve readability.

```
encode_json [0,JSON::true] # yields [false,true]
```

JSON::true, JSON::false, JSON::null

These special values become JSON true and JSON false values, respectively. You can also use "\1" and "\0" directly if you want.

blessed objects

Blessed objects are not directly representable in JSON, but "JSON::XS" allows various ways of handling objects. See "OBJECT SERIALISATION", below, for details.

simple scalars

Simple Perl scalars (any scalar that is not a reference) are the most difficult objects to encode: this module will encode undefined scalars as JSON "null" values, scalars that have last been used in a string context before encoding as JSON strings, and anything else as number value:

```
# dump as number
encode_json [2]          # yields [2]
encode_json [-3.0e17]    # yields [-3e+17]
my $value = 5; encode_json [$value] # yields [5]

# used as string, so dump as string
print $value;
encode_json [$value]     # yields ["5"]

# undef becomes null
encode_json [undef]     # yields [null]
```

You can force the type to be a string by stringifying it:

```
my $x = 3.1; # some variable containing a number
"$x";      # stringified
$x .= "";  # another, more awkward way to stringify
print $x;  # perl does it for you, too, quite often
```

You can force the type to be a number by numifying it:

```
my $x = "3"; # some variable containing a string
$x += 0;     # numify it, ensuring it will be dumped as a number
$x *= 1;     # same thing, the choice is yours.
```

You can not currently force the type in other, less obscure, ways. Tell me if you need this capability (but don't forget to explain why it's needed :).

Note that numerical precision has the same meaning as under Perl (so binary to decimal conversion follows the same rules as in Perl, which can differ to other languages). Also, your perl interpreter might expose extensions to the floating point numbers of your platform, such as

infinities or NaN's - these

cannot be represented in JSON, and it is an error to pass those in.

OBJECT SERIALISATION

As for Perl objects, this module only supports a pure JSON representation (without the ability to deserialise the object automatically again).

SERIALISATION

What happens when this module encounters a Perl object depends on the "allow_blessed" and "convert_blessed" settings, which are used in this order:

1. "convert_blessed" is enabled and the object has a "TO_JSON" method.

In this case, the "TO_JSON" method of the object is invoked in scalar context. It must return a single scalar that can be directly encoded into JSON. This scalar replaces the object in the JSON text.

For example, the following "TO_JSON" method will convert all URI objects to JSON strings when serialised. The fact that these values originally were URI objects is lost.

```
sub URI::TO_JSON {  
    my ($uri) = @_;  
  
    $uri->as_string  
}
```

2. "allow_blessed" is enabled.

The object will be serialised as a JSON null value.

3. none of the above

If none of the settings are enabled or the respective methods are missing, this module throws an exception.

ENCODING/CODESET FLAG NOTES

This section is taken from JSON::XS.

The interested reader might have seen a number of flags that signify encodings or codesets - "utf8", "latin1" and "ascii".

There seems to be some confusion on what these do, so here is a short comparison:

"utf8" controls whether the JSON text created by "encode" (and expected by "decode") is UTF-8 encoded or not, while "latin1" and

"ascii" only control whether "encode" escapes character values outside their respective codeset range. Neither of these flags conflict with each other, although some combinations make less sense than others.

Care has been taken to make all flags symmetrical with respect to "encode" and "decode", that is, texts encoded with any combination of these flag values will be correctly decoded when the same flags are used - in general, if you use different flag settings while encoding vs. when decoding you likely have a bug somewhere.

Below comes a verbose discussion of these flags. Note that a "codeset" is simply an abstract set of character-codepoint pairs, while an encoding takes those codepoint numbers and *encodes* them, in our case into octets. Unicode is (among other things) a codeset, UTF-8 is an encoding, and ISO-8859-1 (= latin 1) and ASCII are both codesets *and* encodings at the same time, which can be confusing.

"utf8" flag disabled

When "utf8" is disabled (the default), then "encode"/"decode" generate and expect Unicode strings, that is, characters with high ordinal Unicode values (> 255) will be encoded as such characters, and likewise such characters are decoded as-is, no changes to them will be done, except "(re-)interpreting" them

as Unicode codepoints or Unicode characters, respectively (to Perl, these are the same thing in strings unless you do funny/weird/dumb stuff).

This is useful when you want to do the encoding yourself (e.g. when you want to have UTF-16 encoded JSON texts) or when some other layer does the encoding for you (for example, when printing to a terminal using a filehandle that transparently encodes to UTF-8 you certainly do NOT want to UTF-8 encode your data first and have Perl encode it another time).

"utf8" flag enabled

If the "utf8"-flag is enabled, "encode"/"decode" will encode all characters using the corresponding UTF-8 multi-byte sequence, and will expect your input strings to be encoded as UTF-8, that is, no "character" of the input string must have any value > 255, as UTF-8 does not allow that.

The "utf8" flag therefore switches between two modes: disabled means you will

get a Unicode string in Perl, enabled means you
get an UTF-8 encoded octet/binary string in Perl.

"latin1" or "ascii" flags enabled

With "latin1" (or "ascii") enabled, "encode" will escape characters with ordinal values > 255 (> 127 with "ascii") and encode the remaining characters as specified by the "utf8" flag.

If "utf8" is disabled, then the result is also correctly encoded in those character sets (as both are proper subsets of Unicode, meaning that a Unicode string with all character values < 256 is the same thing as a ISO-8859-1 string, and a Unicode string with all character values < 128 is the same thing as an ASCII string in Perl).

If "utf8" is enabled, you still get a correct UTF-8-encoded string, regardless of these flags, just some more characters will be escaped using "\uXXXX" then before.

Note that ISO-8859-1-**encoded** strings are not compatible with UTF-8 encoding, while ASCII-encoded strings are. That is because the ISO-8859-1 encoding is NOT a subset of UTF-8 (despite the ISO-8859-1 **codeset** being a subset of Unicode), while ASCII is.

Surprisingly, "decode" will ignore these flags and so treat all input values as governed by the "utf8" flag. If it is disabled, this allows you to decode ISO-8859-1- and ASCII-encoded strings, as both strict subsets of Unicode. If it is enabled, you can correctly decode UTF-8 encoded strings.

So neither "latin1" nor "ascii" are incompatible with the "utf8" flag - they only govern when the JSON output engine escapes a character or not.

The main use for "latin1" is to relatively efficiently store binary data as JSON, at the expense of breaking compatibility with most JSON decoders.

The main use for "ascii" is to force the output to not contain characters with values > 127, which means you can interpret the resulting string as UTF-8, ISO-8859-1, ASCII, KOI8-R or most about any character set and 8-bit-encoding, and still get the same data structure back. This is useful when your channel for JSON transfer is not 8-bit clean or the encoding might be

mangled in between (e.g. in mail), and works because ASCII is a proper subset of most 8-bit and multibyte encodings in use in the world.

BACKWARD INCOMPATIBILITY

Since version 2.90, stringification (and string comparison) for "JSON::true" and "JSON::false" has not been overloaded. It shouldn't matter as long as you treat them as boolean values, but a code that expects they are stringified as "true" or "false" doesn't work as you have expected any more.

```
if (JSON::true eq 'true') { # now fails

print "The result is $JSON::true now."; # => The result is 1 now.
```

And now these boolean values don't inherit JSON::Boolean, either. When you need to test a value is a JSON boolean value or not, use "JSON::is_bool" function, instead of testing the value inherits a particular boolean class or not.

BUGS

Please report bugs on backend selection and additional features this module provides to RT or GitHub issues for this module:

<https://rt.cpan.org/Public/Dist/Display.html?Queue=JSON>
<https://github.com/makamaka/JSON/issues>

Please report bugs and feature requests on decoding/encoding and boolean behaviors to the author of the backend module you are using.

SEE ALSO

JSON::XS, Cpanel::JSON::XS, JSON::PP for backends.

JSON::MaybeXS, an alternative that prefers Cpanel::JSON::XS.

"RFC4627"(<<http://www.ietf.org/rfc/rfc4627.txt>>)

AUTHOR

Makamaka Hannyaharamitu, <[makamaka\[at\]cpan.org](mailto:makamaka@cpan.org)>

JSON::XS was written by Marc Lehmann <[schmorp\[at\]schmorp.de](mailto:schmorp[at]schmorp.de)>

The release of this new version owes to the courtesy of Marc Lehmann.

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```
use strict;
```

```
use warnings;
```

```
use Benchmark qw( cmpthese timethese );
```

```
our $VERSION = '1.00';
```

```
my $wanttime = $ARGV[1] || 5;
```

```
use JSON qw( -support_by_pp -no_export ); # for JSON::PP::Boolean inheritance
```

```
use JSON::PP ();
```

```
use JSON::XS ();
```

```
use utf8;
```

```
my $pp = JSON::PP->new->utf8;
```

```
my $xs = JSON::XS->new->utf8;
```

```
local $/;
```

```
my $json = <>;
```

```
my $perl = JSON::XS::decode_json $json;
```

```
my $result;
```

```
printf( "JSON::PP %s\n", JSON::PP->VERSION );
```

```
printf( "JSON::XS %s\n", JSON::XS->VERSION );
```

```
print "-----\n";
```

```
print "->encode()\n";
```

```
print "-----\n";
```

```
$result = timethese( -$wanttime,
```

```
{
```

```
  'JSON::PP' => sub { $pp->encode( $perl ) },
```

```
  'JSON::XS' => sub { $xs->encode( $perl ) },
```

```
},
```

```
'none'
```

```
);
```

```

cmpthese( $result );

print "-----\n";
print "->pretty->canonical->encode()\n";
print "-----\n";

$pp->pretty->canonical;
$xs->pretty->canonical;

$result
= timethese( -$wanttime,
  {
    'JSON::PP' => sub { $pp->encode( $perl ) },
    'JSON::XS' => sub { $xs->encode( $perl ) },
  },
  'none'
);
cmpthese( $result );

print "-----\n";

__END__

=pod

=head1 SYNOPSIS

bench_encode.pl json-file
# or
bench_encode.pl json-file minimum-time

=head1 DESCRIPTION

L<JSON::PP> and L<JSON::XS> encoding benchmark.

=head1 AUTHOR

makamaka

=head1 LISENCE

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```

```
* /opt/cola/permits/1673388252_1683929510.8585129/0/libjson-perl-4-04000-orig-tar-gz/JSON-4.04/eg/bench_encode.pl
```

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```
=pod
```

```
=head1 NAME
```

JSON::PP5005 - Helper module in using JSON::PP in Perl 5.005

```
=head1 DESCRIPTION
```

JSON::PP calls internally.

```
=head1 AUTHOR
```

Makamaka Hannyaharamitu, E<lt>makamaka[at]cpan.orgE<gt>

```
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```

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```
=cut
```

Found in path(s):

```
* /opt/cola/permits/1673388252_1683929510.8585129/0/libjson-perl-4-04000-orig-tar-gz/JSON-4.04/lib/JSON/backportPP/Compat5005.pm
```

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```
use strict;
use warnings;
use Benchmark qw( cmpthese timethese );
```

```
our $VERSION = '1.00';
```

```
my $wanttime = $ARGV[1] || 5;
```

```
use JSON qw( -support_by_pp -no_export ); # for JSON::PP::Boolean inheritance
use JSON::PP ();
use JSON::XS ();
use utf8;
```

```
my $pp = JSON::PP->new->utf8;
```

```
my $xs = JSON::XS->new->utf8;
```

```

local $/;

my $json = <>;
my $perl = JSON::XS::decode_json $json;
my $result;

printf( "JSON::PP %s\n", JSON::PP->VERSION );
printf( "JSON::XS %s\n", JSON::XS->VERSION );

print "-----\n";
print "->decode()\n";
print "-----\n";

$result = timethese( -$wanttime,
    {
        'JSON::PP' => sub { $pp->decode( $json ) },
        'JSON::XS' => sub { $xs->decode( $json ) },
    },
    'none'
);
cmpthese( $result );

print "-----\n";

__END__

=pod

=head1 SYNOPSIS

bench_decode.pl json-file
# or
bench_decode.pl json-file
minimum-time

=head1 DESCRIPTION

L<JSON::PP> and L<JSON::XS> decoding benchmark.

=head1 AUTHOR

makamaka

=head1 LISENCE

```

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1.396 libyang 2.0.112-6ubuntu2

1.396.1 Available under license :

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Upstream-Name: libyang

License: BSD-3-clause

Files: *

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1.397 juju-ratelimit 1.0.1

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1.398 libcrypt-random-seed-perl 0.03-1.1

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To do so, attach the following notices to the program. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

```
<one line to give the program's name and a brief idea of what it does.>  
Copyright (C) 19yy <name of author>
```

```
This program is free software; you can redistribute it and/or modify  
it under the terms of the GNU General Public License as published by  
the Free Software Foundation; either version 1, or (at your option)  
any later version.
```

```
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GNU General Public License for more details.
```

```
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along with this program; if not, write to the Free Software  
Foundation, Inc.,  
51 Franklin Street, Fifth Floor, Boston MA 02110-1301 USA
```

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If the program is interactive, make it output a short notice like this when it starts in an interactive mode:

```
Gnomovision version 69, Copyright (C) 19xx name of author  
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.  
This is free software, and you are welcome to redistribute it  
under certain conditions; type `show c' for details.
```

The hypothetical commands `show w' and `show c' should show the appropriate parts of the General Public License. Of course, the commands you use may be called something other than `show w' and `show c'; they could even be mouse-clicks or menu items--whatever suits your program.

You should also get your employer (if you work as a programmer) or your

school, if any, to sign a "copyright disclaimer" for the program, if necessary. Here a sample; alter the names:

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disclaims all copyright interest in the
program `Gnomovision' (a program to direct compilers to make passes
at assemblers) written by James Hacker.

<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice

That's all there is to it!

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The End

1.399 cloud-init 23.1.2-0ubuntu0~22.04.1

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Upstream-Name: cloud-init

Upstream-Contact: cloud-init-dev@lists.launchpad.net

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The

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Yoyodyne, Inc., hereby disclaims all copyright interest in the library `Frob' (a library for tweaking knobs) written by James Random Hacker.

<signature of Ty Coon>, 1 April 1990
Ty Coon, President of Vice

That's all there is to it!
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Version 2, June 1991

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[This is the first released version of the library GPL. It is numbered 2 because it goes with version 2 of the ordinary GPL.]

Preamble

The licenses for most software are designed to take away your freedom to share and change it. By contrast, the GNU General Public Licenses are intended to guarantee your freedom to share and change free software--to make sure the software is free for all its users.

This license, the Library General Public License, applies to some specially designated Free Software Foundation software, and to any other libraries whose authors decide to use it. You can use it for your libraries, too.

When we speak of free software, we are referring to freedom, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for

this service if you wish), that you receive source code or can get it if you want it, that you can change the software or use pieces of it in new free programs; and that you know you can do these things.

To protect your rights, we need to make restrictions that forbid anyone to deny you these rights or to ask you to surrender the rights. These restrictions translate to certain responsibilities for you if you distribute copies of the library, or if you modify it.

For example, if you distribute copies of the library, whether gratis or for a fee, you must give the recipients all the rights that we gave you. You must make sure that they, too, receive or can get the source code. If you link a program with the library, you must provide complete object files to the recipients so that they can relink them with the library, after making changes to the library and recompiling it. And you must show them these terms so they know their rights.

Our method of protecting your rights has two steps: (1) copyright the library, and (2) offer you this license which gives you legal permission to copy, distribute and/or modify the library.

Also, for each distributor's protection, we want to make certain that everyone understands that there is no warranty for this free library. If the library is modified by someone else and passed on, we want its recipients to know that what they have is not the original version, so that any problems introduced by others will not reflect on the original authors' reputations.

Finally, any free program is threatened constantly by software patents. We wish to avoid the danger that companies distributing free software will individually obtain patent licenses, thus in effect transforming the program into proprietary software. To prevent this, we have made it clear that any patent must be licensed for everyone's free use or not licensed at all.

Most GNU software, including some libraries, is covered by the ordinary GNU General Public License, which was designed for utility programs. This license, the GNU Library General Public License, applies to certain designated libraries. This license is quite different from the ordinary one; be sure to read it in full, and don't assume that anything in it is the same as in the ordinary license.

The reason we have a separate public license for some libraries is that they blur the distinction we usually make between modifying or adding to a program and simply using it. Linking a program with a library, without changing the library, is in some sense simply using the library, and is

analogous to running a utility program or application program. However, in a textual and legal sense, the linked executable is a combined work, a derivative of the original library, and the ordinary General Public License treats it as such.

Because of this blurred distinction, using the ordinary General Public License for libraries did not effectively promote software sharing, because most developers did not use the libraries. We concluded that weaker conditions might promote sharing better.

However, unrestricted linking of non-free programs would deprive the users of those programs of all benefit from the free status of the libraries themselves. This Library General Public License is intended to permit developers of non-free programs to use free libraries, while preserving your freedom as a user of such programs to change the free libraries that are incorporated in them. (We have not seen how to achieve this as regards changes in header files, but we have achieved it as regards changes in the actual functions of the Library.) The hope is that this will lead to faster development of free libraries.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, while the latter only works together with the library.

Note that it is possible for a library to be covered by the ordinary General Public License rather than by this special one.

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0. This License Agreement applies to any software library which contains a notice placed by the copyright holder or other authorized party saying it may be distributed under the terms of this Library General Public License (also called "this License"). Each licensee is addressed as "you".

A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under

copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

1. You may copy and distribute verbatim copies of the Library's complete source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and distribute a copy of this License along with the Library.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

a) The modified work must itself be a software library.

b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.

c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.

d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses

the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.

Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6.

Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also compile or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

c) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

d) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the source code distributed need not include anything that is normally

distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

7. You may place library facilities that are a work based on the Library side-by-side in a single library together with other library facilities not covered by this License, and distribute such a combined library, provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise permitted, and provided that you do these two things:

a) Accompany the combined library with a copy of the same work based on the Library, uncombined with any other library facilities. This must be distributed under the terms of the Sections above.

b) Give prominent notice with the combined library of the fact that part of it is a work based on the Library, and explaining where to find the accompanying uncombined form of the same work.

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This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License.

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END OF TERMS AND CONDITIONS

Appendix: How to Apply These Terms to Your New Libraries

If you develop a new library, and you want it to be of the greatest possible use to the public, we recommend making it free software that everyone can redistribute and change. You can do so by permitting redistribution under these terms (or, alternatively, under the terms of the ordinary General Public License).

To apply these terms, attach the following notices to the library. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

<one line to give the library's name and a brief idea of what it does.>

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Also add information on how to contact you by electronic and paper mail.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a "copyright disclaimer" for the library, if necessary.

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<signature of Ty Coon>, 1 April 1990

Ty Coon, President of Vice

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Version 3, 29 June 2007

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want it, that you can change the software or use pieces of it in new
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these rights or asking you to surrender the rights. Therefore, you have
certain responsibilities if you distribute copies of the software, or if
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For example, if you distribute copies of such a program, whether
gratis or for a fee, you must pass on to the recipients the same
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or can get the source code. And you must show them these terms so they
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Developers that use the GNU GPL protect your rights with two steps:

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assert copyright on the software, and (2) offer you this License
giving you legal permission to copy, distribute and/or modify it.

For the developers' and authors' protection, the GPL clearly explains
that there is no warranty for this free software. For both users' and
authors' sake, the GPL requires that modified versions be marked as

changed, so that their problems will not be attributed erroneously to authors of previous versions.

Some devices are designed to deny users access to install or run modified versions of the software inside them, although the manufacturer can do so. This is fundamentally incompatible with the aim of protecting users' freedom to change the software. The systematic pattern of such abuse occurs in the area of products for individuals to use, which is precisely where it is most unacceptable. Therefore, we have designed this version of the GPL to prohibit the practice for those products. If such problems arise substantially in other domains, we stand ready to extend this provision to those domains in future versions of the GPL, as needed to protect the freedom of users.

Finally, every program is threatened constantly by software patents. States should not allow patents to restrict development and use of software on general-purpose computers, but in those that do, we wish to avoid the special danger that patents applied to a free program could make it effectively proprietary. To prevent this, the GPL assures that patents cannot be used to render the program non-free.

The precise terms and conditions for copying, distribution and modification follow.

TERMS AND CONDITIONS

0. Definitions.

"This License" refers to version 3 of the GNU General Public License.

"Copyright" also means copyright-like laws that apply to other kinds of works, such as semiconductor masks.

"The Program" refers to any copyrightable work licensed under this License. Each licensee is addressed as "you". "Licensees" and "recipients" may be individuals or organizations.

To "modify" a work means to copy from or adapt all or part of the work in a fashion requiring copyright permission, other than the making of an exact copy. The resulting work is called a "modified version" of the earlier work or a work "based on" the earlier work.

A "covered work" means either the unmodified Program or a work based on the Program.

To "propagate" a work means to do anything with it that, without

permission, would make you directly or secondarily liable for infringement under applicable copyright law, except executing it on a computer or modifying a private copy. Propagation includes copying, distribution (with or without modification), making available to the public, and in some countries other activities as well.

To "convey" a work means any kind of propagation that enables other parties to make or receive copies. Mere interaction with a user through a computer network, with no transfer of a copy, is not conveying.

An interactive user interface displays "Appropriate Legal Notices" to the extent that it includes a convenient and prominently visible feature that (1) displays an appropriate copyright notice, and (2) tells the user that there is no warranty for the work (except to the extent that warranties are provided), that licensees may convey the work under this License, and how to view a copy of this License. If the interface presents a list of user commands or options, such as a menu, a prominent item in the list meets this criterion.

1. Source Code.

The "source code" for a work means the preferred form of the work for making modifications to it. "Object code" means any non-source form of a work.

A "Standard Interface" means an interface that either is an official standard defined by a recognized standards body, or, in the case of interfaces specified for a particular programming language, one that is widely used among developers working in that language.

The

"System Libraries" of an executable work include anything, other than the work as a whole, that (a) is included in the normal form of packaging a Major Component, but which is not part of that Major Component, and (b) serves only to enable use of the work with that Major Component, or to implement a Standard Interface for which an implementation is available to the public in source code form. A "Major Component", in this context, means a major essential component (kernel, window system, and so on) of the specific operating system (if any) on which the executable work runs, or a compiler used to produce the work, or an object code interpreter used to run it.

The "Corresponding Source" for a work in object code form means all the source code needed to generate, install, and (for an executable work) run the object code and to modify the work, including scripts to control those activities. However, it does not include the work's System Libraries, or general-purpose tools or generally

available free

programs which are used unmodified in performing those activities but which are not part of the work. For example, Corresponding Source includes interface definition files associated with source files for the work, and the source code for shared libraries and dynamically linked subprograms that the work is specifically designed to require, such as by intimate data communication or control flow between those subprograms and other parts of the work.

The Corresponding Source need not include anything that users can regenerate automatically from other parts of the Corresponding Source.

The Corresponding Source for a work in source code form is that same work.

2. Basic Permissions.

All rights granted under this License are granted for the term of copyright on the Program, and are irrevocable provided the stated conditions are met. This License explicitly affirms your unlimited permission to run the unmodified Program. The output from running a covered work is covered

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You may make, run and propagate covered works that you do not convey, without conditions so long as your license otherwise remains in force. You may convey covered works to others for the sole purpose of having them make modifications exclusively for you, or provide you with facilities for running those works, provided that you comply with the terms of this License in conveying all material for which you do not control copyright. Those thus making or running the covered works for you must do so exclusively on your behalf, under your direction and control, on terms that prohibit them from making any copies of your copyrighted material outside their relationship with you.

Conveying under any other circumstances is permitted solely under the conditions stated below. Sublicensing is not allowed;

section 10

makes it unnecessary.

3. Protecting Users' Legal Rights From Anti-Circumvention Law.

No covered work shall be deemed part of an effective technological measure under any applicable law fulfilling obligations under article 11 of the WIPO copyright treaty adopted on 20 December 1996, or

similar laws prohibiting or restricting circumvention of such measures.

When you convey a covered work, you waive any legal power to forbid circumvention of technological measures to the extent such circumvention is effected by exercising rights under this License with respect to the covered work, and you disclaim any intention to limit operation or modification of the work as a means of enforcing, against the work's users, your or third parties' legal rights to forbid circumvention of technological measures.

4. Conveying Verbatim Copies.

You may convey verbatim copies of the Program's source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice; keep intact all notices stating that this License and any non-permissive terms added in accord with section 7 apply to the code; keep intact all notices of the absence of any warranty; and give all recipients a copy of this License along with the Program.

You may charge any price or no price for each copy that you convey, and you may offer support or warranty protection for a fee.

5. Conveying Modified Source Versions.

You may convey a work based on the Program, or the modifications to produce it from the Program, in the form of source code under the terms of section 4, provided that you also meet all of these conditions:

- a) The work must carry prominent notices stating that you modified it, and giving a relevant date.
- b) The work must carry prominent notices stating that it is released under this License and any conditions added under section 7. This requirement modifies the requirement in section 4 to "keep intact all notices".
- c) You must license the entire work, as a whole, under this License to anyone who comes into possession of a copy. This License will therefore apply, along with any applicable section 7 additional terms, to the whole of the work, and all its parts, regardless of how they are packaged. This License gives no permission to license the work in any other way, but it does not invalidate such permission if you have separately received it.

d) If the work has interactive user interfaces, each must display Appropriate Legal Notices; however, if the Program has interactive interfaces that do not display Appropriate Legal Notices, your work need not make them do so.

A compilation of a covered work with other separate and independent works, which are not by their nature extensions of the covered work, and which are not combined with it such as to form a larger program, in or on a volume of a storage or distribution medium, is called an "aggregate" if the compilation and its resulting copyright are not used to limit the access or legal rights of the compilation's users beyond what the individual works permit. Inclusion of a covered work in an aggregate does not cause this License to apply to the other parts of the aggregate.

6. Conveying Non-Source Forms.

You may convey a covered work in object code form under the terms of sections 4 and 5, provided that you also convey the machine-readable Corresponding Source under the terms of this License, in one of these ways:

a) Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by the Corresponding Source fixed on a durable physical medium customarily used for software interchange.

b) Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by a written offer, valid for at least three years and valid for as long as you offer spare parts or customer support for that product model, to give anyone who possesses the object code either (1) a copy of the Corresponding Source for all the software in the product that is covered by this License, on a durable physical medium customarily used for software interchange, for a price no more than your reasonable cost of physically performing this conveying of source, or (2) access to copy the Corresponding Source from a network server at no charge.

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(This file is under construction.) -*- text -*-

If you've contributed to gas and your name isn't listed here, it is not meant as a slight. I just don't know about it. Email me, nickc@redhat.com and I'll correct the situation.

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+++++

Dean Elsner wrote the original gas for vax. [more details?]

Jay Fenlason maintained gas for a while, adding support for gdb-specific debug information and the 68k series machines, most of the preprocessing pass, and extensive changes in messages.c, input-file.c, write.c.

K. Richard Pixley maintained gas for a while, adding various enhancements and many bug fixes, including merging support for several processors, breaking gas up to handle multiple object file format backends (including heavy rewrite, testing, an integration of the coff and b.out backends), adding configuration including heavy testing and verification of cross assemblers and file splits and renaming, converted gas to strictly ansi C including full prototypes, added support for m680[34]0 & cpu32, considerable work on i960 including a coff port (including considerable amounts of reverse engineering), a sparc opcode file rewrite, decstation, rs6000, and hp300hpux host ports, updated "know" assertions and made them work, much other reorganization, cleanup, and lint.

Ken Raeburn wrote the high-level BFD interface code to replace most of the code in format-specific I/O modules.

The original Vax-VMS support was contributed by David L. Kashtan. Eric Youngdale and Pat Rankin have done much work with it since.

The Intel 80386 machine description was written by Eliot Dresselhaus.

Minh Tran-Le at IntelliCorp contributed some AIX 386 support.

The Motorola 88k machine description was contributed by Devon Bowen of Buffalo University and Torbjorn Granlund of the Swedish Institute of Computer Science.

Keith

Knowles at the Open Software Foundation wrote the original MIPS back end (tc-mips.c, tc-mips.h), and contributed Rose format support that hasn't been merged in yet. Ralph Campbell worked with the MIPS code to support a.out format.

Support for the Zilog Z8k and Hitachi H8/300, H8/500 and SH processors

(tc-z8k, tc-h8300, tc-h8500, tc-sh), and IEEE 695 object file format (obj-ieee), was written by Steve Chamberlain of Cygnus Solutions. Steve also modified the COFF back end (obj-coffbfd) to use BFD for some low-level operations, for use with the Hitachi, 29k and Zilog targets.

John Gilmore built the AMD 29000 support, added .include support, and simplified the configuration of which versions accept which pseudo-ops. He updated the 68k machine description so that Motorola's opcodes always produced fixed-size instructions (e.g. jsr), while synthetic instructions remained shrinkable (jbsr). John fixed many bugs, including true tested cross-compilation support, and one bug in relaxation that took a week and required the proverbial one-bit fix.

Ian Lance Taylor of Cygnus Solutions merged the Motorola and MIT syntaxes for the 68k, completed support for some COFF targets (68k, i386 SVR3, and SCO Unix), wrote the ECOFF support based on Michael Meissner's mips-tfile program, wrote the PowerPC and RS/6000 support, and made a few other minor patches. He handled the binutils releases for versions 2.7 through 2.9.

David Edelsohn contributed fixes for the PowerPC and AIX support.

Steve Chamberlain made gas able to generate listings.

Support for the HP9000/300 was contributed by Glenn Engel of HP.

Support for ELF format files has been worked on by Mark Eichin of Cygnus Solutions (original, incomplete implementation), Pete Hoogenboom at the University of Utah (HPPA mainly), Michael Meissner of the Open Software Foundation (i386 mainly), and Ken Raeburn of Cygnus Solutions (sparc, initial 64-bit support).

Several engineers at Cygnus Solutions have also provided many small bug fixes and configuration enhancements.

The initial Alpha support was contributed by Carnegie-Mellon University. Additional work was done by Ken Raeburn of Cygnus Solutions. Richard Henderson then rewrote much of the Alpha support.

Ian Dall updated the support code for the National Semiconductor 32000 series, and added support for Mach 3 and NetBSD running on the PC532.

Klaus Kaempf ported the assembler and the binutils to openVMS/Alpha.

Steve Haworth contributed the support for the Texas Instruction c30

(tms320c30).

H.J. Lu has contributed many patches and much testing.

Alan Modra reworked much of the i386 backend, improving the error checking, updating the code, and improving the 16 bit support, using patches from the work of Martynas Kunigelis and H.J. Lu.

Many others have contributed large or small bugfixes and enhancements. If you've contributed significant work and are not mentioned on this list, and want to be, let us know. Some of the history has been lost; we aren't intentionally leaving anyone out.

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1.403 iptables 1.8.7-1ubuntu5.1

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1.404 perl 5.34.0-3ubuntu1.2

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1.405 python3.10 3.10.6-1~22.04.2ubuntu1.1

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In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see <http://www.cnri.reston.va.us>) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations, which became Zope Corporation. In 2001, the Python Software Foundation (PSF, see <https://www.python.org/psf/>) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation was a sponsoring member of the PSF.

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1.6	1.5.2	2000	CNRI	no

2.0	1.6	2000	BeOpen.com	no
1.6.1	1.6	2001	CNRI	yes (2)
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2.0.1	2.0+1.6.1	2001	PSF	yes
2.1.1	2.1+2.0.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes
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1.406 libssh 0.9.6-2ubuntu0.22.04.1

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1.407 python 3.10.6-1~22.04.2ubuntu1.1

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Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see <http://www.cwi.nl>) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see <http://www.cnri.reston.va.us>) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations, which became Zope Corporation. In 2001, the Python Software Foundation (PSF, see <https://www.python.org/psf/>) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation was a sponsoring member of the PSF.

All

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Release	Derived from	Year	Owner	GPL-compatible? (1)
0.9.0 thru 1.2		1991-1995	CWI	yes
1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
1.6	1.5.2	2000	CNRI	no

2.0	1.6	2000	BeOpen.com	no
1.6.1	1.6	2001	CNRI	yes (2)
2.1	2.0+1.6.1	2001	PSF	no
2.0.1	2.0+1.6.1	2001	PSF	yes
2.1.1	2.1+2.0.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes
2.1.3	2.1.2	2002	PSF	yes
2.2 and above	2.1.1	2001-now		
PSF	yes			

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1.408 libvmtools 12.1.5-3~ubuntu0.22.04.1

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If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

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Open-vm-tools v10.3.0

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>>> freebsd-base64-4.8

>>>

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base64.c -- routines to encode/decode base64 data

\$OpenLDAP: pkg/ldap/libraries/liblutil/base64.c,v 1.15 2006/01/03 22:12:11 kurt Exp \$ /

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1.410 libalgorithm-diff-perl 1.201-1

1.410.1 Available under license :

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```
---
abstract: unknown
author:
  - unknown
build_requires:
  ExtUtils::MakeMaker: '0'
configure_requires:
  ExtUtils::MakeMaker: '0'
dynamic_config: 1
generated_by: 'ExtUtils::MakeMaker version 7.46, CPAN::Meta::Converter version 2.150010'
license: unknown
meta-spec:
  url: http://module-build.sourceforge.net/META-spec-v1.4.html
  version: '1.4'
name: Algorithm-Diff
no_index:
  directory:
    - t
    - inc
version: '1.201'
x_serialization_backend: 'CPAN::Meta::YAML version 0.018'
```

Found in path(s):

```
* /opt/cola/permits/1715453514_1686310426.8819616/0/libalgorithm-diff-perl-1-201-orig-1-tar-gz/Algorithm-Diff-1.201/META.yml
```

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```
#!/usr/bin/perl -w
#
# `Diff' program in Perl
# Copyright 1998 M-J. Dominus. (mjd-perl-diff@plover.com)
#
# This program is free software; you can redistribute it and/or modify it
# under the same terms as Perl itself.
#
# Altered to output in `context diff' format (but without context)
# September 1998 Christian Murphy (cpm@muc.de)
#
```

```

# Command-line arguments and context lines feature added
# September 1998 Amir D. Karger (karger@bead.aecom.yu.edu)
#
# In this file, "item" usually means "line of text", and "item number" usually
# means "line number". But theoretically the code could be used more generally
use strict;

use Algorithm::Diff qw(diff);
use File::stat;
use vars qw($opt_C $opt_c $opt_u $opt_U);
use Getopt::Std;

my $usage = << "ENDUSAGE";
Usage: $0 [{-c | -u}] [{-C | -U} lines] oldfile newfile
  -c will do a context diff with 3 lines of context
  -C will do a context diff with 'lines' lines of context
  -u will do a unified diff with 3 lines of context
  -U will do a unified diff with 'lines' lines of context
ENDUSAGE

getopts('U:C:cu') or bag("$usage");
bag("$usage") unless @ARGV == 2;
my ($file1, $file2) = @ARGV;
if (defined $opt_C || defined $opt_c) {
    $opt_c = ""; # -c on if -C given on command line
    $opt_u = undef;
} elsif (defined $opt_U || defined $opt_u) {
    $opt_u = ""; # -u on if -U given on command line
    $opt_c = undef;
} else {
    $opt_c = ""; # by default, do context diff, not old diff
}

my ($char1, $char2); # string to print before file names
my $Context_Lines; # lines of context to print
if (defined $opt_c) {
    $Context_Lines = defined $opt_C ? $opt_C : 3;
    $char1 = '*' x 3; $char2 = '-' x 3;
} elsif (defined $opt_u) {
    $Context_Lines = defined $opt_U ? $opt_U : 3;
    $char1 = '-' x 3; $char2 = '+' x 3;
}

# After we've read up to a certain point in each file, the number of items
# we've read from each file will differ by $FLD (could be 0)
my
$File_Length_Difference = 0;

```

```

open (F1, $file1) or bag("Couldn't open $file1: $!");
open (F2, $file2) or bag("Couldn't open $file2: $!");
my (@f1, @f2);
chomp(@f1 = <F1>);
close F1;
chomp(@f2 = <F2>);
close F2;

# diff yields lots of pieces, each of which is basically a Block object
my $diffs = diff(\@f1, \@f2);
exit 0 unless @$diffs;

my $st = stat($file1);
print "$char1 $file1\t", scalar localtime($st->mtime), "\n";
$st = stat($file2);
print "$char2 $file2\t", scalar localtime($st->mtime), "\n";

my ($hunk,$oldhunk);
# Loop over hunks. If a hunk overlaps with the last hunk, join them.
# Otherwise, print out the old one.
foreach my $piece (@$diffs) {
    $hunk = new Hunk ($piece, $Context_Lines);
    next unless $oldhunk;

    if ($hunk->does_overlap($oldhunk)) {
        $hunk->prepend_hunk($oldhunk);
    } else {
        $oldhunk->output_diff(\@f1, \@f2);
    }

} continue {
    $oldhunk = $hunk;
}

# print the last hunk
$oldhunk->output_diff(\@f1, \@f2);
exit 1;
# END MAIN PROGRAM

sub bag {
    my
    $msg = shift;
    $msg .= "\n";
    warn $msg;
    exit 2;
}

# Package Hunk. A Hunk is a group of Blocks which overlap because of the

```

```

# context surrounding each block. (So if we're not using context, every
# hunk will contain one block.)
{
package Hunk;

sub new {
# Arg1 is output from &LCS::diff (which corresponds to one Block)
# Arg2 is the number of items (lines, e.g.,) of context around each block
#
# This subroutine changes $File_Length_Difference
#
# Fields in a Hunk:
# blocks    - a list of Block objects
# start     - index in file 1 where first block of the hunk starts
# end       - index in file 1 where last block of the hunk ends
#
# Variables:
# before_diff - how much longer file 2 is than file 1 due to all hunks
#              until but NOT including this one
# after_diff  - difference due to all hunks including this one
my ($class, $piece, $context_items) = @_ ;

my $block = new Block ($piece); # this modifies $FLD!

my $before_diff = $File_Length_Difference;
# BEFORE this hunk
my $after_diff = $before_diff + $block->{"length_diff"};
$File_Length_Difference += $block->{"length_diff"};

# @remove_array and @insert_array hold the items to insert and remove
# Save the start & beginning of each array. If the array doesn't exist
# though (e.g., we're only adding items in this block), then figure
# out the line number based on the line number of the other file and
# the current difference in file lengths
my @remove_array = $block->remove;
my @insert_array = $block->insert;
my ($a1, $a2, $b1, $b2, $start1, $start2, $end1, $end2);
$a1 = @remove_array ? $remove_array[0 ]->{"item_no"} : -1;
$a2 = @remove_array ? $remove_array[-1]->{"item_no"} : -1;
$b1 = @insert_array ? $insert_array[0 ]->{"item_no"} : -1;
$b2 = @insert_array ? $insert_array[-1]->{"item_no"} : -1;

$start1 = $a1 == -1 ? $b1 - $before_diff : $a1;
$end1   = $a2 == -1 ? $b2 - $after_diff  : $a2;
$start2 = $b1 == -1 ?
$a1 + $before_diff : $b1;
$end2   = $b2 == -1 ? $a2 + $after_diff  : $b2;

```

```

# At first, a hunk will have just one Block in it
my $hunk = {
    "start1" => $start1,
    "start2" => $start2,
    "end1" => $end1,
    "end2" => $end2,
    "blocks" => [$block],
};
bless $hunk, $class;

$hunk->flag_context($context_items);

return $hunk;
}

# Change the "start" and "end" fields to note that context should be added
# to this hunk
sub flag_context {
    my ($hunk, $context_items) = @_;
    return unless $context_items; # no context

    # add context before
    my $start1 = $hunk->{"start1"};
    my $num_added = $context_items > $start1 ? $start1 : $context_items;
    $hunk->{"start1"} -= $num_added;
    $hunk->{"start2"} -= $num_added;

    # context after
    my $end1 = $hunk->{"end1"};
    $num_added = ($end1+$context_items > $#f1) ?
        $#f1 - $end1 :
        $context_items;
    $hunk->{"end1"} += $num_added;
    $hunk->{"end2"}
    += $num_added;
}

# Is there an overlap between hunk arg0 and old hunk arg1?
# Note: if end of old hunk is one less than beginning of second, they overlap
sub does_overlap {
    my ($hunk, $oldhunk) = @_;
    return "" unless $oldhunk; # first time through, $oldhunk is empty

    # Do I actually need to test both?
    return ($hunk->{"start1"} - $oldhunk->{"end1"} <= 1 ||
        $hunk->{"start2"} - $oldhunk->{"end2"} <= 1);
}

```

```

# Prepend hunk arg1 to hunk arg0
# Note that arg1 isn't updated! Only arg0 is.
sub prepend_hunk {
    my ($hunk, $oldhunk) = @_ ;

    $hunk->{"start1"} = $oldhunk->{"start1"};
    $hunk->{"start2"} = $oldhunk->{"start2"};

    unshift (@{$hunk->{"blocks"}}, @{$oldhunk->{"blocks"}});
}

# DIFF OUTPUT ROUTINES. THESE ROUTINES CONTAIN DIFF FORMATTING INFO...
sub output_diff {
    if (defined $main::opt_u) {&output_unified_diff(@_)}
    elsif (defined $main::opt_c) {&output_context_diff(@_)}
    else {die "unknown diff"}
}

sub output_unified_diff {

    my ($hunk, $fileref1, $fileref2) = @_ ;
    my @blocklist;

    # Calculate item number range.
    my $range1 = $hunk->unified_range(1);
    my $range2 = $hunk->unified_range(2);
    print "@@ -$range1 +$range2 @@\n";

    # Outlist starts containing the hunk of file 1.
    # Removing an item just means putting a '-' in front of it.
    # Inserting an item requires getting it from file2 and splicing it in.
    # We splice in $num_added items. Remove blocks use $num_added because
    # splicing changed the length of outlist.
    # We remove $num_removed items. Insert blocks use $num_removed because
    # their item numbers---corresponding to positions in file *2*--- don't take
    # removed items into account.
    my $low = $hunk->{"start1"};
    my $hi = $hunk->{"end1"};
    my ($num_added, $num_removed) = (0,0);
    my @outlist = @{$fileref1[$low..$hi]};
    map {s/^/ /} @outlist; # assume it's just context

    foreach my $block (@{$hunk->{"blocks"}}) {
    foreach my $item ($block->remove)
    {
        my $op = $item->{"sign"}; # -
        my $offset = $item->{"item_no"} - $low + $num_added;

```



```

$outlist[$offset] =~ s/^/$op/;
$num_removed++;
}
foreach my $item ($block->insert) {
    my $op = $item->{"sign"}; # +
    my $i = $item->{"item_no"};
    my $offset = $i - $hunk->{"start2"} + $num_removed;
    splice(@outlist,$offset,0,"$op$$fileref2[$i]");
    $num_added++;
}
}

map {s/$\n/} @outlist; # add \n's
print @outlist;

}

sub output_context_diff {
    my ($hunk, $fileref1, $fileref2) = @_;
    my @blocklist;

    print "*****\n";
    # Calculate item number range.
    my $range1 = $hunk->context_range(1);
    my $range2 = $hunk->context_range(2);

    # Print out file 1 part for each block in context diff format if there are
    # any blocks that remove items
    print "*** $range1 ***\n";
    my $low = $hunk->{"start1"};
    my $hi = $hunk->{"end1"};
    if (@blocklist = grep {$_->remove} @{$hunk->{"blocks"}}) {
    my @outlist =
    @$fileref1[$low..$hi];
    map {s/^/ /} @outlist; # assume it's just context
    foreach my $block (@blocklist) {
        my $op = $block->op; # - or !
        foreach my $item ($block->remove) {
            $outlist[$item->{"item_no"} - $low] =~ s/^/$op/;
        }
    }
    map {s/$\n/} @outlist; # add \n's
    print @outlist;
    }

    print "--- $range2 ---\n";
    $low = $hunk->{"start2"};
    $hi = $hunk->{"end2"};

```

```

    if (@blocklist = grep {$_->insert} @{$hunk->{"blocks"}}) {
    my @outlist = @fileref2[$low..$hi];
    map {s/^/ /} @outlist; # assume it's just context
    foreach my $block (@blocklist) {
        my $op = $block->op; # + or !
        foreach my $item ($block->insert) {
            $outlist[$item->{"item_no"} - $low] =~ s/^/$op/;
        }
    }
    map {s/$\n/} @outlist; # add \n's
    print @outlist;
    }
}

sub context_range {
# Generate a range of item numbers to print. Only print 1 number if the range
# has only one item in it. Otherwise, it's 'start,end'
    my ($hunk, $flag) = @_;
    my ($start, $end) = ($hunk->{"start$flag"}, $hunk->{"end$flag"});
    $start++; $end++; # index from 1, not zero
    my $range = ($start < $end) ? "$start,$end" : $end;
    return $range;
}

sub unified_range {
# Generate a range of item numbers to print for unified diff
# Print number where block starts, followed by number of lines in the block
# (don't print number of lines if it's 1)
    my ($hunk, $flag) = @_;
    my ($start, $end) = ($hunk->{"start$flag"}, $hunk->{"end$flag"});
    $start++; $end++; # index from 1, not zero
    my $length = $end - $start + 1;
    my $first = $length < 2 ? $end : $start; # strange, but correct...
    my $range = $length == 1 ? $first : "$first,$length";
    return $range;
}
} # end Package Hunk

# Package Block. A block is an operation removing, adding, or changing
# a group of items. Basically, this is just a list of changes, where each
# change adds or deletes a single item.
# (Change could be a separate class, but it didn't seem worth it)
{
package Block;
sub new {
# Input is
    a chunk from &Algorithm::LCS::diff
# Fields in a block:

```

```

# length_diff - how much longer file 2 is than file 1 due to this block
# Each change has:
# sign      - '+' for insert, '-' for remove
# item_no   - number of the item in the file (e.g., line number)
# We don't bother storing the text of the item
#
my ($class,$chunk) = @_;
my @changes = ();

# This just turns each change into a hash.
foreach my $item (@$chunk) {
my ($sign, $item_no, $text) = @$item;
my $hashref = {"sign" => $sign, "item_no" => $item_no};
push @changes, $hashref;
}

my $block = { "changes" => \@changes };
bless $block, $class;

$block->{"length_diff"} = $block->insert - $block->remove;
return $block;
}

# LOW LEVEL FUNCTIONS
sub op {
# what kind of block is this?
my $block = shift;
my $insert = $block->insert;
my $remove = $block->remove;

$remove && $insert and return '!';
$remove and return '-';
$insert and return '+';
warn "unknown block type";
return '^'; # context block
}

# Returns a list of the changes in this block that remove items
# (or the number of removals if called in scalar context)
sub remove { return grep { $_->{"sign"} eq '-' } @{$shift->{"changes"}}; }

# Returns a list of the changes in this block that insert items
sub insert { return grep { $_->{"sign"} eq '+' } @{$shift->{"changes"}}; }

} # end of package Block

```

Found in path(s):

```
* /opt/cola/permits/1715453514_1686310426.8819616/0/libalgorithm-diff-perl-1-201-orig-1-tar-gz/Algorithm-Diff-1.201/bin/cdiff.pl
```

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```
=head1 NAME
```

Algorithm::Diff - Compute 'intelligent' differences between two files / lists

```
=head1 SYNOPSIS
```

```
require Algorithm::Diff;
```

```
# This example produces traditional 'diff' output:
```

```
my $diff = Algorithm::Diff->new( \@seq1, \@seq2 );
```

```
$diff->Base( 1 ); # Return line numbers, not indices
```

```
while( $diff->Next() ) {  
    next if $diff->Same();  
    my $sep = "  
    if( !$diff->Items(2) ) {  
        printf "%d,%dd%d\n",  
            $diff->Get(qw( Min1 Max1 Max2 ));  
    } elsif( !$diff->Items(1) ) {  
        printf "%da%d,%d\n",  
            $diff->Get(qw( Max1 Min2 Max2 ));  
    } else {  
        $sep = "---\n";  
        printf "%d,%dc%d,%d\n",  
            $diff->Get(qw( Min1 Max1 Min2 Max2 ));  
    }  
    print "< $_" for $diff->Items(1);  
    print $sep;  
    print "> $_" for $diff->Items(2);  
}
```

```
# Alternate interfaces:
```

```
use Algorithm::Diff qw(  
    LCS LCS_length LCSIdx  
    diff sdiff compact_diff  
    traverse_sequences traverse_balanced );
```

```
@lcs = LCS( \@seq1, \@seq2 );
```

```
$lcsref = LCS( \@seq1, \@seq2 );
```

```
$scount = LCS_length( \@seq1, \@seq2 );
```

```
( $seq1idxref, $seq2idxref ) = LCSidx( \@seq1, \@seq2 );
```

```
# Complicated interfaces:
```

```
@diffs = diff( \@seq1, \@seq2 );
```

```
@sdiffs = sdiff( \@seq1, \@seq2 );
```

```
@cdiffs = compact_diff( \@seq1, \@seq2 );
```

```
traverse_sequences(  
  \@seq1,  
  \@seq2,  
  { MATCH => \&callback1,  
    DISCARD_A => \&callback2,  
    DISCARD_B => \&callback3,  
  },  
  \&key_generator,  
  @extra_args,  
);
```

```
traverse_balanced(  
  \@seq1,  
  \@seq2,  
  { MATCH => \&callback1,  
    DISCARD_A => \&callback2,  
    DISCARD_B => \&callback3,  
    CHANGE => \&callback4,  
  },  
  \&key_generator,  
  @extra_args,  
);
```

=head1 INTRODUCTION

(by
Mark-Jason Dominus)

I once read an article written by the authors of C<diff>; they said that they worked very hard on the algorithm until they found the right one.

I think what they ended up using (and I hope someone will correct me, because I am not very confident about this) was the 'longest common subsequence' method. In the LCS problem, you have two sequences of items:

a b c d f g h j q z

a b c d e f g i j k r x y z

and you want to find the longest sequence of items that is present in both original sequences in the same order. That is, you want to find a new sequence I<S> which can be obtained from the first sequence by deleting some items, and from the second sequence by deleting other items. You also want I<S> to be as long as possible. In this case I<S> is

a b c d f g j z

From there it's only a small step to get diff-like output:

```
e h i k q r x y
+ - + + - + + +
```

This module solves the LCS problem. It also includes a canned function to generate C<diff>-like output.

It might seem from the example above that the LCS of two sequences is always pretty obvious, but that's not always the case, especially when the two sequences have many repeated elements. For example, consider

```
a x b y c z p d q
a b c a x b y c z
```

A naive approach might start by matching up the C<a> and C that appear at the beginning of each sequence, like this:

```
a x b y c      z p d q
a b c a b y c z
```

This finds the common subsequence C<a b c z>. But actually, the LCS is C<a x b y c z>:

```
a x b y c z p d q
a b c a x b y c z
```

or

```
a      x b y c z p d q
a b c a x b y c z
```

=head1 USAGE

(See also the README file and several example scripts include with this module.)

This module now provides an object-oriented interface that uses less memory and is easier to use than most of the previous procedural interfaces. It also still provides several exportable functions. We'll deal with these in ascending order of difficulty: C<LCS>, C<LCS_length>, C<LCSidx>, OO interface, C<prepare>, C<diff>, C<sdiff>, C<traverse_sequences>, and C<traverse_balanced>.

=head2 C<LCS>

Given references to two lists of items, LCS returns an array containing their longest common subsequence. In scalar context, it returns a reference to such a list.

```
@lcs = LCS( \@seq1, \@seq2 );  
$lcsref = LCS( \@seq1, \@seq2 );
```

C<LCS> may be passed an optional third parameter; this is a CODE reference to a key generation function. See L</KEY GENERATION FUNCTIONS>.

```
@lcs = LCS( \@seq1, \@seq2, \&keyGen, @args );  
$lcsref = LCS( \@seq1, \@seq2, \&keyGen, @args );
```

Additional parameters, if any, will be passed to the key generation routine.

=head2 C<LCS_length>

This is just like C<LCS> except it only returns the length of the longest common subsequence. This provides a performance gain of about 9% compared to C<LCS>.

=head2 C<LCSidx>

Like C<LCS> except it returns references to two arrays. The first array contains the indices into @seq1 where the LCS items are located. The second array contains the indices into @seq2 where the LCS items are located.

Therefore, the following three lists will contain the same values:

```
my( $idx1, $idx2 ) = LCSidx( \@seq1, \@seq2 );  
my @list1 = @seq1[ @$idx1 ];
```

```
my @list2 = @seq2[ @$idx2 ];
my @list3 = LCS( \@seq1, \@seq2 );
```

=head2 C<new>

```
$diff = Algorithm::Diff->new( \@seq1, \@seq2 );
$diff = Algorithm::Diff->new( \@seq1, \@seq2, \%opts );
```

C<new> computes the smallest set of additions and deletions necessary to turn the first sequence into the second and compactly records them in the object.

You use the object to iterate over I<hunks>, where each hunk represents a contiguous section of items which should be added, deleted, replaced, or left unchanged.

The following summary of all of the methods looks a lot like Perl code but some of the symbols have different meanings:

```
[ ] Encloses optional arguments
:   Is followed by the default value for an optional argument
|   Separates alternate return results
```

Method summary:

```
$obj    = Algorithm::Diff->new( \@seq1, \@seq2, [ \%opts ] );
$pos    = $obj->Next( [ $count : 1 ] );
$revPos = $obj->Prev( [ $count : 1 ] );
$obj    = $obj->Reset( [ $pos : 0 ] );
$copy   = $obj->Copy( [ $pos, [ $newBase ] ] );
$oldBase = $obj->Base( [ $newBase ] );
```

Note that all of the following methods C<die> if used on an object that is "reset" (not currently pointing at any hunk).

```
$bits    = $obj->Diff( );
@items|s|cnt = $obj->Same( );
@items|s|cnt = $obj->Items( $seqNum );
@idxs|s|cnt = $obj->Range( $seqNum, [ $base ] );
$minIdx  = $obj->Min( $seqNum, [ $base ] );
$maxIdx  = $obj->Max( $seqNum, [ $base ] );
@values  = $obj->Get( @names );
```

Passing in C<undef> for an optional argument is always treated the same as if no argument were passed in.

=over 4

=item

C<Next>

```
$pos = $diff->Next(); # Move forward 1 hunk
$pos = $diff->Next( 2 ); # Move forward 2 hunks
$pos = $diff->Next(-5); # Move backward 5 hunks
```

C<Next> moves the object to point at the next hunk. The object starts out "reset", which means it isn't pointing at any hunk. If the object is reset, then C<Next()> moves to the first hunk.

C<Next> returns a true value iff the move didn't go past the last hunk. So C<Next(0)> will return true iff the object is not reset.

Actually, C<Next> returns the object's new position, which is a number between 1 and the number of hunks (inclusive), or returns a false value.

=item C<Prev>

C<Prev(\$N)> is almost identical to C<Next(-\$N)>; it moves to the \$Nth previous hunk. On a 'reset' object, C<Prev()> [and C<Next(-1)>] move to the last hunk.

The position returned by C<Prev> is relative to the I<end> of the hunks; -1 for the last hunk, -2 for the second-to-last, etc.

=item C<Reset>

```
$diff->Reset(); # Reset the object's
position
$diff->Reset($pos); # Move to the specified hunk
$diff->Reset(1); # Move to the first hunk
$diff->Reset(-1); # Move to the last hunk
```

C<Reset> returns the object, so, for example, you could use C<< \$diff->Reset()->Next(-1) >> to get the number of hunks.

=item C<Copy>

```
$copy = $diff->Copy( $newPos, $newBase );
```

C<Copy> returns a copy of the object. The copy and the original object share most of their data, so making copies takes very little memory. The copy maintains its own position (separate from the original), which is the main purpose of copies. It also maintains its own base.

By default, the copy's position starts out the same as the original

object's position. But C<Copy> takes an optional first argument to set the new position, so the following three snippets are equivalent:

```
$copy = $diff->Copy($pos);
```

```
$copy = $diff->Copy();  
$copy->Reset($pos);
```

```
$copy = $diff->Copy()->Reset($pos);
```

C<Copy> takes an optional second argument to set the base for the copy. If you wish to change the base of the copy but leave the position the same as in the original, here are two equivalent ways:

```
$copy = $diff->Copy();  
$copy->Base( 0 );
```

```
$copy = $diff->Copy(undef,0);
```

Here are two equivalent way to get a "reset" copy:

```
$copy = $diff->Copy(0);
```

```
$copy = $diff->Copy()->Reset();
```

=item C<Diff>

```
$bits = $obj->Diff();
```

C<Diff> returns a true value iff the current hunk contains items that are different between the two sequences. It actually returns one of the follow 4 values:

=over 4

=item Z<>3

C<3==(1|2)>. This hunk contains items from @seq1 and the items from @seq2 that should replace them. Both sequence 1 and 2 contain changed items so both the 1 and 2 bits are set.

=item Z<>2

This hunk only contains items from @seq2 that should be inserted (not items from @seq1). Only sequence 2 contains changed items so only the 2 bit is set.

=item Z<>1

This hunk only contains items from @seq1 that should be deleted (not items from @seq2). Only sequence 1 contains changed items so only the 1 bit is set.

=item Z<>0

This means that the items in this hunk are the same in both sequences. Neither sequence 1 nor 2 contain changed items so neither the 1 nor the 2 bits are set.

=back

=item C<Same>

C<Same> returns a true value iff the current hunk contains items that are the same in both sequences. It actually returns the list of items if they are the same or an empty list if they aren't. In a scalar context, it returns the size of the list.

=item C<Items>

```
$count = $diff->Items(2);  
@items = $diff->Items($seqNum);
```

C<Items> returns the (number of) items from the specified sequence that are part of the current hunk.

If the current hunk contains only insertions, then C<< \$diff->Items(1) >> will return an empty list (0 in a scalar context). If the current hunk contains only deletions, then C<< \$diff->Items(2) >> will return an empty list (0 in a scalar context).

If the hunk contains replacements, then both C<< \$diff->Items(1) >> and C<< \$diff->Items(2) >> will return different, non-empty lists.

Otherwise, the hunk contains identical items and all of the following will return the same lists:

```
@items = $diff->Items(1);  
@items = $diff->Items(2);  
@items = $diff->Same();
```

=item C<Range>

```
$count = $diff->Range( $seqNum );
"indices = $diff->Range( $seqNum );
"indices = $diff->Range( $seqNum, $base );
```

C<Range> is like C<Items> except that it returns a list of I<indices> to the items rather than the items themselves. By default, the index of the first item (in each sequence) is 0 but this can be changed by calling the C<Base> method. So, by default, the following two snippets return the same lists:

```
@list = $diff->Items(2);
@list = @seq2[ $diff->Range(2) ];
```

You can also specify the base to use as the second argument. So the following two snippets I<always> return the same lists:

```
@list = $diff->Items(1);
@list = @seq1[ $diff->Range(1,0)
];
```

=item C<Base>

```
$curBase = $diff->Base();
$oldBase = $diff->Base($newBase);
```

C<Base> sets and/or returns the current base (usually 0 or 1) that is used when you request range information. The base defaults to 0 so that range information is returned as array indices. You can set the base to 1 if you want to report traditional line numbers instead.

=item C<Min>

```
$min1 = $diff->Min(1);
$min = $diff->Min( $seqNum, $base );
```

C<Min> returns the first value that C<Range> would return (given the same arguments) or returns C<undef> if C<Range> would return an empty list.

=item C<Max>

C<Max> returns the last value that C<Range> would return or C<undef>.

=item C<Get>

```
( $n, $x, $r ) = $diff->Get(qw( min1 max1 range1 ));
@values = $diff->Get(qw( 0min2 1max2 range2 same base ));
```

C<Get> returns one or more scalar values. You pass in a list of the names of the values you want returned. Each name must match one of the following regexes:

```
 /^(-?\d+)?(min|max)[12]$/i
 /^(\d+)(range[12]|same|diff|base)$/i
```

The 1 or 2 after a name says which sequence you want the information for (and where allowed, it is required). The optional number before "min" or "max" is the base to use. So the following equalities hold:

```
 $diff->Get('min1') == $diff->Min(1)
 $diff->Get('0min2') == $diff->Min(2,0)
```

Using C<Get> in a scalar context when you've passed in more than one name is a fatal error (C<die> is called).

=back

=head2 C<prepare>

Given a reference to a list of items, C<prepare> returns a reference to a hash which can be used when comparing this sequence to other sequences with C<LCS> or C<LCS_length>.

```
 $prep = prepare( \@seq1 );
 for $i ( 0 .. 10_000 )
 {
   @lcs = LCS( $prep, $seq[$i] );
   # do something useful with @lcs
 }

```

C<prepare> may be passed an optional third parameter; this is a CODE reference to a key generation function. See L<KEY GENERATION FUNCTIONS>.

```
 $prep = prepare( \@seq1, \&keyGen );

 for $i ( 0 .. 10_000 )
 {
   @lcs = LCS( $seq[$i], $prep, \&keyGen );
   # do something useful with @lcs
 }

```

Using C<prepare> provides a performance gain of about 50% when calling LCS many times compared with not preparing.

=head2 C<diff>

```
@diffs = diff(\@seq1, \@seq2);  
$diffs_ref = diff(\@seq1, \@seq2);
```

C<diff> computes the smallest set of additions and deletions necessary to turn the first sequence into the second, and returns a description of these changes. The description is a list of I<hunks>; each hunk represents a contiguous section of items which should be added, deleted, or replaced. (Hunks containing unchanged items are not included.)

The return value of C<diff> is a list of hunks, or, in scalar context, a reference to such a list. If there are no differences, the list will be empty.

Here is an example. Calling C<diff> for the following two sequences:

```
a b c e h j l m n p  
b c d e f j k l m r s t
```

would produce the following list:

```
(  
  [ [ '-', 0, 'a' ] ],  
  
  [ [ '+', 2, 'd' ] ],  
  
  [ [ '-', 4, 'h' ],  
    [ '+', 4, 'f' ] ],  
  
  [ [ '+', 6, 'k' ] ],  
  
  [ [ '-', 8, 'n' ],  
    [ '-', 9, 'p' ],  
    [ '+', 9, 'r' ],  
    [ '+', 10, 's' ],  
    [ '+', 11, 't' ] ],  
)
```

There are five hunks here. The first hunk says that the C<a> at position 0 of the first sequence should be deleted (C<->). The second hunk says that the C<d> at position 2 of the second sequence should be inserted (C<+>). The third hunk says that the C<h> at position 4 of the first sequence should be removed and replaced with the C<f> from position 4 of the second sequence. And so on.

C<diff> may be passed an optional third parameter; this is a CODE

reference to a key generation function. See L</KEY GENERATION FUNCTIONS>.

Additional parameters, if any, will be passed to the key generation routine.

=head2 C<sdiff>

```
@sdiffs = sdiff( \@seq1, \@seq2 );
$sdiffs_ref = sdiff( \@seq1, \@seq2
);
```

C<sdiff> computes all necessary components to show two sequences and their minimized differences side by side, just like the Unix-utility I<sdiff> does:

```
same      same
before |  after
old   <  -
-     >  new
```

It returns a list of array refs, each pointing to an array of display instructions. In scalar context it returns a reference to such a list. If there are no differences, the list will have one entry per item, each indicating that the item was unchanged.

Display instructions consist of three elements: A modifier indicator (C<+>: Element added, C<->: Element removed, C<u>: Element unmodified, C<c>: Element changed) and the value of the old and new elements, to be displayed side-by-side.

An C<sdiff> of the following two sequences:

```
a b c e h j l m n p
b c d e f j k l m r s t
```

results in

```
( [ '-', 'a', " ],
  [ 'u', 'b', 'b' ],
  [ 'u', 'c', 'c' ],
  [ '+', " ", 'd' ],
  [ 'u', 'e', 'e' ],
  [ 'c',
'h', 'f' ],
  [ 'u', 'j', 'j' ],
  [ '+', " ", 'k' ],
  [ 'u', 'l', 'l' ],
```

```

    ['u', 'm', 'm'],
    ['c', 'n', 'r'],
    ['c', 'p', 's'],
    ['+', ", 't'],
)

```

C<sdiff> may be passed an optional third parameter; this is a CODE reference to a key generation function. See L</KEY GENERATION FUNCTIONS>.

Additional parameters, if any, will be passed to the key generation routine.

```
=head2 C<compact_diff>
```

C<compact_diff> is much like C<sdiff> except it returns a much more compact description consisting of just one flat list of indices. An example helps explain the format:

```

my @a = qw( a b c e h j l m n p );
my @b = qw( b c d e f j k l m r s t);
@cdiff = compact_diff( \@a, \@b );
# Returns:
# @a @b @a @b
# start start values values
( 0, 0, # =
  0, 0, # a !
  1, 0, # b c = b c
  3, 2, # ! d
  3, 3, #
e = e
  4, 4, # f ! h
  5, 5, # j = j
  6, 6, # ! k
  6, 7, # l m = l m
  8, 9, # n p ! r s t
  10, 12, #
);

```

The 0th, 2nd, 4th, etc. entries are all indices into @seq1 (@a in the above example) indicating where a hunk begins. The 1st, 3rd, 5th, etc. entries are all indices into @seq2 (@b in the above example) indicating where the same hunk begins.

So each pair of indices (except the last pair) describes where a hunk begins (in each sequence). Since each hunk must end at the item just before the item that starts the next hunk, the next pair of indices can be used to determine where the hunk ends.

So, the first 4 entries (0..3) describe the first hunk. Entries 0 and 1 describe where the first hunk begins (and so are always both 0). Entries 2 and 3 describe where the next hunk begins, so subtracting 1 from each tells us where the first hunk ends. That is, the first hunk contains items C<\${diff[0]}> through C<\${diff[2]} - 1> of the first sequence and contains items C<\${diff[1]}> through C<\${diff[3]} - 1> of the second sequence.

In other words, the first hunk consists of the following two lists of items:

```
# 1st pair   2nd pair
# of indices of indices
@list1 = @a[ ${diff[0]} .. ${diff[2]}-1 ];
@list2 = @b[ ${diff[1]} .. ${diff[3]}-1 ];
# Hunk start Hunk end
```

Note that the hunks will always alternate between those that are part of the LCS (those that contain unchanged items) and those that contain changes. This means that all we need to be told is whether the first hunk is a 'same' or 'diff' hunk and we can determine which of the other hunks contain 'same' items or 'diff' items.

By convention, we always make the first hunk contain unchanged items. So the 1st, 3rd, 5th, etc. hunks (all odd-numbered hunks if you start counting from 1) all contain unchanged items. And the 2nd, 4th, 6th, etc. hunks (all even-numbered hunks if you start counting from 1) all contain changed items.

Since @a and @b don't begin with the same value, the first hunk in our example is empty (otherwise we'd violate the above convention). Note that the first 4 index values in our example are all zero. Plug these values into our previous code block and we get:

```
@hunk1a = @a[ 0 .. 0-1 ];
@hunk1b = @b[ 0 .. 0-1 ];
```

And C<0..-1> returns the empty list.

Move down one pair of indices (2..5) and we get the offset ranges for the second hunk, which contains changed items.

Since C<@diff[2..5]> contains (0,0,1,0) in our example, the second hunk consists of these two lists of items:

```
@hunk2a = @a[ ${diff[2]} .. ${diff[4]}-1 ];
```

```

    @hunk2b = @b[ $cdiff[3] .. $cdiff[5]-1 ];
# or
    @hunk2a = @a[ 0 .. 1-1 ];
    @hunk2b = @b[ 0 .. 0-1 ];
# or
    @hunk2a = @a[ 0 .. 0 ];
    @hunk2b = @b[ 0 .. -1 ];
# or
    @hunk2a = ( 'a' );
    @hunk2b = ( );

```

That is, we would delete item
0 ('a') from @a.

Since $C<@diff[4..7]>$ contains (1,0,3,2) in our example, the third hunk consists of these two lists of items:

```

    @hunk3a = @a[ $cdiff[4] .. $cdiff[6]-1 ];
    @hunk3a = @b[ $cdiff[5] .. $cdiff[7]-1 ];
# or
    @hunk3a = @a[ 1 .. 3-1 ];
    @hunk3a = @b[ 0 .. 2-1 ];
# or
    @hunk3a = @a[ 1 .. 2 ];
    @hunk3a = @b[ 0 .. 1 ];
# or
    @hunk3a = qw( b c );
    @hunk3a = qw( b c );

```

Note that this third hunk contains unchanged items as our convention demands.

You can continue this process until you reach the last two indices, which will always be the number of items in each sequence. This is required so that subtracting one from each will give you the indices to the last items in each sequence.

=head2 C<traverse_sequences>

C<traverse_sequences> used to be the most general facility provided by this module (the new OO interface is more powerful and much easier to use).

Imagine that there are two arrows. Arrow A points to an element of sequence A, and arrow B points to an element of the sequence B. Initially, the arrows point to the first elements of the respective sequences. C<traverse_sequences> will advance the arrows through the sequences one element at a time, calling an appropriate user-specified

callback function before each advance. It will advance the arrows in such a way that if there are equal elements C<\$A[\$i]> and C<\$B[\$j]> which are equal and which are part of the LCS, there will be some moment during the execution of C<traverse_sequences> when arrow A is pointing to C<\$A[\$i]> and arrow B is pointing to C<\$B[\$j]>. When this happens, C<traverse_sequences> will call the C<MATCH> callback function and then it will advance both arrows.

Otherwise, one of the arrows is pointing to an element of its sequence that is not part of the LCS. C<traverse_sequences> will advance that arrow and will call the C<DISCARD_A> or the C<DISCARD_B> callback, depending on which arrow it advanced. If both arrows point to elements that are not part of the LCS, then C<traverse_sequences> will advance one of them and call the appropriate callback, but it is not specified which it will call.

The arguments to C<traverse_sequences> are the two sequences to traverse, and a hash which specifies the callback functions, like this:

```
traverse_sequences(  
  \@seq1, \@seq2,  
  { MATCH => $callback_1,  
    DISCARD_A => $callback_2,  
    DISCARD_B => $callback_3,  
  }  
);
```

Callbacks for MATCH, DISCARD_A, and DISCARD_B are invoked with at least the indices of the two arrows as their arguments. They are not expected to return any values. If a callback is omitted from the table, it is not called.

Callbacks for A_FINISHED and B_FINISHED are invoked with at least the corresponding index in A or B.

If arrow A reaches the end of its sequence, before arrow B does, C<traverse_sequences> will call the C<A_FINISHED> callback when it advances arrow B, if there is such a function; if not it will call C<DISCARD_B> instead. Similarly if arrow B finishes first. C<traverse_sequences> returns when both arrows are at the ends of their respective sequences. It returns true on success and false on failure. At present there is no way to fail.

C<traverse_sequences> may be passed an optional fourth parameter; this is a CODE reference to a key generation function. See L</KEY GENERATION FUNCTIONS>.

Additional parameters, if any, will be passed to the key generation function.

If you want to pass additional parameters to your callbacks, but don't need a custom key generation function, you can get the default by passing undef:

```
traverse_sequences(  
  \@seq1, \@seq2,  
  { MATCH => $callback_1,  
    DISCARD_A => $callback_2,  
    DISCARD_B => $callback_3,  
  },  
  undef, # default key-gen  
  $myArgument1,  
  $myArgument2,  
  $myArgument3,  
);
```

C<traverse_sequences> does not have a useful return value; you are expected to plug in the appropriate behavior with the callback functions.

=head2 C<traverse_balanced>

C<traverse_balanced> is an alternative to C<traverse_sequences>. It uses a different algorithm to iterate through the entries in the computed LCS. Instead of sticking to one side and showing element changes as insertions and deletions only, it will jump back and forth between the two sequences and report I<changes> occurring as deletions on one side followed immediately by an insertion on the other side.

In addition to the C<DISCARD_A>, C<DISCARD_B>, and C<MATCH> callbacks supported by C<traverse_sequences>, C<traverse_balanced> supports a C<CHANGE> callback indicating that one element got C<replaced> by another:

```
traverse_balanced(  
  \@seq1, \@seq2,  
  { MATCH => $callback_1,  
    DISCARD_A => $callback_2,  
    DISCARD_B => $callback_3,  
    CHANGE => $callback_4,  
  }  
);
```

If no C<CHANGE> callback is specified, C<traverse_balanced> will

map C<CHANGE> events to C<DISCARD_A> and C<DISCARD_B> actions, therefore resulting in a similar behaviour as C<traverse_sequences> with different order of events.

C<traverse_balanced> might be a bit slower than C<traverse_sequences>, noticeable only while processing huge amounts of data.

The C<sdiff> function of this module is implemented as call to C<traverse_balanced>.

C<traverse_balanced> does not have a useful return value; you are expected to plug in the appropriate behavior with the callback functions.

=head1 KEY GENERATION FUNCTIONS

Most of the functions accept an optional extra parameter. This is a CODE reference to a key generating (hashing) function that should return a string that uniquely identifies a given element. It should be the case that if two elements are to be considered equal, their keys should be the same (and the other way around). If no key generation function is provided, the key will be the element as a string.

By default, comparisons will use "eq" and elements will be turned into keys using the default stringizing operator "".

Where this is important is when you're comparing something other than strings. If it is the case that you have multiple different objects that should be considered to be equal, you should supply a key generation function. Otherwise, you have to make sure that your arrays contain unique references.

For instance, consider this example:

```
package Person;

sub new
{
    my $package = shift;
    return bless { name => "", ssn => "", @_ }, $package;
}

sub clone
{
    my $old = shift;
    my $new = bless { %$old }, ref($old);
}
```

```
sub hash
{
    return shift()->{'ssn'};
}
```

```
my $person1 = Person->new( name => 'Joe', ssn => '123-45-6789' );
my $person2 = Person->new( name => 'Mary', ssn => '123-47-0000' );
my $person3 = Person->new( name => 'Pete', ssn => '999-45-2222' );
my $person4 = Person->new( name => 'Peggy', ssn => '123-45-9999'
);
my $person5 = Person->new( name => 'Frank', ssn => '000-45-9999' );
```

If you did this:

```
my $array1 = [ $person1, $person2, $person4 ];
my $array2 = [ $person1, $person3, $person4, $person5 ];
Algorithm::Diff::diff( $array1, $array2 );
```

everything would work out OK (each of the objects would be converted into a string like "Person=HASH(0x82425b0)" for comparison).

But if you did this:

```
my $array1 = [ $person1, $person2, $person4 ];
my $array2 = [ $person1, $person3, $person4->clone(), $person5 ];
Algorithm::Diff::diff( $array1, $array2 );
```

`$person4` and `$person4->clone()` (which have the same name and SSN) would be seen as different objects. If you wanted them to be considered equivalent, you would have to pass in a key generation function:

```
my $array1 = [ $person1, $person2, $person4 ];
my $array2 = [ $person1, $person3, $person4->clone(), $person5 ];
Algorithm::Diff::diff( $array1, $array2, \&Person::hash );
```

This would use the 'ssn' field in each `Person` as a comparison key, and so would consider `$person4` and `$person4->clone()` as equal.

You may also pass additional parameters to the key generation function if you wish.

=head1 ERROR CHECKING

If you pass these routines a non-reference and they expect a reference, they will die with a message.

=head1 AUTHOR

This version released by Tye McQueen (<http://perlmonks.org/?node=tye>).

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=head1 MAILING LIST

Mark-Jason still maintains a mailing list. To join a low-volume mailing list for announcements related to diff and Algorithm::Diff, send an empty mail message to mjd-perl-diff-request@plover.com.

=head1 CREDITS

Versions through 0.59 (and much of this documentation) were written by:

Mark-Jason Dominus

This version borrows some documentation and routine names from Mark-Jason's, but Diff.pm's code was completely replaced.

This code was adapted from the Smalltalk code of Mario Wolczko <mario@wolczko.com>, which is available at <ftp://st.cs.uiuc.edu/pub/Smalltalk/MANCHESTER/manchester/4.0/diff.st>

C<sdiff> and C<traverse_balanced> were written by Mike Schilli <m@perlmeister.com>.

The algorithm is that described in I<A Fast Algorithm for Computing Longest Common Subsequences>, CACM, vol.20, no.5, pp.350-353, May 1977, with a few minor improvements to improve the speed.

Much work was done by Ned Konz (perl@bike-nomad.com).

The OO interface and some other changes are by Tye McQueen.

=cut

Found in path(s):

* /opt/cola/permits/1715453514_1686310426.8819616/0/libalgorithm-diff-perl-1-201-orig-1-tar-gz/Algorithm-Diff-1.201/lib/Algorithm/Diff.pm

No license file was found, but licenses were detected in source scan.

```
#!/usr/bin/perl
#
# `Diff' program in Perl
# Copyright 1998 M-J. Dominus. (mjd-perl-diff@plover.com)
#
# This program is free software; you can redistribute it and/or modify it
# under the same terms as Perl itself.
#

use Algorithm::Diff qw(diff);

bag("Usage: $0 oldfile newfile") unless @ARGV == 2;

my ($file1, $file2) = @ARGV;

# -f $file1 or bag("$file1: not a regular file");
# -f $file2 or bag("$file2: not a regular file");

-T $file1 or bag("$file1: binary");
-T $file2 or bag("$file2: binary");

open (F1, $file1) or bag("Couldn't open $file1: $!");
open (F2, $file2) or bag("Couldn't open $file2: $!");
chomp(@f1 = <F1>);
close F1;
chomp(@f2 = <F2>);
close F2;

$diffs = diff(\@f1, \@f2);
exit 0 unless @$diffs;

foreach $chunk (@$diffs) {

    foreach $line (@$chunk) {
        my ($sign, $lineno, $text) = @$line;
        printf "%4d$sign %s\n", $lineno+1, $text;
    }
    print "-----\n";
}

exit 1;

sub bag {
    my $msg = shift;
    $msg .= "\n";
    warn $msg;
    exit 2;
}
```


}

Found in path(s):

* /opt/cola/permits/1715453514_1686310426.8819616/0/libalgorithm-diff-perl-1-201-orig-1-tar-gz/Algorithm-Diff-1.201/bin/diff.pl

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1.411 iso-codes 4.9.0-1

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Version 2.1, February 1999

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```
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```

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```
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```

```
{signature of Ty Coon}, 1 April 1989  
Ty Coon, President of Vice
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1.413 libfile-listing-perl 6.14-1

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```
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```

```
<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
```

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1.414 liblwp-mediatypes-perl 6.04-1

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```

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```

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```

```
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```

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```
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```

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Ty Coon, President of Vice

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1.415 libhtml-form-perl 6.07-1

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<one line to give the program's name and a brief idea of what it does.>  
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```

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```
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program `Gnomovision' (a program to direct compilers to make passes
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```

```
<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
```

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1.416 libencode-locale-perl 1.05-1.1

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Encode-Locale

=====

The purpose of this Perl module is try determine what encodings should be used when interfacing to various external interfaces. You will need perl-5.8 or better to use this module.

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Found in path(s):

* /opt/cola/permits/1718151950_1686572150.3337777/0/libencode-locale-perl-1-05-orig-1-tar-gz/Encode-Locale-1.05/README

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=head1 NAME

Encode::Locale - Determine the locale encoding

=head1 SYNOPSIS

```
use Encode::Locale;
use Encode;
```

```
$string = decode(locale => $bytes);
$bytes = encode(locale => $string);
```

```
if (-t) {
    binmode(STDIN, ":encoding(console_in)");
    binmode(STDOUT, ":encoding(console_out)");
    binmode(STDERR, ":encoding(console_out)");
}
```

```
# Processing file names passed in as arguments
my $uni_filename = decode(locale => $ARGV[0]);
open(my $fh, "<", encode(locale_fs => $uni_filename))
    || die "Can't open '$uni_filename': $!";
binmode($fh, ":encoding(locale)");
...
```

=head1 DESCRIPTION

In many applications it's wise to let Perl use Unicode for the strings it processes. Most of the interfaces Perl has to the outside world are still byte based. Programs therefore need to decode byte strings that enter the program from the outside and encode them again on the way out.

The POSIX locale system

is used to specify both the language conventions requested by the user and the preferred character set to consume and output. The `C<Encode::Locale>` module looks up the charset and encoding (called a CODESET in the locale jargon) and arranges for the `L<Encode>` module to know this encoding under the name "locale". It means bytes obtained from the environment can be converted to Unicode strings by calling `C<<Encode::encode(locale => $bytes) >>` and converted back again with `C<<Encode::decode(locale => $string) >>`.

Where file systems interfaces pass file names in and out of the program we also need care. The trend is for operating systems to use a fixed file encoding that don't actually depend on the locale; and this module determines the most appropriate encoding for file names. The `L<Encode>` module will know this encoding under the name "locale_fs". For traditional Unix systems this will be an alias to the same encoding as "locale".

For programs running in a terminal window (called a "Console" on some systems)

the "locale" encoding is usually a good choice for what to expect as input and output. Some systems allows us to query the encoding set for the terminal and `C<Encode::Locale>` will do that if available and make these encodings known under the `C<Encode>` aliases "console_in" and "console_out". For systems where we can't determine the terminal encoding these will be aliased as the same encoding as "locale". The advice is to use "console_in" for input known to come from the terminal and "console_out" for output to the terminal.

In addition to arranging for various Encode aliases the following functions and variables are provided:

=over

=item `decode_argv()`

=item `decode_argv(Encode::FB_CROAK)`

This will decode the command line arguments to perl (the `C<@ARGV>` array) in-place.

The function will by default replace characters that can't be decoded by `"\x{FFFD}"`, the Unicode replacement character.

Any argument provided is passed as CHECK to underlying Encode::decode() call.

Pass the value C<Encode::FB_CROAK> to have the decoding croak if not all the command line arguments can be decoded. See L<Encode/"Handling Malformed Data"> for details on other options for CHECK.

```
=item env( $uni_key )
```

```
=item env( $uni_key => $uni_value )
```

Interface to get/set environment variables. Returns the current value as a Unicode string. The \$uni_key and \$uni_value arguments are expected to be Unicode strings as well. Passing C<undef> as \$uni_value deletes the environment variable named \$uni_key.

The returned value will have the characters that can't be decoded replaced by "\x{FFFD}", the Unicode replacement character.

There is no interface to request alternative CHECK behavior as for decode_argv(). If you need that you need to call encode/decode yourself. For example:

```
my $key = Encode::encode(locale => $uni_key, Encode::FB_CROAK);
my $uni_value = Encode::decode(locale => $ENV{$key}, Encode::FB_CROAK);
```

```
=item reinit( )
```

```
=item reinit( $encoding
 )
```

Reinitialize the encodings from the locale. You want to call this function if you changed anything in the environment that might influence the locale.

This function will croak if the determined encoding isn't recognized by the Encode module.

With argument force \$ENCODING_... variables to set to the given value.

```
=item $ENCODING_LOCALE
```

The encoding name determined to be suitable for the current locale. L<Encode> know this encoding as "locale".

```
=item $ENCODING_LOCALE_FS
```

The encoding name determined to be suitable for file system interfaces involving file names.

L<Encode> know this encoding as "locale_fs".

=item \$ENCODING_CONSOLE_IN

=item \$ENCODING_CONSOLE_OUT

The encodings to be used for reading and writing output to the a console.
L<Encode> know these encodings as "console_in" and "console_out".

=back

=head1 NOTES

This table summarizes the mapping of the encodings set up
by the C<Encode::Locale> module:

Encode			
Alias	Windows		
Mac OS X		POSIX	
locale	ANSI	nl_langinfo	nl_langinfo
locale_fs	ANSI	UTF-8	nl_langinfo
console_in	OEM	nl_langinfo	nl_langinfo
console_out	OEM	nl_langinfo	nl_langinfo

=head2 Windows

Windows has basically 2 sets of APIs. A wide API (based on passing UTF-16 strings) and a byte based API based a character set called ANSI. The regular Perl interfaces to the OS currently only uses the ANSI APIs. Unfortunately ANSI is not a single character set.

The encoding that corresponds to ANSI varies between different editions of Windows. For many western editions of Windows ANSI corresponds to CP-1252 which is a character set similar to ISO-8859-1. Conceptually the ANSI character set is a similar concept to the POSIX locale CODESET so this module figures out what the ANSI code page is and make this available as \$ENCODING_LOCALE and the "locale" Encoding alias.

Windows systems

also operate with another byte based character set.

It's called the OEM code page. This is the encoding that the Console takes as input and output. It's common for the OEM code page to differ from the ANSI code page.

=head2 Mac OS X

On Mac OS X the file system encoding is always UTF-8 while the locale can otherwise be set up as normal for POSIX systems.

File names on Mac OS X will at the OS-level be converted to NFD-form. A file created by passing a NFC-filename will come in NFD-form from `readdir()`. See `L<Unicode::Normalize>` for details of NFD/NFC.

Actually, Apple does not follow the Unicode NFD standard since not all character ranges are decomposed. The claim is that this avoids problems with round trip conversions from old Mac text encodings. See `L<Encode::UTF8Mac>` for details.

=head2 POSIX (Linux and other Unixes)

File systems might vary in what encoding is to be used for filenames. Since this module has no way to actually figure out what the is correct it goes with the best guess which is to assume filenames are encoding according to the current locale. Users are advised to always specify UTF-8 as the locale charset.

=head1 SEE ALSO

`L<I18N::Langinfo>`, `L<Encode>`, `L<Term::Encoding>`

=head1 AUTHOR

Copyright 2010 Gisle Aas <gisle@aes.no>.

This library is free software; you can redistribute it and/or modify it under the same terms as Perl itself.

=cut

Found in path(s):

* /opt/cola/permits/1718151950_1686572150.3337777/0/libencode-locales-perl-1-05-orig-1-tar-gz/Encode-Locale-1.05/lib/Encode/Locale.pm

No license file was found, but licenses were detected in source scan.

abstract: 'Determine the locale encoding'

author:

- 'Gisle Aas <gisle@activestate.com>'

build_requires:

ExtUtils::MakeMaker: '0'

Test::More: '0'

configure_requires:

ExtUtils::MakeMaker: '0'

dynamic_config: 1

generated_by: 'ExtUtils::MakeMaker version 7.0401, CPAN::Meta::Converter version 2.150001'
license: perl
meta-spec:
url: <http://module-build.sourceforge.net/META-spec-v1.4.html>
version: '1.4'
name: Encode-Locale
no_index:
directory:
- t
- inc
recommends:
I18N::Langinfo: '0'
requires:
Encode: '2'
Encode::Alias: '0'
perl: '5.008'
resources:
repository: <http://github.com/gisle/encode-locale>
version: '1.05'

Found in path(s):

* /opt/cola/permits/1718151950_1686572150.3337777/0/libencode-locale-perl-1-05-orig-1-tar-gz/Encode-Locale-1.05/META.yml

1.417 libwww-robotrules-perl 6.02-1

1.417.1 Available under license :

No license file was found, but licenses were detected in source scan.

license: perl

Found in path(s):

* /opt/cola/permits/1718151910_1686572145.6609106/0/libwww-robotrules-perl-6-02-orig-1-tar-gz/WWW-RobotRules-6.02/META.yml

No license file was found, but licenses were detected in source scan.

```
# Bender: "Well, I don't have anything else  
#     planned for today. Let's get drunk!"
```

=head1 NAME

WWW::RobotRules - database of robots.txt-derived permissions

=head1 SYNOPSIS

```
use WWW::RobotRules;  
my $rules = WWW::RobotRules->new('MOMspider/1.0');
```

```

use LWP::Simple qw(get);

{
  my $url = "http://some.place/robots.txt";
  my $robots_txt = get $url;
  $rules->parse($url, $robots_txt) if defined $robots_txt;
}

{
  my $url = "http://some.other.place/robots.txt";
  my $robots_txt = get $url;
  $rules->parse($url, $robots_txt) if defined $robots_txt;
}

# Now we can check if a URL is valid for those servers
# whose "robots.txt" files we've gotten and parsed:
if($rules->allowed($url)) {
  $c = get $url;
  ...
}

```

=head1 DESCRIPTION

This module parses F</robots.txt> files as specified in "A Standard for Robot Exclusion", at <<http://www.robotstxt.org/wc/norobots.html>> Webmasters can use the F</robots.txt> file to forbid conforming robots from accessing parts of their web site.

The parsed files are kept in a WWW::RobotRules object, and this object provides methods to check if access to a given URL is prohibited. The same WWW::RobotRules object can be used for one or more parsed F</robots.txt> files on any number of hosts.

The following methods are provided:

=over 4

=item \$rules = WWW::RobotRules->new(\$robot_name)

This is the constructor for WWW::RobotRules objects. The first argument given to new() is the name of the robot.

=item \$rules->parse(\$robot_txt_url, \$content, \$fresh_until)

The parse() method takes as arguments the URL that was used to

retrieve the `F</robots.txt>` file, and the contents of the file.

`=item $rules->allowed($uri)`

Returns TRUE if this robot is allowed to retrieve this URL.

`=item $rules->agent([$name])`

Get/set the agent name. NOTE: Changing the agent name will clear the robots.txt rules and expire times out of the cache.

`=back`

`=head1 ROBOTS.TXT`

The format and semantics of the `"/robots.txt"` file are as follows (this is an edited abstract of <http://www.robotstxt.org/wc/norobots.html>):

The file consists of one or more records separated by one or more blank lines. Each record contains lines of the form

`<field-name>: <value>`

The field name is case insensitive. Text after the `#` character on a line is ignored during parsing. This is used for comments. The following `<field-names>` can be used:

`=over 3`

`=item User-Agent`

The value of this field is the name of the robot the record is describing access policy for. If more than one `I<User-Agent>` field is present the record describes an identical access policy for more than one robot. At least one field needs to be present per record. If the value is `'*'`, the record describes the default access policy for any robot that has not matched any of the other records.

The `I<User-Agent>` fields must occur before the `I<Disallow>` fields. If a record contains a `I<User-Agent>` field after a `I<Disallow>` field, that constitutes a malformed record. This parser will assume that a blank line should have been placed before that `I<User-Agent>` field, and will break the record into two. All the fields before the `I<User-Agent>` field will constitute a record, and the `I<User-Agent>` field will be the first field in a new record.

=item Disallow

The value of this field specifies a partial URL that is not to be visited. This can be a full path, or a partial path; any URL that starts with this value will not be retrieved

=back

Unrecognized records are ignored.

=head1 ROBOTS.TXT EXAMPLES

The following example "/robots.txt" file specifies that no robots should visit any URL starting with "/cyberworld/map/" or "/tmp/":

```
User-agent: *
Disallow: /cyberworld/map/ # This is an infinite virtual URL space
Disallow: /tmp/ # these will soon disappear
```

This example "/robots.txt" file specifies that no robots should visit any URL starting with "/cyberworld/map/", except the robot called "cybermapper":

```
User-agent: *
Disallow: /cyberworld/map/ # This is an infinite virtual URL space

# Cybermapper knows where to go.
User-agent: cybermapper
Disallow:
```

This example indicates that no robots should visit this site further:

```
# go away
User-agent: *
Disallow: /
```

This is an example of a malformed robots.txt file.

```
# robots.txt for ancientcastle.example.com
# I've locked myself away.
User-agent: *
Disallow: /

# The castle is your home now, so you can go anywhere you like.
User-agent: Belle
Disallow: /west-wing/ # except the west wing!
# It's good to be the Prince...
```

User-agent: Beast

Disallow:

This file is missing the required blank lines between records.

However, the intention is clear.

=head1 SEE ALSO

L<LWP::RobotUA>, L<WWW::RobotRules::AnyDBM_File>

=head1 COPYRIGHT

Copyright 1995-2009, Gisle Aas

Copyright 1995, Martijn Koster

This library is free software; you can redistribute it and/or
modify it under the same terms
as Perl itself.

Found in path(s):

```
* /opt/cola/permits/1718151910_1686572145.6609106/0/libwww-robotrules-perl-6-02-orig-1-tar-gz/WWW-  
RobotRules-6.02/lib/WWW/RobotRules.pm
```

No license file was found, but licenses were detected in source scan.

NAME

WWW::RobotRules - database of robots.txt-derived permissions

SYNOPSIS

```
use WWW::RobotRules;  
my $rules = WWW::RobotRules->new('MOMspider/1.0');
```

```
use LWP::Simple qw(get);
```

```
{  
    my $url = "http://some.place/robots.txt";  
    my $robots_txt = get $url;  
    $rules->parse($url, $robots_txt) if defined $robots_txt;  
}
```

```
{  
    my $url = "http://some.other.place/robots.txt";  
    my $robots_txt = get $url;  
    $rules->parse($url, $robots_txt) if defined $robots_txt;  
}
```

```
# Now we can check if a URL is valid for those servers
```

```
# whose "robots.txt" files we've gotten and parsed:
```

```
if($rules->allowed($url)) {
```

```
$c = get $url;  
...  
}
```

DESCRIPTION

This module parses /robots.txt files as specified in "A Standard for Robot Exclusion", at <http://www.robotstxt.org/wc/norobots.html>. Webmasters can use the /robots.txt file to forbid conforming robots from accessing parts of their web site.

The parsed files are kept in a WWW::RobotRules object, and this object provides methods to check if access to a given URL is prohibited. The same WWW::RobotRules object can be used for one or more parsed /robots.txt files on any number of hosts.

The following methods are provided:

```
$rules = WWW::RobotRules->new($robot_name)
```

This is the constructor for WWW::RobotRules objects. The first argument given to new() is the name of the robot.

```
$rules->parse($robot_txt_url, $content, $fresh_until)
```

The parse() method takes as arguments the URL that was used to retrieve the /robots.txt file, and the contents of the file.

```
$rules->allowed($uri)
```

Returns TRUE if this robot is allowed to retrieve this URL.

```
$rules->agent([$name])
```

Get/set the agent name. NOTE: Changing the agent name will clear the robots.txt rules and expire times out of the cache.

ROBOTS.TXT

The format and semantics of the "/robots.txt" file are as follows (this is an edited abstract of <http://www.robotstxt.org/wc/norobots.html>):

The file consists of one or more records separated by one or more blank lines. Each record contains lines of the form

```
<field-name>: <value>
```

The field name is case insensitive. Text after the '#' character on a line is ignored during parsing. This is used for comments. The following <field-names> can be used:

User-Agent

The value of this field is the name of the robot the record is

describing access policy for. If more than one *User-Agent* field is present the record describes an identical access policy for more than one robot. At least one field needs to be present per record. If the value is '*', the record describes the default access policy for any robot that has not not matched any of the other records.

The *User-Agent* fields must occur before the *Disallow* fields. If a record contains a *User-Agent* field after a *Disallow* field, that constitutes a malformed record. This parser will assume that a blank line should have been placed before that *User-Agent* field, and will break the record into two. All the fields before the *User-Agent* field will constitute a record, and the *User-Agent* field will be the first field in a new record.

Disallow

The value of this field specifies a partial URL that is not to be visited. This can be a full path, or a partial path; any URL that starts with this value will not be retrieved

Unrecognized records are ignored.

ROBOTS.TXT EXAMPLES

The following example "/robots.txt" file specifies that no robots should visit any URL starting with "/cyberworld/map/" or "/tmp/":

```
User-agent: *
Disallow: /cyberworld/map/ # This is an infinite virtual URL space
Disallow: /tmp/ # these will soon disappear
```

This example "/robots.txt" file specifies that no robots should visit any URL starting with "/cyberworld/map/", except the robot called "cybermapper":

```
User-agent: *
Disallow: /cyberworld/map/ # This is an infinite virtual URL space
```

```
# Cybermapper knows where to go.
```

```
User-agent: cybermapper
Disallow:
```

This example indicates that no robots should visit this site further:

```
# go away
User-agent: *
Disallow: /
```

This is an example of a malformed robots.txt file.


```
# robots.txt for ancientcastle.example.com
# I've locked myself away.
User-agent: *
Disallow: /
# The castle is your home now, so you can go anywhere you like.
User-agent: Belle
Disallow: /west-wing/ # except the west wing!
# It's good to be the Prince...
User-agent: Beast
Disallow:
```

This file is missing the required blank lines between records. However, the intention is clear.

SEE ALSO

LWP::RobotUA,
WWW::RobotRules::AnyDBM_File

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Copyright 1995, Martijn Koster

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Found in path(s):

```
* /opt/cola/permits/1718151910_1686572145.6609106/0/libwww-robotrules-perl-6-02-orig-1-tar-gz/WWW-
RobotRules-6.02/README
```

1.418 libhttp-negotiate-perl 6.01-1

1.418.1 Available under license :

No license file was found, but licenses were detected in source scan.

NAME

HTTP::Negotiate - choose a variant to serve

SYNOPSIS

```
use HTTP::Negotiate qw(choose);
```

```
# ID   QS   Content-Type Encoding Char-Set   Lang Size
$variants =
  [['var1', 1.000, 'text/html', undef, 'iso-8859-1', 'en', 3000],
   ['var2', 0.950, 'text/plain', 'gzip', 'us-ascii', 'no', 400],
   ['var3', 0.3, 'image/gif', undef, undef, undef, 43555],
  ];
```

```
@preferred = choose($variants, $request_headers);  
$the_one = choose($variants);
```

DESCRIPTION

This module provides a complete implementation of the HTTP content negotiation algorithm specified in draft-ietf-http-v11-spec-00.ps chapter 12. Content negotiation allows for the selection of a preferred content representation based upon attributes of the negotiable variants and the value of the various Accept* header fields in the request.

The variants are ordered by preference by calling the function choose().

The first parameter is reference to an array of the variants to choose among. Each element in this array is an array with the values [\$id, \$qs, \$content_type, \$content_encoding, \$charset, \$content_language, \$content_length] whose meanings are described below. The \$content_encoding and \$content_language can be either a single scalar value or an array reference if there are several values.

The second optional parameter is either a HTTP::Headers or a HTTP::Request object which is searched for "Accept*" headers. If this parameter is missing, then the accept specification is initialized from the CGI environment variables HTTP_ACCEPT, HTTP_ACCEPT_CHARSET, HTTP_ACCEPT_ENCODING and HTTP_ACCEPT_LANGUAGE.

In an array context, choose() returns a list of [variant identifier, calculated quality, size] tuples. The values are sorted by quality, highest quality first. If the calculated quality is the same for two variants, then they are sorted by size (smallest first). *E.g.*:

```
(['var1', 1, 2000], ['var2', 0.3, 512], ['var3', 0.3, 1024]);
```

Note that also zero quality variants are included in the return list even if these should never be served to the client.

In a scalar context, it returns the identifier of the variant with the highest score or `undef` if none have non-zero quality.

If the \$HTTP::Negotiate::DEBUG variable is set to TRUE, then a lot of noise is generated on STDOUT during evaluation of choose().

VARIANTS

A variant is described by a list of the following values. If the attribute does not make sense or is unknown for a variant, then use `undef` instead.

identifier

This is a string that you use as the name for the variant. This identifier for the preferred variants returned by choose().

qs This is a number between 0.000 and 1.000 that describes the "source quality". This is what draft-ietf-http-v11-spec-00.ps says about this value:

Source quality is measured by the content provider as representing the amount of degradation from the original source. For example, a picture in JPEG form would have a lower qs when translated to the XBM format, and much lower qs when translated to an ASCII-art representation. Note, however, that this is a function of the source - an original piece of ASCII-art may degrade in quality if it is captured in JPEG form. The qs values should be assigned to each variant by the content provider; if no qs value has been assigned, the default is generally "qs=1".

content-type

This is the media type of the variant. The media type does not include a charset attribute, but might contain other parameters. Examples are:

text/html
text/html;version=2.0
text/plain
image/gif
image/jpg

content-encoding

This is one or more content encodings that has been applied to the variant. The content encoding is generally used as a modifier to the content media type. The most common content encodings are:

gzip
compress

content-charset

This is the character set used when the variant contains text. The charset value should generally be `undef` or one of these:

us-ascii
iso-8859-1 ... iso-8859-9
iso-2022-jp
iso-2022-jp-2
iso-2022-kr

unicode-1-1
unicode-1-1-utf-7
unicode-1-1-utf-8

content-language

This describes one or more languages that are used in the variant. Language is described like this in draft-ietf-http-v11-spec-00.ps: A language is in this context a natural language spoken, written, or otherwise conveyed by human beings for communication of information to other human beings. Computer languages are explicitly excluded.

The language tags are defined by RFC 3066. Examples are:

no Norwegian
en International English
en-US US English
en-cockney

content-length

This is the number of bytes used to represent the content.

ACCEPT HEADERS

The following Accept* headers can be used for describing content preferences in a request (This description is an edited extract from draft-ietf-http-v11-spec-00.ps):

Accept

This header can be used to indicate a list of media ranges which are acceptable as a response to the request. The "*" character is used to group media types into ranges, with "*/*" indicating all media types and "type/*" indicating all subtypes of that type.

The parameter q is used to indicate the quality factor, which represents the user's preference for that range of media types. The parameter mbx gives the maximum acceptable size of the response content. The default values are: q=1 and mbx=infinity. If no Accept header is present, then the client accepts all media types with q=1.

For example:

Accept: audio/*;q=0.2;mbx=200000, audio/basic

would mean: "I prefer audio/basic (of any size), but send me any audio type if it is the best available after an 80% mark-down in quality and its size is less than 200000 bytes"

Accept-Charset

Used to indicate what character sets are acceptable for the response.

The "us-ascii" character set is assumed to be acceptable for all user agents. If no Accept-Charset field is given, the default is that any charset is acceptable. Example:

Accept-Charset: iso-8859-1, unicode-1-1

Accept-Encoding

Restricts the Content-Encoding values which are acceptable in the response. If no Accept-Encoding field is present, the server may assume that the client will accept any content encoding. An empty

Accept-Encoding means that no content encoding is acceptable. Example:

Accept-Encoding: compress, gzip

Accept-Language

This field is similar to Accept, but restricts the set of natural languages that are preferred in a response. Each language may be given an associated quality value which represents an estimate of the user's comprehension of that language. For example:

Accept-Language: no, en-gb;q=0.8, de;q=0.55

would mean: "I prefer Norwegian, but will accept British English (with 80% comprehension) or German (with 55% comprehension).

COPYRIGHT

Copyright 1996,2001 Gisle Aas.

This library is free software; you can redistribute it and/or modify it under the same terms as Perl itself.

AUTHOR

Gisle Aas <gisle@aas.no>

Found in path(s):

* /opt/cola/permits/1718151888_1686572141.8605995/0/libhttp-negotiate-perl-6-01-orig-1-tar-gz/HTTP-Negotiate-6.01/README

No license file was found, but licenses were detected in source scan.

license: perl

Found in path(s):

* /opt/cola/permits/1718151888_1686572141.8605995/0/libhttp-negotiate-perl-6-01-orig-1-tar-gz/HTTP-Negotiate-6.01/META.yml

No license file was found, but licenses were detected in source scan.

=head1 NAME

HTTP::Negotiate - choose a variant to serve

=head1 SYNOPSIS

```
use HTTP::Negotiate qw(choose);
```

```
# ID    QS    Content-Type  Encoding Char-Set    Lang  Size
$variants =
  [['var1', 1.000, 'text/html',  undef, 'iso-8859-1', 'en', 3000],
   ['var2', 0.950, 'text/plain', 'gzip', 'us-ascii',  'no', 400],
   ['var3', 0.3,  'image/gif',  undef,  undef,    undef, 43555],
  ];
```

```
@preferred = choose($variants, $request_headers);
$the_one    = choose($variants);
```

=head1 DESCRIPTION

This module provides a complete implementation of the HTTP content negotiation algorithm specified in F<draft-ietf-http-v11-spec-00.ps> chapter 12. Content negotiation allows for the selection of a preferred content representation based upon attributes of the negotiable variants and the value of the various Accept* header fields in the request.

The variants are ordered by preference by calling the function choose().

The first parameter is reference to an array of the variants to choose among.

Each element in this array is an array with the values [\$id, \$qs, \$content_type, \$content_encoding, \$charset, \$content_language, \$content_length] whose meanings are described below. The \$content_encoding and \$content_language can be either a single scalar value or an array reference if there are several values.

The second optional parameter is either a HTTP::Headers or a HTTP::Request object which is searched for "Accept*" headers. If this parameter is missing, then the accept specification is initialized from the CGI environment variables HTTP_ACCEPT, HTTP_ACCEPT_CHARSET, HTTP_ACCEPT_ENCODING and HTTP_ACCEPT_LANGUAGE.

In an array context, choose() returns a list of [variant identifier, calculated quality, size] tuples. The values are sorted by quality, highest quality first. If the calculated quality is the same

for two variants, then they are sorted by size (smallest first). I<E.g.>:

```
(['var1', 1, 2000], ['var2', 0.3, 512], ['var3', 0.3, 1024]);
```

Note that also zero quality variants are included in the return list even if these should never be served to the client.

In a scalar context, it returns the identifier of the variant with the highest score or C<undef> if none have non-zero quality.

If the \$HTTP::Negotiate::DEBUG variable is set to TRUE, then a lot of noise is generated on STDOUT during evaluation of choose().

=head1 VARIANTS

A variant is described by a list of the following values. If the attribute does not make sense or is unknown for a variant, then use C<undef> instead.

=over 3

=item identifier

This is a string that you use as the name for the variant. This identifier for the preferred variants returned by choose().

=item qs

This is a number between 0.000 and 1.000 that describes the "source quality". This is what F<draft-ietf-http-v11-spec-00.ps> says about this value:

Source quality is measured by the content provider as representing the amount of degradation from the original source. For example, a picture in JPEG form would have a lower qs when translated to the XBM format, and much lower qs when translated to an ASCII-art representation. Note, however, that this is a function of the source - an original piece of ASCII-art may degrade in quality if it is captured in JPEG form. The qs values should be assigned to each variant by the content provider; if no qs value has been assigned, the default is generally "qs=1".

=item content-type

This is the media type of the variant. The media type does not include a charset attribute, but might contain other parameters. Examples are:

text/html
text/html;version=2.0
text/plain
image/gif
image/jpg

=item content-encoding

This is one or more content encodings that has been applied to the variant. The content encoding is generally used as a modifier to the content media type. The most common content encodings are:

gzip
compress

=item content-charset

This
is the character set used when the variant contains text.
The charset value should generally be C<undef> or one of these:

us-ascii
iso-8859-1 ... iso-8859-9
iso-2022-jp
iso-2022-jp-2
iso-2022-kr
unicode-1-1
unicode-1-1-utf-7
unicode-1-1-utf-8

=item content-language

This describes one or more languages that are used in the variant. Language is described like this in F<draft-ietf-http-v11-spec-00.ps>: A language is in this context a natural language spoken, written, or otherwise conveyed by human beings for communication of information to other human beings. Computer languages are explicitly excluded.

The language tags are defined by RFC 3066. Examples are:

no Norwegian
en International English
en-US US English
en-cockney

=item content-length

This is the number of bytes used to represent the content.

=back

=head1 ACCEPT HEADERS

The following Accept* headers can be used for describing content preferences in

a request (This description is an edited extract from F<draft-ietf-http-v11-spec-00.ps>):

=over 3

=item Accept

This header can be used to indicate a list of media ranges which are acceptable as a response to the request. The "*" character is used to group media types into ranges, with "*/*" indicating all media types and "type/*" indicating all subtypes of that type.

The parameter q is used to indicate the quality factor, which represents the user's preference for that range of media types. The parameter mbx gives the maximum acceptable size of the response content. The default values are: q=1 and mbx=infinity. If no Accept header is present, then the client accepts all media types with q=1.

For example:

Accept: audio/*;q=0.2;mbx=200000, audio/basic

would mean: "I prefer audio/basic (of any size), but send me any audio type if it is the best available after an 80% mark-down in quality and its size is less than 200000 bytes"

=item Accept-Charset

Used to indicate what character sets are acceptable for the response.

The "us-ascii" character set is assumed to be acceptable for all user agents. If no Accept-Charset field is given, the default is that any charset is acceptable. Example:

Accept-Charset: iso-8859-1, unicode-1-1

=item Accept-Encoding

Restricts the Content-Encoding values which are acceptable in the response. If no Accept-Encoding field is present, the server may assume that the client will accept any content encoding. An empty Accept-Encoding means that no content encoding is acceptable. Example:

```
Accept-Encoding: compress, gzip
```

```
=item Accept-Language
```

This field is similar to Accept, but restricts the set of natural languages that are preferred in a response. Each language may be given an associated quality value which represents an estimate of the user's comprehension of that language. For example:

```
Accept-Language: no, en-gb;q=0.8, de;q=0.55
```

would mean: "I prefer Norwegian, but will accept British English (with 80% comprehension)
or German (with 55% comprehension).

```
=back
```

```
=head1 COPYRIGHT
```

Copyright 1996,2001 Gisle Aas.

This library is free software; you can redistribute it and/or modify it under the same terms as Perl itself.

```
=head1 AUTHOR
```

Gisle Aas <gisle@aa.no>

```
=cut
```

Found in path(s):

```
* /opt/cola/permits/1718151888_1686572141.8605995/0/libhttp-negotiate-perl-6-01-orig-1-tar-gz/HTTP-Negotiate-6.01/lib/HTTP/Negotiate.pm
```

1.419 libfont-afm-perl 1.20-3

1.419.1 Available under license :

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Found in path(s):

* /opt/cola/permits/1718151904_1686572142.4196196/0/libfont-afm-perl-1-20-orig-1-tar-gz/Font-AFM-1.20/lib/Font/Metrics/CourierBold.pm

* /opt/cola/permits/1718151904_1686572142.4196196/0/libfont-afm-perl-1-20-orig-1-tar-gz/Font-AFM-1.20/lib/Font/Metrics/CourierOblique.pm

* /opt/cola/permits/1718151904_1686572142.4196196/0/libfont-afm-perl-1-20-orig-1-tar-gz/Font-AFM-1.20/lib/Font/Metrics/Courier.pm

* /opt/cola/permits/1718151904_1686572142.4196196/0/libfont-afm-perl-1-20-orig-1-tar-gz/Font-AFM-1.20/lib/Font/Metrics/CourierBoldOblique.pm

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Found in path(s):

* /opt/cola/permits/1718151904_1686572142.4196196/0/libfont-afm-perl-1-20-orig-1-tar-gz/Font-AFM-1.20/lib/Font/Metrics/Helvetica.pm

* /opt/cola/permits/1718151904_1686572142.4196196/0/libfont-afm-perl-1-20-orig-1-tar-gz/Font-AFM-1.20/lib/Font/Metrics/HelveticaOblique.pm

No license file was found, but licenses were detected in source scan.

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Found in path(s):

* /opt/cola/permits/1718151904_1686572142.4196196/0/libfont-afm-perl-1-20-orig-1-tar-gz/Font-AFM-1.20/lib/Font/Metrics/TimesItalic.pm

* /opt/cola/permits/1718151904_1686572142.4196196/0/libfont-afm-perl-1-20-orig-1-tar-gz/Font-AFM-1.20/lib/Font/Metrics/TimesBold.pm

* /opt/cola/permits/1718151904_1686572142.4196196/0/libfont-afm-perl-1-20-orig-1-tar-gz/Font-AFM-1.20/lib/Font/Metrics/TimesBoldItalic.pm

* /opt/cola/permits/1718151904_1686572142.4196196/0/libfont-afm-perl-1-20-orig-1-tar-gz/Font-AFM-1.20/lib/Font/Metrics/TimesRoman.pm

No license file was found, but licenses were detected in source scan.

=head1 NAME

Font::AFM - Interface to Adobe Font Metrics files

=head1 SYNOPSIS

use Font::AFM;

\$h = new Font::AFM "Helvetica";

```
$copyright = $h->Notice;
$w = $h->Wx->{"aring"};
$w = $h->stringwidth("Gisle", 10);
$h->dump; # for debugging
```

=head1 DESCRIPTION

This module implements the `Font::AFM` class. Objects of this class are initialised from an AFM (Adobe Font Metrics) file and allow you to obtain information about the font and the metrics of the various glyphs in the font.

All measurements in AFM files are given in terms of units equal to 1/1000 of the scale factor of the font being used. To compute actual sizes in a document, these amounts should be multiplied by (scale factor of font)/1000.

The following methods are available:

=over 3

=item `$afm = Font::AFM->new($fontname)`

Object constructor. Takes the name of the font as argument.
Croaks if the font can not be found.

=item `$afm->latin1_wx_table()`

Returns

a 256-element array, where each element contains the width of the corresponding character in the iso-8859-1 character set.

=item `$afm->stringwidth($string, [$fontsize])`

Returns the width of the argument string. The string is assumed to be encoded in the iso-8859-1 character set. A second argument can be used to scale the width according to the font size.

=item `$afm->FontName`

The name of the font as presented to the PostScript language `C<findfont>` operator, for instance "Times-Roman".

=item `$afm->FullName`

Unique, human-readable name for an individual font, for instance "Times Roman".

=item `$afm->FamilyName`

Human-readable name for a group of fonts that are stylistic variants of a single design. All fonts that are members of such a group should have exactly the same C<FamilyName>. Example of a family name is "Times".

=item \$afm->Weight

Human-readable name for the weight, or "boldness", attribute of a font. Examples are C<Roman>, C<Bold>, C<Light>.

=item \$afm->ItalicAngle

Angle
in degrees counterclockwise from the vertical of the dominant vertical strokes of the font.

=item \$afm->IsFixedPitch

If C<true>, the font is a fixed-pitch (monospaced) font.

=item \$afm->FontBBox

A string of four numbers giving the lower-left x, lower-left y, upper-right x, and upper-right y of the font bounding box. The font bounding box is the smallest rectangle enclosing the shape that would result if all the characters of the font were placed with their origins coincident, and then painted.

=item \$afm->UnderlinePosition

Recommended distance from the baseline for positioning underline strokes. This number is the y coordinate of the center of the stroke.

=item \$afm->UnderlineThickness

Recommended stroke width for underlining.

=item \$afm->Version

Version number of the font.

=item \$afm->Notice

Trademark or copyright notice, if applicable.

=item \$afm->Comment

Comments found in the AFM file.

=item \$afm->EncodingScheme

The name of the standard encoding scheme for the font. Most Adobe fonts use the C<AdobeStandardEncoding>. Special fonts might state C<FontSpecific>.

=item \$afm->CapHeight

Usually the y-value of the top of the capital H.

=item \$afm->XHeight

Typically the y-value of the top of the lowercase x.

=item \$afm->Ascender

Typically the y-value of the top of the lowercase d.

=item \$afm->Descender

Typically the y-value of the bottom of the lowercase p.

=item \$afm->Wx

Returns a hash table that maps from glyph names to the width of that glyph.

=item \$afm->BBox

Returns a hash table that maps from glyph names to bounding box information. The bounding box consist of four numbers: llx, lly, urx, ury.

=item \$afm->dump

Dumps the content of the Font::AFM object to STDOUT. Might sometimes be useful for debugging.

=back

The AFM specification can be found at:

http://partners.adobe.com/asn/developer/pdfs/tn/5004.AFM_Spec.pdf

=head1 ENVIRONMENT

=over 10

=item METRICS

Contains the path to search for AFM-files. Format is as for the
PATH

environment variable. The default path built into this library is:

/usr/lib/afm:/usr/local/lib/afm:/usr/openwin/lib/fonts/afm/.

=back

=head1 BUGS

Kerning data and composite character data are not yet parsed.

Ligature data is not parsed.

=head1 COPYRIGHT

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it under the same terms as Perl itself.

=cut

Found in path(s):

* /opt/cola/permits/1718151904_1686572142.4196196/0/libfont-afm-perl-1-20-orig-1-tar-gz/Font-AFM-
1.20/AFM.pm

No license file was found, but licenses were detected in source scan.

license: ~

Found in path(s):

* /opt/cola/permits/1718151904_1686572142.4196196/0/libfont-afm-perl-1-20-orig-1-tar-gz/Font-AFM-
1.20/META.yml

No license file was found, but licenses were detected in source scan.

NAME

Font::AFM - Interface to Adobe Font Metrics files

SYNOPSIS

use Font::AFM;

\$h = new Font::AFM "Helvetica";

```
$copyright = $h->Notice;
$w = $h->Wx->{"aring"};
$w = $h->stringwidth("Gisle", 10);
$h->dump; # for debugging
```

DESCRIPTION

This module implements the `Font::AFM` class. Objects of this class are initialised from an AFM-file and allows you to obtain information about the font and the metrics of the various glyphs in the font.

All measurements in AFM files are given in terms of units equal to 1/1000 of the scale factor of the font being used. To compute actual sizes in a document, these amounts should be multiplied by (scale factor of font)/1000.

The following methods are available:

`$fm = Font::AFM->new($fontname)`

Object constructor. Takes the name of the font as argument. It will croak if the font can not be found.

`$fm->latin1_wx_table()`

Returns a 256 element array, where each element contains the width of the corresponding character in the iso-8859-1 character set.

`$fm->stringwidth($string, [$fontsize])`

Returns the width of the string passed as argument. The string is assumed to be encoded in the iso-8859-1 character set. A second argument can be used to scale the width according to the font size.

`$fm->FontName`

The name of the font as presented to the PostScript language `\findfont` operator, for instance "Times-Roman".

`$fm->FullName`

Unique, human-readable name for an individual font, for instance "Times Roman".

`$fm->FamilyName`

Human-readable name for a group of fonts that are stylistic variants of a single design. All fonts that are member of such a group should have exactly the same `\FamilyName`. Example of a family name is "Times".

\$afm->Weight

Human-readable

name for the weight, or "boldness", attribute of a font. Examples are `Roman`, `Bold`, `Light`.

\$afm->ItalicAngle

Angle in degrees counterclockwise from the vertical of the dominant vertical strokes of the font.

\$afm->IsFixedPitch

If the value is `true`, it indicated that the font is a fixed-pitch (monospaced) font.

\$afm->FontBBox

A string of four numbers giving the lower-left x, lower-left y, upper-right x, and upper-right y of the font bounding box. The font bounding box is the smallest rectangle enclosing the shape that would result if all the characters of the font were placed with their origins coincident, and then painted.

\$afm->UnderlinePosition

Recommended distance from the baseline for positioning underline strokes. This number is the y coordinate of the center of the stroke.

\$afm->UnderlineThickness

Recommended stroke width for underlining.

\$afm->Version

Version number of the font.

\$afm->Notice

Trademark or copyright notice, if applicable.

\$afm->Comment

Comments found in the AFM file.

\$afm->EncodingScheme

The name of the standard encoding scheme for the font. Most Adobe fonts use the `AdobeStandardEncoding`. Special fonts might state `FontSpecific`.

\$afm->CapHeight

Usually the y-value of the top of the capital H.

\$afm->XHeight

Typically the y-value of the top of the lowercase x.

\$afm->Ascender

Typically the y-value of the top of the lowercase d.

\$afm->Descender

Typically the y-value of the bottom of the lowercase p.

\$afm->Wx

Returns a hash table that maps from glyph names to the width of that glyph.

\$afm->BBox

Returns a hash table that maps from glyph names to bounding box information. The bounding box consist of 4 numbers: llx, lly, urx, ury.

\$afm->dump

Dumps the content of the Font::AFM object to STDOUT. Might sometimes be useful for debugging.

The AFM specification can be found at:

ftp://ftp.adobe.com/pub/adobe/DeveloperSupport/TechNotes/PSfiles/5004.AFM_Spec.ps

ENVIRONMENT

METRICS Contains the path to search for AFM-files. Format is as for the PATH environment variable. The default path built into this library is:

`/usr/lib/afm:/usr/local/lib/afm:/usr/openwin/lib/fonts/afm/.`

BUGS

Kerning data and composite character data is not yet parsed.
Ligature data is not parsed.

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Found in path(s):

* /opt/cola/permits/1718151904_1686572142.4196196/0/libfont-afm-perl-1-20-orig-1-tar-gz/Font-AFM-1.20/README

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Found in path(s):

* /opt/cola/permits/1718151904_1686572142.4196196/0/libfont-afm-perl-1-20-orig-1-tar-gz/Font-AFM-1.20/lib/Font/Metrics/HelveticaBoldOblique.pm
* /opt/cola/permits/1718151904_1686572142.4196196/0/libfont-afm-perl-1-20-orig-1-tar-gz/Font-AFM-1.20/lib/Font/Metrics/HelveticaBold.pm

1.420 libhttp-date-perl 6.05-1

1.420.1 Available under license :

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END OF TERMS AND CONDITIONS

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If you develop a new program, and you want it to be of the greatest possible use to humanity, the best way to achieve this is to make it free software which everyone can redistribute and change under these terms.

To do so, attach the following notices to the program.

It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

```
<one line to give the program's name and a brief idea of what it does.>  
Copyright (C) 19yy <name of author>
```

This program is free software; you can redistribute it and/or modify it under the terms of the GNU General Public License as published by the Free Software Foundation; either version 1, or (at your option) any later version.

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Also add information on how to contact you by electronic and paper mail.

If the program is interactive, make it output a short notice like this when it starts in an interactive mode:

```
Gnomovision version 69, Copyright (C) 19xx name of author  
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.  
This is free software, and you are welcome to redistribute it  
under certain conditions; type `show c' for details.
```

The hypothetical commands `show w' and `show c' should show the appropriate parts of the General Public License. Of course, the commands you use may be called something other than `show w' and `show c'; they could even be mouse-clicks or menu items--whatever suits your program.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a "copyright disclaimer" for the program, if necessary. Here a sample; alter the names:

```
Yoyodyne, Inc., hereby disclaims  
all copyright interest in the  
program `Gnomovision' (a program to direct compilers to make passes  
at assemblers) written by James Hacker.
```


<signature of Ty Coon>, 1 April 1989

Ty Coon, President of Vice

That's all there is to it!

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The Artistic License

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- d) make other distribution arrangements with the Copyright Holder.

4. You may distribute the programs of this Package in object code or executable form, provided that you do at least ONE of the following:

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1.421 libio-html-perl 1.004-2

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```
<one line to give the program's name and a brief idea of what it does.>  
Copyright (C) 19yy <name of author>
```

```
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the Free Software Foundation; either version 1, or (at your option)  
any later version.
```

```
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```

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```
Gnomovision version 69, Copyright (C) 19xx name of author
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.
```

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```
Yoyodyne,
Inc., hereby disclaims all copyright interest in the
program `Gnomovision' (a program to direct compilers to make passes
at assemblers) written by James Hacker.
```

```
<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
```

That's all there is to it!

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Gocheck - A rich testing framework for Go

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mgo - MongoDB driver for Go

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tomb - support for clean goroutine termination in Go.

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```
{one line to give the program's name and a brief idea of what it does.}
Copyright (C) {year} {name of author}
```

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```
{project} Copyright (C) {year} {fullname}
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This is free software, and you are welcome to redistribute it
```

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```
// -*- Mode: Go; indent-tabs-mode: t -*-
```

```
/*
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 *
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 * it under the terms of the GNU General Public License version 3 as
 * published by the Free Software Foundation.
 *
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 * GNU General Public License for more details.
 *
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 * along with this program. If not, see <http://www.gnu.org/licenses/>.
 */
```

```
package spdx
```

```
// From https://spdx.org/licenses/
// data files: https://github.com/spdx/license-list-data
// Version: 3.11 2020-11-25
//
// jq < json/licenses.json '.licenses | .[] | select(.isOsiApproved == true) | .licenseId' | sort | sed -e 's/$/,/'
// nolint:deadcode,unused
var osi = []string{
    "OSD",
    "AAL",
```

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"AFL-1.2",
"AFL-2.0",
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"AGPL-3.0-only",
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"Artistic-1.0-cl8",
"Artistic-1.0-Perl",
"Artistic-2.0",
"BSD-1-Clause",
"BSD-2-Clause",
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"CATOSL-1.1",
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"Entessa",
"EPL-1.0",
"EPL-2.0",
"EUDatagrid",
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"Fair",
"Frameworx-1.0",
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"GPL-2.0-only",
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"MS-PL",
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"MulanPSL-2.0",
"Multics",
"NASA-1.3",
"Naumen",
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"Nokia",
"NPOSL-3.0",

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"Sleepycat",
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"UCL-1.0",
"Unicode-DFS-2016",
"Unlicense",
"UPL-1.0",
"VSL-1.0",
"W3C",
"Watcom-1.0",
"Xnet",
"Zlib",
"ZPL-2.0",
}

//
using SPDX license data:
// jq < json/licenses.json '.licenses | .[] | .licenseId' | sort | sed -e 's/$/.'/
var allLicenses = []string{
"0BSD",
"AAL",
"Abstyles",
"Adobe-2006",
"Adobe-Glyph",
"ADSL",
"AFL-1.1",

```


"AFL-1.2",
"AFL-2.0",
"AFL-2.1",
"AFL-3.0",
"Afmparse",
"AGPL-1.0",
"AGPL-1.0-only",
"AGPL-1.0-or-later",
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"AGPL-3.0-only",
"AGPL-3.0-or-later",
"Aladdin",
"AMDPLPA",
"AML",
"AMPAS",
"ANTLR-PD",
"ANTLR-PD-fallback",
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"Apache-1.1",
"Apache-2.0",
"APAFML",
"APL-1.0",
"APSL-1.0",
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"Artistic-1.0-Perl",
"Artistic-2.0",
"Bahyph",
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"BSD-2-Clause",
"BSD-2-Clause-FreeBSD",
"BSD-2-Clause-NetBSD",
"BSD-2-Clause-Patent",
"BSD-2-Clause-Views",
"BSD-3-Clause",
"BSD-3-Clause-Attribution",
"BSD-3-Clause-Clear",
"BSD-3-Clause-LBNL",

"BSD-3-Clause-No-Nuclear-License",
"BSD-3-Clause-No-Nuclear-License-2014",
"BSD-3-Clause-No-Nuclear-Warranty",
"BSD-3-Clause-Open-MPI",
"BSD-4-Clause",
"BSD-4-Clause-UC",
"BSD-Protection",
"BSD-Source-Code",
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"BUSL-1.1",
"bzip2-1.0.5",
"bzip2-1.0.6",
"CAL-1.0",
"CAL-1.0-Combined-Work-Exception",
"Caldera",
"CATOSL-1.1",
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"CC-BY-3.0-US",
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"CC-BY-NC-ND-2.5",
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"CC-BY-NC-ND-3.0-IGO",
"CC-BY-NC-ND-4.0",
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"CC-BY-NC-SA-2.5",
"CC-BY-NC-SA-3.0",
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"CC-BY-ND-2.5",
"CC-BY-ND-3.0",
"CC-BY-ND-4.0",
"CC-BY-SA-1.0",
"CC-BY-SA-2.0",
"CC-BY-SA-2.0-UK",

"CC-BY-SA-2.5",
"CC-BY-SA-3.0",
"CC-BY-SA-3.0-AT",
"CC-BY-SA-4.0",
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"CDLA-Permissive-1.0",
"CDLA-Sharing-1.0",
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"CECILL-2.1",
"CECILL-B",
"CECILL-C",
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"CERN-OHL-P-2.0",
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"CERN-OHL-W-2.0",
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"CNRI-Python",
"CNRI-Python-GPL-Compatible",
"Condor-1.1",
"copyleft-next-0.3.0",
"copyleft-next-0.3.1",
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"CPL-1.0",
"CPOL-1.02",
"Crossword",
"CrystalStacker",
"CUA-OPL-1.0",
"Cube",
"curl",
"D-FSL-1.0",
"diffmark",
"DOC",
"Dotseqn",
"DSDP",
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"eGenix",
"Entessa",

"EPICS",
"EPL-1.0",
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"ErIPL-1.1",
"etalab-2.0",
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"EUPL-1.0",
"EUPL-1.1",
"EUPL-1.2",
"Eurosymb",
"Fair",
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"GPL-3.0-with-GCC-exception",
"gSOAP-1.3b",
"HaskellReport",
"Hippocratic-2.1",
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"HTMLTIDY",
"IBM-pibs",
"ICU",
"IJG",
"ImageMagick",
"iMatix",
"Imlib2",
"Info-ZIP",
"Intel",
"Intel-ACPI",
"Interbase-1.0",
"IPA",
"IPL-1.0",
"ISC",
"JasPer-2.0",
"JPNIC",
"JSON",
"LAL-1.2",
"LAL-1.3",
"Latex2e",
"Leptonica",
"LGPL-2.0",
"LGPL-2.0+",
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"LGPL-2.1-or-later",
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"libselinux-1.0",
"libtiff",
"LiLiQ-P-1.1",
"LiLiQ-R-1.1",
"LiLiQ-Rplus-1.1",
"Linux-OpenIB",
"LPL-1.0",
"LPL-1.02",
"LPPL-1.0",
"LPPL-1.1",
"LPPL-1.2",
"LPPL-1.3a",
"LPPL-1.3c",
"MakeIndex",
"MirOS",
"MIT",
"MIT-0",
"MIT-advertising",
"MIT-CMU",
"MIT-enna",
"MIT-feh",
"MITNFA",
"MIT-open-group",
"Motosoto",
"mpich2",
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"MPL-2.0-no-copyleft-exception",
"MS-PL",
"MS-RL",
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"NCGL-UK-2.0",

"NCSA",
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"Net-SNMP",
"Newsletr",
"NGPL",
"NIST-PD",
"NIST-PD-fallback",
"NLOD-1.0",
"NLPL",
"Nokia",
"NOSL",
"Noweb",
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"NPOSL-3.0",
"NRL",
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"Nunit",
"OCCT-PL",
"OCLC-2.0",
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"ODC-By-1.0",
"OFL-1.0",
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"Rdisc",
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"SCEA",
"Sendmail",
"Sendmail-8.23",
"SGI-B-1.0",
"SGI-B-1.1",
"SGI-B-2.0",
"SHL-0.5",
"SHL-0.51",
"SimPL-2.0",
"SISSL",

"SISSL-1.2",
"Sleepycat",
"SMLNJ",
"SMPPL",
"SNIA",
"Spencer-86",
"Spencer-94",
"Spencer-99",
"SPL-1.0",
"SSH-OpenSSH",
"SSH-short",
"SSPL-1.0",
"StandardML-NJ",
"SugarCRM-1.1.3",
"SWL",
"TAPR-OHL-1.0",
"TCL",
"TCP-wrappers",
"TMate",
"TORQUE-1.1",
"TOSL",
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"TU-Berlin-2.0",
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"xpp",
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"YPL-1.0",
"YPL-1.1",

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"Zlib",
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"ZPL-1.1",
"ZPL-2.0",
"ZPL-2.1",

//
FIXME: non SPDX licenses that the snapstore uses
"Proprietary",
}

// from
https://www.google.com/url?q=https://docs.google.com/a/s.sfusd.edu/document/d/1wE_zvLU4c291ACi9wIJmQoE4ltKRW4rzM1TYiivEVOs/edit?pli%3D1%23heading%3Dh.ruv3yl8g6czd&sa=D&ust=1473291615601000&usg=AFQjCNFyLcPLdEarX1TOesGWxg9Afb57mA
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licenseExceptions = []string{
"Autoconf-exception-2.0",
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"Bison-exception-2.2",
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"eCos-exception-2.0",
"Font-exception-2.0",
"GCC-exception-2.0",
"GCC-exception-3.1",
"WxWindows-exception-3.1",
}

```

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1.423 linux-kernel 5.15.0-73.80

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```

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```
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```
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```

```
<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
```

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/* nicstar.c v0.22 Jawaid Bazyar (bazyar@hypermall.com)

* nicstar.c, M. Welsh (matt.welsh@cl.cam.ac.uk)

*

* Hacked October, 1997 by Jawaid Bazyar, Interlink Advertising Services Inc.

* <http://www.hypermall.com/>

* 10/1/97 - commented out CFG_PHYIE bit - we don't care when the PHY

* interrupts us (except possibly for removal/insertion of the cable?)

* 10/4/97 - began heavy inline documentation of the code. Corrected typos

* and spelling mistakes.

* 10/5/97 - added code to handle PHY interrupts, disable PHY on

* loss of link, and correctly re-enable PHY when link is

* re-established. (put back CFG_PHYIE)

*

* Modified to work with the IDT7721 nicstar -- AAL5 (tested) only.

*

* R. D. Rechenmacher <ron@fnal.gov>, Aug. 6, 1997

*

* Linux driver for the IDT77201 NICStAR PCI ATM controller.

* PHY component is expected to be 155 Mbps S/UNI-Lite or IDT 77155;

* see init_nicstar() for PHY initialization to change this. This driver

* expects the Linux ATM stack to support scatter-gather

lists

* (skb->atm.iovcnt != 0) for Rx skb's passed to vcc->push.

*

* Implementing minimal-copy of received data:
* IDT always receives data into a small buffer, then large buffers
* as needed. This means that data must always be copied to create
* the linear buffer needed by most non-ATM protocol stacks (e.g. IP)
* Fix is simple: make large buffers large enough to hold entire
* SDU, and leave <small_buffer_data> bytes empty at the start. Then
* copy small buffer contents to head of large buffer.
* Trick is to avoid fragmenting Linux, due to need for a lot of large
* buffers. This is done by 2 things:
* 1) skb->destructor / skb->atm.recycle_buffer
* combined, allow nicstar_free_rx_skb to be called to
* recycle large data buffers
* 2) skb_clone of received buffers
* See nicstar_free_rx_skb and linearize_buffer for implementation
* details.

*
*
*
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*
* M. Welsh, 6 July 1996

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1.424 secureboot-db 1.8

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```

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1.426 libcrypt-ssleay-perl 0.73.06-1build6

1.426.1 Available under license :

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abstract: 'OpenSSL support for LWP'

author:

- 'A. Sinan Unur <nanis@cpan.org>'
- 'David Landgren'
- 'Joshua Chamas'
- 'Gisle Aas'

build_requires:

ExtUtils::MakeMaker: '0'

Test::More: '0.19'

Try::Tiny: '0.19'

configure_requires:

Devel::CheckLib: '1.09'

ExtUtils::CBuilder: '0.280205'

Getopt::Long: '0'

dynamic_config: 1

generated_by: 'ExtUtils::MakeMaker version 7.24, CPAN::Meta::Converter version 2.150010'

keywords:

- lwp
- lwp-useragent
- openssl
- https

license: artistic_2

meta-spec:

url: <http://module-build.sourceforge.net/META-spec-v1.4.html>

version: '1.4'

name: Crypt-SSLeay

no_index:

directory:

- t
- inc
- inc

requires:

Bytes::Random::Secure: '0.28'

LWP::Protocol::https: '6.02'

MIME::Base64: '0'

```
perl: '5.006'  
resources:  
  repository: https://github.com/nanis/Crypt-SSLeay  
  version: 0.73_06  
x_build:  
  recommends:  
    Devel::CheckLib: '0.99'  
x_serialization_backend:  
  'CPAN::Meta::YAML version 0.018'
```

Found in path(s):

```
* /opt/cola/permits/1722412765_1686900670.6992633/0/libcrypt-ssleay-perl-0-73-06-orig-1-tar-gz/Crypt-SSLeay-0.73_06/META.yml
```

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```
# Crypt::SSLeay - OpenSSL support for LWP
```

```
## Do you need Crypt::SSLeay?
```

Since version 6.02, [LWP](https://metacpan.org/pod/LWP) depends on [LWP::Protocol::https](https://metacpan.org/pod/LWP::Protocol::https) which pulls in [IO::Socket::SSL](https://metacpan.org/pod/IO::Socket::SSL) which is then automatically used by [LWP::UserAgent](https://metacpan.org/pod/LWP::UserAgent) unless you explicitly override it. So, you might no longer need `Crypt::SSLeay`. `IO::Socket::SSL` is preferable anyway because it allows hostname verification which `Crypt::SSLeay` does not support.

At this point, `Crypt::SSLeay` is maintained to support existing software that already depends on it. However, it is possible that your software does not really depend on `Crypt::SSLeay`, only on the ability of `LWP::UserAgent` to communicate with sites over SSL/TLS.

If you have both `Crypt::SSLeay` and `IO::Socket::SSL` installed, and would like to force `LWP::UserAgent` to use `Crypt::SSLeay`, you can use:

```
use Net::HTTPS;  
$Net::HTTPS::SSL_SOCKET_CLASS = 'Net::SSL';  
use LWP::UserAgent;
```

or

```
local $ENV{PERL_NET_HTTPS_SSL_SOCKET_CLASS} = 'Net::SSL';  
use LWP::UserAgent;
```

or

```
use Net::SSL;  
use LWP::UserAgent;
```

```
## OpenSSL Heartbleed Bug
```

``perl Makefile.PL`` will show a warning if the version of OpenSSL against which you are building ``Crypt::SSLeay`` seems vulnerable to the [Heartbleed Bug](https://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2014-0160). See my blog post [Is a strong caution about Heartbleed worth the disruption to distributions with a declared dependency on `Crypt::SSLeay``?](http://blog.nu42.com/2014/04/is-strong-caution-about-heartbleed.html) for the reasoning behind this.

Synopsis

```
use Net::SSL;
use LWP::UserAgent;

my $ua = LWP::UserAgent->new(
    ssl_opts => { verify_hostname => 0 },
);

my $response = $ua->get('https://www.example.com/');
print $response->content,
"\n";
```

Description

This Perl module provides support for the HTTPS protocol under LWP, to allow an ``LWP::UserAgent`` object to perform GET, HEAD and POST requests. Please see [LWP](https://metacpan.org/pod/LWP) for more information on POST requests.

The ``Crypt::SSLeay`` package provides ``Net::SSL``, which is loaded by ``LWP::Protocol::https`` for https requests and provides the necessary SSL glue.

This distribution also makes following deprecated modules available:

```
Crypt::SSLeay::CTX
Crypt::SSLeay::Conn
Crypt::SSLeay::X509
```

Work on `Crypt::SSLeay`` has been continued only to provide https support for the LWP (libwww-perl) libraries.

Environment Variables

The following environment variables change the way ``Crypt::SSLeay`` and ``Net::SSL`` behave.

Specify SSL Socket Class

```
$ENV{PERL_NET_HTTPS_SSL_SOCKET_CLASS}
```

can be used to instruct ``LWP::UserAgent`` to use ``Net::SSL`` for HTTPS support rather than ``IO::Socket::SSL``.

Proxy Support

```
$ENV{HTTPS_PROXY}
= 'http://proxy_hostname_or_ip:port';
```

Proxy Basic Authentication

```
$ENV{HTTPS_PROXY_USERNAME} = 'username';
$ENV{HTTPS_PROXY_PASSWORD} = 'password';
```

SSL Diagnostics and Debugging

```
$ENV{HTTPS_DEBUG} = 1;
```

Default SSL Version

```
$ENV{HTTPS_VERSION} = '3';
```

Client Certificate Support

```
$ENV{HTTPS_CERT_FILE} = 'certs/notacacert.pem';
$ENV{HTTPS_KEY_FILE} = 'certs/notacakeynopass.pem';
```

CA cert peer verification

```
$ENV{HTTPS_CA_FILE} = 'certs/ca-bundle.crt';
$ENV{HTTPS_CA_DIR} = 'certs/';
```

Client PKCS12 cert support

```
$ENV{HTTPS_PKCS12_FILE} = 'certs/pkcs12.pkcs12';
$ENV{HTTPS_PKCS12_PASSWORD} = 'PKCS12_PASSWORD';
```

Installation

OpenSSL

You must have OpenSSL installed before compiling this module. You can get the latest OpenSSL package from [OpenSSL.org](<https://www.openssl.org/source/>). We no longer support pre-2000 versions of OpenSSL.

If you are building OpenSSL from source, please follow the directions included in the source package.

Crypt::SSLeay via Makefile.PL

`Makefile.PL` accepts the following command line arguments:

```
##### incpath
```

Path to OpenSSL headers. Can also be specified via ``$ENV{OPENSSL_INCLUDE}``. If the command line argument is provided, it overrides any value specified via the environment variable. Of course, you can ignore both the command line argument and the environment variable, and just add the path to your compiler specific environment variable such as ``CPATH`` or ``INCLUDE`` etc.

libpath

Path to OpenSSL libraries. Can also be specified via ``$ENV{OPENSSL_LIB}``. If the command line argument is provided, it overrides any value specified by the environment variable. Of course, you can ignore both the command line argument and the environment variable and just add the path to your compiler specific environment variable such as ``LIBRARY_PATH`` or ``LIB`` etc.

live-tests

Use ``--live-tests`` to request tests that try to connect to an external web site, and ``--no-live_tests`` to prevent such tests from running. If you run ``Makefile.PL`` interactively, and this argument is not specified on the command line, you will be prompted for a value.

Default is false.

static

Boolean. Default is false. TODO: How is this even supposed to work?

verbose

Boolean. Default is false. If you pass ``--verbose`` on the command line, both "Devel::CheckLib" and "ExtUtils::CBuilder" instances will be configured to echo what they are doing.

If everything builds OK, but you get failures when during tests, ensure that ``LD_LIBRARY_PATH`` is pointing to the location where the correct shared libraries are located.

Crypt::SSLeay

The latest ``Crypt::SSLeay`` can be found at your nearest CPAN, as well as on [metacpan](<https://metacpan.org/dist/Crypt::SSLeay>).

Once you have downloaded and extracted it, ``Crypt::SSLeay`` installs easily using the standard build process:

```
perl Makefile.PL
make
make test
make install
```

Alternatively, you can use

[cpanm](https://metacpan.org/pod/App::cpanminus):

```
cpanm Crypt::SSLeay
```

If you have OpenSSL headers and libraries in nonstandard locations, you can use

```
$ perl Makefile.PL --incpath=... --libpath=...
```

If you would like to use "cpanm" with such custom locations, you can do

```
$ OPENSSL_INCLUDE=... OPENSSL_LIB=... cpanm Crypt::SSLeay
```

or, on Windows,

```
> set OPENSSL_INCLUDE=...
> set OPENSSL_LIB=...
> cpanm Crypt::SSLeay
```

If you are on Windows, and using a MinGW distribution bundled with ActiveState Perl or Strawberry Perl, you would use `dmake` rather than `make`. If you are using Microsoft's build tools, you would use `nmake`.

For unattended (batch) installations, to be absolutely certain that Makefile.PL does not prompt for questions on STDIN, set the environment variable `PERL_MM_USE_DEFAULT=1` as with any CPAN module built using `ExtUtils::MakeMaker`.

VMS

I do not have any experience with VMS. If OpenSSL headers and libraries are not in standard locations searched by your build system by default, please set things up so that they are. If you have generic instructions on how to do it, please open a ticket on RT with the information so I can add it to this document.

Proxy Support

`LWP::UserAgent` and `Crypt::SSLeay` have their own versions of proxy support. Please read these sections to see which one is appropriate.

`LWP::UserAgent` proxy support

`LWP::UserAgent` has its own methods of proxying which may work for you and is likely to be incompatible with `Crypt::SSLeay` proxy support. To use `LWP::UserAgent` proxy support, try something like:

```
my $ua = LWP::UserAgent->new;
$ua->proxy([qw( https http )], "$proxy_ip:$proxy_port");
```

At the time of this writing, libwww v5.6 seems to proxy https requests fine with an Apache mod_proxy server. It sends a line like:

```
GET https://www.example.com HTTP/1.1
```


to the proxy server, which is not the `CONNECT` request that some proxies would expect, so this may not work with other

proxy servers than `mod_proxy`. The `CONNECT` method is used by `Crypt::SSLey`'s internal proxy support.

`Crypt::SSLey` proxy support

For native `Crypt::SSLey` proxy support of https requests, you need to set the environment variable `HTTPS_PROXY` to your proxy server and port, as in:

```
# proxy support
$ENV{HTTPS_PROXY} = 'http://proxy_hostname_or_ip:port';
$ENV{HTTPS_PROXY} = '127.0.0.1:8080';
```

Use of the `HTTPS_PROXY` environment variable in this way is similar to `LWP::UserAgent->env_proxy()` usage, but calling that method will likely override or break the `Crypt::SSLey` support, so do not mix the two.

Basic authentication credentials to the proxy server can be provided this way:

```
# proxy_basic_auth
$ENV{HTTPS_PROXY_USERNAME} = 'username';
$ENV{HTTPS_PROXY_PASSWORD} = 'password';
```

For an example of LWP scripting with `Crypt::SSLey` native proxy support, please look at the `eg/lwp-ssl-test` script in the `Crypt::SSLey` distribution.

Client Certificate
Support

Client certificates are supported. PEM encoded certificate and private key files may be used like this:

```
$ENV{HTTPS_CERT_FILE} = 'certs/notacacert.pem';
$ENV{HTTPS_KEY_FILE} = 'certs/notacakeynopass.pem';
```

You may test your files with the `eg/net-ssl-test` program, bundled with the distribution, by issuing a command like:

```
perl eg/net-ssl-test -cert=certs/notacacert.pem \
-key=certs/notacakeynopass.pem -d GET $HOST_NAME
```

Additionally, if you would like to tell the client where the CA file is, you may set these.

```
$ENV{HTTPS_CA_FILE} = "some_file";
$ENV{HTTPS_CA_DIR} = "some_dir";
```

Note that, if specified, `$ENV{HTTPS_CA_FILE}` must point to the actual certificate file. That is, `$ENV{HTTPS_CA_DIR}` is *not* the path where `$ENV{HTTPS_CA_FILE}` is located.

For certificates in `$ENV{HTTPS_CA_DIR}` to be picked up, follow the instructions on

http://www.openssl.org/docs/ssl/SSL_CTX_load_verify_locations.html.

There is no sample CA

cert file at this time for testing, but you may configure `eg/net-ssl-test` to use your CA cert with the `-CAfile` option. (TODO: then what is the `./certs` directory in the distribution?)

Creating a test certificate

To create simple test certificates with OpenSSL, you may run the following command:

```
openssl req -config /usr/local/openssl/openssl.cnf \  
-new -days 365 -newkey rsa:1024 -x509 \  
-keyout notacakey.pem -out notacacert.pem
```

To remove the pass phrase from the key file, run:

```
openssl rsa -in notacakey.pem -out notacakeynopass.pem
```

PKCS12 support

The directives for enabling use of PKCS12 certificates is:

```
$ENV{HTTPS_PKCS12_FILE} = 'certs/pkcs12.pkcs12';  
$ENV{HTTPS_PKCS12_PASSWORD} = 'PKCS12_PASSWORD';
```

Use of this type of certificate takes precedence over previous certificate settings described. (TODO: unclear? Meaning "the presence of this type of certificate"?)

SSL versions

`Crypt::SSLLeay` tries very hard to connect to *any* SSL

web server accomodating servers that are buggy, old or simply not standards-compliant. To this effect, this module will try SSL connections in this order:

- * SSL v23 : should allow v2 and v3 servers to pick their best type
- * SSL v3 : best connection type
- * SSL v2 : old connection type

Unfortunately, some servers seem not to handle a reconnect to SSL v3 after a failed connect of SSL v23 is tried, so you may set before using LWP or `Net::SSL`:

```
$ENV{HTTPS_VERSION} = 3;
```

to force a version 3 SSL connection first. At this time, only a version 2 SSL connection will be tried after this, as the connection attempt order remains unchanged by this setting.

Acknowledgements

many thanks to the following individuals who helped improve Crypt-SSLey:

* [_Gisle Aas_](#) for writing this module and many others including libwww, for Perl. The web will never be the same :)

* [_Ben Laurie_](#) deserves kudos for his excellent patches for better error handling, SSL information inspection, and random seeding.

* [_Dongqiang Bai_](#) for host name resolution fix when using a proxy.

* [_Stuart Horner_](#) of Core Communications, Inc. who found the need for building `--shared` OpenSSL libraries.

* [_Pavel Hlavnicka_](#) for a patch for freeing memory when using a pkcs12 file, and for inspiring more robust `read()` behavior.

* [_James Woodyatt_](#) is a champ for finding a ridiculous memory leak that has been the bane of many a `Crypt::SSLey` user.

* [_Bryan Hart_](#) for his patch adding proxy support, and thanks to [_Tobias Manthey_](#) for submitting another approach.

* [_Alex Rhomberg_](#) for Alpha linux ccc patch.

* [_Tobias Manthey_](#) for his patches for client certificate support.

* [_Daisuke Kuroda_](#) for adding PKCS12 certificate support.

* [_Gamid Isayev_](#) for CA cert support and insights into error messaging.

* [_Jeff Long_](#) for working through a tricky CA cert SSLClientVerify issue.

* [_Chip Turner_](#) for a patch to build under perl 5.8.0.

* [_Joshua Chamas_](#) for the time he spent maintaining the module.

*

[_Jeff Lavalley_](#) for help with alarms on read failures (CPAN bug #12444).

* [_Guenter Knauf_](#) for significant improvements in configuring things in Win32 and Netware lands and Jan Dubois for various suggestions for improvements.

and [_many others_](#) who provided bug reports, suggestions, fixes and patches.

If you have reported a bug or provided feedback, and you would like to be mentioned by name in this section, please file request on [\[rt.cpan.org\]](http://rt.cpan.org)(<http://rt.cpan.org/NoAuth/Bugs.html?Dist=Crypt-SSLey>).

TODO: Update acknowledgements list.

See Also

* ``Net::SSL``

If you have downloaded this distribution as of a dependency of another distribution, it's probably due to this module (which is included in this distribution).

* ``Net::SSLeay``

[`Net::SSLeay`](<https://metacpan.org/pod/Net::SSLeay>) provides access to the OpenSSL API directly from Perl.

* [OpenSSL binary packages for Windows](<http://www.openssl.org/related/binaries.html>)

* [IO::Socket::SSL](<https://metacpan.org/pod/IO::Socket::SSL>)

*

[Building OpenSSL on 64-bit Windows 8.1 Pro using SDK tools](<http://blog.nu42.com/2014/04/building-openssl-101g-on-64-bit-windows>).

Support

* For use of ``Crypt::SSLeay`` & ``Net::SSL`` with Perl's LWP, please send email to libwww@perl.org.

* For OpenSSL or general SSL support, including issues associated with building and installing OpenSSL on your system, please email the OpenSSL users mailing list at openssl-users@openssl.org. See <http://www.openssl.org/support/community.html> for other mailing lists and archives.

* Please report all bugs on [rt.cpan.org](<http://rt.cpan.org/NoAuth/Bugs.html?Dist=Crypt-SSLeay>).

Authors

This module was originally written by Gisle Aas, and was subsequently maintained by Joshua Chamas, David Landgren, brian d foy, and A. Sinan Unur.

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License

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Found in path(s):

* /opt/cola/permits/1722412765_1686900670.6992633/0/libcrypt-ssleay-perl-0-73-06-orig-1-tar-gz/Crypt-SSLeay-0.73_06/README.md

No license file was found, but licenses were detected in source scan.

=head1 NAME

Crypt::SSLeay::Version - Obtain OpenSSL version information

=head1 SYNOPSIS

```
use Crypt::SSLeay::Version qw(\
    openssl_built_on
    openssl_cflags
    openssl_dir
    openssl_platform
    openssl_version
    openssl_version_number
);

my $version = openssl_version();

if (openssl_cflags() =~ /DOPENSSL_NO_HEARTBEATS/) {
    print "OpenSSL was compiled without heartbeats\n";
}
```

=head1 SUMMARY

Exposes information provided by L<SSLeay_version|https://www.openssl.org/docs/crypto/SSLeay_version.html>.

=head1 EXPORTS

By default, the module exports nothing. You can ask for each subroutine blow to be exported to your namespace.

=head1 SUBROUTINES

=head2 openssl_built_on

The date of the build process in the form "built on: ..." if available or ``built on: date not available" otherwise.

=head2 openssl_cflags

The compiler flags set for the compilation process
in the form "compiler: ..." if available or "compiler: information not available" otherwise.

=head2 openssl_dir

The C<OPENSSLDIR> setting of the library build in the form "OPENSSLDIR: ..." if available or "OPENSSLDIR:
N/A" otherwise.

=head2 openssl_platform

The "Configure" target of the library build in the form "platform: ..." if available or "platform: information not
available" otherwise.

=head2 openssl_version

The version of the OpenSSL library including the release date.

=head2 openssl_version_number

The value of the C<OPENSSL_VERSION_NUMBER> macro as an unsigned integer. This value is more like a
string as version information is packed into specific nibbles see C<crypto/opensslv.h> in the OpenSSL source and
L<<https://metacpan.org/pod/OpenSSL::Versions|OpenSSL::Versions>> for explanation.

=head1 AUTHOR

A. Sinan Unur C<<< <nanis@cpan.org> >>

=head1 COPYRIGHT

Copyright (C) 2014 A. Sinan Unur.

=head1 LICENSE

This program is free software; you can redistribute it and/or
modify it under the terms of L<Artistic License 2.0|http://www.perlfoundation.org/artistic_license_2_0>.

Found in path(s):

* /opt/cola/permits/1722412765_1686900670.6992633/0/libcrypt-ssleay-perl-0-73-06-orig-1-tar-gz/Crypt-SSLeay-
0.73_06/lib/Crypt/SSLeay/Version.pm

No license file was found, but licenses were detected in source scan.

Revision history for Crypt-SSLeay

=====

0.73_06 2017-04-03 16:16:00 UTC

- Update Travis CI configuration
- Don't rely on '.' being in @INC when loading bundled IO::Interactive::Tiny

- No more problems with Devel::CheckLib on Windows
- Don't depend on Path::Class to configure build

0.73_03 2014-10-27 02:23:17 UTC

- Inherit from IO::Socket::IP if available
- Clean up Net::SSL, SSLeay.xs

0.73_02 2014-10-25 19:56:37 UTC

- Allow SSLv3 to be allowed at runtime depending on the value of an environment variable.
- Don't declare a C variable in the middle of a block

0.73_01 2014-10-25 19:05:10 UTC

- Disable SSLv3 at compile time by default.
- Use Bytes::Random::Secure::random_bytes to enhance entropy instead of trying to read from /dev/random, and using contents of stack area if that failed.
- Use a decent list of ciphers by default.
- General clean up

0.73

2014-10-25 16:15:42 UTC

- RT #98108: Using `caller` to decide whether Makefile.PL should be run means CPANPLUS can't invoke Makefile.PL via `do`. Remove for now. I don't know if I am every going to write tests for Makefile.PL ;-)

- 0.70 failed to build because I was not passing the correct version string to XSLoader::load. Also, some machines out there still have versions of `Getopt::Long` that do not provide `GetOptionsFromArray`. Require minimum 2.36 in Makefile.PL.

- It turns out `Dynaloader::bootstrap` does not take a version argument. Who knew ;-)

0.70 2014-04-24 14:53:43 UTC

- RT #94974: I forgot that `return` just returns from the code block for `catch`, not the subroutine so `filter_libs` was still trying to link against various libraries even when Devel::CheckLib was not installed.

0.68 2014-04-24 14:13:07 UTC

- Previous release did not bump version number in Net::SSL even though there was a minor change. Correct that oversight.

0.66

2014-04-24 14:00:42 UTC

- Various minor fixes to C code
- Various fixes to the distribution such as manifest files, additional tests, bundled module etc
- Address RT bugs #94828 and #79212

0.65_14 2014-04-16 23:55:42 UTC

- REMINDER: make test WILL FAIL if your OpenSSL is vulnerable to Heartbleed.
- Add additional functions exposing information that can be obtained via `SSLeyay_version`.

0.65_13 2014-04-15 22:22:43 UTC

- Work in progress
- Add ability to query OpenSSL version, add test whether OpenSSL library being used is vulnerable to the Heartbleed bug.
- Assorted fixes to `Makefile.PL`, most importantly to fix build problems with Strawberry Perl.

0.65_08 2014-04-10 13:40:08 UTC

- Work in progress
- In `Makefile.PL`, use `assert_lib` to find the libraries against which we can actually link rather than passing a big bowl of libs to `WriteMakefile`. Bail out early if we can't link against any of the candidate libraries.

0.65_07 2014-04-10 12:38:06 UTC

- Work in progress
- Make sure `t/02-live.t` actually uses `Net::SSL`.

0.65_06 2014-04-10 10:35:14 UTC

- Work in progress
- Address RT bugs #88786, #88269, #78848, and #79477
- `Makefile.PL` now respects `live-tests` and `no-live-tests`, and allows library

and header locations to be specified via the command line arguments libpath and incpath, respectively.

- These options can also be specified using the environment variables

```
CRYPT_SSLEAY_LIVE_TEST_WANTED
OPENSSL_LIB
OPENSSL_INC
```

- Also fixed a number of embarrassing logic errors and typos in Makefile.PL which were introduced in previous 0.65_xx versions.

0.65_05 2014-04-04 12:38:21 UTC

- Work in progress

- Reorganize Makefile.PL to allow incpath and libpath command line arguments. This attempts to address RT #88786, #88269, #79477, and #78848. This was supposed to be the next step immediately after drastically specifying Makefile.PL. But never got done.

- Also add encoded version number to openssl-version output.

0.65_04

2014-04-02 18:03:11 UTC

- Work in progress

- Address pull requests from GitHub and bug reports on RT. These address RT issues #83764, #86425, #86819, #62133, #82715, #90803

0.64 2012-08-06 01:23:30

- Drastically simplify Makefile.PL to resolve RT bugs #61249, #61324, #63553, #68208, and #68084.

- Forgot to update Changes for 0.63, so this version overrides that.

0.61_05 2012-08-04 00:40:22 UTC

- Trying to distinguish between good vs bad zero returns from underlying SSL_read/SSL_write broke stuff (see RT bug #78695). Revert to previous behavior.

- Completely re-organize Makefile.PL. I hope these changes will help take care of RT bugs #61324, #61249, #63553, and #68084 etc. This is not necessarily finished, but I want to see what happens on CPAN Testers at

this point before making a few other minor changes.

0.60 2012-07-29 21:43:47 UTC

- Release 0.59_03 as 0.60 so distributions can pick up various fixes. The most important one seems to be bug RT #70565. This should take care of bug RT #77167
- SSL_read and SSL_write now try to handle incomplete reads/writes (see bug RT #64054). The current test suite does is not very comprehensive, so caution is recommended at this point. Also, if you have good test cases, I would love to incorporate them into the distribution.

0.59_03 2012-03-10 00:45:28 UTC

- Bump version number and upload to CPAN.

0.59_02 2012-03-08 16:16:03 UTC

- Forgot to update Changes for 0.59_01. The following is a combined list of the more important fixes incorporated in both.
- Bug RT #64054: Handle incomplete reads/writes better
- Bug RT #73754: Add LWP::Protocol::https to PREREQ_PM
- Bug RT #73755: Crypt-SSLeay does not verify hosts (yet). Don't let that cause a failure during tests.
- Streamline t/02-live.t using Try::Tiny and done_testing
- Plus assorted related small changes.

0.58_01 2010-09-08 19:11:39 UTC

- L<text|scheme:...> is not supported in POD for 5.8.5 and earlier.
- TODOs in POD should stand out
- Add /boot/common/ssl and some other directories to unix_ssl_dirs (see bug #60936).

0.58 2010-08-25 14:06:30 UTC

- Bump version number for Crypt::SSLeay to 0.58 and Net::SSL to 2.85 in preparation for release.
- Fix typo in POD is SSLeay.pm s/PEM0encoded/PEM encoded/ (checked

<http://github.com/gitpan/Crypt-SSLLeay/blob/9a1582ee1e4d132ae7cf9497bb83144786425d73/SSLLeay.pm>)

- Update Changes and TODO. Regenerate README and META.yml. Update package author. Minor POD fixes.

0.57_05 2010-08-15 17:41:21 UTC

- Fix for NO_PROXY support in Net::SSL (bug #57836)
- Bump Net::SSL version number to 2.84_02 after changes
- Fix file/dir permissions (bug #60338)
- Review warnings when compiling SSLLeay.xs against older versions of OpenSSL: Warnings are due to OpenSSL.
- Add clarification regarding \$ENV{HTTPS_CA_FILE} and \$ENV{HTTPS_CA_DIR} to the POD.
- Other POD related changes:
 - * Remove historic information in README about platforms where the package was successfully built.
 - * Reformat acknowledgements. TODO: Add more people.
 - * Fix link to Net-SSLLeay.
 - * Add note about the --live-tests command line option
 - * Generate README from POD.
 - * Formatting fixes.
 - * Update copyright notice.

0.57_04 2010-08-11 00:22:33 UTC

- Reorganize Makefile.PL to break individual steps in to subroutines so as to facilitate localized future modifications. Whether there was any point to this remains to be seen.
- In Makefile.PL, accommodate ActiveState+MingW configuration.
- Pick the correct lib location for Strawberry Perl (bug #60230).
- Apply fixes in bug reports #59312 and #33954 to Net/SSL.pm.
- Bump version number in Net/SSL.pm to indicate development release.

0.57_03 2010-08-09 20:12:30 UTC

- If the last component of \$inc_dir is 'openssl', set \$inc_dir to its parent and set \$prefix to 'openssl'. Otherwise, leave \$inc_dir as is and set \$prefix to " (I hope this fixes bugs #28431, #28680, #32084, #43084, #54103 without breaking anything).
-
- Improved OpenSSL detection on Win32/Strawberry Perl (bug #49285).
- Add MIME::Base64 as a prerequisite as Net::SSL needs it.
- exit 0 if OpenSSL can't be found to avoid superfluous reports from CPAN Testers.
- Add \ to \$opt_bench in eg/net-ssl-test (bugs #30931, #39363).

0.57_02 2010-08-08 18:27:40 UTC

- Refactor the version detection algorithm in Makefile.PL to handle all known variations of version number encoding. Should fix bug #52408.

0.57_01 2008-02-18 14:42:32 UTC

- use #include <.> rather than #include "..." in crypt_ssleay_version.h.
- add command-line switch to avoid live tests (bug #30268).
- skip tests in t/01-connect.t if 443 is already in use (bug #30985).
- make code gcc -Wwrite-strings compatible (bug #31926).

0.57 2007-09-17 20:45:20 UTC

- Honour both \$ENV{NO_PROXY} and \$ENV{no_proxy} in Net::SSL::proxy_connect_helper. (Bug #29371 reported by Jan Dubois).
- \$@ construction used in Net::SSL::connect was messed up, which could lead to sub-optimal error reporting. (Bug #29372 reported by Jan Dubois).
- Ensure no proxification is used in t/01-connect.t (which might be the reason for all the spurious smoke failures). Bug #29373 reported by, you guessed it, Jan Dubois).
- Silence a dubious fopen() warning in SSLeay.xs.
- s/Netware/NetWare/ in Net/SSL.pm platform check
- Improvements to Makefile.PL for dealing with platforms where openssl is installed with ./include and ./lib as sibling directories rather than child directories. This should allow the code to configure and build "out of the box" on Solaris (and probably other proprietary platforms).
- Don't carp in LICENSE key addition code in Makefile.PL

0.56_01 2007-08-09 21:59:47 UTC

- Various improvements to the Win32 configure code in Makefile.PL, based on CPAN tickets #28431 and #28432, by Guenter Knauf, notably to allow static linking and OpenSSL living in a relative directory.
- Net::SSL: alarm() is not implemented on Netware platform, so don't try to set one there. (Guenter Knauf).
- Should build on Solaris correctly (bug fix in include dir specification). Based on fix suggested in CPAN bug #28680.

0.56 2007-07-10 19:08:20 UTC

- Purely a documentation issue raised by CPAN bug #27935. Users of previous versions do not need to upgrade.

0.55 2007-06-01 17:34:22 UTC

- Added a blocking() method to Net::SSL (and bumped version to 2.81).

0.54 2007-04-12 22:05:26 UTC

- Rebadged 0.53_05, since no bugs appear to have surfaced.

0.53_05

- Fixed up incorrect LIBS key in WriteMakefile args. Thanks to David Cantrell for giving me access to an OpenBSD box that revealed this problem.
- Added the list of modules that depend on Crypt::SSLeay to the README, as per cpanants.perl.org. (think: improvements to the test suite).

0.53_04 2007-03-06 09:39:01 UTC

- add diag() info to determine possible reasons for failure as per <http://www.nntp.perl.org/group/perl.cpan.testers/2007/03/msg428964.html>
- Tweaks for Strawberry Perl detection.

0.53_03

2007-03-04 18:30:06 UTC

- Adjusted the typemap shims to silence the compiler warnings that occur when sizeof(IV) is larger than sizeof(char *).
- use XSLoader for faster loading if available, otherwise fall back to DynaLoader.
- Makefile.PL heavily reworked, lots of cruft removed.
- Ask to see whether the live tests should be run.
- renamed net_sst.t to 01-connect.t
- added 02-live.t that performs live HTTPS requests.

0.53_02 2007-01-29 10:02:34 UTC

- don't proxy hosts in NO_PROXY environment variable (CPAN bug #11078).
- don't send user agent string to proxy unless send_useragent_to_proxy is enabled. (CPAN bug #4759).
- Net::SSL bumped to 2.80

0.53_01 2007-01-24 22:21:09 UTC

- patch for CPAN #12444 applied (Jeff Lavalley). Net::SSL bumped

tp 2.79.

- example scripts moved into eg/ directory and the documentation updated.
- added a TODO to remind me of what needs to be done.

0.53 2006-12-26 17:21:22 UTC

- 0.52_02 deemed stable

0.52_02 2006-12-20 19:29:01

UTC

- improved VMS support (CPAN bug #19829).
- add a test to see if cert file is readable in Net::SSL::configure_certs (CPAN bug #8498) and Net::SSL version to 2.78.
- known working platforms list removed from documentation. Too old, and CPAN Testers has the up-to-date information.
- minor documentation improvements.

0.52_01 2006-12-17

- add call to SSL_library_init() in new()
- maintenance taken over by brian d foy and David Landgren.

```
$MODULE=Crypt::SSLeay; $VERSION = .51; $DATE="2003-06-10";
```

- fixed build problem for OpenSSL 0.9.6 and some builds of perl 5.8.x which resulted in make error:

```
/usr/include/openssl/des.h:193: parse error before '&' token"
```

Thanks to Rob Brown for submitting a similar patch to cover this problem

- bug fix from Dongqiang Bai when server using proxy cannot resolve host name being connected to

+ Added documentation for updating system OpenSSL libraries for systems such as RedHat that have shared libraries built
Work sponsored
by Stuart Horner of Core Communications, Inc.

```
$MODULE=Crypt::SSLeay; $VERSION = .49; $DATE="2003-01-30";
```

+ Documentation updates, including new support address for LWP issues, and \$ENV{HTTPS_DEBUG} flag.

+ Added c:/openssl in default search path on win32 machines

which is the recommended installation area in the openssl dist

+ Added patch from Pavel Hlavnicka for freeing memory leaks from `SSL_CTX_use_pkcs12_file()` whose functionality is triggered by the `$ENV{HTTPS_PKCS12_*}` settings

+ Set timeout to 15 seconds for `./net_ssl_test` and `lwp-ssl-test` sample scripts for better testing of timeout behavior

+ Added `alarm()` during `Net::SSL->read()` to honor socket timeout setting for more robust applications. `read()` will `die_with_error()` which is consistent with previous semantics used during SSL `read()` failure
Thanks to Pavel Hlavnicka for prompting this change.

+ Removed code that supported versions of SSLeay before version 0.8
I believe SSLeay v.8 was released back in 1998

+ Added patch from Devin Heitmueller so that initial random seed would be taken from `/dev/urandom` if available via `RAND_load_file` API

`$MODULE=Crypt::SSLeay; $VERSION = .45; $DATE="2002-08-01";`

+ PKCS12 certificate support, patch submitted by Beni Takahashi, author of patch Daisuke Kuroda

+ Fixing compile warnings on Solaris 8/Sparc with Forte 7.0 about implicit conversions and implicit declarations. Thanks to Marek Rouchal for bug report.

`$MODULE=Crypt::SSLeay; $VERSION = .43; $DATE="2002-07-29";`

- Removed unused dependency on `URI::URL`, thanks to Ric Steinberger for pointing out this problem under perl 5.8.0

`$MODULE=Crypt::SSLeay; $VERSION = .41; $DATE="2002-07-07";`

- fixed `t/net_ssl.t` to work on Windows NT

`$MODULE=Crypt::SSLeay; $VERSION = .40; $DATE="2002-07-03";`

+ = improvement; - = bug fix

- fixed `Makefile.PL` use of `dirname()` which could error for perl 5.8.x
Thanks to Chip Turner of RedHat for patch.

`$MODULE=Crypt::SSLeay; $VERSION = .39; $DATE="2002-06-23";`

-

Fixed a runtime error with Net::SSL->proxy for running under perl warnings with no proxy defined, which t/net_ssl.t test case revealed.

+ Added t/net_ssl.t test for initializing a Net::SSL object

+ Added build platform success note for (thanks Christopher!)

Solaris 2.8 Sparc ? 5.00503 .37 2002-05-31 Christopher Biow

+ Added build auto-detect for 0.9.6+ and only then use OPENSSL_free instead of free() since older OpenSSL like 0.9.4 did not have it.

+ Added ./net_ssl_test -CAfile documentation, and root CA file from mod_ssl distribution at certs/ca-bundle.crt that can be used for general root CA peer certificate verification.

+ Added build notes for

SunOS 4.1.4, Perl 5.004_04 - ld.so: Undefined symbol: _CRYPT_mem_ctrl

from Jeff Haferman.

+ When Net::SSL->connect() being called from LWP::UserAgent in proxy mode, will connect to the proxy passing the \$ua->agent string as

```
CONNECT $peer_addr:$peer_port HTTP/1.0
User-Agent: $ua->agent
```

+

Integrated Richard Chen's patches for exposing the Net::SSL certificate dates via an API:

```
Crypt::SSLeay::X509::not_before
Crypt::SSLeay::X509::not_after
```

which can be gotten to by a call like...

```
Net::SSL->new(...)->get_peer_certificate->not_after;
```

These methods return a normal timestamp like: 2002-05-22 11:15:17 GMT
There is an example of its use in the ./net_ssl_test script.

The Crypt::SSLeay::* modules will continue to remain undocumented because such functionality lies outside the scope of what this module is geared for. Net::SSLeay provides a more general API for OpenSSL functionality.

\$MODULE=Crypt::SSLeay; \$VERSION = .37; \$DATE="2002-01-08";

+ = improvement; - = bug fix

- use OPENSSL_free() instead of free() to fix crashes with win32 perl 5.6.1
Thanks to Doug MacEachern for patch.

+ added Makefile.PL Candidate() path for win32 builds of OpenSSL
Thanks to David Morse for patch.

\$MODULE=Crypt::SSLeay; \$VERSION = .36; \$DATE="2001-12-05";

-

perl Makefile.PL C:/some_path should be picked up now ...
was doing case insensitive drive letter check before

\$MODULE=Crypt::SSLeay; \$VERSION = .35; \$DATE="2001-10-31";

+ Set local \$SIG{PIPE} = \&die before \$ssl->connect()
to capture the "broken pipe" error associated with connecting
to a computer that is not running a SSL web server,
when Crypt::SSLeay is built with OpenSSL 0.9.6a. This error did
not occur with OpenSSL 0.9.4 or OpenSSL 0.9.5a, but this fix should
be compatible with those versions too.

\$MODULE=Crypt::SSLeay; \$VERSION = .33; \$DATE="2001-10-31";

+ Documented differences / conflicts between LWP proxy support
and Crypt::SSLeay which seems to be a source of confusion for users.

+ Added Net::SSL::get_peer_verify call so the warning header
from LWP that says:

Client-SSL-Warning: Peer certificate not verified

can be suppressed when HTTPS_CA_FILE & HTTPS_CA_DIR environment
variables are set to invoke peer certificate verification.

I

will submit patch for perl-libwww 5.6 for this support
of get_peer_verify shortly.

Modified return values of \$ctx->set_verify() to return 1 when
peer verification is enabled to support get_peer_verify()

\$MODULE=Crypt::SSLeay; \$VERSION = .31; \$DATE="2001-09-21";

+ \$ENV{HTTPS_DEBUG} activates Crypt::SSLeay specific debugging,

so one can debug from LWP:: calls without using ./net_ssl_test script

+ \$ENV{CRYPT_SSLEAY_DEFAULT} may now be set to trigger --default functionality for Makefile.PL

+ Added --default switch to Makefile.PL which will pick up the first OpenSSL distribution detected and use that for building Crypt::SSLeay. Inspired by Doug MacEachern

- removed exit from Makefile.PL, bug found by Doug MacEachern

\$MODULE=Crypt::SSLeay; \$VERSION = .29; \$DATE="2001-06-29";

+ Streamlined *CA* patches so only in \$CTX->set_verify() which gets called every time now.

+ Throw error instead of return undef in Net::SSL->connect() because we loose the errors otherwise. Applications working with Net::SSL will have to trap calls around Net::SSL->connect with eval {}. There are so many kinds of errors now, especially with certificate support that we really need to throw specific error messages, and not let them get lost in \$!.

- Turn SSL_MODE_AUTO_RETRY on so clients can survive changes in SSLVerifyClient changes in the modssl connection

Comment from source:

```
/* The set mode is necessary so the SSL connection can
 * survive a renegotiated cipher that results from
 * modssl VerifyClient config changing between
 * VirtualHost & some other config block. At modssl
 * this would be a [trace] ssl message:
 * "Changed client verification type will force renegotiation"
#ifdef SSL_MODE_AUTO_RETRY
    SSL_set_mode(ssl, SSL_MODE_AUTO_RETRY);
#endif
```

Seems like openssl 0.9.4 didn't need this but 0.9.6 does, not sure though.

+ Integrated patches from Gamid Isayev for CA peer verification. New settings include:

```
$ENV{HTTPS_CA_FILE} = "some_file";
$ENV{HTTPS_CA_DIR} = "some_dir";
```

Also create config switches for these in ./net_ssl_test,

-CAfile and -CAdir

```
$MODULE=Crypt::SSLLeay; $VERSION = .27; $DATE="TBA";
```

- Client certs weren't working correctly, setup certs earlier in connection now, also create new CTX per request, so cert settings don't remain sticky from one request to the next.

```
$MODULE=Crypt::SSLLeay; $VERSION = .25; $DATE="2001-04-10";
```

+ update ./net_ssl_test to do smart parsing of host, where host can now be of the form http://www.nodeworks.com:443/

+ integrated client cert patches provided by Tobias Manthey, creating new config options:

```
$ENV{HTTPS_CERT_FILE} -- file of client certificate  
$ENV{HTTPS_KEY_FILE} -- file of private key file
```

Also support for these options in ./net_ssl_test with these options:

```
-cert client certificate file  
-key private key file
```

like so:

```
./net_ssl_test -cert=notacacert.pem -key=notacakeynopass.pem -d
```

To create simple test cert with openssl:

```
/usr/local/openssl/bin/openssl req -config /usr/local/openssl/openssl.cnf -new -days 365 -newkey rsa:1024 -x509 -  
keyout notacakey.pem -out notacacert.pem  
/usr/local/openssl/bin/openssl rsa -in notacakey.pem -out notacakeynopass.pem
```

```
$MODULE=Crypt::SSLLeay; $VERSION = .24; $DATE="2001-03-09";
```

+ = improvement; - = bug fix

- local \$@ in Net::SSL::DESTROY so we don't kill real errors

```
$MODULE=Crypt::SSLLeay; $VERSION = .23; $DATE="2001-03-09";
```

+ added lwp-ssl-test file for showing LWP code use

+ added -h/-help options & docs to ./net_ssl_test script

+ updated alpha linux patch from Alex Rhomberg to what he originally provided, as it covered -lots case better.

- return undef in Net::SSL::connect() instead of die() for better LWP support & error handling. Still set \$@ though, consistent with IO::Socket::INET

+ alarm() on Unix platforms around ssl ctx connect, which can hang for process for way too long when trying to connect to dead https SSL servers.

\$MODULE=Crypt::SSLey; \$VERSION = .22; \$DATE="2001-01-29";

- remove // style comments

\$MODULE=Crypt::SSLey; \$VERSION = .21; \$DATE="2001-01-10";

- AIX build notes correction

+ No reverse lookup for host done for proxying, more efficient. Reuse of cached PeerAddr name from Net::SSL->new

+ \$ENV{HTTPS_VERSION} setting, so a SSL v3 connection can be used first, instead of SSLv23. Documented in README.pod. Added support for this to the test program as:

```
./net_ssl_test -v[ersion] 3
```

\$MODULE=Crypt::SSLey; \$VERSION = .19; \$DATE="2001-01-07";

+ Added runtime SSL debugging support, was compile time before. Trigger with Net::SSL->new(..., SSL_Debug => 1) as in the ./net_ssl_test script run with -d argument. No API for debugging from LWP requests, just for https debugging with ./net_ssl_test really.

+ Added support for proxy via \$ENV{HTTPS_PROXY} = proxy_host:proxy_port. Thanks to Bryan Hart for the patch. Also basic auth support added & documented.

+ alpha linux ccc support with -lots library added for compile. Patch from Alex Rhomberg.

\$MODULE=Crypt::SSLey; \$VERSION = .18; \$DATE="2000-11-25";

- created perl/c destructors for the X509 cert for after its

fetches by Net::SSL. Crypt::SSLeay seems to run without memory leaks now under LWP and Net::SSL.

- Updated Net::SSL::VERSION, bad version last release.

```
$MODULE=Crypt::SSLeay; $VERSION = .17; $DATE="2000-09-04";
```

- got rid of an implicit char* conversion compile warnings for SSL_get_cipher

+ random seeding now occurs with RAND_seed() on random data from the C call stack, works more consistently than RAND_load_file from Ben's patch.

+ integrated patches from Ben Laurie for better error messaging and random seed initialization

+ set_cipher_list initialized from \$ENV{CRYPT_SSLEAY_CIPHER} where before it was initialized from \$ENV{SSL_CIPHER}, patch from Ben Laurie, so ENV setting not conflict with Apache-SSL

+ tested POST LWP requests and updated documentation indicating that such use is supported

+ net_ssl_test now checks https://www.nodeworks.com by default which has high uptime so should be fine.

+ first argument to perl Makefile.pl must be an absolute path for it to be used as default OpenSSL build path

+ define PL_sv_undef symbols for older perls that don't support it, alias to sv_undef

```
$MODULE=Crypt::SSLeay; $VERSION = .16; $DATE="2000-02-25";
```

- changes sv_undef calls to PL_sv_undef, since sv_undef is no longer supported under the latest dev releases of perl 5.0056

```
$MODULE=Crypt::SSLeay; $VERSION = .15; $DATE="1999-11-23";
```

+ reordered header includes for ActiveState people, likely for easier compiling with perl object.

+ Added support for cranky SSLv3 sites. These are sites that don't acknowledge SSLv23 requests, such as:

<https://www.evergreen-funds.com>

<https://ecomm.sella.it>

So now, the module will try connects to SSL servers in this order: SSLv23, SSLv3, SSLv2

None of the sites that I tested required only SSLv2 connects, but it is there just in case.

+ using the call `SSLeay_add_all_algorithms()`; instead of `SSLeay_add_ssl_algorithms()`, because the latter symbol was not defined on one person's installation.

`$MODULE=Crypt::SSLeay; $VERSION = .14; $DATE="1999-10-03";`

+ = improvement; - = bug fix

+ added support for RSAref tweaked OpenSSL

`$MODULE=Crypt::SSLeay; $VERSION = .12; $DATE="1999-09-13";`

+ Converted `//` style comments to `/* */` for build support of Sun's native `cc`

`$MODULE=Crypt::SSLeay; $VERSION = .11; $DATE="1999-08-16";`

+ New connection strategy suggested by OpenSSL list, first try connecting with SSLv23. This negotiates the more secure SSL3 first, and then downgrades to SSLv2 if first unsuccessful. For buggy servers that can't handle the SSLv23 negotiation, `Net::SSL` then tries a raw SSLv2 connection.

This method works for all servers tested, and has the advantage of transmitting data via the most secure SSL3 method if available.

+ Connects to buggy SSLv2 sites as well as SSLv3 sites & normal SSLv2 sites.

Buggy SSLv2: <https://banking.wellsfargo.com>

SSLv3: <https://www.accountonline.com/CB/MainMenu.idcl>

SSLv2: <https://www.nodeworks.com>

`$MODULE=Crypt::SSLeay; $VERSION = .11; $DATE="1999-08-10";`

+ Worked through `__umoddi3 undef` symbol error for building on Solaris x86. See README build notes.

- + I try to provide backwards compatible building with SSLeay (< v.0.9.2)
- + Will pick up ssl distributions installed at /usr/local/openssl, and /usr/local/ssl ... openssl headers should be at \$SSL_DIR/include/openssl for compilation to work, see README for installation hints.
- Added SSL 3.0 support with SSLv3_client_method() This method will autonegotiate SSL2 or SSL3, and works for web sites that require SSL3
- + Added build support in Makefile.PL for WinNT, MS Visual C++
- + Added support for OpenSSL v.0.9.4

1998-10-13 Gisle Aas <aas@sn.no>

Release 0.07

Applied

patch from Andreas Gustafsson <gson@araneus.fi> which make this module compile on WinNT with ActivePerl and MS Visual C++. For others that try to build on this platform, Andreas also said:

"In addition to making these source changes, I also had to resort to editing the MakeMaker-generated makefile by hand to fix various library paths. Unfortunately, I am not familiar enough with either MakeMaker or NT to provide a clean fix for this problem."

1998-01-13 Gisle Aas <aas@sn.no>

Release 0.06 and 0.05

Fixed test script t/ssl_context.t

SSL->connect can return 0. Fixed bug in Net::SSL

1998-01-12 Gisle Aas <aas@sn.no>

Release 0.04

Mention depreciation in the README. Eric's version of the SSLeay glue will replace this module (as well as Sampo Kellomaki's Net::SSLeay).

1998-01-11 Gisle Aas <aas@sn.no>

Release 0.03

Fixed this file

1998-01-11 Gisle Aas <aas@sn.no>

Release 0.02

More text
in the README

Renamed Crypt::SSLeay::Context to Crypt::SSLeay::MainContext

1998-01-10 Gisle Aas <aas@sn.no>

Release 0.01

Initial release.

Found in path(s):

* /opt/cola/permits/1722412765_1686900670.6992633/0/libcrypt-ssleay-perl-0-73-06-orig-1-tar-gz/Crypt-SSLeay-0.73_06/Changes

No license file was found, but licenses were detected in source scan.

=head1 NAME

Crypt::SSLeay - OpenSSL support for LWP

=head1 HEARTBLEED WARNING

C<perl Makefile.PL> will display a warning if it thinks your OpenSSL might be vulnerable to the L<Heartbleed Bug|<https://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2014-0160>>. You can, of course, go ahead and install the module, but you should be aware that your system might be exposed to an extremely serious vulnerability. This is just a heuristic based on the version reported by OpenSSL. It is entirely possible that your distribution actually pushed a patched library, so if you have concerns, you should investigate further.

=head1 SYNOPSIS


```

use Net::SSL;
use LWP::UserAgent;

my $ua = LWP::UserAgent->new(
    ssl_opts => { verify_hostname => 0 },
);

my $response = $ua->get('https://www.example.com/');
print $response->content, "\n";

```

=head1 DESCRIPTION

This Perl module provides support for the HTTPS protocol under L<LWP>, to allow an L<LWP::UserAgent> object to perform GET, HEAD, and POST requests over encrypted socket connections. Please see L<LWP> for more information on POST requests.

The C<Crypt::SSLeay> package provides C<Net::SSL>, which, if requested, is loaded by C<LWP::Protocol::https> for https requests and provides the necessary SSL glue.

This distribution also makes following deprecated modules available:

```

Crypt::SSLeay::CTX
Crypt::SSLeay::Conn
Crypt::SSLeay::X509

```

=head1 DO YOU NEED Crypt::SSLeay?

Starting with version 6.02 of L<LWP>, C<https> support was unbundled into L<LWP::Protocol::https>. This module specifies as one of its prerequisites L<IO::Socket::SSL> which is automatically used by L<LWP::UserAgent> unless this preference is overridden separately. C<IO::Socket::SSL> is a more complete implementation, and, crucially, it allows hostname verification. C<Crypt::SSLeay> does not support this. At this point, C<Crypt::SSLeay> is maintained to support existing software that already depends on it.

However, it is possible that your software does not really depend on C<Crypt::SSLeay>, only on the ability of C<LWP::UserAgent> class to communicate with sites over SSL/TLS.

If are using version C<LWP> 6.02 or later, and therefore have installed C<LWP::Protocol::https> and its dependencies, and do not explicitly C<use> C<Net::SSL> before loading C<LWP::UserAgent>, or override the default socket class, you are probably using C<IO::Socket::SSL> and do not really need C<Crypt::SSLeay>.

If you have both C<Crypt::SSLeay> and C<IO::Socket::SSL> installed, and would like to force C<LWP::UserAgent> to use C<Crypt::SSLeay>, you can use:

```
use Net::HTTPS;
$Net::HTTPS::SSL_SOCKET_CLASS = 'Net::SSL';
use LWP::UserAgent;
```

or

```
local $ENV{PERL_NET_HTTPS_SSL_SOCKET_CLASS} = 'Net::SSL';
use LWP::UserAgent;
```

or

```
use Net::SSL;
use LWP::UserAgent;
```

=head1 ENVIRONMENT VARIABLES

=over 4

=item Specify SSL Socket Class

C<\${ENV{PERL_NET_HTTPS_SSL_SOCKET_CLASS}}>
can be used to instruct
C<LWP::UserAgent> to use C<Net::SSL> for HTTPS support rather than
C<IO::Socket::SSL>.

=item Proxy Support

```
$ENV{HTTPS_PROXY} = 'http://proxy_hostname_or_ip:port';
```

=item Proxy Basic Authentication

```
$ENV{HTTPS_PROXY_USERNAME} = 'username';
$ENV{HTTPS_PROXY_PASSWORD} = 'password';
```

=item SSL diagnostics and Debugging

```
$ENV{HTTPS_DEBUG} = 1;
```

=item Default SSL Version

```
$ENV{HTTPS_VERSION} = '3';
```

=item Client Certificate Support

```
$ENV{HTTPS_CERT_FILE} = 'certs/notacacert.pem';  
$ENV{HTTPS_KEY_FILE} = 'certs/notacakeynopass.pem';
```

=item CA cert Peer Verification

```
$ENV{HTTPS_CA_FILE} = 'certs/ca-bundle.crt';  
$ENV{HTTPS_CA_DIR} = 'certs/';
```

=item Client PKCS12 cert support

```
$ENV{HTTPS_PKCS12_FILE} = 'certs/pkcs12.pkcs12';  
$ENV{HTTPS_PKCS12_PASSWORD} = 'PKCS12_PASSWORD';
```

=back

=head1 INSTALL

=head2 OpenSSL

You must have OpenSSL installed before compiling this module. You can get the latest

OpenSSL package from [L<https://www.openssl.org/source/>](https://www.openssl.org/source/). We no longer support pre-2000 versions of OpenSSL.

If you are building OpenSSL from source, please follow the directions included in the source package.

=head2 Crypt::SSLeay via Makefile.PL

C<Makefile.PL> accepts the following command line arguments:

=over 4

=item C<incpath>

Path to OpenSSL headers. Can also be specified via C<\$ENV{OPENSSL_INCLUDE}>.

If the command line argument is provided, it overrides any value specified via the environment variable. Of course, you can ignore both the command line argument and the environment variable, and just add the path to your compiler specific environment variable such as C<CPATH> or C<INCLUDE> etc.

=item C<libpath>

Path to OpenSSL libraries. Can also be specified via C<\$ENV{OPENSSL_LIB}>.

If the command line argument is provided, it overrides any value specified by the environment variable. Of course, you can ignore both the command line argument and the environment variable

and just add the path to your compiler
specific environment variable such as C<LIBRARY_PATH> or C<LIB> etc.

=item C<live-tests>

Use C<--live-tests> to request tests that try to connect to an external web site, and C<--no-live_tests> to prevent such tests from running. If you run C<Makefile.PL> interactively, and this argument is not specified on the command line, you will be prompted for a value.

Default is false.

=item C<static>

Boolean. Default is false. B<TODO>: Does it work?

=item C<verbose>

Boolean. Default is false. If you pass C<--verbose> on the command line, both C<Devel::CheckLib> and C<ExtUtils::CBuilder> instances will be configured to echo what they are doing.

=back

If everything builds OK, but you get failures when during tests, ensure that C<LD_LIBRARY_PATH> points to the location where the correct shared libraries are located.

If you are using a custom OpenSSL build, please keep in mind that C<Crypt::SSLeay> must be built using the same compiler and build tools used to build C<perl> and OpenSSL. This can be more of an issue on Windows. If you are using Active State Perl, install the MinGW package distributed by them, and build OpenSSL using that before trying to build this module. If you have built your own Perl using Microsoft SDK tools or IDEs, make sure you build OpenSSL using the same tools.

Depending on your OS, pre-built OpenSSL packages may be available. To get the require headers and import libraries, you may need to install a development version of your operating system's OpenSSL library package. The key is that C<Crypt::SSLeay> makes calls to the OpenSSL library, and how to do so is specified in the C header files that come with the library. Some systems break out the header files into a separate package from that of the libraries. Once the program has been built, you don't need the headers any more.

=head2 Crypt::SSLeay

The latest Crypt::SSLeay can be found at your nearest CPAN mirror, as well as L<<https://metacpan.org/pod/Crypt::SSLeay>>.

Once

you have downloaded it, C<Crypt::SSLeay> installs easily using the standard build process:

```
$ perl Makefile.PL
$ make
$ make test
$ make install
```

or

```
$ cpanm Crypt::SSLeay
```

If you have OpenSSL headers and libraries in nonstandard locations, you can use

```
$ perl Makefile.PL --incpath=... --libpath=...
```

If you would like to use C<cpanm> with such custom locations, you can do

```
$ OPENSSL_INCLUDE=... OPENSSL_LIB=... cpanm Crypt::SSLeay
```

For example, on OS X (Mac) with Homebrew:

```
$ brew install openssl
$ OPENSSL_INCLUDE=$(brew --prefix openssl)/include OPENSSL_LIB=$(brew --prefix openssl)/lib cpanm
Crypt::SSLeay
```

or, on Windows,

```
> set OPENSSL_INCLUDE=...
> set OPENSSL_LIB=...
> cpanm Crypt::SSLeay
```

If you are on Windows, and using a MinGW distribution bundled with ActiveState Perl or Strawberry Perl, you would use C<dmake> rather than C<make>. If you are using Microsoft's build tools, you would use C<nmake>.

For unattended

(batch) installations, to be absolutely certain that F<Makefile.PL> does not prompt for questions on STDIN, set the environment variable C<PERL_MM_USE_DEFAULT=1> as with any CPAN module built using L<ExtUtils::MakeMaker>.

=head3 VMS

I do not have any experience with VMS. If OpenSSL headers and libraries are not in standard locations searched by your build system by default, please set things up so that they are. If you have generic instructions on how to do it, please open a ticket on RT with the information so I can add it to this document.

=head1 PROXY SUPPORT

L<LWP::UserAgent> and L<Crypt::SSLeay> have their own versions of proxy support. Please read these sections to see which one is appropriate.

=head2 LWP::UserAgent proxy support

C<LWP::UserAgent> has its own methods of proxying which may work for you and is likely to be incompatible with C<Crypt::SSLeay> proxy support. To use C<LWP::UserAgent> proxy support, try something like:

```
my $ua = LWP::UserAgent->new;  
$ua->proxy([qw(  
https http)], "$proxy_ip:$proxy_port");
```

At the time of this writing, libwww v5.6 seems to proxy https requests fine with an Apache F<mod_proxy> server. It sends a line like:

```
GET https://www.example.com HTTP/1.1
```

to the proxy server, which is not the C<CONNECT> request that some proxies would expect, so this may not work with other proxy servers than F<mod_proxy>. The C<CONNECT> method is used by C<Crypt::SSLeay>'s internal proxy support.

=head2 Crypt::SSLeay proxy support

For native C<Crypt::SSLeay> proxy support of https requests, you need to set the environment variable C<HTTPS_PROXY> to your proxy server and port, as in:

```
# proxy support  
$ENV{HTTPS_PROXY} = 'http://proxy_hostname_or_ip:port';  
$ENV{HTTPS_PROXY} = '127.0.0.1:8080';
```

Use of the C<HTTPS_PROXY> environment variable in this way is similar to C<LWP::UserAgent->env_proxy(> usage, but calling that method will likely override or break the C<Crypt::SSLeay> support, so do not mix the two.

Basic

auth credentials to the proxy server can be provided
this way:

```
# proxy_basic_auth
$ENV{HTTPS_PROXY_USERNAME} = 'username';
$ENV{HTTPS_PROXY_PASSWORD} = 'password';
```

For an example of LWP scripting with C<Crypt::SSLLeay> native proxy support, please look at the F<eg/lwp-ssl-test> script in the C<Crypt::SSLLeay> distribution.

=head1 CLIENT CERTIFICATE SUPPORT

Client certificates are supported. PEM encoded certificate and private key files may be used like this:

```
$ENV{HTTPS_CERT_FILE} = 'certs/notacacert.pem';
$ENV{HTTPS_KEY_FILE} = 'certs/notacakeynopass.pem';
```

You may test your files with the F<eg/net-ssl-test> program, bundled with the distribution, by issuing a command like:

```
perl eg/net-ssl-test -cert=certs/notacacert.pem \
  -key=certs/notacakeynopass.pem -d GET $HOST_NAME
```

Additionally, if you would like to tell the client where the CA file is, you may set these.

```
$ENV{HTTPS_CA_FILE} = "some_file";
$ENV{HTTPS_CA_DIR} = "some_dir";
```

Note that,

if specified, C<\$ENV{HTTPS_CA_FILE}> must point to the actual certificate file. That is, C<\$ENV{HTTPS_CA_DIR}> is **not** the path were C<\$ENV{HTTPS_CA_FILE}> is located.

For certificates in C<\$ENV{HTTPS_CA_DIR}> to be picked up, follow the instructions on

L<http://www.openssl.org/docs/ssl/SSL_CTX_load_verify_locations.html>

There is no sample CA cert file at this time for testing, but you may configure F<eg/net-ssl-test> to use your CA cert with the -CAfile option.

(TODO: then what is the F<./certs> directory in the distribution?)

=head2 Creating a test certificate

To create simple test certificates with OpenSSL, you may run the following command:

```
openssl req -config /usr/local/openssl/openssl.cnf \  
-new -days 365 -newkey rsa:1024 -x509 \  
-keyout notacakey.pem -out notacacert.pem
```

To remove the pass phrase from the key file, run:

```
openssl rsa -in notacakey.pem -out notacakeynopass.pem
```

=head2 PKCS12 support

The directives for enabling use of PKCS12 certificates is:

```
$ENV{HTTPS_PKCS12_FILE} = 'certs/pkcs12.pkcs12';  
$ENV{HTTPS_PKCS12_PASSWORD} = 'PKCS12_PASSWORD';
```

Use of this type of certificate takes precedence over previous certificate settings described.

(TODO: unclear? Meaning "the presence of this type of certificate"?)

=head1 SSL versions

C<Crypt::SSLeay> tries very hard to connect to I<any> SSL web server accommodating servers that are buggy, old or simply not standards-compliant. To this effect, this module will try SSL connections in this order:

=over 4

=item SSL v23

should allow v2 and v3 servers to pick their best type

=item SSL v3

best connection type

=item SSL v2

old connection type

=back

Unfortunately, some servers seem not to handle a reconnect to SSL v3 after a

failed connect of SSL v23 is tried, so you may set before using LWP or Net::SSL:

```
$ENV{HTTPS_VERSION} = 3;
```

to force a version 3 SSL connection first. At this time only a version 2 SSL connection will be tried after this, as the connection attempt order remains unchanged by this setting.

=head1 ACKNOWLEDGEMENTS

Many thanks to the following individuals who helped improve C<Crypt-SSLey>:

I<Gisle Aas> for writing this module and many others including libwww, for perl. The web will never be the same :)

I<Ben Laurie> deserves kudos for his excellent patches for better error handling, SSL information inspection, and random seeding.

I<Dongqiang Bai> for host name resolution fix when using a proxy.

I<Stuart Horner> of Core Communications, Inc. who found the need for building C<--shared> OpenSSL libraries.

I<Pavel Hlavnicka> for a patch for freeing memory when using a pkcs12 file, and for inspiring more robust C<read()> behavior.

I<James Woodyatt> is a champ for finding a ridiculous memory leak that has been the bane of many a Crypt::SSLey user.

I<Bryan Hart> for his patch adding proxy support, and thanks to I<Tobias Manthey> for submitting another approach.

I<Alex Rhomberg> for Alpha linux ccc patch.

I<Tobias Manthey> for his patches for client certificate support.

I<Daisuke Kuroda> for adding PKCS12 certificate support.

I<Gamid Isayev> for CA cert support and insights into error messaging.

I<Jeff Long> for working through a tricky CA cert SSLClientVerify issue.

I<Chip Turner> for a patch to build under perl 5.8.0.

I<Joshua Chamas> for the time he spent maintaining the module.

I<Jeff Lavallee> for help with alarms on read failures (CPAN bug #12444).

I<Guenter Knauf> for significant improvements in configuring things in Win32 and Netware lands and Jan Dubois for various suggestions for improvements.

and I<many others> who provided bug reports, suggestions, fixes and patches.

If you have reported a bug or provided feedback, and you would like to be mentioned by name in this section, please file request on

L<rt.cpan.org|<http://rt.cpan.org/NoAuth/Bugs.html?Dist=Crypt-SSLeay>>.

=head1 SEE ALSO

=over 4

=item Net::SSL

If you have downloaded this distribution as of a dependency of another distribution,

it's probably due to this module (which is included in this distribution).

=item Net::SSLeay

L<Net::SSLeay> provides access to the OpenSSL API directly from Perl. See L<<https://metacpan.org/pod/Net::SSLeay/>>.

=item Building OpenSSL on 64-bit Windows 8.1 Pro using SDK tools

My blog post L<<http://blog.nu42.com/2014/04/building-openssl-101g-on-64-bit-windows.html>> might be helpful.

=back

=head1 SUPPORT

For issues related to using of C<Crypt::SSLeay> & C<Net::SSL> with Perl's L<LWP>, please send email to C<libwww@perl.org>.

For OpenSSL or general SSL support, including issues associated with building and installing OpenSSL on your system, please email the OpenSSL users mailing list at C<openssl-users@openssl.org>. See L<<http://www.openssl.org/support/community.html>> for other mailing lists and archives.

Please report all bugs using

[L<rt.cpan.org|http://rt.cpan.org/NoAuth/Bugs.html?Dist=Crypt-SSLeay>](http://rt.cpan.org/NoAuth/Bugs.html?Dist=Crypt-SSLeay).

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This module was originally written by Gisle Aas,
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```
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```

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```

```
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```

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```

```
<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
```

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* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/zlib.3

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/* inflate.c -- zlib decompression

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/* uncompr.c -- decompress a memory buffer

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*/

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/* gzread.c -- zlib functions for reading gzip files

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*/

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/* trees.c -- output deflated data using Huffman coding

* Copyright (C) 1995-2017 Jean-loup Gailly

* detect_data_type() function provided freely by Cosmin Truta, 2006

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*/

Found in path(s):

* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/trees.c

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Frequently Asked Questions about zlib

If your question is not there, please check the zlib home page

<http://zlib.net/> which may have more recent information.

The latest zlib FAQ is at http://zlib.net/zlib_faq.html

1. Is zlib Y2K-compliant?

Yes. zlib doesn't handle dates.

2. Where can I get a Windows DLL version?

The zlib sources can be compiled without change to produce a DLL. See the file `win32/DLL_FAQ.txt` in the zlib distribution. Pointers to the precompiled DLL are found in the zlib web site at <http://zlib.net/>.

3. Where can I get a Visual Basic interface to zlib?

See

* <http://marknelson.us/1997/01/01/zlib-engine/>

* `win32/DLL_FAQ.txt` in the zlib distribution

4. `compress()` returns `Z_BUF_ERROR`.

Make sure that before the call of `compress()`, the length of the compressed buffer is equal to the available size of the compressed buffer and not zero. For Visual

Basic, check that this parameter is passed by reference

("as any"), not by value ("as long").

5. `deflate()` or `inflate()` returns `Z_BUF_ERROR`.

Before making the call, make sure that `avail_in` and `avail_out` are not zero.

When setting the parameter `flush` equal to `Z_FINISH`, also make sure that `avail_out` is big enough to allow processing all pending input. Note that a `Z_BUF_ERROR` is not fatal--another call to `deflate()` or `inflate()` can be made with more input or output space. A `Z_BUF_ERROR` may in fact be unavoidable depending on how the functions are used, since it is not possible to tell whether or not there is more output pending when `strm.avail_out` returns with zero. See http://zlib.net/zlib_how.html for a heavily annotated example.

6. Where's the zlib documentation (man pages, etc.)?

It's in `zlib.h` . Examples of zlib usage are in the files `test/example.c` and `test/minigzip.c`, with more in `examples/` .

7. Why don't you use GNU autoconf or libtool or ...?

Because we would like to keep zlib as a very small and simple package. zlib is rather portable and doesn't need much configuration.

8. I found a bug in zlib.

Most of the time, such problems are due to an incorrect usage of zlib. Please try to reproduce the problem with a small program and send the corresponding source to us at `zlib@gzip.org` . Do not send multi-megabyte data files without prior agreement.

9. Why do I get "undefined reference to gzputc"?

If "make test" produces something like

```
example.o(.text+0x154): undefined reference to `gzputc'
```

check that you don't have old files `libz.*` in `/usr/lib`, `/usr/local/lib` or `/usr/X11R6/lib`. Remove any old versions, then do "make install".

10. I need a Delphi interface to zlib.

See the `contrib/delphi` directory in the zlib distribution.

11. Can zlib handle .zip archives?

Not by itself, no. See the directory `contrib/minizip` in the zlib distribution.

12.

Can zlib handle .Z files?

No, sorry. You have to spawn an `uncompress` or `gunzip` subprocess, or adapt the code of `uncompress` on your own.

13. How can I make a Unix shared library?

By default a shared (and a static) library is built for Unix. So:

```
make distclean
```



```
./configure  
make
```

14. How do I install a shared zlib library on Unix?

After the above, then:

```
make install
```

However, many flavors of Unix come with a shared zlib already installed. Before going to the trouble of compiling a shared version of zlib and trying to install it, you may want to check if it's already there! If you can `#include <zlib.h>`, it's there. The `-lz` option will probably link to it. You can check the version at the top of `zlib.h` or with the `ZLIB_VERSION` symbol defined in `zlib.h`.

15. I have a question about OttoPDF.

We are not the authors of OttoPDF. The real author is on the OttoPDF web site: Joel Hainley, jhainley@myndkryme.com.

16.

Can zlib decode Flate data in an Adobe PDF file?

Yes. See <http://www.pdflib.com/>. To modify PDF forms, see <http://sourceforge.net/projects/acroformtool/>.

17. Why am I getting this "register_frame_info not found" error on Solaris?

After installing zlib 1.1.4 on Solaris 2.6, running applications using zlib generates an error such as:

```
ld.so.1: rpm: fatal: relocation error: file /usr/local/lib/libz.so:  
symbol __register_frame_info: referenced symbol not found
```

The symbol `__register_frame_info` is not part of zlib, it is generated by the C compiler (cc or gcc). You must recompile applications using zlib which have this problem. This problem is specific to Solaris. See <http://www.sunfreeware.com> for Solaris versions of zlib and applications using zlib.

18. Why does gzip give an error on a file I make with compress/deflate?

The compress and deflate functions produce data in the zlib format, which is different and incompatible with the gzip format. The `gz*` functions in zlib on the other hand use the gzip format. Both the zlib and gzip formats use the same compressed data format internally, but have different headers

and trailers around the compressed data.

19. Ok, so why are there two different formats?

The gzip format was designed to retain the directory information about a single file, such as the name and last modification date. The zlib format on the other hand was designed for in-memory and communication channel applications, and has a much more compact header and trailer and uses a faster integrity check than gzip.

20. Well that's nice, but how do I make a gzip file in memory?

You can request that deflate write the gzip format instead of the zlib format using `deflateInit2()`. You can also request that inflate decode the gzip format using `inflateInit2()`. Read `zlib.h` for more details.

21. Is zlib thread-safe?

Yes. However any library routines that zlib uses and any application-provided memory allocation routines must also be thread-safe. zlib's `gz*` functions use `stdio` library routines, and most of zlib's functions use the library memory allocation routines by default. zlib's `*Init*` functions allow for the application to provide custom memory allocation routines.

Of course, you should only operate on any given zlib or gzip stream from a single thread at a time.

22. Can I use zlib in my commercial application?

Yes. Please read the license in `zlib.h`.

23. Is zlib under the GNU license?

No. Please read the license in `zlib.h`.

24. The license says that altered source versions must be "plainly marked". So what exactly do I need to do to meet that requirement?

You need to change the `ZLIB_VERSION` and `ZLIB_VERNUM` #defines in `zlib.h`. In particular, the final version number needs to be changed to "f", and an identification string should be appended to `ZLIB_VERSION`. Version numbers `x.x.x.f` are reserved for modifications to zlib by others than the zlib maintainers. For example, if the version of the base zlib you are altering is "1.2.3.4", then in `zlib.h` you should change `ZLIB_VERNUM` to `0x123f`, and `ZLIB_VERSION` to something like "1.2.3.f-zachary-mods-v3". You can also update the version strings in `deflate.c` and `inftrees.c`.

For altered source distributions, you should also note the origin and nature of the changes in zlib.h, as well as in ChangeLog and README, along with the dates of the alterations. The origin should include at least your name (or your company's name), and an email address to contact for help or issues with the library.

Note that distributing a compiled zlib library along with zlib.h and zconf.h is also a source distribution, and so you should change ZLIB_VERSION and ZLIB_VERNUM and note the origin and nature of the changes in zlib.h as you would for a full source distribution.

25.

Will zlib work on a big-endian or little-endian architecture, and can I exchange compressed data between them?

Yes and yes.

26. Will zlib work on a 64-bit machine?

Yes. It has been tested on 64-bit machines, and has no dependence on any data types being limited to 32-bits in length. If you have any difficulties, please provide a complete problem report to zlib@gzip.org

27. Will zlib decompress data from the PKWare Data Compression Library?

No. The PKWare DCL uses a completely different compressed data format than does PKZIP and zlib. However, you can look in zlib's contrib/blast directory for a possible solution to your problem.

28. Can I access data randomly in a compressed stream?

No, not without some preparation. If when compressing you periodically use Z_FULL_FLUSH, carefully write all the pending data at those points, and keep an index of those locations, then you can start decompression at those points. You have to be careful to not use Z_FULL_FLUSH too often, since it can significantly degrade compression. Alternatively, you can scan a deflate stream once to generate an index, and then use that index for random access. See examples/zran.c .

29. Does zlib work on MVS, OS/390, CICS, etc.?

It has in the past, but we have not heard of any recent evidence. There were working ports of zlib 1.1.4 to MVS, but those links no longer work. If you know of recent, successful applications of zlib on these operating systems, please let us know. Thanks.

30. Is there some simpler, easier to read version of inflate I can look at to

understand the deflate format?

First off, you should read RFC 1951. Second, yes. Look in zlib's contrib/puff directory.

31. Does zlib infringe on any patents?

As far as we know, no. In fact, that was originally the whole point behind zlib. Look here for some more information:

<http://www.gzip.org/#faq11>

32. Can zlib work with greater than 4 GB of data?

Yes. inflate() and deflate() will process any amount of data correctly. Each call of inflate() or deflate() is limited to input and output chunks of the maximum value that can be stored in the compiler's "unsigned int" type, but there is no limit to the number of chunks. Note however that the strm.total_in and strm_total_out counters may be limited to 4 GB. These counters are provided as a convenience and are not used internally by inflate() or deflate(). The application can easily set up its own counters updated after each call of inflate() or deflate() to count beyond 4 GB. compress() and uncompress() may be limited to 4 GB, since they operate in a single call. gzseek() and gztell() may be limited to 4 GB depending on how zlib is compiled. See the zlibCompileFlags() function in zlib.h.

The word "may" appears several times above since there is a 4 GB limit only if the compiler's "long" type is

32 bits. If the compiler's "long" type is 64 bits, then the limit is 16 exabytes.

33. Does zlib have any security vulnerabilities?

The only one that we are aware of is potentially in gzprintf(). If zlib is compiled to use sprintf() or vsprintf(), then there is no protection against a buffer overflow of an 8K string space (or other value as set by gzbuffer()), other than the caller of gzprintf() assuring that the output will not exceed 8K. On the other hand, if zlib is compiled to use snprintf() or vsnprintf(), which should normally be the case, then there is no vulnerability. The ./configure script will display warnings if an insecure variation of sprintf() will be used by gzprintf(). Also the zlibCompileFlags() function will return information on what variant of sprintf() is used by gzprintf().

If you don't have snprintf() or vsnprintf() and would like one, you can find a portable implementation here:

<http://www.ijs.si/software/snprintf/>

Note that you should be using the most recent version of zlib. Versions 1.1.3 and before were subject to a double-free vulnerability, and versions 1.2.1 and 1.2.2 were subject to an access exception when decompressing invalid compressed data.

34. Is there a Java version of zlib?

Probably what you want is to use zlib in Java. zlib is already included as part of the Java SDK in the `java.util.zip` package. If you really want a version of zlib written in the Java language, look on the zlib home page for links: <http://zlib.net/>.

35. I get this or that compiler or source-code scanner warning when I crank it up to maximally-pedantic. Can't you guys write proper code?

Many years ago, we gave up attempting to avoid warnings on every compiler in the universe. It just got to be a waste of time, and some compilers were downright silly as well as contradicted each other. So now, we simply make sure that the code always works.

36. Valgrind (or some similar memory access checker) says that deflate is performing a conditional jump that depends on an uninitialized value. Isn't that a bug?

No. That is intentional for performance reasons, and the output of deflate is not affected. This only started showing up recently since zlib 1.2.x uses `malloc()` by default for allocations, whereas earlier versions used `calloc()`, which zeros out the allocated memory. Even though the code was correct, versions 1.2.4 and later was changed to not stimulate these checkers.

37. Will zlib read the (insert any ancient or arcane format here) compressed data format?

Probably not. Look in the `comp.compression` FAQ for pointers to various formats and associated software.

38. How can I encrypt/decrypt zip files with zlib?

zlib doesn't support encryption. The original PKZIP encryption is very weak and can be broken with freely available programs. To get strong encryption,

use GnuPG, <http://www.gnupg.org/>, which already includes zlib compression. For PKZIP compatible "encryption", look at <http://www.info-zip.org/>

39. What's the difference between the "gzip" and "deflate" HTTP 1.1 encodings?

"gzip" is the gzip format, and "deflate" is the zlib format. They should probably have called the second one "zlib" instead to avoid confusion with the raw deflate compressed data format. While the HTTP 1.1 RFC 2616 correctly points to the zlib specification in RFC 1950 for the "deflate" transfer encoding, there have been reports of servers and browsers that incorrectly produce or expect raw deflate data per the deflate specification in RFC 1951, most notably Microsoft. So even though the "deflate" transfer encoding using the zlib format would be the more efficient approach (and in fact exactly what the zlib format was designed for), using the "gzip" transfer encoding is probably more reliable due to an unfortunate choice of name on the part of the HTTP 1.1 authors.

Bottom line: use the gzip format for HTTP 1.1 encoding.

40. Does zlib support the new "Deflate64" format introduced by PKWare?

No. PKWare has apparently decided to keep that format proprietary, since they have not documented it as they have previous compression formats. In any case, the compression improvements are so modest compared to other more modern approaches, that it's not worth the effort to implement.

41. I'm having a problem with the zip functions in zlib, can you help?

There are no zip functions in zlib. You are probably using minizip by Giles Vollant, which is found in the contrib directory of zlib. It is not part of zlib. In fact none of the stuff in contrib is part of zlib. The files in there are not supported by the zlib authors. You need to contact the authors of the respective contribution for help.

42. The match.asm code in contrib is under the GNU General Public License.

Since it's part of zlib, doesn't that mean that all of zlib falls under the GNU GPL?

No. The files in contrib are not part of zlib. They were contributed by other authors and are provided as a convenience to the user within the zlib distribution. Each item in contrib has its own license.

43. Is zlib subject to export controls? What is its ECCN?

zlib is not subject to export controls, and so is classified as EAR99.

44. Can you please sign these lengthy legal documents and fax them back to us so that we can use your software in our product?

No. Go away. Shoo.

Found in path(s):

* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/FAQ

No license file was found, but licenses were detected in source scan.

Not copyrighted -- provided to the public domain

Found in path(s):

* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/examples/zlib_how.html

No license file was found, but licenses were detected in source scan.

/* gzappend -- command to append to a gzip file

Copyright (C) 2003, 2012 Mark Adler, all rights reserved
version 1.2, 11 Oct 2012

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Mark Adler madler@alumni.caltech.edu

*/

Found in path(s):

* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/examples/gzappend.c

No license file was found, but licenses were detected in source scan.

/* inffback.c -- inflate using a call-back interface

* Copyright (C) 1995-2016 Mark Adler

* For conditions of distribution and use, see copyright notice in zlib.h

*/

Found in path(s):

* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/inflback.c

No license file was found, but licenses were detected in source scan.

/* inflate.h -- internal inflate state definition

* Copyright (C) 1995-2016 Mark Adler

* For conditions of distribution and use, see copyright notice in zlib.h

*/

Found in path(s):

* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/inflate.h

No license file was found, but licenses were detected in source scan.

/* fitblk.c: example of fitting compressed output to a specified size

Not copyrighted -- provided to the public domain

Version 1.1 25 November 2004 Mark Adler */

Found in path(s):

* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/examples/fitblk.c

No license file was found, but licenses were detected in source scan.

/* unzip.c -- IO for uncompress .zip files using zlib

Version 1.1, February 14h, 2010

part of the MiniZip project - (<http://www.winimage.com/zLibDll/minizip.html>)

Copyright (C) 1998-2010 Gilles Vollant (minizip) (<http://www.winimage.com/zLibDll/minizip.html>)

Modifications of Unzip for Zip64

Copyright (C) 2007-2008 Even Rouault

Modifications for Zip64 support on both zip and unzip

Copyright (C) 2009-2010 Mathias Svensson (<http://result42.com>)

For more info read MiniZip_info.txt

Decryption code comes from crypt.c by Info-ZIP but has been greatly reduced in terms of compatibility with older software. The following is from the original crypt.c.
Code woven in by Terry Thorsen 1/2003.

Copyright (c) 1990-2000 Info-ZIP. All rights reserved.

See the accompanying

file LICENSE, version 2000-Apr-09 or later

(the contents of which are also included in zip.h) for terms of use.

If, for some reason, all these files are missing, the Info-ZIP license also may be found at: <ftp://ftp.info-zip.org/pub/infozip/license.html>

crypt.c (full version) by Info-ZIP. Last revised: [see crypt.h]

The encryption/decryption parts of this source code (as opposed to the non-echoing password parts) were originally written in Europe. The whole source package can be freely distributed, including from the USA. (Prior to January 2000, re-export from the US was a violation of US law.)

This encryption code is a direct transcription of the algorithm from Roger Schlafly, described by Phil Katz in the file appnote.txt. This file (appnote.txt) is distributed with the PKZIP program (even in the version without encryption capabilities).

Changes in unzip.c

2007-2008 - Even Rouault - Addition of cpl_unzGetCurrentFileZStreamPos
2007-2008 - Even Rouault - Decoration of symbol names unz* -> cpl_unz*
2007-2008 - Even Rouault - Remove old C style function prototypes
2007-2008 - Even Rouault - Add unzip support for ZIP64

Copyright (C) 2007-2008 Even Rouault

Oct-2009 - Mathias Svensson - Removed cpl_* from symbol names (Even Rouault added them but since this is now moved to a new project (minizip64) I renamed them again).

Oct-2009 - Mathias Svensson - Fixed problem if uncompressed size was > 4G and compressed size was <4G should only read the compressed/uncompressed size from the Zip64 format if the size from normal header was 0xFFFFFFFF

Oct-2009 - Mathias Svensson - Applied some bug fixes from patches received from Gilles Vollant

Oct-2009 - Mathias Svensson - Applied support to unzip files with compression method BZIP2 (bzip2 lib is required)

Patch created by Daniel Borca

Jan-2010 - back to unzip and minizip 1.0 name scheme, with compatibility layer

Copyright (C) 1998 - 2010 Gilles Vollant, Even Rouault, Mathias Svensson

*/

Found in path(s):

* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/contrib/minizip/unzip.c

No license file was found, but licenses were detected in source scan.

/* unzip.h -- IO for uncompress .zip files using zlib
Version 1.1, February 14h, 2010
part of the MiniZip project - (<http://www.winimage.com/zLibDll/minizip.html>)

Copyright (C) 1998-2010 Gilles Vollant (<http://www.winimage.com/zLibDll/minizip.html>)

Modifications of Unzip for Zip64
Copyright (C) 2007-2008 Even Rouault

Modifications for Zip64 support on both zip and unzip
Copyright (C) 2009-2010 Mathias Svensson (<http://result42.com>)

For more info read MiniZip_info.txt

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Changes

See header of unzip64.c

*/

Found in path(s):

* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/contrib/minizip/unzip.h

No license file was found, but licenses were detected in source scan.

```
/*
Additional tools for Minizip
Code: Xavier Roche '2004
License: Same as ZLIB (www.gzip.org)
*/
```

Found in path(s):

```
* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/contrib/minizip/mztools.h
* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/contrib/minizip/mztools.c
```

No license file was found, but licenses were detected in source scan.

```
/* gzjoin -- command to join gzip files into one gzip file
```

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version 1.2, 14 Aug 2012

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Mark Adler madler@alumni.caltech.edu

```
*/
```

Found in path(s):

```
* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/examples/gzjoin.c
```

No license file was found, but licenses were detected in source scan.

```
/* zran.c -- example of zlib/gzip stream indexing and random access
```

```
* Copyright (C) 2005, 2012 Mark Adler
```

```
* For conditions of distribution and use, see copyright notice in zlib.h
```

```
Version 1.1 29 Sep 2012 Mark Adler */
```

Found in path(s):

```
* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/examples/zran.c
```

No license file was found, but licenses were detected in source scan.

```
/* example.c -- usage example of the zlib compression library
```

```
* Copyright (C) 1995-2006, 2011, 2016 Jean-loup Gailly
```

```
* For conditions of distribution and use, see copyright notice in zlib.h
```

```
*/
```

Found in path(s):

```
* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/test/example.c
```

No license file was found, but licenses were detected in source scan.

MiniZip - Copyright (c) 1998-2010 - by Gilles Vollant - version 1.1 64 bits from Mathias Svensson

Introduction

MiniZip 1.1 is built from MiniZip 1.0 by Gilles Vollant (<http://www.winimage.com/zLibDll/minizip.html>)

When adding ZIP64 support into minizip it would result into risk of breaking compatibility with minizip 1.0. All possible work was done for compatibility.

Background

When adding ZIP64 support Mathias Svensson found that Even Rouault have added ZIP64 support for unzip.c into minizip for a open source project called gdal (<http://www.gdal.org/>)

That was used as a starting point. And after that ZIP64 support was added to zip.c some refactoring and code cleanup was also done.

Changed from MiniZip 1.0 to MiniZip 1.1

```
* Added ZIP64 support for unzip ( by Even Rouault )
```

```
* Added ZIP64 support for zip ( by Mathias Svensson
```

```
)
```

```
* Reverted some changed that Even Rouault did.
```

```
* Bunch of patches received from Gulles Vollant that he received for MiniZip from various users.
```

```
* Added unzip patch for BZIP Compression method (patch create by Daniel Borca)
```

```
* Added BZIP Compress method for zip
```

```
* Did some refactoring and code cleanup
```

Credits

Gilles Vollant - Original MiniZip author
Even Rouault - ZIP64 unzip Support
Daniel Borca - BZip Compression method support in unzip
Mathias Svensson - ZIP64 zip support
Mathias Svensson - BZip Compression method support in zip

Resources

ZipLayout <http://result42.com/projects/ZipFileLayout>

Command line tool for Windows that shows the layout and information of the headers in a zip archive.
Used when debugging and validating the creation of zip files using MiniZip64

ZIP App Note <http://www.pkware.com/documents/casestudies/APPNOTE.TXT>
Zip File specification

Notes.

* To be able to use BZip compression method in
zip64.c or unzip64.c the BZIP2 lib is needed and HAVE_BZIP2 need to be defined.

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Found in path(s):

* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/contrib/minizip/MiniZip64_info.txt

No license file was found, but licenses were detected in source scan.

```
/* crc32.c -- compute the CRC-32 of a data stream
* Copyright (C) 1995-2006, 2010, 2011, 2012, 2016 Mark Adler
* For conditions of distribution and use, see copyright notice in zlib.h
*
* Thanks to Rodney Brown <rbrown64@csc.com.au> for his contribution of faster
* CRC methods: exclusive-oring 32 bits of data at a time, and pre-computing
* tables for updating the shift register in one step with three exclusive-ors
* instead of four steps with four exclusive-ors. This results in about a
* factor of two increase in speed on a Power PC G4 (PPC7455) using gcc -O3.
*/
```

Found in path(s):

```
*/opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/crc32.c
```

No license file was found, but licenses were detected in source scan.

```
/* gun.c -- simple gunzip to give an example of the use of inflateBack()
* Copyright (C) 2003, 2005, 2008, 2010, 2012 Mark Adler
* For conditions of distribution and use, see copyright notice in zlib.h
Version 1.7 12 August 2012 Mark Adler */
```

Found in path(s):

```
*/opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/examples/gun.c
```

No license file was found, but licenses were detected in source scan.

```
/* zlib.h -- interface of the 'zlib' general purpose compression library
version 1.2.11, January 15th, 2017
```

Copyright (C) 1995-2017 Jean-loup Gailly and Mark Adler

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Jean-loup Gailly Mark Adler
jloup@gzip.org madler@alumni.caltech.edu

The data format used by the zlib library is described by RFCs (Request for Comments) 1950 to 1952 in the files <http://tools.ietf.org/html/rfc1950> (zlib format), rfc1951 (deflate format) and rfc1952 (gzip format).

*/

Found in path(s):

* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/zlib.h

No license file was found, but licenses were detected in source scan.

/* gzguts.h -- zlib internal header definitions for gz* operations

* Copyright (C) 2004, 2005, 2010, 2011, 2012, 2013, 2016 Mark Adler

* For conditions of distribution and use, see copyright notice in zlib.h

*/

Found in path(s):

* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/gzguts.h

No license file was found, but licenses were detected in source scan.

/*

* gzlog.c

* Copyright (C) 2004, 2008, 2012, 2016 Mark Adler, all rights reserved

* For conditions of distribution and use, see copyright notice in gzlog.h

* version 2.2, 14 Aug 2012

*/

Found in path(s):

* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/examples/gzlog.c

No license file was found, but licenses were detected in source scan.

/* inftrees.c -- generate Huffman trees for efficient decoding

* Copyright (C) 1995-2017 Mark Adler

* For conditions of distribution and use, see copyright notice in zlib.h

*/

Found in path(s):

* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/inftrees.c

No license file was found, but licenses were detected in source scan.

/* infcover.c -- test zlib's inflate routines with full code coverage

* Copyright (C) 2011, 2016 Mark Adler

* For conditions of distribution and use, see copyright notice in zlib.h

*/

Found in path(s):

* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/test/infcover.c

No license file was found, but licenses were detected in source scan.

For conditions of distribution and use, see copyright notice in zlib.h

Found in path(s):

* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/old/os2/Makefile.os2

* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/msdos/Makefile.dj2

* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/msdos/Makefile.emx

* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/old/Makefile.emx

No license file was found, but licenses were detected in source scan.

/* Adler-32 -- compute the Adler-32 checksum of a data stream

* Copyright (C) 1995-2011, 2016 Mark Adler

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*/

Found in path(s):

* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/adler32.c

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/* deflate.h -- internal interface and configuration of the compression library

* Copyright (C) 1995-2016 Jean-loup Gailly, Mark Adler

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*/

Found in path(s):

* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/zutil.h

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/* gzclose.c -- zlib gzclose() function

* Copyright (C) 2004, 2010 Mark Adler

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*/

Found in path(s):

* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/gzclose.c

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/* compress.c -- compress a memory buffer

* Copyright (C) 1995-2005, 2014, 2016 Jean-loup Gailly, Mark Adler

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*/

Found in path(s):

* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/compress.c
No license file was found, but licenses were detected in source scan.

/* inffast.c -- fast decoding

* Copyright (C) 1995-2017 Mark Adler

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*/

Found in path(s):

* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/inffast.c
No license file was found, but licenses were detected in source scan.

/* zconf.h -- configuration of the zlib compression library

* Copyright (C) 1995-2016 Jean-loup Gailly, Mark Adler

* For conditions of distribution and use, see copyright notice in zlib.h

*/

Found in path(s):

* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/zconf.h.in

* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/zconf.h.cmakein

* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/zconf.h

No license file was found, but licenses were detected in source scan.

/* inftrees.h -- header to use inftrees.c

* Copyright (C) 1995-2005, 2010 Mark Adler

* For conditions of distribution and use, see copyright notice in zlib.h

*/

Found in path(s):

* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/inftrees.h

No license file was found, but licenses were detected in source scan.

/* gzlog.h

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version 2.2, 14 Aug 2012

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Mark Adler madler@alumni.caltech.edu

*/

Found in path(s):

* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/examples/gzlog.h

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/* inffast.h -- header to use inffast.c

* Copyright (C) 1995-2003, 2010 Mark Adler

* For conditions of distribution and use, see copyright notice in zlib.h

*/

Found in path(s):

* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/inffast.h

No license file was found, but licenses were detected in source scan.

/* zip.h -- IO on .zip files using zlib

Version 1.1, February 14h, 2010

part of the MiniZip project - (<http://www.winimage.com/zLibDll/minizip.html>)

Copyright (C) 1998-2010 Gilles Vollant (minizip) (<http://www.winimage.com/zLibDll/minizip.html>)

Modifications for Zip64 support

Copyright (C) 2009-2010 Mathias Svensson (<http://result42.com>)

For more info read MiniZip_info.txt

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Changes

See header of zip.h

*/

Found in path(s):

* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/contrib/minizip/zip.h

No license file was found, but licenses were detected in source scan.

/* gzwrite.c -- zlib functions for writing gzip files

* Copyright (C) 2004-2017 Mark Adler

* For conditions of distribution and use, see copyright notice in zlib.h

*/

Found in path(s):

* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/gzwrite.c

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ZLIB DATA COMPRESSION LIBRARY

zlib 1.2.11 is a general purpose data compression library. All the code is thread safe. The data format used by the zlib library is described by RFCs (Request for Comments) 1950 to 1952 in the files <http://tools.ietf.org/html/rfc1950> (zlib format), rfc1951 (deflate format) and rfc1952 (gzip format).

All functions of the compression library are documented in the file `zlib.h` (volunteer to write man pages welcome, contact zlib@gzip.org). A usage example of the library is given in the file `test/example.c` which also tests that the library is working correctly. Another example is given in the file `test/minigzip.c`. The compression library itself is composed of all source files in the root directory.

To compile all files and run the test program, follow the instructions given at

the top of Makefile.in. In short "./configure; make test", and if that goes well, "make install" should work for most flavors of Unix. For Windows, use one of the special makefiles in win32/ or contrib/vstudio/. For VMS, use make_vms.com.

Questions about zlib should be sent to <zlib@gzip.org>, or to Gilles Vollant <info@winimage.com> for the Windows DLL version. The zlib home page is <http://zlib.net/>. Before reporting a problem, please check this site to verify that you have the latest version of zlib; otherwise get the latest version and check whether the problem still exists or not.

PLEASE read the zlib FAQ http://zlib.net/zlib_faq.html before asking for help.

Mark Nelson <markn@ieee.org> wrote an article about zlib for the Jan. 1997 issue of Dr. Dobbs's Journal; a copy of the article is available at <http://marknelson.us/1997/01/01/zlib-engine/>.

The changes made in version 1.2.11 are documented in the file ChangeLog.

Unsupported third party contributions are provided in directory contrib/.

zlib is available in Java using the java.util.zip package, documented at <http://java.sun.com/developer/technicalArticles/Programming/compression/>.

A Perl interface to zlib written by Paul Marquess <pmqs@cpan.org> is available at CPAN (Comprehensive Perl Archive Network) sites, including <http://search.cpan.org/~pmqs/IO-Compress-Zlib/>.

A Python interface to zlib written by A.M. Kuchling <amk@amk.ca> is available in Python 1.5 and later versions, see <http://docs.python.org/library/zlib.html>.

zlib is built into tcl: <http://wiki.tcl.tk/4610>.

An experimental package to read and write files in .zip format, written on top of zlib by Gilles Vollant <info@winimage.com>, is available in the contrib/minizip directory of zlib.

Notes for some targets:

- For Windows DLL versions, please see win32/DLL_FAQ.txt
- For 64-bit Irix, deflate.c must be compiled without any optimization. With -O, one libpng test fails. The test works in 32 bit mode (with the -n32 compiler flag). The compiler bug has been reported to SGI.

- zlib doesn't work with gcc 2.6.3 on a DEC 3000/300LX under OSF/1 2.1 it works when compiled with cc.
- On Digital Unix 4.0D (formely OSF/1) on AlphaServer, the cc option -std1 is necessary to get gzprintf working correctly. This is done by configure.
- zlib doesn't work on HP-UX 9.05 with some versions of /bin/cc. It works with other compilers. Use "make test" to check your compiler.
- gzdopen is not supported on RISCOS or BEOS.
- For PalmOs, see <http://palmzlib.sourceforge.net/>

Acknowledgments:

The deflate format used by zlib was defined by Phil Katz. The deflate and zlib specifications were written by L. Peter Deutsch. Thanks to all the people who reported problems and suggested various improvements in zlib; they are too numerous to cite here.

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Jean-loup Gailly Mark Adler
jloup@gzip.org madler@alumni.caltech.edu

If you use the zlib library in a product, we would appreciate *not* receiving

lengthy legal documents to sign. The sources are provided for free but without warranty of any kind. The library has been entirely written by Jean-loup Gailly and Mark Adler; it does not include third-party code.

If you redistribute modified sources, we would appreciate that you include in the file ChangeLog history information documenting your changes. Please read the FAQ for more information on the distribution of modified source versions.

Found in path(s):

* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/README

No license file was found, but licenses were detected in source scan.

```
/* zpipe.c: example of proper use of zlib's inflate() and deflate()
```

```
Not copyrighted -- provided to the public domain
```

```
Version 1.4 11 December 2005 Mark Adler */
```

Found in path(s):

* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/examples/zpipe.c

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```
/* minigzip.c -- simulate gzip using the zlib compression library
```

```
* Copyright (C) 1995-2006, 2010, 2011, 2016 Jean-loup Gailly
```

```
* For conditions of distribution and use, see copyright notice in zlib.h
```

```
*/
```

Found in path(s):

* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/test/minigzip.c

No license file was found, but licenses were detected in source scan.

```
/* zutil.c -- target dependent utility functions for the compression library
```

```
* Copyright (C) 1995-2017 Jean-loup Gailly
```

```
* For conditions of distribution and use, see copyright notice in zlib.h
```

```
*/
```

Found in path(s):

* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/zutil.c

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```
/* deflate.h -- internal compression state
```

```
* Copyright (C) 1995-2016 Jean-loup Gailly
```

```
* For conditions of distribution and use, see copyright notice in zlib.h
```

```
*/
```

Found in path(s):

* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/deflate.h

No license file was found, but licenses were detected in source scan.

```
/* deflate.c -- compress data using the deflation algorithm
* Copyright (C) 1995-2017 Jean-loup Gailly and Mark Adler
* For conditions of distribution and use, see copyright notice in zlib.h
*/
```

Found in path(s):

```
* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/deflate.c
No license file was found, but licenses were detected in source scan.
```

```
/* gzlib.c -- zlib functions common to reading and writing gzip files
* Copyright (C) 2004-2017 Mark Adler
* For conditions of distribution and use, see copyright notice in zlib.h
*/
```

Found in path(s):

```
* /opt/cola/permits/1749578620_1689918803.5657074/0/zlib-1-2-11-dfsg-orig-2-tar-gz/zlib-1.2.11.dfsg/gzlib.c
```

1.436 gopkg.in-yaml 2.4.0

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