

Cisco UCS Common Platform Architecture Version 2 (CPAv2) for Big Data with Hortonworks

Building a 64 Node Hadoop Cluster Last Updated: April 9, 2014



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Cisco UCS Common Platform Architecture Version 2 (CPAv2) for Big Data with Hortonworks Data Platform 2.0 (HDP 2.0)

Introduction

Hadoop has become a strategic data platform embraced by mainstream enterprises as it offers the fastest path for businesses to unlock value in big data while maximizing existing investments. The Hortonworks Data Platform (HDP) is a 100% open source distribution of Apache Hadoop that is truly enterprise grade having been built, tested and hardened with enterprise rigor. The combination of HDP and Cisco UCS provides industry-leading platform for Hadoop based applications.

Audience

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Cisco UCS Common Platform Architecture Version 2 (CPAv2) for Big Data

The Cisco UCS solution for Hortonworks Data Platform 2.0 is based on Cisco UCS Common Platform Architecture Version 2 (CPAv2) for Big Data, a highly scalable architecture designed to meet a variety of scale-out application demands with seamless data integration and management integration capabilities built using the following components:

- **Cisco UCS 6200 Series Fabric Interconnects** provide high-bandwidth, low-latency connectivity for servers, with integrated, unified management provided for all connected devices by Cisco UCS Manager. Deployed in redundant pairs, Cisco fabric interconnects offer the full active-active redundancy, performance, and exceptional scalability needed to support the large number of nodes that are typical in clusters serving big data applications. Cisco UCS Manager enables rapid and consistent server configuration using service profiles, automating ongoing system maintenance activities such as firmware updates across the entire cluster as a single operation. Cisco UCS Manager also offers advanced monitoring with options to raise alarms and send notifications about the health of the entire cluster.
- **Cisco UCS 2200 Series Fabric Extenders** extend the network into each rack, acting as remote line cards for fabric interconnects and providing highly scalable and extremely cost-effective connectivity for a large number of nodes.

- Cisco UCS C-Series Rack Mount Servers are 2-socket servers based on Intel Xeon E-2600 v2 series processors and supporting up to 768 GB of main memory. 24 Small Form Factor (SFF) disk drives are supported in performance optimized option and 12 Large Form Factor (LFF) disk drives are supported in capacity option, along with 4 Gigabit Ethernet LAN-on-motherboard (LOM) ports.
- Cisco UCS Virtual Interface Cards (VICs) are unique to Cisco; Cisco UCS Virtual Interface Cards incorporate next-generation converged network adapter (CNA) technology from Cisco, and offer dual 10-Gbps ports designed for use with Cisco UCS C-Series Rack-Mount Servers. Optimized for virtualized networking, these cards deliver high performance and bandwidth utilization and support up to 256 virtual devices.
- **Cisco UCS Manager** resides within the Cisco UCS 6200 Series Fabric Interconnects. It makes the system self-aware and self-integrating, managing all of the system components as a single logical entity. Cisco UCS Manager can be accessed through an intuitive graphical user interface (GUI), a command-line interface (CLI), or an XML application-programming interface (API). Cisco UCS Manager uses service profiles to define the personality, configuration, and connectivity of all resources within Cisco Unified Computing System, radically simplifying provisioning of resources so that the process takes minutes instead of days. This simplification allows IT departments to shift their focus from constant maintenance to strategic business initiatives.

Hortonworks Data Platform

The Hortonworks Data Platform 2.0 (HDP 2.0) is an enterprise-grade, hardened Apache Hadoop distribution that enables you to store, process, and manage large data sets.

Apache Hadoop is an open-source software framework that allows for the distributed processing of large data sets across clusters of computers using simple programming models. It is designed for high-availability and fault-tolerance, and can scale from a single server up to thousands of machines.

The Hortonworks Data Platform combines the most useful and stable versions of Apache Hadoop and its related projects into a single tested and certified package. Hortonworks offers the latest innovations from the open source community, along with the testing and quality you expect from enterprise-quality software.

The Hortonworks Data Platform is designed to integrate with and extend the capabilities of your existing investments in data applications, tools, and processes. With Hortonworks, you can refine, analyze, and gain business insights from both structured and unstructured data - quickly, easily, and economically.

Hortonworks Key Features and Benefits

With the Hortonworks Data Platform, enterprises can retain and process more data, join new and existing data sets, and lower the cost of data analysis. Hortonworks enables enterprises to implement the following data management principles:

- Retain as much data as possible. Traditional data warehouses age, and over time will eventually store only summary data. Analyzing detailed records is often critical to uncovering useful business insights.
- Join new and existing data sets. Enterprises can build large-scale environments for transactional data with analytic databases, but these solutions are not always well suited to processing nontraditional data sets such as text, images, machine data, and online data. Hortonworks enables enterprises to incorporate both structured and unstructured data in one comprehensive data management system.

- Archive data at low cost. It is not always clear what portion of stored data will be of value for future analysis. Therefore, it can be difficult to justify expensive processes to capture, cleanse, and store that data. Hadoop scales easily, so you can store years of data without much incremental cost, and find deeper patterns that your competitors may miss.
- Access all data efficiently. Data needs to be readily accessible. Apache Hadoop clusters can provide a low-cost solution for storing massive data sets while still making the information readily available. Hadoop is designed to efficiently scan all of the data, which is complimentary to databases that are efficient at finding subsets of data.
- Apply data cleansing and data cataloging. Categorize and label all data in Hadoop with enough descriptive information (metadata) to make sense of it later, and to enable integration with transactional databases and analytic tools. This greatly reduces the time and effort of integrating with other data sets, and avoids a scenario in which valuable data is eventually rendered useless.
- Integrate with existing platforms and applications. There are many business intelligence (BI) and analytic tools available, but they may not be compatible with your particular data warehouse or DBMS. Hortonworks connects seamlessly with many leading analytic, data integration, and database management tools.

The Hortonworks Data Platform is the foundation for the next-generation enterprise data architecture—one that addresses both the volume and complexity of today's data.

Solution Overview

The current version of the Cisco UCS Common Platform Architecture (CPAv2) Version 2 for Big Data offers the following configuration depending on the compute and storage requirements:

Performance and Capacity Balanced	Capacity Optimized	Capacity Optimized with Flash Memory
16 Cisco UCS C240 M3 Rack Servers, each with:	16 Cisco UCS C240 M3 Rack Servers, each with:	16 Cisco UCS C240 M3 Rack Servers, each with:
 2 Intel Xeon processors E5-2660 v2 256 GB of memory 	 2 Intel Xeon processors E5-2640 v2 	 2 Intel Xeon processors E5-2660 v2
 LSI MegaRaid 9271CV 8i card 24 1-TB 7.2K SFF SAS drives (384 TB total) 	 128 GB of memory LSI MegaRaid 9271CV 8i card 12 4-TB 7.2 LFF SAS 	 128 GB of memory Cisco UCS Nytro MegaRAID 200-GB Controller
	drives (768 TB total)	 12 4-TB 7.2K LFF SAS drives (768 TB total)

Table 1 Cisco UCS CPAv2 Configuration Details



This CVD describes the installation process for a 64 node Performance and Capacity Balanced Cluster configuration.

The Performance and capacity balanced cluster configuration consists of the following:

- Two Cisco UCS 6296UP Fabric Interconnects
- Eight Cisco Nexus 2232PP Fabric Extenders (two per rack)
- 64 Cisco UCS C240 M3 Rack-Mount servers (16 per rack)
- Four Cisco R42610 standard racks
- Eight Vertical Power distribution units (PDUs) (Country Specific)

Rack and PDU Configuration

Each rack consists of two vertical PDUs. The master rack consists of two Cisco UCS 6296UP Fabric Interconnects, two Cisco Nexus 2232PP Fabric Extenders and sixteen Cisco UCS C240M3 Servers, connected to each of the vertical PDUs for redundancy; thereby, ensuring availability during power source failure. The expansion racks consists of two Cisco Nexus 2232PP Fabric Extenders and sixteen Cisco UCS C240M3 Servers are connected to each of the vertical PDUs for redundancy; thereby, ensuring availability during power source failure, similar to the master rack.



Please contact your Cisco representative for country specific information.

Table 2 and Table 3 describe the rack configurations of rack 1 (master rack) and racks 2-4 (expansion racks).

Table 2	Rack 1	' (M	aster	Rack)
---------	--------	------	-------	------	---

Cisco	Master Rack
42URack	
42	Cisco UCS FI
41	6296UP
40	
39	Cisco UCS FI
	6296UP
38	Cisco Nexus FEX
	2232PP
37	Cisco Nexus FEX
-	2232PP
36	Unused
35	Unused
34	Unused
33	Unused
32	Cisco UCS C240M3
31	
30	Cisco UCS C240M3
29	
28	Cisco UCS C240M3
27	
26	Cisco UCS C240M3
25	
24	Cisco UCS C240M3
23	
22	Cisco UCS C240M3
21	

20	Cisco UCS C240M3
19	
18	Cisco UCS C240M3
17	
16	Cisco UCS C240M3
15	
14	Cisco UCS C240M3
13	
12	Cisco UCS C240M3
11	
10	Cisco UCS C240M3
9	
8	Cisco UCS C240M3
7	
6	Cisco UCS C240M3
5	
4	Cisco UCS C240M3
3	
2	Cisco UCS C240M3
1	

1

Table 3

Rack 2-4 (Expansion Racks)

1000 5	Ruck 2 4 (Expansion Rucks)
Cisco 42URack	Expansion Rack
42	Unused
41	Unused
40	Unused
39	Unused
38	Cisco Nexus FEX
	2232PP
37	Cisco Nexus FEX
	2232PP
36	Unused
35	Unused
34	Unused
33	Unused
32	Cisco UCS C240M3
31	
30	Cisco UCS C240M3
29	
28	Cisco UCS C240M3
27	
26	Cisco UCS C240M3
25	
24	Cisco UCS C240M3
23	
22	Cisco UCS C240M3
21	
20	Cisco UCS C240M3
19	
18	Cisco UCS C240M3
17	
16	Cisco UCS C240M3
15	

14	Cisco UCS C240M3
13	
12	Cisco UCS C240M3
11	
10	Cisco UCS C240M3
9	
8	Cisco UCS C240M3
7	
6	Cisco UCS C240M3
5	
4	Cisco UCS C240M3
3	
2	Cisco UCS C240M3
1	

Server Configuration and Cabling

Figure 1

The Cisco UCS C240 M3 rack server is equipped with Intel Xeon E5-2660 v2 processors, 256 GB of memory, Cisco UCS Virtual Interface Card 1225 Cisco, Cisco LSI MegaRAID SAS 9271 CV-8i storage controller and 24 x 1TB 7.2K SATA disk drives.

Figure 1 illustrates the ports on the Cisco Nexus 2232PP fabric extender connecting to the Cisco UCS C240M3 Servers. Sixteen Cisco UCS C240M3 servers are used in Master rack configurations.

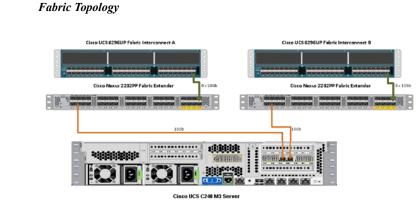
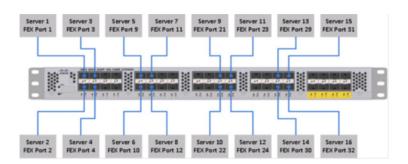


Figure 2 illustrates the port connectivity between the Cisco Nexus 2232PP fabric extender and Cisco UCS C240M3 server.

Figure 2 Connectivity Diagram of Cisco Nexus 2232PP FEX and Cisco UCS C240M3 Servers



For more information on physical connectivity and single-wire management see:

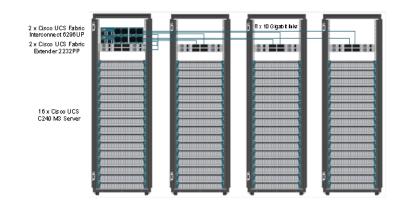
http://www.cisco.com/en/US/docs/unified_computing/ucs/c-series_integration/ucsm2.1/b_UCSM2-1_C-Integration_chapter_010.html

For more information on physical connectivity illustrations and cluster setup, see:

http://www.cisco.com/en/US/docs/unified_computing/ucs/c-series_integration/ucsm2.1/b_UCSM2-1_C-Integration_chapter_010.html#reference_FE5B914256CB4C47B30287D2F9CE3597

Figure 3 depicts a 64 node cluster. Each link in the figure represents 8 x 10 Gigabit links.

Figure 3 64 Nodes Cluster Configuration



Software Distributions and Versions

The software distributions required versions are listed below.

Hortonworks Data Platform (HDP 2.0)

The Hortonworks Data Platform supported is HDP 2.0. For more information visit http://www.hortonworks.com.

Red Hat Enterprise Linux (RHEL)

The operating system supported is Red Hat Enterprise Linux 6.4. For more information visit http://www.redhat.com.

Software Versions

The software versions tested and validated in this document are shown in Table 4.

Layer	Component	Version or Release
Compute	Cisco UCS C240-M3	1.5.4f
	Cisco UCS 6296UP	UCS 2.2(1b)A
	Cisco UCS VIC1225 Firmware	2.2(1b)
Network	Cisco UCS VIC1225 Driver	2.1.1.41
	Cisco Nexus 2232PP	5.2(3)N2(2.21b)
Storago	LSI 9271-8i Firmware	23.12.0-0021
Storage	LSI 9271-8i Driver	06.602.03.00
	Red Hat Enterprise Linux Server	6.4 (x86_64)
Software	Cisco UCS Manager	2.2(1b)
	HDP	2.0

The latest drivers can be downloaded from the link below:

http://software.cisco.com/download/release.html?mdfid=284296254&flowid=31743&softwareid=2838 53158&release=1.5.1&relind=AVAILABLE&rellifecycle=&reltype=latest

Fabric Configuration

This section provides details for configuring a fully redundant, highly available Cisco UCS 6296 fabric configuration.

- 1. Initial setup of the Fabric Interconnect A and B.
- 2. Connect to IP address of Fabric Interconnect A using web browser.
- 3. Launch UCS Manager.
- 4. Edit the chassis discovery policy.
- 5. Enable server and uplink ports.
- 6. Create pools and polices for service profile template.
- 7. Create Service Profile template and 64 Service profiles.
- 8. Start discover process.

9. Associate to server.

Performing Initial Setup of Cisco UCS 6296 Fabric Interconnects

This section describes the steps to perform initial setup of the Cisco UCS 6296 Fabric Interconnects A and B.

Configure Fabric Interconnect A

- 1. Connect to the console port on the first Cisco UCS 6296 Fabric Interconnect.
- 2. At the prompt to enter the configuration method, enter console to continue.
- 3. If asked to either perform a new setup or restore from backup, enter setup to continue.
- 4. Enter y to continue to set up a new Fabric Interconnect.
- 5. Enter y to enforce strong passwords.
- 6. Enter the password for the admin user.
- 7. Enter the same password again to confirm the password for the admin user.
- 8. When asked if this fabric interconnect is part of a cluster, answer y to continue.
- 9. Enter A for the switch fabric.
- **10.** Enter the cluster name for the system name.
- 11. Enter the Mgmt0 IPv4 address.
- 12. Enter the Mgmt0 IPv4 netmask.
- 13. Enter the IPv4 address of the default gateway.
- 14. Enter the cluster IPv4 address.
- 15. To configure DNS, answer y.
- 16. Enter the DNS IPv4 address.
- 17. Answer y to set up the default domain name.
- 18. Enter the default domain name.
- **19.** Review the settings that were printed to the console, and if they are correct, answer yes to save the configuration.
- 20. Wait for the login prompt to make sure the configuration has been saved.

Configure Fabric Interconnect B

- 1. Connect to the console port on the second Cisco UCS 6296 Fabric Interconnect.
- 2. When prompted to enter the configuration method, enter console to continue.
- **3.** The installer detects the presence of the partner Fabric Interconnect and adds this fabric interconnect to the cluster. Enter y to continue the installation.
- 4. Enter the admin password that was configured for the first Fabric Interconnect.
- 5. Enter the Mgmt0 IPv4 address.
- 6. Answer yes to save the configuration.

7. Wait for the login prompt to confirm that the configuration has been saved.

For more information on configuring Cisco UCS 6200 Series Fabric Interconnect, see:

http://www.cisco.com/en/US/docs/unified_computing/ucs/sw/gui/config/guide/2.0/b_UCSM_GUI_Configuration_Guide_2_0_chapter_0100.html

Logging Into Cisco UCS Manager

Follow these steps to login to Cisco UCS Manager.

- 1. Open a Web browser and navigate to the Cisco UCS 6296 Fabric Interconnect cluster address.
- 2. Click the Launch link to download the Cisco UCS Manager software.
- 3. If prompted to accept security certificates, accept as necessary.
- 4. When prompted, enter admin for the username and enter the administrative password.
- 5. Click Login to log in to the Cisco UCS Manager.

Upgrading Cisco UCS Manager Software to Version 2.2(1b)

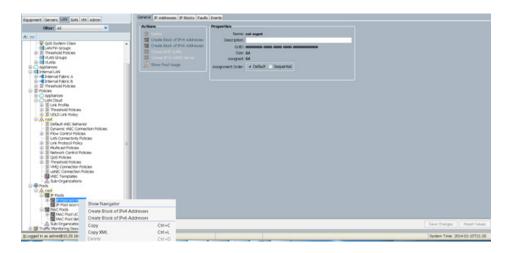
This document assumes the use of UCS 2.2(1b). Refer to Upgrading between Cisco UCS 2.0 Releases to upgrade the Cisco UCS Manager software and Cisco UCS 6296 Fabric Interconnect software to version 2.2(1b). Also, make sure the Cisco UCS C-Series version 2.2(1b) software bundles is installed on the Fabric Interconnects.

Adding Block of IP Addresses for KVM Access

These steps provide details for creating a block of KVM IP addresses for server access in the Cisco UCS environment.

- 1. Select the LAN tab at the top of the left window.
- 2. Select Pools > IpPools > Ip Pool ext-mgmt.
- 3. Right-click IP Pool ext-mgmt.
- 4. Select Create Block of IPv4 Addresses.

Figure 4 Adding Block of IPv4 Addresses for KVM Access Part 1



5. Enter the starting IP address of the block and number of IPs needed, as well as the subnet and gateway information.

Figure 5Adding Block of IPv4 Addresses for KVM Access Part 2

Create a	Block of IPv4 A	ddresses		
From:	0.0.0.0	Size:	_	1
Subnet Mask:	255.255.255.0	Default Gateway:	0.0.0.0	
Primary DNS:	0.0.0.0	Secondary DNS:	0.0.0.0	

- 6. Click OK to create the IP block.
- 7. Click OK in the message box.

Figure 6 Adding Block of IPv4 Addresses for KVM Access Part 3

🛕 Create Blo	ck of IPv4 Addresses			×
Create a	Block of IPv4 Address	es		Ø
From:	10.29.160.70	Size:	0	64 💌
Subnet Mask:	255.255.255.0	Default Gateway:	10.29.160.1	
Primary DNS:	0.0.0.0	Secondary DNS:	0.0.0.0	
				OK Cancel

Editing Chassis and FEX Discovery Policy

These steps provide details for modifying the chassis discovery policy. Setting the discovery policy now will simplify the addition of future Cisco UCS B-Series Chassis and additional Fabric Extenders for further Cisco UCS C-Series connectivity.

- 1. Navigate to the Equipment tab in the left pane.
- 2. In the right pane, click the Policies tab.
- 3. Under Global Policies, change the Chassis/FEX Discovery Policy to 8-link.
- 4. Click Save Changes in the bottom right hand corner.
- 5. Click OK.

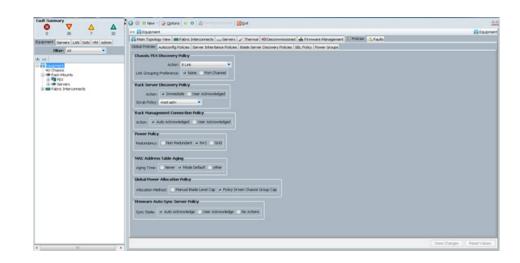


Figure 7 Chasses and FEX Discovery Policy

Enabling Server Ports and Uplink Ports

Follow these steps to enable server and uplinks ports:

- 1. Select the Equipment tab on the top left of the window.
- Select Equipment > Fabric Interconnects > Fabric Interconnect A (primary) > Fixed Module.
- 3. Expand the Unconfigured Ethernet Ports section.
- 4. Select all the ports that are connected to the Cisco 2232 FEX (8 per FEX), right-click them, and select Reconfigure > Configure as a Server Port.
- 5. Select port 1 that is connected to the uplink switch, right-click, then select Reconfigure > Configure as Uplink Port.
- 6. Select Show Interface and select 10GB for Uplink Connection.
- 7. A pop-up window appears to confirm your selection. Click Yes then OK to continue.
- Select Equipment > Fabric Interconnects > Fabric Interconnect B (subordinate) > Fixed Module.
- 9. Expand the UnConfigured Ethernet Ports section.
- 10. Select all the ports that are connected to the Cisco 2232 Fabric Extenders (8 per Fex), right-click them, and select Reconfigure > Configure as Server Port.
- 11. A prompt displays asking if this is what you want to do. Click Yes then OK to continue.
- 12. Select port number 1, which is connected to the uplink switch, right-click, then select Reconfigure > Configure as Uplink Port.
- 13. Select Show Interface and select 10GB for Uplink Connection.
- 14. A pop-up window appears to confirm your selection. Click Yes then OK to continue.

Figure 8

```
Enabling Server Ports
```

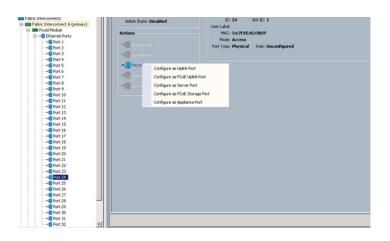


Figure 9

Showing Servers and Uplink Ports

ult Summary	100	D New +	Options 0 0	odos activities 1 6	ol Eve		
🛛 🗸 🛆 🖉							
0 24 7 32			Fabric Interconnects •		nnect A (primary) * 🗖	Fixed Module	
upment Servers LAN SAN VM Admin	Genera	Ethernet Po	rts FC Ports Faults Ev	rents			
Filter: All	d, File	r = Export	Print If Role: 🗸 All	Unconfigured	Network V Server	🔽 FCoE Uplink 🔽 Unifie	d Uplink 📝 Appliance Stora
	Slot	Port ID	MAC	If Role	If Type	Overall Status	Administrative Stat
	1	1	00:24:64:68:E1:88	Network	Physical	1 Up	t Enabled
Equipment	1	2	00:2A:6A:68:E1:89	Server	Physical	1 Up	t Enabled
- NO Chassis	1	3	00:24:64:68:E1:84	Server	Physical	1 Up	t Enabled
	1	4	00:24:64:68:E1:88	Server	Physical		t Enabled
E Servers						t Up	
Fabric Interconnects	1	5	00:2A:6A:6B:E1:9C	Server	Physical	t Up	t Enabled
Figure Fabric Interconnect A (primary)	1	6	00:2A:6A:68:E1:80	Server	Physical	t Up	I Enabled
E Facer Pacer Pacer (Primary)	1	7	00:2A:6A:68:E1:8E	Server	Physical	1 Up	I Enabled
Ethernet Ports	1	8	00:24:6A:68:E1:8F	Server	Physical	t Up	t Enabled
Port 1	1	9	00:2A:6A:6B:E1:90	Server	Physical	1 Up	In Enabled
Port 2	1	10	00:2A:6A:68:E1:91	Server	Physical	1 Up	t Enabled
Port 3	1	2.1	00:2A:6A:68:E1:92	Server	Physical	1 Up	1 Enabled
Port 4	1	12	00:2A:6A:68:E1:93	Server	Physical	1 Up	t Enabled
Port S	1	13	00:24:64:68:E1:94	Server	Physical	1 Up	t Enabled
Port 6	1	14	00:24:64:68:E1:95	Server	Physical	1 Up	1 Enabled
Port 7	1	15	00:24:64:68:E1:96	Server	Physical	1 Up	† Enabled
Port 8	1	16	00:24:64:68:E1:97	Server	Physical	1 Up	t Enabled
Port 9	1	17	00:24:64:68:E1:97				t Enabled
Port 10				Server	Physical	t Up	
Port 11	1	18	00:2A:6A:68:E1:99	Server	Physical	t Up	t Enabled
Port 12	1	19	00:2A:6A:68:E1:9A	Server	Physical	1 Up	Enabled
Port 13	1	20	00:2A:6A:6B:E1:98	Server	Physical	t Up	I Enabled
Port 14	1	21	00:2A:6A:68:E1:9C	Server	Physical	t Up	t Enabled
Port 15	1	22	00:2A:6A:68:E1:90	Server	Physical	t Up	1 Enabled
Port 16	1	23	00:2A:6A:68:E1:9E	Server	Physical	1 Up	1 Enabled
Port 17	1	24	00:24:64:68:E1:9F	Server	Physical	t Up	1 Enabled
	1	25	00:24:64:68:E1:40	Server	Physical	1 Up	1 Enabled
Port 19	1	26	00:24:64:68:E1:A1	Server	Physical	1 Up	1 Enabled
Port 20	1	27	00:24:64:68:E1:A2	Server	Physical	1 Up	† Enabled
Port 21	1	28	00:2A:6A:68:E1:A3	Server	Physical	1 Up	t Enabled
Port 22	1	29	00:24:64:68:E1:44	Server	Physical	1 Up	1 Enabled
Port 24	1	30	00:24:64:68:E1:44				t Enabled
Port 25	1			Server	Physical	t Up	
Port 26	1	31	00:2A:6A:68:E1:A6	Server	Physical	1 Up	t Enabled
	1	32	00:2A:6A:6B:E1:A7	Server	Physical	t Up	t Enabled
Port 28							

Creating Pools for Service Profile Templates

Creating an Organization

Organizations are used as a means to arrange and restrict access to various groups within the IT organization, thereby enabling multi-tenancy of the compute resources. This document does not assume the use of Organizations; however the necessary steps are provided for future reference.

Follow these steps to configure an organization within the Cisco UCS Manager GUI:

- 1. Click New on the top left corner in the right pane in the Cisco UCS Manager GUI.
- 2. Select Create Organization from the options
- 3. Enter a name for the organization.

- 4. (Optional) Enter a description for the organization.
- 5. Click OK.
- 6. Click OK in the success message box.

Creating MAC Address Pools

Follow these steps to create MAC address pools:

- 1. Select th LAN tab on the left of the window.
- 2. Select Pools > root.
- 3. Right-click MAC Pools under the root organization.
- 4. Select Create MAC Pool to create the MAC address pool. Enter ucs for the name of the MAC pool.
- 5. (Optional) Enter a description of the MAC pool.
- 6. Click Next.
- 7. Click Add.
- 8. Specify a starting MAC address.
- 9. Specify a size of the MAC address pool, which is sufficient to support the available server resources.
- 10. Click OK.

Figure 10 Specifying First MAC Address and Size



11. Click Finish.

Unified C	omputing Syst	tem M	lanag
Create MAC Pool 1. VDefine Name and	Add MAC Addresses		
<u>Description</u> 2. √ <u>Add MAC Addresses</u>	Name	From 000:25:85:00:00	To . 00:25:85:00:
	Add	Dolata	

Figure 11 Adding MAC Addresses

12. When the message box displays, click OK.

Figure 12 Confirming Newly Added MAC Pool

Create M	AC Pool 🛛 🗙
٩	Successfully created MAC POOL ucs.
	OK

Configuring VLANs

VLANs are configured as in shown in Table 5.

VLAN	Fabric	NIC Port	Function	Failover
vlan160_mgmt	А	eth0	Management, User	Fabric Failover to B
-			connectivity	
vlan12_HDFS	В	eth1	Hadoop	Fabric Failover to A
vlan11_DATA	А	eth2	Hadoop and/or	Fabric Failover to B
			SAN/NAS access, ETL	

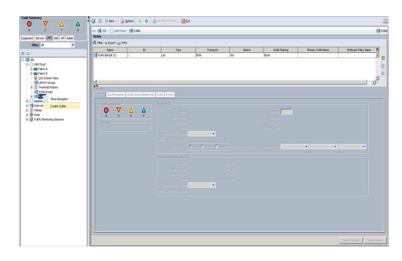
All of the VLANs created need to be trunked to the upstream distribution switch connecting the fabric interconnects. For this deployment vlan160_mgmt is configured for management access and user connectivity, vlan12_HDFS is configured for Hadoop interconnect traffic and vlan11_DATA is configured for optional secondary interconnect and/or SAN/NAS access, heavy ETL, etc.

Follow these steps to configure VLANs in the Cisco UCS Manager GUI:

- 1. Select the LAN tab in the left pane in the Cisco UCS Manager GUI.
- 2. Select LAN > VLANs.
- 3. Right-click the VLANs under the root organization.
- 4. Select Create VLANs to create the VLAN.

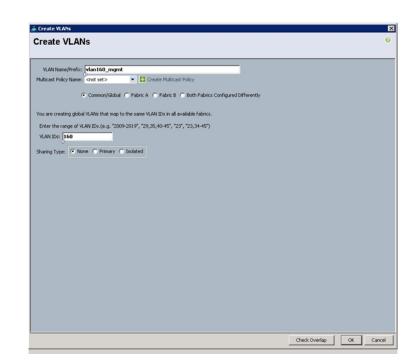
Figure 13

Creating VLAN



- 5. Enter vlan160_mgmt for the VLAN Name.
- 6. Select Common/Global for vlan160_mgmt.
- 7. Enter 160 on VLAN IDs of the Create VLAN IDs.
- 8. Click OK and then, click Finish.
- 9. Click OK in the success message box.

Figure 14 Creating Management VLAN



- 10. Select the LAN tab in the left pane again.
- **11.** Select LAN > VLANs.

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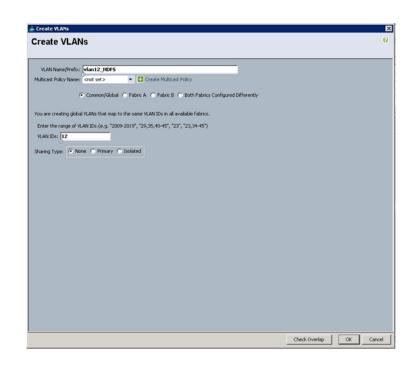
- 12. Right-click the VLANs under the root organization.
- 13. Select Create VLANs to create the VLAN.
- 14. Enter vlan11_DATA for the VLAN Name.
- 15. Select Common/Global for the vlan11_DATA.
- 16. Enter 11 on VLAN IDs of the Create VLAN IDs.
- 17. Click OK and then, click Finish.
- 18. Click OK in the success message box.

Figure 15 Creating VLAN for Data

Create VLANs VLAN Name@Prefix: varial_Data Madicast Policy costee Multicast Policy common/Global Fabric & Fabric & Both Fabrics Configured Differently You are creating global VLANs that map to the same VLAN UDs in all available fabrics. Eret the range of VLAN IDs.(e.g., "2009-2019", "29, 95, 40-45", "23", "23, 34-45") YAN IDs: [1] Shuring Type: None Permary	
Multicast Policy Name: (mt sets) Common/Global Fabric A Fabric B Both Fabrics Configured Differently Tou are creating global YLANIs that map to the same VLAN ID's in all available fabrics. Enter the range of VLAN ID(e.g., 2009-2019', "29,35,40-45", "23", "23", 24",45") YLAN ID: Sharing Type: None Primary Isolated	
Multicast Policy Name: (mt sets) Common/Global Fabric A Fabric B Both Fabrics Configured Differently Tou are creating global YLANIs that map to the same VLAN ID's in all available fabrics. Enter the range of VLAN ID(e.g., 2009-2019', "29,35,40-45", "23", "23", 24",45") YLAN ID: Sharing Type: None Primary Isolated	
You are creating global VLANs that map to the same YLAN IDs in all available fabrics. Enter the range of VLAN IDs.(e.g. '2009-2019', '29,35,40-45', '23', '23,34-45') VLAN IDS: Sharing Type: INone Primary Isolated	
Enter the range of VLAN IDs. (e.g. "2009-2019", "29,35,40-45", "23", "23,34-45") VLAN IDs: [1] Sharing Type: None Primary Isolated	
VLN IDs: 11	
VLN IDs: 11	
Sharng Type: Pinary C Isolated	
Check Overlap OK Ca	OK Cano

- 19. Select the LAN tab in the left pane again.
- **20.** Select LAN > VLANs.
- 21. Right-click the VLANs under the root organization.
- 22. Select Create VLANs to create the VLAN.
- 23. Enter vlan12_HDFS for the VLAN Name.
- 24. Select Common/Global for the vlan12_HDFS.
- 25. Enter 12 on VLAN IDs of the Create VLAN IDs.
- 26. Click Ok and then, click Finish.

Figure 16 Creating VLAN for Hadoop Data



Creating a Server Pool

A server pool contains a set of servers. These servers typically share the same characteristics. Those characteristics can be their location in the chassis, or an attribute such as server type, amount of memory, local storage, type of CPU, or local drive configuration. You can manually assign a server to a server pool, or use server pool policies and server pool policy qualifications to automate the assignment

Follow these steps to configure the server pool within the Cisco UCS Manager GUI:

- 1. Select the Servers tab in the left pane in the UCS Manager GUI.
- 2. Select Pools > root.
- 3. Right-click the Server Pools.
- 4. Select Create Server Pool.
- 5. Enter your required name (ucs) for the Server Pool in the name text box.
- 6. (Optional) enter a description for the organization.
- 7. Click Next to add the servers.

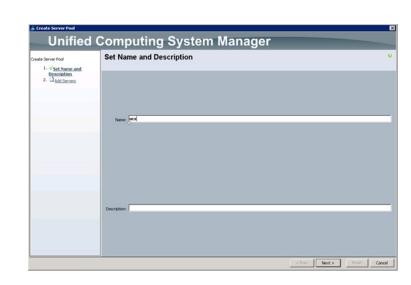
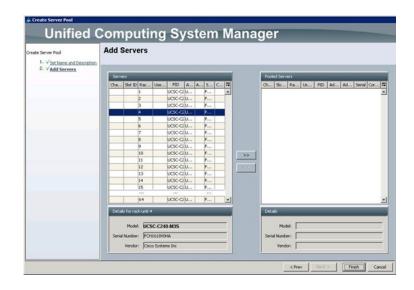


Figure 17 Setting Name and Description of the Server Pool

- 8. Select all the Cisco UCS C240M3S servers to be added to the server pool you previously created (ucs), then Click >> to add them to the pool.
- 9. Click Finish.
- 10. Click OK and then click Finish.

Figure 18 Adding Servers to the Server Pool



Creating Policies for Service Profile Templates

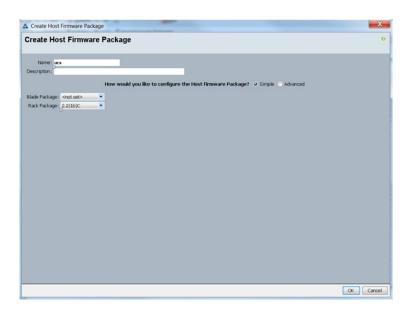
Creating Host Firmware Package Policy

Firmware management policies allow the administrator to select the corresponding packages for a given server configuration. These include adapters, BIOS, board controllers, FC adapters, HBA options, ROM and storage controller properties as applicable.

Follow these steps to create a firmware management policy for a given server configuration using the Cisco UCS Manager GUI:

- 1. Select the Servers tab in the left pane in the Cisco UCS Manager GUI.
- 2. Select Policies > root.
- 3. Right-click Host Firmware Packages.
- 4. Select Create Host Firmware Package.
- 5. Enter your required Host Firmware package name (ucs).
- 6. Select Simple radio button to configure the Host Firmware package.
- 7. Select the appropriate Rack package that you have.
- 8. Click OK to complete creating the management firmware package.
- 9. Click OK.

Figure 19 Creating Host Firmware Package



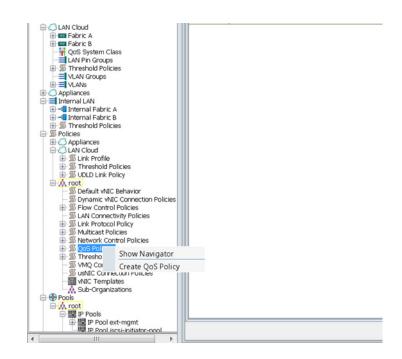
Creating QoS Policies

Follow these steps to create the QoS policy for a given server configuration using the Cisco UCS Manager GUI:

Best Effort Policy

- 1. Select the LAN tab in the left pane in the Cisco UCS Manager GUI.
- 2. Select Policies > root.
- 3. Right-click QoS Policies.
- 4. Select Create QoS Policy.

Figure 20 Creating QoS Policy



- 5. Enter BestEffort as the name of the policy.
- 6. Select BestEffort from the drop down menu.
- 7. Keep the Burst(Bytes) field as default (10240).
- 8. Keep the Rate(Kbps) field as default (line-rate).
- 9. Keep Host Control radio button as default (none).
- 10. When the pop-up window appears, click OK to complete the creation of the Policy.

Figure 21 Creating Best Effort Qos Policy

		_	Create QoS Polic	c y	×
ame: BestEffo Egress Priority: Burst(Bytes): Rate(Kbps):	Best Effort	×		ssfully created QOS Policy BestEff how Navigator for QOS Policy Best	
Host Control:	None C Full				

Platinum Policy

- 1. Select the LAN tab in the left pane in the UCSM GUI.
- 2. Select Policies > root.
- **3.** Right-click QoS Policies.
- 4. Select Create QoS Policy.
- 5. Enter Platinum as the name of the policy.
- 6. Select Platinum from the drop down menu.
- 7. Keep the Burst(Bytes) field as default (10240).
- 8. Keep the Rate(Kbps) field as default (line-rate).
- 9. Keep Host Control radio button as default (none).
- 10. When the pop-up window appears, click OK to complete the creation of the Policy.

Figure 22 Creating Platinum QoS Policy

ame: Platinum		-	Create Qo	oS Policy 🗙
Egress Priority: Burst(Bytes): Rate(Kbps):	10240	•	•	Successfully created QOS Policy Platinum.
Host Control:	None C Full			

Setting Jumbo Frames

Follow these steps for setting Jumbo frames and enabling QoS:

1. Select the LAN tab in the left pane in the UCSM GUI.

- 2. Select LAN Cloud > QoS System Class.
- 3. In the right pane, select the General tab
- 4. In the Platinum row, enter 9000 for MTU.
- 5. Check the Enabled Check box next to Platinum.
- 6. In the Best Effort row, select best-effort for weight.
- 7. In the Fiber Channel row, select none for weight.
- 8. Click Save Changes.
- 9. Click OK.

Figure 23	Setting Jumbo Frames

Filter: All	Priority	Enabled	Co5	Packet Drop	Weight		Weight (%)	MTU		Multicast Optimized
	Platinum	V	5		10	٠	90	9000	-	
LAN	Gold		4	V	9	٠	N/A	normal	•	
E Fabric A	Silver		2	V	8	٠	N/A	normal	•	
Fabric 8 CoS System Class	Bronze		1	V	7.	٠	N/A	normal	-	
LAN Pin Groups	Best Effort		Any		best-effort	٠	9	normal	-	
U.N. Grups U.N. Grups Internal LAN Internal LAN Polices Polices Polices	Fibre Channel		3		none		1	fc	•	N/A

Creating Local Disk Configuration Policy

Follow these steps to create local disk configuration in the Cisco UCS Manager GUI:

- 1. Select the Servers tab on the left pane in the UCS Manager GUI.
- 2. Go to Policies > root.
- 3. Right-click Local Disk Config Policies.
- 4. Select Create Local Disk Configuration Policy.
- 5. Enter ucs as the local disk configuration policy name.
- 6. Change the Mode to Any Configuration. Uncheck the Protect Configuration box.
- 7. Keep the FlexFlash State field as default (Disable).
- 8. Keep the FlexFlash RAID Reporting State field as default (Disable).
- 9. Click OK to complete the creation of the Local Disk Configuration Policy.
- 10. Click OK.

Figure 24 Configuring Local Disk Policy



Creating Server BIOS Policy

The BIOS policy feature in Cisco UCS automates the BIOS configuration process. The traditional method of setting the BIOS is done manually and is often error-prone. By creating a BIOS policy and assigning the policy to a server or group of servers, you can enable transparency within the BIOS settings configuration.



BIOS settings can have a significant performance impact, depending on the workload and the applications. The BIOS settings listed in this section is for configurations optimized for best performance which can be adjusted based on the application, performance and energy efficiency requirements.

Follow these steps to create a server BIOS policy using the Cisco UCS Manager GUI:

- 1. Select the Servers tab in the left pane in the Cisco UCS Manager GUI.
- 2. Select Policies > root.
- 3. Right-click BIOS Policies.
- 4. Select Create BIOS Policy.
- 5. Enter your preferred BIOS policy name (ucs).
- 6. Change the BIOS settings as per the following figures:

Figure 25 Creating Server BIOS Policy

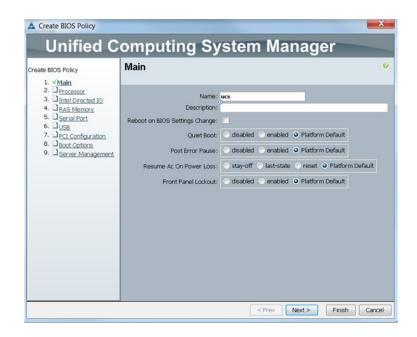


Figure 26 Creating Server BIOS Policy for Processor



1

Create BIOS Policy	Intel Directed IO		0
Vitán 2. √Processo: 3. √Intel Directed ID 4. □ PAS Hemory 5. □ Sensi Port 6. □ USB 7. □ PCI Confloaration 8. □ Best Octoons 9. □ Servier Management	Interrupt Remap: C Coherency Support: C ATS Support: C	dsabled C enabled Platform Default dsabled C enabled Platform Default dsabled C enabled Platform Default dsabled C enabled Platform Default dsabled C enabled Platform Default	

Figure 27 Creating Server BIOS Policy for Intel Directed IO

- 7. Click Finish to complete creating the BIOS policy.
- 8. Click OK.

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Figure 28 Creating Server BIOS Policy for Memory



Figure 29

Creating a Boot Policy

Follow these steps to create boot policies within the Cisco UCS Manager GUI:

- 1. Select the Servers tab in the left pane in the Cisco UCS Manager GUI.
- 2. Select Policies > root.
- 3. Right-click the Boot Policies.

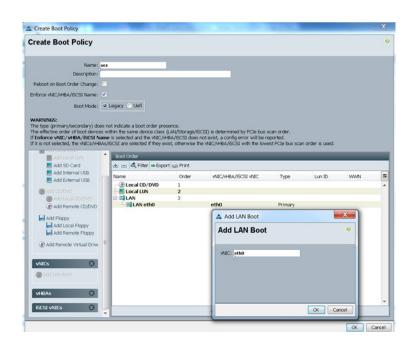
Creating Bot Policy Part 1

4. Select Create Boot Policy.

🕝 🏐 🗉 New - 🕞 Options 🛛 📀 🕕 🖓 Dexit V ▲ >> 🥪 Servers 🕴 🐒 Policies 🕴 🛝 root 🖓 📓 Boot Policies Boot Policies Events vers LAN SAN VM Admin 🟦 😑 🛋 Filter 👄 Export 🎯 Print . rt All WEC/MBA/ISCSI WEC Order Boot Policy UCS Boot Policy default Boot Policy default Boot Policy diag Boot Policy utility BIOS Policie Boot Policies Create Boot Policy s are Parkar N Policies

- 5. Enter ucs as the boot policy name.
- 6. (Optional) enter a description for the boot policy.
- 7. Keep the Reboot on Boot Order Change check box unchecked.
- 8. Keep Enforce vNIC/vHBA/iSCSI Name check box checked.
- 9. Keep Boot Mode Default (Legacy).
- 10. Expand Local Devices > Add CD/DVD and select Add Local CD/DVD.
- 11. Expand Local Devices > Add Local Disk and select Add Local LUN.
- 12. Expand vNICs and select Add LAN Boot and enter eth0.
- 13. Click OK to add the Boot Policy.
- 14. Click OK.

Figure 30 Creating Boot Policy Part 2



Creating a Service Profile Template

Follow these steps to create a service profile template:

- 1. Select the Servers tab in the left pane in the Cisco UCS GUI.
- 2. Right-click Service Profile Templates.
- 3. Select Create Service Profile Template.

Figure 31 Creating a Service Profile Template

Porture Carlo Measa	 Core Unified Computing System Hanager 		
Constrained and a set of the set of th	Fault Summary	😡 🐵 🗉 New - 😡 Geben 🕘 🕖 🖾 Analog Alandes 🛛 🎆 D.K.	±
Care of Mark (a)			🔛 Service Profile Template
Note Note Image: A rest of the second seco	Colonere Servers LAN SAN VM Adver		
A De la construir de la constr	Filter Al T	a a d, rise = Epot co rest	
Right Cick Service Profile Template and cick on Create Service Pro	and the second se		A09100 [0]
		when we have a state of the sta	8

The Create Service Profile Template window appears.

The steps listed below provide a detailed configuration procedure to identify the service profile template:

a. Name the service profile template as ucs.

- b. Select the Updating Template radio button.
- c. In the UUID section, select Hardware Default as the UUID pool.
- d. Click Next to continue to the next section.

Figure 32 Identify Service Profile Template

 Service Profile Template 1. √<u>Identify Service</u> Profile Template 	Identify Service Profile Template You must enter a name for the service profile template and specify the template type. You can also specify how a UUD will be assigned to this template and enter a description.
2. Jetantina 3. Januar 4. Janna 5. <u>Anti-Ak-Kommer</u> 6. Januar 1. <u>Anti-Ak-Kommer</u> 6. Januar 1. <u>Anti-Ak-Kommer</u> 8. Januar 2. <u>Anti-Ak-Kommer</u> 1. <u>Januar</u> 2. <u>Janua</u>	Name: book The trendents will be created in the following organization. Its name must be unsign within the organization. Where: expression The trendents will be created in the following organization. Its name must be unsign within the organization. Type: Initial frequence - Updating - Updatin

Configuring Network Settings for a Template

Follow these steps to configure the network settings for a template:

- 1. Keep the Dynamic vNIC Connection Policy field at the default.
- 2. Select Expert radio button for the option how would you like to configure LAN connectivity?
- 3. Click Add to add a vNIC to the template.



Figure 33 Configuring Network Settings for a Template

- 4. The Create vNIC window displays. Name the vNIC as eth0.
- 5. Select ucs in the Mac Address Assignment pool.
- 6. Select the Fabric A radio button and check the Enable failover check box for the Fabric ID.
- 7. Check the vlan160 mgmt check box for VLANs and select the Native VLAN radio button.
- 8. Select MTU size as 1500
- 9. Select adapter policy as Linux
- 10. Select QoS Policy as BestEffort.
- 11. Keep the Network Control Policy as Default.
- 12. Keep the Connection Policies as Dynamic vNIC.
- 13. Keep the Dynamic vNIC Connection Policy as <not set>.
- 14. Click OK.

I

Figure 34 Configuring vNIC eth0

ame: MAC Address e vNIC Template: MAC Address Assignment: Lcs(S12/S12) e vNIC Template: Image: Constant Address Assignment: Lcs(S12/S12) I Create VAIC Template: Image: Constant Address will be automatically assigned from the selected pool. I Create VAIC Template: Image: Constant Address will be automatically assigned from the selected pool. I Create VAIC Template: Image: Constant Address will be automatically assigned from the selected pool. ViANs: Image: Constant Address Patient Address will be automatically assigned from the selected pool. Select Name Native VLAN ViANs: Image: Constant VLAN I Vianili DaTA Image: Constant VLAN I Create VLAN Image: Constant VLAN MTU: Isoo	MAC Address Assignment: ucs(512/512) Create MAC Pool The MAC address will be automatically assigned from the selected pool.	Immediate MAC Address Assignment: ucs(S12/S12) InvAIC Template: Immediate MAC Pool Create VAIC Template: Immediate MAC Pool The MAC address will be automatically assigned from the selected pool. virk ID: Flatnic A Fabric B Fallover VLAN Immediate Filter Export Go Print Select Name Native VLAN Immediate Immediate Information Immediate Informat	MAC Address Assignment: ucs(\$12,512) WAC Address Assignment: ucs(\$12,512) Create VAIC Template Create VAIC Template MAC Address will be automatically assigned from the selected pool. The MAC address will be automatically assigned from the selected pool. First D: Fabric A Fabric B Enable Failover VAIAS Filter Export (© Print Select Name Native VLAN TO: : 500 Warring Warring Mac address Profile Create VLAN MTC: : 500 Warring For cate VLAN MTC: : 500 Warring For cate VLAN MTC: : 500 Warring Create VLAN MTC: : 500 Warring	Auto: Template: MAC Address Assignment: ucs(512/512) Image: Create VAIC Template: Image: Create MAC Pool The MAC Address will be automatically assigned from the selected pool. The MAC Address will be automatically assigned from the selected pool. tric ID: Fabric A Fabric B Enable Failover Image: Create VAIC Fool VLAS Image: Create MAC Pool Image: Create VAIC Fool Select Name Nather VLAN Image: Create VAIN Image: Create VAIN Image: Create VAIN Image: Create VAIN MIC: 1500 Image: Create VAIN Image: Create VAIN Miles sure that the MTU has the same value in the COS System Class corresponding to the Egress priority of the selected QoS Policy. Image: Create VAIN In Group: Create VAIN Image: Create VAIN Create VAIN Create Class corresponding to the Egress priority of the selected QoS Policy. Image: Create VAIN Create VAIN Create Class corresponding to the Egress priority of the selected QoS Policy. In Group: Create VAIN Create LAIN Pin Group Image: Create VAIN Create VAIN Pin Group Image: Create VAIN Pin Group Interpretional Parameters Image: Create VAIN Pin Group Image: Create VAIN Pin Group Image: Create VAIN Pin Group Interpretional Parameters Image: Create VAIN Pin Group Image: Create VAIN Pin Group Image: Create VAIN Pin Group <th>MAC Address Assignment: ucs(\$12,512) WAC Address Assignment: ucs(\$12,512) Create VAIC Template Create VAIC Template MAC Address will be automatically assigned from the selected pool. The MAC address will be automatically assigned from the selected pool. First D: Fabric A Fabric B Enable Failover VAIAS Filter Export (© Print Select Name Native VLAN TO: : 500 Warring Warring Mac address Profile Create VLAN MTC: : 500 Warring For cate VLAN MTC: : 500 Warring For cate VLAN MTC: : 500 Warring Create VLAN MTC: : 500 Warring</th> <th>0</th> <th></th> <th></th> <th></th>	MAC Address Assignment: ucs(\$12,512) WAC Address Assignment: ucs(\$12,512) Create VAIC Template Create VAIC Template MAC Address will be automatically assigned from the selected pool. The MAC address will be automatically assigned from the selected pool. First D: Fabric A Fabric B Enable Failover VAIAS Filter Export (© Print Select Name Native VLAN TO: : 500 Warring Warring Mac address Profile Create VLAN MTC: : 500 Warring For cate VLAN MTC: : 500 Warring For cate VLAN MTC: : 500 Warring Create VLAN MTC: : 500 Warring	0			
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- 15. The Create vNIC window appears. Name the vNIC eth1.
- 16. Select ucs in the Mac Address Assignment pool.
- 17. Select Fabric B radio button and check the Enable failover check box for the Fabric ID.
- 18. Check the vlan12_HDFS check box for VLANs and select the Native VLAN radio button
- 19. Select MTU size as 9000
- 20. Select adapter policy as Linux
- 21. Select QoS Policy as Platinum.
- 22. Keep the Network Control Policy as Default.
- 23. Keep the Connection Policies as Dynamic vNIC.
- 24. Keep the Dynamic vNIC Connection Policy as <not set>.
- 25. Click OK.

Figure 35 Configuring vNIC eth1

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	MAC Address	
lame: eth1	MAC Address Assignment: ucs(512/512)	
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The Create vNIC window appears.

- **26.** Name the vNIC eth2.
- 27. Select ucs in the Mac Address Assignment pool.
- 28. Select Fabric A radio button and check the Enable failover check box for the Fabric ID.
- 29. Check the vlan11_DATA check box for VLANs and select the Native VLAN radio button
- 30. Select MTU size as 9000
- 31. Select adapter policy as Linux
- 32. Select QoS Policy as Platinum.
- 33. Keep the Network Control Policy as Default.
- 34. Keep the Connection Policies as Dynamic vNIC.
- 35. Keep the Dynamic vNIC Connection Policy as <not set>.
- 36. Click OK.

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Figure 36

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Configuring vNIC eth2
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		Native VLAN	
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Adapter Policy: Unux QoS Policy: Platnum Create Ethernet Adapter Policy QoS Policy: Platnum Create QoS Policy Network Control Policy: default Connection Policies	C Create VLAN MTU: 9000 Warning Make sure that the MTU has the s corresponding to the Egress prior Ph Group: <not set=""></not>	ty of the selected QoS Policy.	•
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Network Control Policy: default	Create VLAN MTU: 9000 Warning Make ser that the MTU has the a corresponding to the Egress prior Pin Group: rot set> Derrational Parameters dapter Performance Profile	ty of the selected QoS Policy.	
onnection Policies	Create VLAN MTU: 9000 Warning Mikes sure that the MTU has the is corresponding to the Egress prior Pin Group: strot set> Operational Parameters dapter Performance Profile Adapter Policy: Linux	ty of the selected QoS Policy. Create LAN Pin Group Create LAN Pin Group	
	C Create VLAN MTU: 9900 Wanning Make sure that the MTU has the s corresponding to the Egress prior Pri Group: <not set=""> C Operational Parameters dapter Performance Profile Adapter Policy: Linux QoS Policy: Estimum</not>	ty of the selected QoS Policy. Create LAN Pin Group Create Ethernet Adapt C Create Ethernet Adapt C Create QoS Policy	er Policy
Dynamic vNIC O vMQ	C Create VLAN MTU: 9900 Wanning Make sure that the MTU has the s corresponding to the Egress prior Pri Group: <not set=""> C Operational Parameters dapter Performance Profile Adapter Policy: Linux QoS Policy: Estimum</not>	ty of the selected QoS Policy. Create LAN Pin Group Create Ethernet Adapt C Create Ethernet Adapt C Create QoS Policy	er Policy
	Create VLAN MTU: 9900 Warning Mikes sure that the MTU has the is corresponding to the Egress prior Pri Group: <not set=""> Coperational Parameters dapter Performance Profile Adapter Policy:Platrum. Jetwork Control Policy:Platrum.</not>	ty of the selected QoS Policy. Create LAN Pin Group Create Ethernet Adapt C Create Ethernet Adapt C Create QoS Policy	er Policy

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Configuring a Storage Policy for a Template

Follow these steps to configure storage policies:

- 1. Select ucs for the local disk configuration policy.
- 2. Select the No vHBAs radio button for the option for How would you like to configure SAN connectivity?
- 3. Click Next to continue to the next section.

Figure 37 Configuring Storage Settings

Create Service Profile Template 1. √Identify Service Profile	Storage	Manager uration information.	Û
Josef Marco Freito Josef Marco Freito Josef Marco Josef Marco	Select a local disk configuration policy. Local Storage: uce	Cherris exprendique and a service profile a	ky

4. Click Next when the zoning window appears to go to the next section.

Figure 38 Configure Zoning

Unified Computing System Manager A distribution A distributi	×				🚔 Create Service Profile Template
Create Service Profile Template I - V Justicity Service Profile Velocity Coming Specify Coming information Specify Coming information WARNEX Switch in end-boxt mode, zening coefliperation will NOT be applied. WARNEX Switch in end-boxt mode, zening coefliperation will NOT be applied. WARNEX Switch in end-boxt mode, zening coefliperation will NOT be applied. Second Scholard Risking Secon		Manager	System	Computing	Unified (
Intensidat. WARNING: Switch in end-host mode, in end-host mode, zening configuration will NOT be applied. V. V docate. Sump configuration molecule and following steps: I. Vestimation Thick: Intensity of the instant (specific steps) Description Transfer Sump configuration will not be applied. Vestimation Thick: Intensity of the instant (specific steps) I. Vestimation Thick: Substrated Instant (specific steps) Substrate Transfer Substrate Transfer I. Constrained Thick: Substrate Transfer Substrate Transfer Substrate Transfer S	0			Zoning	Create Service Profile Template
Name To Storage Connecton Polcy Name		aya)	lowing steps: As are created on storage p lected Initiator Group(s)	Zoning configuration involves the fi 1. Select vHSA Initiator(s) (vH 2. Select vHSA Initiator Group(3. Add selected Initiator(s) to s	Involution 2. √ Mathematica 3. √ Socialita 4. √ Zomina 5
Name Storage Connection Poly Name Society 2000		sect while instator Groups	ſ		9. Operational Policies
	1	Name Storage Connection Policy Name			
Chiefe Add The Nodry	×		>> Add To >>		
		💼 Delete 🛛 🖬 Add 📲 Modify			
				•	
< Prev Next > Finish	Cancel	< Prev Next > Pinish			

Configuring vNIC/vHBA Placement for a Template

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Follow these steps to configure vNIC/vHBA placement policy:

- 1. Select the Default Placement Policy option for the Select Placement field.
- 2. Select eth0, eth1 and eth2 assign the vNICs in the following order:

- a. eth0
- b. eth1
- c. eth2
- 3. Review to make sure that all of the vNICs were assigned in the appropriate order.
- 4. Click Next to continue to the next section.

Figure 39 vNIC/vHBA Placement



Configuring the Server Boot Order for a Template

Follow these steps to set the boot order for servers:

- 1. Select ucs in the Boot Policy name field.
- 2. Check the Enforce vNIC/vHBA/iSCSI Name check box.
- 3. Review to make sure that all of the boot devices were created and identified.
- 4. Verify that the boot devices are in the correct boot sequence.
- 5. Click OK.
- 6. Click Next to continue to the next section.

Figure 40 Creating Boot Policy



In the Maintenance Policy window, follow these steps to apply the maintenance policy:

- 1. Keep the Maintenance policy at no policy used by default.
- 2. Click Next to continue to the next section.

Configuring the Server Assignment for a Template

In the Server Assignment window, follow these steps to assign the servers to the pool:

- 1. Select ucs for the Pool Assignment field.
- 2. Keep the Server Pool Qualification field at default.
- 3. Select ucs in Host Firmware Package.

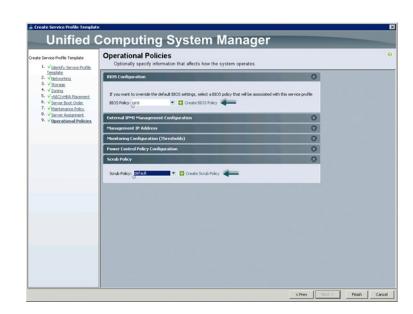
	de	X
Unified (Computing System Manager	
ervice Profile Template	Server Assignment Optionally specify a server pool for this service profile template.	0
Videntify Service Profile <u>Template</u> Vietworking		-
✓ Storage ✓ Zoning	Pool Assignment: UCS Create Server Pool Select the power state to be applied when this	
ALC/VHBA Placement Server Boot Order Maintenance Policy	profile is associated with the server.	
rver Assignment perational Policies	16 Up C Down	
AND DESCRIPTION OF A DE	The service profile template will be associated with one of the servers in the selected pool.	
	If desired, you can specify an additional server pool policy qualification that the selected server must meet. To do so, select the qualification from the list.	
	Server Pool Qualification: www.sets-wide Restrict Manaton:	
	Hestrick Hilly door:	
	Firmware Management (BIDS, Disk Controller, Adapter)	
	If you select a host firmware pokcy for this service profile, the profile will update the firmware on the server that it is associated with.	
	If you select a host firmware policy for this service profile, the profile will update the firmware on the	
	If you select a host firmware pokcy for this service profile, the profile will update the firmware on the server that it is associated with.	
	If you select a host firmware policy for this service profile, the profile will update the firmware on the server that it is associated with. Otherwise the system uses the firmware already installed on the associated server.	

Figure 41 Server Assignment

Configuring Operational Policies for a Template

In the Operational Policies Window, follow these steps:

- 1. Select ucs in the BIOS Policy field.
- 2. Click Finish to create the Service Profile template.
- 3. Click OK in the pop-up window to proceed.



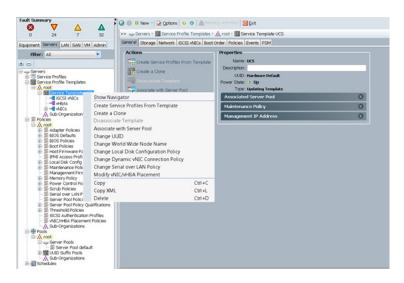
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Figure 42 Selecting BIOS Policy

Select the Servers tab in the left pane of the Cisco UCS Manager GUI.

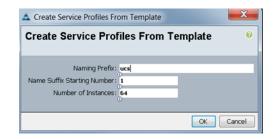
- 1. Go to Service Profile Templates > root.
- 2. Right-click Service Profile Templates ucs.
- 3. Select Create Service Profiles From Template.

Figure 43 Creating Service Profiles from Template



The Create Service Profile from Template window appears.

Figure 44 Selecting Name and Total Number of Service Profiles



Cisco UCS Manager will discover the servers. The association of the Service Profiles will take place automatically.

The Final Cisco UCS Manager window is shown in Figure 45.

Figure 45 Cisco UCS Manager Displaying all Notes

Epignent Servers LAV SAN VM Advin	Servers														
Filler Al ·	d, 18v = 1	Lipot di Prit													
and the second se	Name	Overal Status	PD	Publi	User Label	Cares	Henory	Adapters	MDCs.	HERA	Operability	Power State	Assoc State	Profile	Fait Supression Stat.
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8 11 Equpriere	I Server 2	1 Ok	UC9C-C240	ONDUCS C2		20	262344	1	3	0	# Operable	1 On	1 Associated	orgroot/le-G.	NA
-NJ Charait	de Server 3	1 Ok	UCIC-C240	Own UCS CZ		20	262344	1	3	0	Operable	¥ 06	• Associated	orgenation of	NA
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8 1 10	de Server 5	1 04	UCSC-0240	Cars UCS C2		20	202244	1	3	0	8 Operable	1 On	1 Associated	arg-root/e-ci.	NA
R a Fabre Diterconnects	- Server 6	1 OL	UC9C-C240	Own UCS C2		20	282144	1	3	0	# Operable	\$ On	1 Associated	org-root/h-U.	NA
	Server 7	1 OA	UC3C-C240	Own UCS C2		20	262344		3	0	Coperable	1 On	1 Associated	orgroot/s-G.	NA
	OF Server 8	1 OL	UCSC-C240	CHER UCS CZ		20	29/2344	1	3	0	# Operable	1 On	* Associated	orgrout/s-c.	NA
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	Server 11	1 OA	UC9C-C240	Cores UCS-C2		20	262144		3	0	# Openable	1 On	+ Associated	org-root/le-U.	NA
	Server 12	1 04	UCSC-CHO-	Corn UCS CZ		20	282344	4	3	0	* Operable	1 On	* Associated	orgrout/s-G.	NA
	Contract 10	1 08	UCSC-C240	Costs UCS C2		20	262344	3	3	0	Coerable	1 On	1 Associated	orgenat/hest.	NA
	Server 14	1 08		Comp UCS C2		20	252344	3	3	0	# Operable	1 -On	# Associated	09108/6-0.	NA
	Server 15	1 OR	UC9C-C240	Corp UCS C2		20	292144	3	3	0	# Openable	1 -On	† Associated	orprost/le-U.	NA
	-IP Server 16	1 Ok	UCSC-CH0	Cars UCS-C2-		20	262344		3	8	· Operable	1 On.	• Associated	orprost/la-G.	NA

Configuring Disk Drives for OS on Name Nodes

Namenode and Secondary Namenode have a different RAID configuration compared to Data nodes. This section details the configuration of disk drives for OS on these nodes (rhell and rhel2). The disk drives are configured as RAID1, read ahead cache is enabled and write cache is enabled while battery is present. The first two disk drives are used for operating system and remaining 22 disk drives are using for HDFS as described in the following sections.

There are several ways to configure RAID: using LSI WebBIOS Configuration Utility embedded in the MegaRAID BIOS, booting DOS and running MegaCLI commands, using Linux based MegaCLI commands, or using third party tools that have MegaCLI integrated. For this deployment, the first two disk drives are configured using LSI WebBIOS Configuration Utility and rests are configured using Linux based MegaCLI commands after the OS is installed.

R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
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	c driv		and								k Dri												

```
configure RAID 1
using WebBIOS
```

configure RAID 1 using Megacli

Follow these steps to create RAID1 on the first two disk drives to install the operating system:

- 1. When the server is booting, the following text appears on the screen:
- 2. Press <Ctrl><H> to launch the WebBIOS.
- 3. Press Ctrl+H immediately.

The Adapter Selection window appears.

- 1. Click Start to continue.
- 2. Click Configuration Wizard.

Figure 46

Adapter Selection for RAID Configuration

Adapter Selecti	ion			LSI
Adapter No.	Bus No.	Device No.	Туре	Firmware Pkg. Version
0. 🕥	130	0	LSI MegaRAID SAS 9271-81	23-12-0-0018
		<u> </u>	[Start]	<u></u>

3. In the configuration wizard window, choose Clear Configuration and click Next to clear the existing configuration.

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Figure 47 Clearing Current Configuration on the Controller



- 4. Choose Yes when asked to confirm the wiping of the current configuration.
- 5. In the Physical View, make sure that all the drives are Unconfigured Good.
- 6. Click Configuration Wizard.

Figure 48 Confirming Clearance of the Previous Configuration on the Controller



7. In the Configuration Wizard window choose the configuration type to be New Configuration and click Next.

Figure 49 Choosing to Create a New Configuration



- 8. Select the configuration method to be Manual Configuration; this enables you to have complete control over all attributes of the new storage configuration, such as, the drive groups, virtual drives and the ability to set their parameters.
- 9. Click Next.

Figure 50 Choosing the Manual Configuration Method



The Drive Group Definition window appears. Use this window to choose the first two drives to create drive group.

- **10.** Click Add to Array to move the drives to a proposed drive group configuration in the Drive Groups pane.
- 11. Click Accept DG and then, click Next.

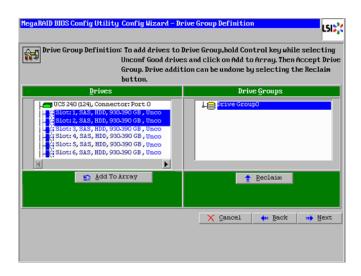


Figure 51 Selecting First Drive and Adding to the Drive Group

12. In the Span definitions Window, click Add to SPAN and click Next.

Figure 52 Span Definition Window

MegaRAID BIOS Config Utility) Config Wizard – Sj	pan Definition	LSIX
Span Definition:	drop-down.Click o	to a Span, select an array hole from th on Add To Span. Array hole will be added t ddition can be undone by selecting the	
Array With Free S	Space	Span	
	V	Drive Group:0,R0, R1,1-617 TB	
💁 Add to SP.	AN	A Reclaim	
		🗙 Cancel	Next

- 13. In the Virtual Drive definitions window;
 - a. Click Update Size.
 - b. Change Strip Size to 64 KB. A larger strip size produces higher read performance
 - c. From the Read Policy drop-down list, choose Always Read Ahead.
 - d. From the Write Policy drop-down list, choose Write Back with BBU.
 - e. Make sure RAID Level is set to RAID1.
 - f. Click Accept to accept the changes to the virtual drive definitions.

g. Click Next.



Clicking Update Size might change some of the settings in the window. Make sure all settings are correct before accepting.

1

Figure 53 Virtual Drive Definition Window

RAID Level	RAID1	Ųin	rtual Drives	
Strip Size	64 KB	-		
Access Policy	RU	-		
Read Policy	Always Read Ahead]		
Write Policy	Always Write Back 🖉]		
IQ Policy	Direct 🔻			_
Drive Cache	Unchanged 🔻		SSIBLE RAID Leve	ls
Disable B <u>G</u> I	No	-	10 11.550.550 05	
Select Size	930-390 GB 💌	Update Size		
	Trees	t Reclaim		
		X Cancel	- Back	Next

- 14. After you finish the virtual drive definitions, click Next. The Configuration Preview window appears showing VD0.
- **15.** Check the virtual drive configuration in the Configuration Preview window and click Accept to save the configuration.

Figure 54 Completed Virtual Drive Definition

RAID Level	RAIDO V	<u>V</u> irtual Drives
<u>S</u> trip Siz e	64 KB 🔻	Drive Group 0
Access Policy	RW	
Read <u>P</u> olicy	Always Read Ahead	
Write Policy	Vrite Back with BBU	
IQ Policy	Direct 💌	
Drive Cache	Unchanged 🔻	Press Back Button To Add Another Virtual Drive.
Disable B <u>G</u> I	No	
Select Size	GB 💌	
		Reclaim
		🗙 Cancel 🛛 🗰 Back 🛛 🗰 Mext

- 16. Click Yes to save the configuration.
- 17. In the managing SSD Caching Window, click Cancel.

AID BIOS Config Utility		
It is possible to enable	SSD caching on the following new virtual drives.	
Virtual Drive:		
Virtual Drive	SSD Caching	
☐ Å11		
	Enable Cancel	

Figure 55 SSD Caching Window

18. Click Yes when prompted to confirm the initialization.

Figure 56 Initializing Virtual Drive Window

RiegaRAID BIOS Config Utility	Confirm Page	LSD ₄
All data on the r	ee Virtual Drives will be lost. Wa	nt to Initialize?

- 19. Set VD0 as the Boot Drive and click Go.
- 20. Click Home.

I

21. Review the Configuration and click Exit.

Figure 57 Setting Virtual Drive as Boot Drive

HegaRAID BIOS Config Utility Virtual Drives	LSI
	Virtual Drives:
	 Fast Initialize Slow Initialize Check Consistency Properties Set Boot Drive (current= NONE) Go Reset
1 Home	4. Back

Configuring disks 3-24 are done using Linux based MegaCLI command as described in the section about Configuring Data Drives for Namenode later in this document.

Configuring Disk Drives for OS on Data Nodes

Nodes 3 through 64 are configured as data nodes. This section details the configuration of disk drives for OS on the data nodes. As stated above, the focus of this CVD is the High Performance Configuration featuring 24 1TB SFF disk drives. The disk drives are configured as individual RAID0 volumes with 1MB stripe size. Read ahead cache is enabled and write cache is enabled while battery is present. The first disk drive is used for operating system and remaining 23 disk drives are using for HDFS as described in the following sections.



In the case of High Capacity Configuration featuring 12 4TB LFF disk drives, the disk drives are configured as individual RAID0 volumes with 1MB stripe size. Read ahead cached is enable and write cache is enabled while battery is present. Two partitions of 1TB and 3TB are created on the first disk drive, the 1TB partition is used for operating system and the 3TB partition is used for HDFS along with disk drives 2 through 12.

There are several ways to configure RAID: using LSI WebBIOS Configuration Utility embedded in the MegaRAID BIOS, booting DOS and running MegaCLI commands, using Linux based MegaCLI commands, or using third party tools that have MegaCLI integrated. For this deployment, the first disk drive is configured using LSI WebBIOS Configuration Utility and rest is configured using Linux based MegaCLI commands after the OS is installed.

Follow these steps to create RAID0 on the first disk drive to install the operating system:

- 1. When the server is booting, the following text appears on the screen:
 - a. Press <Ctrl><H> to launch the WebBIOS.

b. Press Ctrl+H immediately.

The Adapter Selection window appears.

- 2. Click Start to continue.
- 3. Click Configuration Wizard.

Figure 58 Adapter Selection for RAID Configuration

re Pkg. Version
0018

4. In the configuration wizard window, choose Clear Configuration and click Next to clear the existing configuration.

Figure 59 Clearing Current Configuration on the Controller



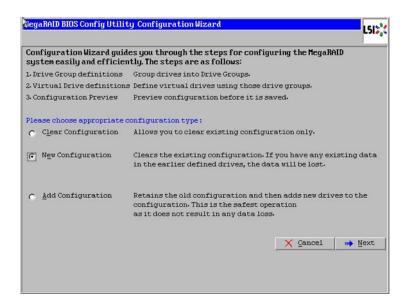
- 5. Choose Yes when asked to confirm the wiping of the current configuration.
- 6. In the Physical View, make sure that all the drives are Unconfigured Good.
- 7. Click Configuration Wizard.



Figure 60 Confirming Clearance of the Previous Configuration on the Controller

8. In the Configuration Wizard window choose the configuration type to be New Configuration and click Next.

Figure 61 Choosing to Create a New Configuration



- **9.** Select the configuration method to be Manual Configuration; this enables you to have complete control over all attributes of the new storage configuration, such as, the drive groups, virtual drives and the ability to set their parameters.
- 10. Click Next.

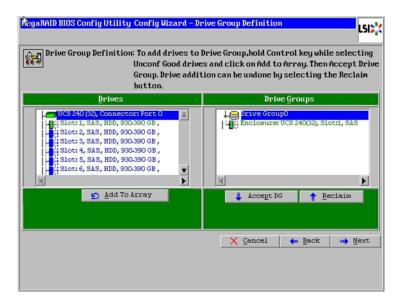
Figure 62 Choosing Manual Configuration Method



The Drive Group Definition window appears. Use this window to choose the first drive to create drive groups.

- **11.** Click Add to Array to move the drives to a proposed drive group configuration in the Drive Groups pane.
- 12. Click Accept DG.
- 13. Click Next.

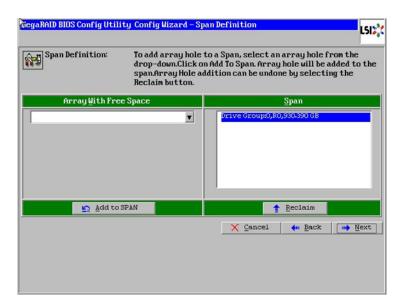
Figure 63 Selecting the First Drive and Adding to Drive Group



14. In the Span definitions Window, click Add to SPAN and click Next.

Figure 64

Span Definition Window



- 15. In the Virtual Drive definitions window;
 - a. Click on Update Size.
 - b. Change Strip Size to 1MB. A larger strip size produces higher read performance
 - c. From the Read Policy drop-down list, choose Always Read Ahead.
 - d. From the Write Policy drop-down list, choose Write Back with BBU.
 - e. Make sure RAID Level is set to RAID0.
 - f. Click Accept to accept the changes to the virtual drive definitions.
 - g. Click Next.



Clicking Update Size might change some of the settings in the window. Make sure all settings are correct before accepting.

Figure 65 Virtual Drive Definition Window

RAID Level	RAIDO	<u>V</u> irtual Drives
Strip Size	1 MB 🔻	
Access Policy	RU	
Read Policy	Always Read Ahead	
Write Policy	Write Back with BBU	
IQ Policy	Direct 💌	
Drive Cache	Unchanged 🔻	Next LD, Possible RAID Levels R0:930.390 GB
Disable B <u>G</u> I	No	10,500,500
Select Size	930-390 GB	Update Size
	Accept	Reclaim
		🗙 Cancel 🛛 🗰 Back 💷 Mext

- **16.** After you finish the virtual drive definitions, click Next. The Configuration Preview window appears showing VD0.
- 17. Check the virtual drive configuration in the Configuration Preview window and click Accept to save the configuration.

Figure 66 Completed Virtual Drive Definition

RAID Level RAID 0 Uritual Drives Strip Size 64 KB Image: Composition of the stress of t	
Read Policy Always Read Ahead	
Write Policy Write Back with BBU	
IO Policy Direct y	
Drive Cache Unchanged V Press Back Button To Add Another Virtua	Drive.
Disable BGI No 💌	
Select Size GB V	
Reclaim	
🗙 Cancel 🛛 🦛 Back 🛛 🗰	Next

18. Click Yes to save the configuration.

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19. In the managing SSD Caching Window, click Cancel.

Figure 67 SSD Caching Window

It is possible to enable	SSD caching on the following new virtual drives	
⊻irtual Drive:		
Virtual Drive	SSD Caching	
<u> </u>		
	Enable Cancel	

1

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20. Click Yes.when prompted to confirm the initialization.

Figure 68 Initializing Virtual Drive Window



21. Set VD0 as the Boot Drive and click Go.

Figure 69 Setting Virtual Drive as Boot Drive

Virtual Drives:
 Fast Initialize Slow Initialize Check Consistency Properties Set Boot Drive (current= NONE) So Reset

- 22. Click Home.
- 23. Review the Configuration and Click Exit.

The steps above can be repeated to configure disks 2-24 or using Linux based MegaCLI commands as described in the section about Configuring Data Drives later in this document.

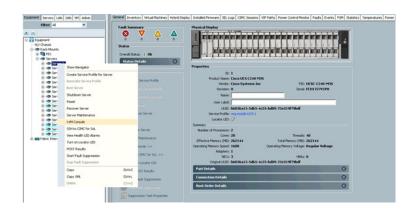
Installing Red Hat Linux 6.4 with KVM

The following section provides detailed procedures for installing Red Hat Linux 6.4.

There are multiple methods to install Red Hat Linux operating system. The installation procedure described in this deployment guide uses KVM console and virtual media from Cisco UCS Manager.

- 1. Log in to the Cisco UCS 6296 Fabric Interconnect and launch the Cisco UCS Manager application.
- 2. Select the Equipment tab.
- 3. In the navigation pane expand Rack-mounts and Servers.
- 4. Right click the server and select KVM Console.

Figure 70 Selecting KVM Console Option



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- 5. In the KVM window, select the Virtual Media tab.
- 6. Click the Add Image button found in the right hand corner of the Virtual Media selection window.
- 7. Browse to the Red Hat Enterprise Linux Server 6.4 installer ISO image file.



The Red Hat Enterprise Linux 6.4 DVD is assumed to be on the client machine.

Virtual Media	Read Only	Drive						
Mapped		Drive						
		Drive						
		A: - Floppy					Exit	
		_					Create Imag	je
_		🖃 G: - Remova					Add Image.	
	\checkmark	🙆 E: - CD/DVD					Remove Imag	
	\vee	🔊 D: - CD/DVD						
							Details ±	
)etails Target Drive	Mappe	d To	Read Bytes	Write Bytes	Duration		 	
	Mappe Not map		Read Bytes	Write Bytes	Duration		 USB Reset	
Target Drive		oped	Read Bytes	Write Bytes	Duration		USB Reset	:
Target Drive /irtual CD/DVD	Not ma	oped oped	Read Bytes	Write Bytes	Duration	[USB Reset	:
Target Drive /irtual CD/DVD Removable Disk	Not maj Not maj	oped oped	Read Bytes	Write Bytes	Duration		USB Reset	:
Target Drive /irtual CD/DVD Removable Disk	Not maj Not maj	oped oped	Read Bytes	Write Bytes	Duration		USB Reset	:
Target Drive /irtual CD/DVD Removable Disk	Not maj Not maj	oped oped	Read Bytes	Write Bytes	Duration		USB Reset	:
Target Drive /irtual CD/DVD Removable Disk	Not maj Not maj	oped oped	Read Bytes	Write Bytes	Duration		USB Reset	:
Target Drive /irtual CD/DVD	Not ma	oped	Read Bytes	Write Bytes	Duration		USB Res	et

Figure 71 Adding an ISO Image

8. Click Open to add the image to the list of virtual media.

Figure 72 Browse to Red Hat Enterprise Linux ISO Image

約 Open						×
Look in:	📃 Desktop		•	Ť	P 🛄 🗖	
Recent Items	Computer Network Libraries Administra RHEL_6.4					
My Documents Computer						
	File name:	RHEL_6.4 x86_64.iso				Open
Network	Files of type:	Disk image file (*.iso, *.img)			•	Cancel

Γ

9. Check the check box for Mapped, next to the entry corresponding to the image you just added. In the KVM window, select the KVM tab to monitor during boot.

- 10. In the KVM window, select the Boot Server button in the upper left corner.
- 11. Click OK.
- 12. Click OK to reboot the system.

Figure 73 Mapping ISO Image

Help								
Boot Server 🜙		rver 🥺 Reset						
4 Console Server								
M Virtual Media								
Client View								
	Read Only	Drive						Exit
		A: - Floppy						Create Image
		🖃 G: - Removable	Disk					Add Image
	M	🛃 E: - CD/DVD					_	
	1 1 1	💩 D: - CD/DVD					_	Remove Image
		🛃 C:\Users\Admir	histrator\Desktop	NRHEL_6.4.x86	64.iso - I			Details #
	Mapped	Io	Read Bytes	Write Bytes	Duration	_		
Target Drive	Mapped	To sers\Administrator\	Read Bytes	Write Bytes	Duration 00:00:08		_	USB Reset
Target Drive Virtual CD/DVD		sers\Administrator\					-	USB Reset
Target Drive Virtual CD/DVD Removable Disk	😂 C:(U	sers\Administrator\ ped					-	USB Reset
Target Drive Virtual CD/DVD Removable Disk	A C:\U	sers\Administrator\ ped					-	USB Reset
Target Drive Virtual CD/DVD Removable Disk	A C:\U	sers\Administrator\ ped					-	USB Reset
Target Drive Virtual CD/DVD Removable Disk	A C:\U	sers\Administrator\ ped					-	USB Reset
Target Drive Virtual CD/DVD Removable Disk	A C:\U	sers\Administrator\ ped					-	USB Reset
Target Drive Virtual CD/DVD Removable Disk	A C:\U	sers\Administrator\ ped						USB Reset
Target Drive Virtual CD/DVD Removable Disk	A C:\U	sers\Administrator\ ped					-	USB Reset
Detals Target Drive Virtual CD(0VO Removable Disk: Floppy	A C:\U	sers\Administrator\ ped						USB Reset
Target Drive Virtual CD/DVD Removable Disk	Soft mapp	sersî,Administratorî,		0			-	USB Reset

On reboot, the machine detects the presence of the Red Hat Enterprise Linux Server 6.4 install media. 13. Select the Install or Upgrade an Existing System.

Figure 74 Select Install Option

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14. Skip the Media test since you are installing from an ISO Image.

Figure 75 Skipping Media Test

🌲 UCS / Rack -16 - KVM Console 📃 🗖	X
File View Macros Tools Help	
🚙 Boot Server 🛛 🤩 Shutdown Server 😂 Reset	
KVM Console Server	
KVM Virtual Media	
Welcome to Red Hat Enterprise Linux for x86_64	
A Logged in as _computeToken_@10.29.160.50 Not registered with UCS Central System Time: 2013-03-087	22:17

1

15. Click Next.



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16. Select the Language for the Installation

Arabic (العربية)	
Assamese (অসমীয়া)	
Bengali (বাংলা)	
Bengali(India) (বাংলা (ভারত))	
Bulgarian (Български)	
Catalan (Català)	
Chinese(Simplified) (简体中文)	
Chinese(Traditional) (中文(正體))	
Croatian (Hrvatski)	
Czech (Čeština)	
Danish (Dansk)	
Dutch (Nederlands)	
English (English)	
Estonian (eesti keel)	
finnish (suomi)	
rench (Français)	
German (Deutsch)	
Greek (Ελληνικά)	
Gujarati (ગુજરાતી)	
lebrew (עברית)	
lindi (हिन्दी)	
lungarian (Magyar)	
celandic (Íslenska)	
loko (Iloko)	
ndonesian (Indonesia)	

1

Figure 77 Selecting Language for the Installation

17. Select Basic Storage Devices.

Figure 78	Selecting Basic Storage Devices	
	vices will your installation involve? age Devices	
	rades to typical types of storage devices. If you're not sure which option is right for you,	
O Installs or upg	d Storage Devices prades to enterprise devices such as Storage Area Networks (SANs). This option will allow oE / ISCSI / zFCP disks and to filter out devices the installer should ignore.	
		ex Back

18. Select Fresh Installation.

L

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19. Enter the Host name of the server and click Next.

Figure 79 Selecting Fresh Installation

•	Fresh Installation Choose this option to install a fresh copy of Red Hat Enterprise Linux on your system. Existing software and data may be overwritten depending on your configuration choices.		
•	Upgrade an Existing Installation Choose this option if you would like to upgrade your existing Red Hat Enterprise Linux system. This option will preserve the existing data on your storage device(s).		
		B ack	▶ <u>N</u> ext

- 20. Click Configure Network. The Network Connections window should appear.
- 21. In the Network Connections window, select the Wired tab.
- 22. Select the interface System eth0 and click Edit.

Editing System eth0 appears.

- 23. Check the check box Connect automatically.
- 24. In the drop down menu select Manual Method.
- 25. Click Add and enter IP Address, Netmask and the Gateway.
- **26.** For this demonstration use the following:
 - a. IP Address: 10.29.160.53
 - **b.** Netmask: 255.255.255.0
 - **c.** Gateway: 10.29.160.1
- 27. Add DNS servers (optional).
- 28. Click Apply.

	tname: rhel1			Editing eth0
				Connection game: eth0
*				Connect automatically
	Netwo	rk Connections		Wired 802.1x Security IPv4 Settings IPv6 Settings
	Wired Wireless	Mobile Broadband	VPN R DSL	Method: Manual
	Name	Last Used	Add	Addresses
	System eth0	never	Edit	Address Netmask Gateway Add
	System eth1 System eth2	never	Delete	10.29.160.53 22.255.255.0 10.29.160.1 Delet
			Close	DNS servers: Search domains: DHCP client ID: Require IPv4 addressing for this connection to comp Boutes
				Available to all users Cancel Ap

Figure 80 Configuring Network for eth0

- 29. Repeat the steps 26 to steps 28 for system eth1 with the following:
 - IP Address: 192.168.12.11
 - Netmask: 255.255.255.0

Figure 81 Configuring Network for eth1

			Editing eth
			Connection name: eth1
			Connect automatically
Netv	vork Connections		Wired 802.1x Security IPv4 Settings IPv6 Settings
			Method: Manual
Wired Wireless	Mobile Broadband	VPN 📑 DSL	Methou. Manual
Name	Last Used	Add	Addresses
System eth0	never	Edit	Address Netmask Gateway Add
System eth1 System eth2	never	Delete	192.168.12.11 255.255.255.0 Delete
		Close	DNS servers: Search domains: DHCP client ID: Ø Require IPv4 addressing for this connection to complement of the connection to connecti
			Available to all users Cancel Appl

- 30. Repeat the steps 26 to steps 28 for system eth2 with the following:
 - IP Address: 192.168.11.11
 - Netmask: 255.255.255.0

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Table 6 lists the IP address of the nodes in the cluster.

31. Select the appropriate Time Zone.

Figure 82 Select Time Zone



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32. Enter the root Password and click Next.

Figure 83	Entering the Root Password		
The root the syste user.	account is used for administering em. Enter a password for the root		
Root <u>P</u> assword:	·····		
<u>C</u> onfirm:	••••••		
k			
20			₩ <u>Back</u>

33. Select Use All Space and click Next.

34. Choose an appropriate boot drive.

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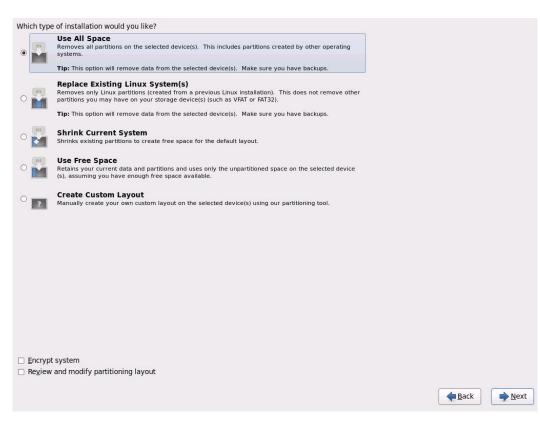


Figure 84Selecting Install Options

- 35. Click Write changes to disk and click Next.
- Figure 85 Confirming Formatting of Disk



36. Select Basic Server Installation and click Next.

Database Server Web Server Identity Management Server Virtualization Host	
Identity Management Server	
o medaledeon nose	
O Desktop	
Software Development Workstation	
🔿 Minimal	
] High Availability	
High Availability	
High Availability Load Balancer ☑ Red Hat Enterprise Linux	
High Availability Load Balancer Z Red Hat Enterprise Linux	
☐ High Availability ☐ Load Balancer ☑ Red Hat Enterprise Linux	
High Availability Load Balancer ✓ Red Hat Enterprise Linux Perilient Channel ● Add additional software repositories	
High Availability Load Balancer ✓ Red Hat Enterprise Linux ➡ Add additional software repositories >>>>>>>>>>>>>>>>>>>>>>>>>>>>>>	
□ Load Balancer ☑ Red Hat Enterprise Linux	

Figure 86 Selecting Type of Installation

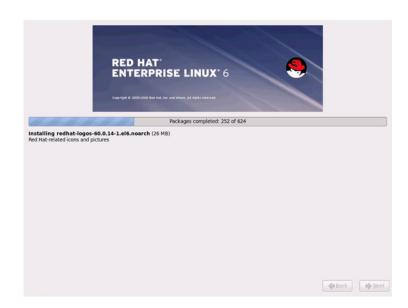
After the installer is finished loading, it will continue with the installation as shown in the figures below:



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Figure 88 Installation in Progress



- **37.** When the installation is complete, reboot the system.
- 38. Repeat steps 1 through 37 to install Red Hat Linux on Servers 2 through 64.

۵, Note

The OS installation and configuration of the nodes that is mentioned above can be automated through PXE boot or third party tools.

The hostnames and their corresponding IP addresses are shown in Table 6.

Hostname	eth0	eth1	eth2
rhel1	10.29.160.53	192.168.12.11	192.168 . 11.11
rhel2	10.29.160.54	192.168.12.12	192.168.11.12
rhel3	10.29.160.55	192.168.12.13	192.168.11.13
rhel4	10.29.160.56	192.168.12.14	192.168.11.14
rhel5	10.29.160.57	192.168.12.15	192.168.11.15
rhel6	10.29.160.58	192.168.12.16	192.168.11.16
rhel7	10.29.160.59	192.168.12.17	192.168.11.17
rhel8	10.29.160.60	192.168.12.18	192.168.11.18
rhel9	10.29.160.61	192.168.12.19	192.168.11.19
rhel10	10.29.160.62	192.168.12.20	192.168.11.20
rhel11	10.29.160.63	192.168.12.21	192.168.11.21
rhel12	10.29.160.64	192.168.12.22	192.168.11.22
rhel13	10.29.160.65	192.168.12.23	192.168.11.23
rhel14	10.29.160.66	192.168.12.24	192.168.11.24

Table 6Hostnames and IP Addresses

rhel15	10.29.160.67	192.168.12.25	192.168.11.25
rhel16	10.29.160.68	192.168.12.26	192.168.11.26
rhel64	10.29.160.116	192.168.12.74	192.168.11.74

Post OS Install Configuration

Choose one of the nodes of the cluster or a separate node as Admin Node for management such as HDP installation, parallel shell, creating a local Red Hat repo and others. In this document, use rhell for this suppose.

Setting Up Password-less Login

To manage all of the clusters nodes from the admin node we need to setup password-less login. It assists in automating common tasks with Parallel-SSH (pssh) and shell-scripts without having to use passwords.

When Red Hat Linux is installed across all the nodes in the cluster, follow the steps below in order to enable password less login across all the nodes.

1. Login to the Admin Node (rhel1)

ssh 10.29.160.53

2. Run the ssh-keygen command to create both public and private keys on the admin node.

[root@rhel1 ~]# ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/root/.ssh/id_rsa):
Created directory '/root/.ssh'.
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /root/.ssh/id rsa.
Your public key has been saved in /root/.ssh/id_rsa.pub.
The key fingerprint is:
ab:4e:78:10:54:81:4e:04:8d:af:4f:a4:b2:c4:bb:88
The key's randomart image is:
+[RSA 2048]+
.=000.
+
+.
+.
. +. S
.00 .0 .
I.O.O. O .
+o .
Eo
L

3. Run the following command from the admin node to copy the public key id_rsa.pub to all the nodes of the cluster. ssh-copy-id appends the keys to the remote-host's .ssh/authorized_key.

for IP in {53..116}; do echo -n "\$IP -> "; ssh-copy-id -i ~/.ssh/id_rsa.pub 10.29.160.\$IP; done

4. Enter yes for Are you sure you want to continue connecting (yes/no)?

5. Enter the password of the remote host.

Installing and Configuring Parallel Shell

PARALLEL-SSH

Parallel SSH is used to run commands on several hosts at the same time. It takes a file of hostnames and a bunch of common ssh parameters as parameters, executes the given command in parallel on the nodes specified.

1. From the system that is connected to the Internet, download pssh.

wget https://parallel-ssh.googlecode.com/files/pssh-2.3.1.tar.gz

scp pssh-2.3.1.tar.gz rhel1:/root

2. Copy pssh-2.3.1.tar.gz to the Admin Node

```
ssh rhel1
tar xzf pssh-2.3.1.tar.gz
cd pssh-2.3.1
python setup.py install
```

3. Extract and Install pssh on the Admin node.

```
[root@redhat ~]# scp pssh-2.3.1.tar.gz rhel1:/root
The authenticity of host 'rhel1 (10.29.160.53)' can't be established.
RSA key fingerprint is 25:15:c9:7d:e0:db:78:2c:0d:ce:e5:2d:e3:e2:5e:44.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added 'rhell' (RSA) to the list of known hosts.
root@rhel1's password:
pssh-2.3.1.tar.gz
[root@redhat ~]# ssh rhel1
root@rhel1's password:
Last login: Wed Apr 24 09:06:38 2013 from 10.29.160.90
[root@rhel1 ~]# tar xzf pssh-2.3.1.tar.gz
[root@rhel1 ~]# cd pssh-2.3.1
[root@rhel1 pssh-2.3.1]# python setup.py install
running install
running build
running build_py
running build scripts
running install_lib
running install_scripts
changing mode of /usr/bin/pslurp to 755
changing mode of /usr/bin/pnuke to 755
changing mode of /usr/bin/prsync to 755
changing mode of /usr/bin/pscp to 755
changing mode of /usr/bin/pssh-askpass to 755
changing mode of /usr/bin/pssh to 755
running install_data
running install egg info
Removing /usr/lib/python2.6/site-packages/pssh-2.3.1-py2.6.egg-info
Writing /usr/lib/python2.6/site-packages/pssh-2.3.1-py2.6.egg-info
```

4. Create a host file containing the IP addresses of all the nodes and all the Datanodes in the cluster. This file is passed as a parameter to pssh to identify the nodes to run the commands on.

```
vi /root/allnodes
# This file contains ip address of all nodes of the cluster
#used by parallel-shell (pssh). For Details man pssh
10.29.160.53
10.29.160.54
10.29.160.55
10.29.160.56
10.29.160.57
10.29.160.58
10.29.160.59
10.29.160.60
10.29.160.61
10.29.160.62
10.29.160.63
10.29.160.64
10.29.160.65
10.29.160.66
10.29.160.67
10.29.160.68
. . .
10.29.160.116
```

```
vi /root/datanodes
10.29.160.55
10.29.160.56
10.29.160.57
10.29.160.58
10.29.160.59
10.29.160.60
10.29.160.61
10.29.160.62
10.29.160.63
10.29.160.64
10.29.160.65
10.29.160.66
10.29.160.67
10.29.160.68
. . .
10.29.160.116
```

CLUSTER SHELL

1. From the system connected to the Internet, download the Cluster shell (clush) and install it on rhell. Cluster shell is available from EPEL (Extra Packages for Enterprise Linux) repository.

```
wget
http://dl.fedoraproject.org/pub/epel//6/x86_64/clustershell-1.6-1.el6
.noarch.rpm
scp clustershell-1.6-1.el6.noarch.rpm rhel1:/root/
```

2. Login to rhel1 and install cluster shell

yum install clustershell-1.6-1.el6.noarch.rpm

- 3. Edit /etc/clustershell/groups file to include hostnames for all the nodes of the cluster.
- 4. For 64 node cluster all: rhel[1-64]

Configuring /etc/hosts

Follow the steps below to create the host file across all the nodes in the cluster:

1. Populate the host file with IP addresses and corresponding hostnames on the Admin node (rhell).

```
vi /etc/hosts
127.0.0.1 localhost localhost.localdomain localhost4
localhost4.localdomain4
::1 localhost localhost.localdomain localhost6
localhost6.localdomain6
192.168.12.11 rhel1
192.168.12.12 rhel2
192.168.12.13 rhel3
```

192.168.12.14 rhel4 192.168.12.15 rhel5 192.168.12.16 rhel6 192.168.12.17 rhel7 192.168.12.19 rhel9 192.168.12.20 rhel10 192.168.12.21 rhel11 192.168.12.22 rhel12 192.168.12.23 rhel13 192.168.12.24 rhel14 192.168.12.25 rhel15 192.168.12.26 rhel16 ...

 Deploy /etc/hosts from the admin node (rhell) to all the nodes via the following pscp command: pscp -h /root/allnodes /etc/hosts /etc/hosts

<pre>[root@rhel1 ~]# pscp -h /root/allnodes /etc/hosts /etc/hosts</pre>
[1] 11:40:27 [SUCCESS] 10.29.160.53
[2] 11:40:27 [SUCCESS] 10.29.160.55
[3] 11:40:27 [SUCCESS] 10.29.160.58
[4] 11:40:27 [SUCCESS] 10.29.160.56
[5] 11:40:27 [SUCCESS] 10.29.160.57
[6] 11:40:27 [SUCCESS] 10.29.160.54
[7] 11:40:27 [SUCCESS] 10.29.160.61
[8] 11:40:27 [SUCCESS] 10.29.160.66
[9] 11:40:27 [SUCCESS] 10.29.160.64
[10] 11:40:27 [SUCCESS] 10.29.160.68
[11] 11:40:27 [SUCCESS] 10.29.160.59
[12] 11:40:27 [SUCCESS] 10.29.160.62
[13] 11:40:27 [SUCCESS] 10.29.160.65
[14] 11:40:27 [SUCCESS] 10.29.160.67
[15] 11:40:27 [SUCCESS] 10.29.160.60
[16] 11:40:27 [SUCCESS] 10.29.160.63
[64] 11:40:27 [SUCCESS] 10.29.160.116

Creating Red Hat Local Repository

To create a repository using RHEL DVD or ISO on the admin node (in this deployment, rhell is used for this purpose), create a directory with all the required RPMs; run the createrepo command and then publish the resulting repository.

1. Log on to rhell. Create a directory that would contain the repository.

mkdir -p /var/www/html/rhelrepo

- 2. Copy the contents of the Red Hat DVD to /var/www/html/rhelrepo
- 3. Alternatively, if you have access to a Red Hat ISO Image, Copy the ISO file to rhel1.

scp rhel-server-6.4-x86_64-dvd.iso rhel1:/root



Here we assume you have the Red Hat ISO file located in your present working directory.

```
mkdir -p /mnt/rheliso
mount -t iso9660 -o loop /root/rhel-server-6.4-x86_64-dvd.iso
/mnt/rheliso/
```

4. Copy the contents of the ISO to the /var/www/html/rhelrepo directory

```
cp -r /mnt/rheliso/* /var/www/html/rhelrepo
```

5. On rhell, create a repo file to enable the use of the yum command.

```
vi /var/www/html/rhelrepo/rheliso.repo
[rhel6.4]
name=Red Hat Enterprise Linux 6.4
baseurl=http://10.29.160.53/rhelrepo
gpgcheck=0
enabled=1
```

```
<u>Note</u>
```

Based on this repository file, yum requires httpd to be running on rhell for other nodes to access the repository. Steps to install and configure httpd are in the following section.

6. Copy the rheliso.repo to all the nodes of the cluster.

```
pscp -h /root/allnodes /var/www/html/rhelrepo/rheliso.repo
/etc/yum.repos.d/
```

[root@rhel1 ~]# pscp -h /root/allnodes /var/www/html/rhelrepo/rheliso.rep
o /etc/yum.repos.d/
[1] 15:00:09 [SUCCESS] 10.29.160.57
[2] 15:00:09 [SUCCESS] 10.29.160.54
[3] 15:00:09 [SUCCESS] 10.29.160.53
[4] 15:00:09 [SUCCESS] 10.29.160.56
[5] 15:00:09 [SUCCESS] 10.29.160.58
[6] 15:00:09 [SUCCESS] 10.29.160.55
[7] 15:00:09 [SUCCESS] 10.29.160.60
[8] 15:00:09 [SUCCESS] 10.29.160.59
[9] 15:00:09 [SUCCESS] 10.29.160.65
[10] 15:00:09 [SUCCESS] 10.29.160.64
[11] 15:00:09 [SUCCESS] 10.29.160.61
[12] 15:00:09 [SUCCESS] 10.29.160.67
[13] 15:00:09 [SUCCESS] 10.29.160.62
[14] 15:00:09 [SUCCESS] 10.29.160.63
[15] 15:00:09 [SUCCESS] 10.29.160.66
[16] 15:00:09 [SUCCESS] 10.29.160.68
: : : : : : : : : : : : : : : : : : :

7. To make use of repository files on rhell without httpd, edit the baseurl of repo file /etc/yum.repos.d/rheliso.repo to point repository location in the file system.

```
vi /etc/yum.repos.d/rheliso.repo
[rhel6.4]
name=Red Hat Enterprise Linux 6.4
baseurl=file:///var/www/html/rhelrepo
gpgcheck=0
enabled=1
```

8. pssh -h /root/allnodes "yum clean all"

I

[roo	t@rhel1 ~]# pssh -h	/root/allnodes	"yum clear	n all"
[1]	12:14:09	[SUCCESS]	10.29.160.55		
[2]	12:14:09	[SUCCESS]	10.29.160.53		
[3]	12:14:09	[SUCCESS]	10.29.160.57		
[4]	12:14:09	[SUCCESS]	10.29.160.54		
[5]	12:14:09	[SUCCESS]	10.29.160.62		
[6]	12:14:09	[SUCCESS]	10.29.160.59		
[7]	12:14:09	[SUCCESS]	10.29.160.56		
[8]	12:14:09	[SUCCESS]	10.29.160.58		
[9]	12:14:09	[SUCCESS]	10.29.160.61		
[10]	12:14:09	[SUCCESS]	10.29.160.65		
[11]	12:14:09	[SUCCESS]	10.29.160.60		
[12]	12:14:09	[SUCCESS]	10.29.160.68		
[13]	12:14:09	[SUCCESS]	10.29.160.63		
[14]	12:14:09	[SUCCESS]	10.29.160.64		
[15]	12:14:10	[SUCCESS]	10.29.160.66		
[16]	12:14:10	[SUCCESS]	10.29.160.67		
[64]	12:14:10	[SUCCESS]	10.29.160.116		

Creating the Red Hat Repository Database

Install the createrepo package. Use it to regenerate the repository database(s) for the local copy of the RHEL DVD contents. Then purge the yum caches.

```
yum -y install createrepo
cd /var/www/html/rhelrepo
createrepo .
yum clean all
[root@rhel1 rhelrepo]# createrepo .
368/3596 - Packages/pygobject2-doc-2.20.0-5.el6.x86_64.rpm
iso-8859-1 encoding on Ville Skyttä <ville.skytta@iki.fi> - 2.8.2-2
3596/3596 - Packages/lohit-bengali-fonts-2.4.3-6.el6.noarch.rpm
Saving Primary metadata
Saving file lists metadata
Saving other metadata _
```

Upgrading the LSI driver

The latest LSI driver is required for performance and bug fixes. The latest drivers can be downloaded from the link below:

http://software.cisco.com/download/release.html?mdfid=284296254&flowid=31743&softwareid=2838 53158&release=1.5.1&relind=AVAILABLE&rellifecycle=&reltype=latest

In the ISO image, the required driver kmod-megaraid_sas-06.602.03.00_rhel6.4-2.x86_64.rpm can be located at ucs-cxxx-drivers.1.5.1\Linux\Storage\LSI\92xx\RHEL\RHEL6.4

From a node connected to the Internet, download and transfer

kmod-megaraid_sas-06.602.03.00_rhel6.4-2.x86_64.rpm to rhel1 (admin node). Install the rpm on all nodes of the cluster using the following pssh commands. For this example, the rpm is assumed to be in present working directory of rhel1.

```
pscp -h /root/allnodes
kmod-megaraid sas-06.602.03.00 rhel6.4-2.x86 64.rpm /root/
```

[roo	ot@rhel1 ~]# pscp	-h /root/a	llnodes	kmod-megaraid	sas-06.602
03	.00 rhel	L6.4-2.x	86 64.rpm /	'root/		
[1]	15:46:54	[SUCCESS]	10.29.160.53			
[2]	15:46:54	[SUCCESS]	10.29.160.64			
[3]	15:46:54	[SUCCESS]	10.29.160.55			
[4]	15:46:54	[SUCCESS]	10.29.160.56			
[5]	15:46:54	[SUCCESS]	10.29.160.60			
[6]	15:46:54	[SUCCESS]	10.29.160.58			
[7]	15:46:54	[SUCCESS]	10.29.160.59			
[8]	15:46:54	[SUCCESS]	10.29.160.54			
[9]	15:46:54	[SUCCESS]	10.29.160.57			
[10]	15:46:54	[SUCCESS]	10.29.160.61			
[11]	15:46:54	[SUCCESS]	10.29.160.63			
[12]	15:46:54	[SUCCESS]	10.29.160.66			
[13]	15:46:54	[SUCCESS]	10.29.160.62			
[14]	15:46:54	[SUCCESS]	10.29.160.65			
[15]	15:46:54	[SUCCESS]	10.29.160.67			
[16]	15:46:54	[SUCCESS]	10.29.160.68			
[64]	15:46:54	[SUCCESS]	10.29.160.116			

pssh -h /root/allnodes "rpm -ivh
kmod-megaraid_sas-06.602.03.00_rhel6.4-2.x86_64.rpm "

[root@rhel1 ~]# pssh -h /root/allnodes "rpm -ivh kmod-megarai
.d_sas-06.602.03.00_rhel6.4-2.x86_64.rpm"
(1) 15:49:11 [SUCCESS] 10.29.160.53
[2] 15:49:13 [SUCCESS] 10.29.160.67
[3] 15:49:13 [SUCCESS] 10.29.160.54
[4] 15:49:13 [SUCCESS] 10.29.160.58
[5] 15:49:13 [SUCCESS] 10.29.160.62
[6] 15:49:13 [SUCCESS] 10.29.160.60
[7] 15:49:13 [SUCCESS] 10.29.160.65
[8] 15:49:13 [SUCCESS] 10.29.160.57
[9] 15:49:13 [SUCCESS] 10.29.160.61
[10] 15:49:13 [SUCCESS] 10.29.160.66
[11] 15:49:13 [SUCCESS] 10.29.160.64
[12] 15:49:13 [SUCCESS] 10.29.160.56
[13] 15:49:13 [SUCCESS] 10.29.160.55
[14] 15:49:14 [SUCCESS] 10.29.160.59
[15] 15:49:14 [SUCCESS] 10.29.160.63
(16) 15:49:16 [SUCCESS] 10.29.160.68
[64] 15:49:16 [SUCCESS] 10.29.160.116

Make sure that the above installed version of kmod-megaraid_sas driver is being used on all nodes by running the command "modinfo megaraid_sas" on all nodes.

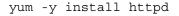
pssh -	h /root/allnodes	"modinfo	megaraid_sas	head	-5"
filename:	/lib/modules/2.6.32-358.e16.x8	6 64/extra/megara	id sas/megaraid sas.ko		
description:	LSI MegaRAID SAS Driver				
author:	megaraidlinux@lsi.com				
version:	06.602.03.00				
1	0.07				

Installing httpd

Follow these steps to install httpd:

1. Install httpd on the admin node to host repositories.

The Red Hat repository is hosted using HTTP on the admin node, this machine is accessible by all the hosts in the cluster.



2. Add ServerName and make the necessary changes to the server configuration file.

```
/etc/httpd/conf/httpd.conf
   ServerName 10.29.160.53:80
```



3. Ensure httpd is able to read the repofiles

chcon -R -t httpd_sys_content_t /var/www/html/rhelrepo

4. Start httpd

```
service httpd start chkconfig httpd on
```

Installing xfsprogs

Follow these steps to install xfsprogs;

1. Install xfsprogs on all the nodes for xfs filesystem.

pssh -h /root/allnodes "yum -y install xfsprogs"

[rod	ot@rhel1	~]# pss	h -h	/root/allnodes	''Yum	-У	install	xfsprogs"
[1]	12:26:34	SUCCE	SS]	10.29.160.57				
[2]	12:26:3	SUCCE	SS]	10.29.160.56				
[3]	12:26:3	SUCCE	SS]	10.29.160.53				
[4]	12:26:3	SUCCE	SS]	10.29.160.59				
[5]	12:26:3	SUCCE	SS]	10.29.160.61				
[6]	12:26:3	SUCCE	SS]	10.29.160.63				
[7]	12:26:3	SUCCE	SS]	10.29.160.54				
[8]	12:26:3	SUCCE	SS]	10.29.160.62				
[9]	12:26:3	SUCCE	SS]	10.29.160.66				
[10]	12:26:3	35 SUCC	ESS]	10.29.160.60				
[11]	12:26:3	35 SUCC	ESS]	10.29.160.68				
[12]	12:26:3	35 SUCC	ESS]	10.29.160.58				
[13]	12:26:3	35 SUCC	ESS]	10.29.160.64				
[14]	12:26:3	35 SUCC	ESS]	10.29.160.55				
[15]	12:26:3	35 SUCC	ESS]	10.29.160.65				
[16]	12:26:3	35 [SUCC	ESS]	10.29.160.67				

Setting JAVA_HOME

Execute the following command on admin node (rhel1):

```
echo "export JAVA_HOME=/usr/lib/jvm/jre-1.7.0-openjdk.x86_64" >>
/etc/profile
```

[root@rhell ~]# echo export JAVA_HOME=/usr/lib/jvm/jre-1.7.0-openjdk.x86_64 >> /etc/profile

Copy the profile file from admin node (rhell) to all the nodes using the following command:

pscp -h /root/allnodes /etc/profile /etc/

NTP Configuration

The Network Time Protocol (NTP) is used to synchronize the time of all the nodes within the cluster. The Network Time Protocol daemon (ntpd) sets and maintains the system time of day in synchronism with the timeserver located in the admin node (rhel1). Configuring NTP is critical for any Hadoop Cluster. If server clocks in the cluster drift out of sync, serious problems will occur with HBase and other services.

```
Installing an internal NTP server keeps your cluster synchronized even when an outside NTP
server is inaccessible.
```

1. Configure /etc/ntp.conf on the admin node with the following contents:

```
vi /etc/ntp.conf
driftfile /var/lib/ntp/drift
restrict 127.0.0.1
restrict -6 ::1
server 127.127.1.0
fudge 127.127.1.0 stratum 10
includefile /etc/ntp/crypto/pw
keys /etc/ntp/keys
```

2. Create /root/ntp.conf on the admin node and copy it to all nodes:

```
vi /root/ntp.conf
server 10.29.160.53
driftfile /var/lib/ntp/drift
restrict 127.0.0.1
restrict -6 ::1
includefile /etc/ntp/crypto/pw
keys /etc/ntp/keys
```

[root@rhel1 ~]#	for SERVER in	{54116}; do	sco	/root/ntp.conf	10.29.160.\$SE	RVER:	/etc/ntp.conf;	done
ntp.conf					100%	142	0.1KB/s	00:00
ntp.conf					100%	142	0.1KB/s	00:00
ntp.conf					100%	142	0.1KB/s	00:00
ntp.conf					100%	142	0.1KB/s	00:00
ntp.conf					100%	142	0.1KB/s	00:00
ntp.conf					100%	142	0.1KB/s	00:00
ntp.conf					100%	142	0.1KB/s	00:00
ntp.conf					100%	142	0.1KB/s	00:00
ntp.conf					100%	142	0.1KB/s	00:00
ntp.conf					100%	142	0.1KB/s	00:00
ntp.conf					100%	142	0.1KB/s	00:00
ntp.conf					100%	142	0.1KB/s	00:00
ntp.conf					100%	142	0.1KB/s	00:00
ntp.conf					100%	142	0.1KB/s	00:00
ntp.conf					100%	142	0.1KB/s	00:00

3. Copy ntp.conf file from the admin node to /etc of all the nodes by executing the following command in the admin node (rhell)

for SERVER in {54..116}; do scp /root/ntp.conf 10.29.160.\$SERVER:/etc/ntp.conf; done



Do not use pssh /root/allnodes command without editing the host file allnodes as it overwrites /etc/ntp.conf from the admin node.

4. Syncronize the time and restart NTP daemon on all nodes:

```
pssh -h /root/allnodes "yum install -y ntpdate"
pssh -h /root/allnodes "service ntpd stop"
pssh -h /root/allnodes "ntpdate rhel1"
pssh -h /root/allnodes "service ntpd start"
```

[roo	ot@rhel1 ~]# pssh -1	n /root/allnodes	"service	ntpd restart"
[1]	13:38:55	[SUCCESS]	10.29.160.54		
[2]	13:38:55	[SUCCESS]	10.29.160.53		
[3]	13:38:55	[SUCCESS]	10.29.160.56		
[4]	13:38:55	[SUCCESS]	10.29.160.57		
[5]	13:38:55	[SUCCESS]	10.29.160.55		
[6]	13:38:55	[SUCCESS]	10.29.160.58		
[7]	13:38:55	[SUCCESS]	10.29.160.60		
			10.29.160.59		
[9]	13:38:55	[SUCCESS]	10.29.160.64		
			10.29.160.62		
			10.29.160.61		
			10.29.160.66		
			10.29.160.63		
			10.29.160.65		
			10.29.160.67		
[16]	13:38:55	[SUCCESS]	10.29.160.68		
[64]	13:38:55	[SUCCESS]	10.29.160.116		

Make sure restart of NTP daemon across reboots:

pssh -h /root/allnodes "chkconfig ntpd on"

Enabling Syslog

Syslog must be enabled on each node to preserve logs regarding killed processes or failed jobs. Modern versions such as syslog-ng and rsyslog are possible, making it more difficult to be sure that a syslog daemon is present. One of the following commands should suffice to confirm that the service is properly configured:

clush -B -a rsyslogd -v

clush -B -a service rsyslog status

Setting ulimit

On each node, ulimit -n specifies the number of inodes that can be opened simultaneously. With the default value of 1024, the system appears to be out of disk space and shows no inodes available. This value should be set to 64000 on every node.



Higher values are unlikely to result in an appreciable performance gain.

For setting ulimit on Redhat, edit /etc/security/limits.conf and add the following lines:

```
root soft nofile 64000
root hard nofile 64000
```

Verify the ulimit setting with the following step:

Note

ulimit values are applied on a new shell, running the command on a node on an earlier instance of a shell will show old values

1. Run the following command at a command line. The command should report 64000.

```
clush -B -a ulimit -n
```

Disabling SELinux

SELinux must be disabled during the HDP install procedure and cluster setup. SELinux can be enabled after installation and while the cluster is running.

SELinux can be disabled by editing /etc/selinux/config and changing the SELINUX line to SELINUX=disabled. The following command will disable SELINUX on all nodes.

```
pssh -h /root/allnodes "sed -i
's/SELINUX=enforcing/SELINUX=disabled/g' /etc/selinux/config "
```

	h (mh a 1 f	14	Incot 102 2 modes	Hand	to longeneine (di cob) ed (et	
				sed -1	's/enforcing/disabled/g'	/etc/serinux/config"
			10.29.160.53			
[2]	14:07:40	[SUCCESS]	10.29.160.54			
[3]	14:07:40	[SUCCESS]	10.29.160.57			
[4]	14:07:40	[SUCCESS]	10.29.160.55			
[5]	14:07:40	[SUCCESS]	10.29.160.56			
161	14:07:40	SUCCESS	10.29.160.59			
			10.29.160.58			
			10.29.160.63			
			10.29.160.61			
			10.29.160.60			
111	14:07:40	SUCCESS]	10.29.160.66			
[12]	14:07:40	[SUCCESS]	10.29.160.67			
(13)	14:07:40	[SUCCESS]	10.29.160.62			
14	14:07:40	[SUCCESS]	10.29.160.65			
15	14:07:40	SUCCESS	10.29.160.64			
			10.29.160.68			
	:	:	:			
64	14:07:40	[SUCCESS]	10.29.160.116			

pssh -h /root/allnodes "setenforce 0"



The above command may fail if SELinux is already disabled

Set TCP Retries

Adjusting the tcp_retries parameter for the system network enables faster detection of failed nodes. Given the advanced networking features of UCS, this is a safe and recommended change (failures observed at the operating system layer are most likely serious rather than transitory). On each node, set the number of TCP retries to 5 can help detect unreachable nodes with less latency.

1. Edit the file /etc/sysctl.conf and add the following line:

net.ipv4.tcp_retries2=5

2. Save the file and run:

```
clush -B -a sysctl -p
```

Disabling the Linux Firewall

The default Linux firewall settings are far too restrictive for any Hadoop deployment. Since the Cisco UCS Big Data deployment will be in its own isolated network, there is no need to leave the iptables service running.

pssh -h /root/allnodes "service iptables stop"

<pre>[root@rhel1 ~]# pssh -h /root/allnodes "service iptables stop"</pre>
[1] 14:13:25 [SUCCESS] 10.29.160.54
[2] 14:13:25 [SUCCESS] 10.29.160.55
[3] 14:13:25 [SUCCESS] 10.29.160.57
[4] 14:13:25 [SUCCESS] 10.29.160.59
[5] 14:13:25 [SUCCESS] 10.29.160.56
[6] 14:13:25 [SUCCESS] 10.29.160.62
[7] 14:13:25 [SUCCESS] 10.29.160.60
[8] 14:13:25 [SUCCESS] 10.29.160.66
[9] 14:13:25 [SUCCESS] 10.29.160.61
[10] 14:13:25 [SUCCESS] 10.29.160.63
[11] 14:13:25 [SUCCESS] 10.29.160.67
[12] 14:13:25 [SUCCESS] 10.29.160.58
[13] 14:13:25 [SUCCESS] 10.29.160.53
[14] 14:13:25 [SUCCESS] 10.29.160.68
[15] 14:13:25 [SUCCESS] 10.29.160.65
[16] 14:13:25 [SUCCESS] 10.29.160.64
[64] 14:13:25 [SUCCESS] 10.29.160.116

pssh -h /root/allnodes "chkconfig iptables off"

[roo	ot@r	hel	.1 ~	·]#]	pssh	-h	ı /	roo	t/a	llr	nodes	"chkc	onfig	i	ptal	bles	off"
[1]	14:	13:	25	SU	CCESS		10	.29	.16	0.5	54						
[2]	14:	13:	25	SU	CCESS		10	.29	.16	0.5	55						
[3]	14:	13:	25	SU	CCESS		10	.29	.16	0.5	57						
[4]	14:	13:	25	[SU	CCESS		10	.29	.16	0.5	59						
[5]	14:	13:	25	SU	CCESS		10	.29	.16	0.5	66						
[6]	14:	13:	25	SU	CCESS		10	.29	.16	0.6	52						
[7]	14:	13:	25	[SU	CCESS		10	.29	.16	0.6	50						
[8]	14:	13:	25	[SU	CCESS		10	.29	.16	0.6	56						
[9]	14:	13:	25	[SU	CCESS		10	.29	.16	0.6	51						
[10]	14	:13	:25	S	UCCES	S	1	0.2	9.1	60.	63						
[11]	14	:13	:25	S	UCCES	S	1	0.2	9.1	.60.	67						
[12]	14	:13	:25	S	UCCES	S	1	0.2	9.1	.60.	58						
[13]	14	:13	:25	S	UCCES	S]	1	0.2	9.1	.60.	53						
[14]	14	:13	:25	[S	UCCES	S	1	0.2	9.1	60.	68						
[15]	14	:13	:25	[S	UCCES	S	1	0.2	9.1	.60.	65						
[16]	14	:13	:25	[S	UCCES	S]	1	.0.2	9.1	.60.	64						
10.41	- 4			T.C.	:		-	~ ~	<u>, i</u>	60	116						
[04]	14	:13	:25	្រទ	UCCES	5	T	0.2	A.1	.00.	110						

Configuring Data Drives on Name Node

The section Configuring Disk Drives for OS on Name Nodes describes the steps to configure the first two disk drives for the operating system for nodes rhell and rhel2. The remaining disk drives can also be configured Raid 1 similarly or by using MegaCli as described below.

Follow these steps to configure data drive on Name Node:

- From the LSI website http://www.lsi.com/support/Pages/Download-Results.aspx?keyword=9271-8i
- 2. Download MegaCli and its dependencies and transfer to Admin node.

```
scp /root/MegaCli64 rhel1:/root/
scp /root/Lib_Utils-1.00-08.noarch.rpm rhel1:/root/
scp /root/Lib_Utils2-1.00-01.noarch.rpm rhel1:/root/
```

3. Copy all three files to all the nodes using the following commands:

pscp -h /root/allnodes /root/MegaCli64 /root/

[ro	ot@rhel1 ·	~]# pscp -1	n /root/allnodes	/root/MegaCli64	/root/
[1]	13:00:40	[SUCCESS]	10.29.160.53		
[2]	13:00:40	[SUCCESS]	10.29.160.61		
[3]	13:00:40	[SUCCESS]	10.29.160.58		
[4]	13:00:40	[SUCCESS]	10.29.160.62		
[5]	13:00:40	[SUCCESS]	10.29.160.56		
[6]	13:00:40	[SUCCESS]	10.29.160.57		
[7]	13:00:40	[SUCCESS]	10.29.160.66		
[8]	13:00:40	[SUCCESS]	10.29.160.59		
[9]	13:00:40	[SUCCESS]	10.29.160.60		
[10]	13:00:4	0 [SUCCESS]	10.29.160.55		
[11]	13:00:4	0 [SUCCESS]	10.29.160.68		
[12]	13:00:4	0 [SUCCESS]	10.29.160.54		
[13]	13:00:4	0 [SUCCESS]	10.29.160.63		
[14]	13:00:4	0 [SUCCESS]	10.29.160.64		
[15]	13:00:4	0 [SUCCESS]	10.29.160.65		
[16]	13:00:4	0 [SUCCESS]	10.29.160.67		
[64]	13:00:40	[SUCCESS]	10.29.160.116		

pscp -h /root/allnodes /root/Lib_Utils* /root/

<pre>[root@rhel1 ~]# pscp -h /root/allnodes /root/Lib Utils* /root/</pre>
[1] 13:01:26 [SUCCESS] 10.29.160.53
[2] 13:01:26 [SUCCESS] 10.29.160.58
[3] 13:01:26 [SUCCESS] 10.29.160.59
[4] 13:01:26 [SUCCESS] 10.29.160.60
[5] 13:01:26 [SUCCESS] 10.29.160.67
[6] 13:01:26 [SUCCESS] 10.29.160.63
[7] 13:01:26 [SUCCESS] 10.29.160.61
[8] 13:01:26 [SUCCESS] 10.29.160.57
[9] 13:01:26 [SUCCESS] 10.29.160.54
[10] 13:01:26 [SUCCESS] 10.29.160.56
[11] 13:01:26 [SUCCESS] 10.29.160.62
[12] 13:01:26 [SUCCESS] 10.29.160.55
[13] 13:01:26 [SUCCESS] 10.29.160.64
[14] 13:01:26 [SUCCESS] 10.29.160.66
[15] 13:01:26 [SUCCESS] 10.29.160.65
[16] 13:01:26 [SUCCESS] 10.29.160.68
[64] 13:01:26 [SUCCESS] 10.29.160.116

4. Run the following command to install the rpms on all the nodes:

pssh -h /root/allnodes "rpm -ivh Lib Utils*"

[root@rhel1 ~]# pssh -h /root/allnodes "rpm -ivh Lib Utils*"
[1] 13:02:05 [SUCCESS] 10.29.160.64
[2] 13:02:05 [SUCCESS] 10.29.160.62
[3] 13:02:05 [SUCCESS] 10.29.160.57
[4] 13:02:05 [SUCCESS] 10.29.160.66
[5] 13:02:05 [SUCCESS] 10.29.160.58
[6] 13:02:05 [SUCCESS] 10.29.160.59
[7] 13:02:05 [SUCCESS] 10.29.160.54
[8] 13:02:05 [SUCCESS] 10.29.160.67
[9] 13:02:05 [SUCCESS] 10.29.160.60
[10] 13:02:05 [SUCCESS] 10.29.160.65
[11] 13:02:05 [SUCCESS] 10.29.160.56
[12] 13:02:05 [SUCCESS] 10.29.160.55
[13] 13:02:05 [SUCCESS] 10.29.160.63
[14] 13:02:05 [SUCCESS] 10.29.160.61
[15] 13:02:05 [SUCCESS] 10.29.160.68
[16] 13:02:05 [SUCCESS] 10.29.160.53
[64] 13:02:05 [SUCCESS] 10.29.160.116

5. Run the following script as root user on NameNode and Secondary NameNode to create the virtual drives.

vi /root/raid1.sh

```
./MegaCli64 -cfgldadd
r1[$1:3,$1:4,$1:5,$1:6,$1:7,$1:8,$1:9,$1:10,$1:11,$1:12,$1:13,$1:14,$
1:15,$1:16,$1:17,$1:18,$1:19,$1:20,$1:21,$1:22,$1:23,$1:24] wb ra
nocachedbadbbu strpsz1024 -a0
```

The above script requires enclosure ID as a parameter.

6. Run the following command to get enclousure id:

./MegaCli64 pdlist -a0 | grep Enc | grep -v 252 | awk '{print \$4}' | sort | uniq -c | awk '{print \$2}' chmod 755 raidl.sh 7. Run MegaCliscript as follows: ./raidl.sh <EnclosureID> obtained by running the command above WB: Write back RA: Read Ahead NoCachedBadBBU: Do not write cache when the BBU is bad. Strpsz1024: Strip Size of 1024K

```
Note
```

The command above will not override any existing configuration. To clear and reconfigure existing configurations refer to Embedded MegaRAID Software Users Guide available at www.lsi.com

Configuring the Filesystem for NameNodes

```
vi /root/driveconf.sh
#!/bin/bash
#disks count=`lsblk -id | grep sd
                                    wc -1`
#if [ $disks count -eq 2 ]; then
    echo "Found 2 disks"
#
#else
    echo "Found $disks count disks. Expecting 2. Exiting .. "
#
#
     exit 1
fi
[[ "-x" == "\{1\}" ]] && set -x && set -v && shift 1
for X in /sys/class/scsi_host/host?/scan
do
echo '- - - ' > \{X\}
done
for X in /dev/sd?
do
echo $X
if [[ -b ${X} && `/sbin/parted -s ${X} print quit |/bin/grep -c boot`
-ne 0 ]]
then
echo "$X bootable - skipping."
continue
else
Y = \{X # # * / \} 1
/sbin/parted -s ${X} mklabel gpt quit
/sbin/parted -s ${X} mkpart 1 6144s 100% quit
/sbin/mkfs.xfs -f -q -l size=65536b,lazy-count=1,su=256k -d
sunit=1024,swidth=6144 -r extsize=256k -L ${Y} ${X}1
(( $? )) && continue
```

```
/bin/mkdir -p /DATA/${Y}
(( $? )) && continue
/bin/mount -t xfs -o allocsize=128m,noatime,nobarrier,nodiratime
${X}1 /DATA/${Y}
(( $? )) && continue
echo "LABEL=${Y} /DATA/${Y} xfs
allocsize=128m,noatime,nobarrier,nodiratime 0 0" >> /etc/fstab
fi
done
```

Configuring Data Drives on Data Nodes

The section Configuring Disk Drives for OS on Data Nodesdescribes the setps to configure the first disk drive for the operating system for nodes rhel3 to rhel64. Remaining disk drives can also be configured similarly or using MegaCli as described below.

Issue the following command from the admin node to create the virtual drives with RAID 0 configurations on all the datanodes:

pssh -h /root/datanodes "./MegaCli64 -cfgeachdskraid0 WB RA direct NoCachedBadBBU strpsz1024 -a0"

```
WB: Write back
RA: Read Ahead
NoCachedBadBBU: Do not write cache when the BBU is bad.
Strpsz1024: Strip Size of 1024K
```

٩, Note

The command above will not override existing configurations. To clear and reconfigure existing configurations refer to Embedded MegaRAID Software Users Guide available at www.lsi.com.

Note

Make sure all the drives are up by running the following command: ./MegaCli64 -PDList -aAll |grep -i "Firmware state"

[root@rhel1	~]# ./1	MegaCli64	-PDList	-aAll	grep -	i "Firmware	state"
Firmware st							
Firmware st	ate: On:	line, Spun	Up				
Firmware st	ate: On!	line, Spun	Up				
Firmware st	ate: On:	line, Spun	Up				
Firmware st	ate: On	line, Spun	Up				
Firmware st	ate: On	line, Spun	Up				
Firmware st	ate: On:	line, Spun	Up				
Firmware st	ate: On	line, Spun	Up				
Firmware st	ate: On	line, Spun	Up				
Firmware st	ate: On	line, Spun	Up				
Firmware st	ate: On	line, Spun	Up				
Firmware st	ate: On:	line, Spun	Up				

Configuring the Filesystem for Data Nodes

On the Admin node, create a file containing the following script.

1. To create partition tables and file systems on the local disks supplied to each of the nodes, run the following script as the root user on each node:

```
vi /root/driveconf.sh
#!/bin/bash
#disks count=`lsblk -id | grep sd | wc -l`
#if [ $disks_count -eq 24 ]; then
     echo "Found 24 disks"
#
#else
#
     echo "Found $disks count disks. Expecting 24. Exiting .. "
#
     exit 1
fi
[[ "-x" == "${1}" ]] && set -x && set -v && shift 1
for X in /sys/class/scsi host/host?/scan
do
echo '- - -' > \{X\}
done
for X in /dev/sd?
do
echo $X
if [[ -b ${X} && `/sbin/parted -s ${X} print quit |/bin/grep -c boot`
-ne 0 ]]
then
echo "$X bootable - skipping."
continue
else
Y=${X##*/}1
/sbin/parted -s ${X} mklabel gpt quit
/sbin/parted -s ${X} mkpart 1 6144s 100% quit
/sbin/mkfs.xfs -f -q -l size=65536b,lazy-count=1,su=256k -d
sunit=1024, swidth=6144 -r extsize=256k -L ${Y} ${X}1
(($?)) && continue
/bin/mkdir -p /DATA/${Y}
(( $? )) && continue
/bin/mount -t xfs -o allocsize=128m, noatime, nobarrier, nodiratime
\{X\}1 / DATA / \{Y\}
(( $? )) && continue
echo "LABEL=${Y} /DATA/${Y} xfs
allocsize=128m, noatime, nobarrier, nodiratime 0 0" >> /etc/fstab
fi
done
```

2. Run the following command to copy driveconf.sh to all the data nodes:

pscp -h /root/datanodes /root/driveconf.sh /root/

3. Run the following command from the admin node to run the script across all data nodes:

roo	t@rhel1 ~	-]# pssh -	h /root/allnodes	"./driveconf.sh"
1]	16:15:24	[SUCCESS]	10.29.160.67	
2]	16:15:24	[SUCCESS]	10.29.160.54	
3]	16:15:24	[SUCCESS]	10.29.160.63	
4]	16:15:24	[SUCCESS]	10.29.160.66	
5]	16:15:24	[SUCCESS]	10.29.160.65	
6]	16:15:24	[SUCCESS]	10.29.160.62	
7]	16:15:24	[SUCCESS]	10.29.160.61	
8]	16:15:24	[SUCCESS]	10.29.160.60	
9]	16:15:24	[SUCCESS]	10.29.160.59	
10]	16:15:24	SUCCESS] 10.29.160.58	
11]	16:15:24	SUCCESS	10.29.160.57	
12]	16:15:24	I [SUCCESS	10.29.160.64	
13]	16:15:25	5 [SUCCESS	10.29.160.56	
14]	16:15:25	5 [SUCCESS	10.29.160.55	
15]	16:15:25	5 [SUCCESS	10.29.160.53	
16]	16:15:35	5 [SUCCESS	10.29.160.68	
641	16.15.2	. I encorea	10.29.160.116	
0 4]	10:15:3	o [BOCCESS	10.29.100.110	

pssh -h /root/datanodes "./driveconf.sh"

Installing Hortonworks Data Platform 2.0

HDP is an enterprise grade, hardened Hadoop distribution. HDP combines Apache Hadoop and its related projects into a single tested and certified package. It offers the latest innovations from the open source community with the testing and quality you expect from enterprise quality software. HPD components are depicted in figure 10.

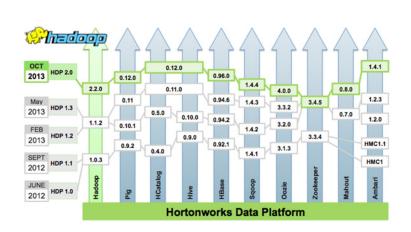


Figure 89 HDP Components

Pre-Requisites for HDP Installation

This section details the pre-requisites for HDP Installation, such as setting up the HDP Repository.

Hortonworks Repository

Follow these steps to install the Hortonworks Repository:

1. From a host connected to the Internet, download the Hortonworks repositories as shown below and transfer it to the admin node:

mkdir -p /tmp/Hortonworks

2. Download Hortonworks HDP Repo:

```
wget
http://public-repo-1.hortonworks.com/HDP/centos6/HDP-2.0.6.0-centos6-
rpm.tar.gz
```

3. Download Hortonworks HDP-Utils Repo:

```
wget
http://public-repo-1.hortonworks.com/HDP-UTILS-1.1.0.16/repos/centos6
/HDP-UTILS-1.1.0.16-centos6.tar.gz
```

4. Download Ambari Repo:

```
wget
http://public-repo-1.hortonworks.com/ambari/centos6/ambari-1.4.3.38-c
entos6.tar.gz
```

5. Copy the repository directory to the admin node:

scp -r /tmp/Hortonworks/ rhel1:/var/www/html

6. Extract the files:

```
login to rhel1
cd /var/www/html/Hortonworks
tar -zxvf HDP-2.0.6.0-centos6-rpm.tar.gz
tar -zxvf HDP-UTILS-1.1.0.16-centos6.tar.gz
tar -zxvf ambari-1.4.3.38-centos6.tar.gz
```

7. Create the hdp.repo file with following contents:

```
vi /etc/yum.repos.d/hdp.repo
```

```
[HDP-UTILS-1.1.0.16]
name=Hortonworks Data Platform Utils Version - HDP-UTILS-1.1.0.16
baseurl= http://rhell/Hortonworks/HDP-UTILS-1.1.0.16/repos/centos6
gpgcheck=0
enabled=1
priority=1
```

```
[HDP]
name=Hortonworks Data Platform HDP
baseurl= http://rhel1/Hortonworks/HDP/centos6/2.x/updates/2.0.6.0
gpgcheck=0
enabled=1
priority=1
```

8. Create the Ambari repo file with following contents:

```
vi /etc/yum.repos.d/ambari.repo
```

```
[Updates-ambari-1.4.3.38]
name=ambari-1.4.3.38 - Updates
baseurl= http://rhel1/Hortonworks/ambari/centos6/1.x/updates/1.4.3.38
gpgcheck=0
enabled=1
priority=1
```

9. From the admin node copy the repo files to /etc/yum.repos.d/ of all the nodes of the cluster:

```
pscp -h /root/allnodes /etc/yum.repos.d/hdp.repo /etc/yum.repos.d/
```

```
pscp -h /root/allnodes /etc/yum.repos.d/ambari.repo /etc/yum.repos.d/
```

Hortonworks Data Platform Installation

Follow these steps to install HDP:

1. Install and Setup Ambari Server on rhell

```
yum install ambari-server
```

2. Setup Ambari Server

ambari-server setup -j \$JAVA_HOME -s



Start Ambari Server

ambari-server start

Confirm Ambari Server Startup

ps -ef | grep ambari-server

Log into Ambari Server

When the Ambari service has been started, access the Ambari Install Wizard through the browser.

1

- 1. Point the browser to http://<ip address for rhel1>:8080
- 2. Log in to the Ambari Server using the default username/password: admin/admin. This can be changed at a later period of time.

Sign in	
Username	
admin	
Password	
•••••	

Create Cluster Name

Following these steps to create the cluster name:

- 1. At the Welcome page, type "Cisco_HDP2" as the name for the cluster in the text box.
- 2. Click Next.

Ambari		admin
CLUSTER INSTALL WIZARD	Welcome to Apache Ambari!	
Select Stack	Ambari makes it easy to install, manage, and monitor Hadoop clusters. We will walk you through the cluster installation process with this step-by-step wtzard.	
Install Options Confirm Hosts	Name your cluster Learn more	
Choose Services	Cisco_HDP2	
Assign Masters		
Assign Slaves and Clients		Next -+
Customize Services		
Install, Start and Test		
Summary		

Select Stack

I

Follow these steps to select stack:

- 1. Select HDP 2.0.6 stack.
- 2. Expand "Advanced Repository Options".
- 3. Under the advanced repository option:
 - Select RedHat 6 checkbox
 - Update the RedHat 6 Base URL to http://rhel1/Hortonworks/ rhel1/Hortonworks/HDP/centos6/2.x/updates/2.0.6.0/

LUSTER INSTALL WIZARD	Select Stac	k	
Select Stack	Please select the servi	ce stack that you want to use to install your Hadoop cluster.	
install Options	Stacks		
Confirm Hosts	@ HDP 2.0.6		
hoose Services	C HDP 1.3.3		
sign Masters	C HDP 1.3.2		
sign Slaves and Clients	 Advanced Reposit 	no Orbani	
tomize Services	· Paraneo Report	ay opposite	
eview		itory Base URLs for downloading the Stack software packages. If your hosts	
istall, Start and Test		nternet, you will have to create a local mirror of the Stack repository that is ac those Base URLs here.	cessible
immary		sing local mirror repositories, you only need to provide Base URLs for the Op alling for your Stack. Uncheck all other repositories.	erating
	os	Base URL	
	Red Hat 5		
	CentOS 5 Oracle Linux 5	http://public-repo-1.hortonworks.com/HDP/centos5/2.xlupdates/2.0.6.0	
	Red Hat 6	http://rhei1/Hortonworks/HDP/centos6/2 x/updates/2 0.6.0/	O DUndo
	CentOS 6 Oracle Linux 6	Traditional interformation contrasted systems and an an an and an	
	SUSE 11	http://public-repo-1.hortoriworks.com/HDP/suse11/2.x/updates/2.0.6.0/	
	Skip Repository Ba	ise URL validation (Advanced) 9	

Hortonworks Data Platform Installation

In order to build up the cluster, the install wizard needs to know general information about how the cluster has to be set up. This requires providing the Fully Qualified Domain Name (FQDN) of each of the host. The wizard also needs to access the private key file that was created in Setting Up Password-less Login. It uses these to locate all the hosts in the system and to access and interact with them securely.

- 1. Use the Target Hosts text box to enter the list of host names, one per line. One can also use ranges inside brackets to indicate larger sets of hosts.
- 2. Select the option Provide your SSH Private Key in the Ambari cluster install wizard.
- 3. Copy the contents of the file /root/.ssh/id_rsa on rhell and paste it in the text area provided by the Ambari cluster install wizard.



Make sure that no extra white space after the text-----END RSA PRIVATE KEY-----

4. Click the Register and Confirm button to continue.

[root@rhel1 ~]# cat /root/.ssh/id_rsa
BEGIN RSA PRIVATE KEY
MIIEoQIBAAKCAQEAYDOIRbk4mB2rizc0/g0M2iYT2h4vxkIxA/uvQVPthFreUdgT
Zehw/Qtdk7meeqhgqsHmb1CriF0m6SxvPEXW2cGoAx75hZwTuDIR3Qlvk6oYUmDW
BKq5TMfUMKfD7tknkGkg5N+YHsPCoNILlz/Wqc01hZZ0tiCmrxeRnPGSlJY74/Db
A0BewMuNajAoVppPD6cLGF6/NKORpEDUnCuwe5pCRV5tko+gzBeBF5oeCS6Ya6I7
nS0HplJXV0Mv23SNUwl3cswbqLdrr3atG6YRieVrmmr/PlrKMp192tzQ1mHZMBqG
w1RJTILjygW0gp5g7NQBGeM7sX4V60mzv4vmzwIBIwKCAQEAg4+UEI+o2PjKVCuX
2h+XEwMUXCJ3KoNEyBpr2nj7KxckYas/8oLN6B1pYR0UB3X2YZVc6hBwuLI+JDMk
hrGNMALqwDjtHUl0yX/9HDlmlDyTo9k8LvPY2q8zqvHnJ+3Jisi92Dspc01xRRxQ
wnpofjAm1CDx5WXp4MZYX9HynCcKmheFefobLys6gloxd84eHW1y6b0xU1dh7hsQ
pcK+xpdFWlsHYFbvckTuCHUAezF4+uBT5F0PMiD7PwzrvbXKA65ABuezv9gg2/I1
PekIkRvbosniFbBUi2ZOS1uN/gsaZgmSQ9gTarJlV8zMy6K31LETcOckl2LZHRX2
5sEx6wKBgQD9CiKc0HFiulrQWW5cLTDJU8wzTiNK4M91Qb2L0hfFuZfluiAl3Ref
yiL9MjE3A5Mnn9pcRxMmXXPF4t9iuLh3+3tCsr1TzPm14WT+Fipa9sh+3JZ2HKgm
pCquAEdoFRK4oP3/yYQg95gie2SC9sB0z6zVohdyNUvnkiMb9vwi3wKBgQDKiyTi
Yu4210wsYKfZ7YjomjRKUFaH4CKtnyJy1SM3wFPRnZJd4BUaMq0DaTxr2tW4si+4
t88M8XS6FHGHymSqRtL0tYzMlmmwUtjCLNZQfqSeg1NovekXxXL0iUzel8PL3Z0H
AeBj0/GLQ3SF/PGWMokCwNtaJoV/xldBdIsqEQKBgEERPBmx8UVF3NZ9ZYVqtMY0
09KtsU3Ex52x0ad1VpHt5TsSmo1kv06TEE+8cw41fZx5j+vXwxh+bjozBj30/Dwc
GGGbrQbrkKscs5HLL325+QqtwEpB4hiQnUKvnVVHP1QMJA6S53YxCdz7KHlypnqq
bkWQFKhW2QEIUivDKuRlAoGASzr/EkIAtUfFb5Gdbj0n4V3Y6Gb7kY3DvNS1BhSm
rk7ADAdTnzX5N23L08gAf9TwS+ppfx+zTfNIn0MFmNYlY9EpyJs0S/1adLE0roWu
sC8J8bu/5RNWk8z+z9s5zwUrd5txT2cY1J8t1KQGtWyUPxoVoe/ccfENA5LP872s
xnsCgYAFRE4SbB416p9miiR1+gNCiihM9N+FmHMmcP/y80QL/MoAYoHB1Tn8cwVu
l+sju4bWGUZvnGMWXwpEU5zVBra+yShh309IwjP/1kpCNWz7CX+/uI6FY+sl2xTr
t5P/Avh0vUKMhRFjXFQoY5yqNUkasvIu6S8Q1unl8N2IhEgw1g==
END RSA PRIVATE KEY

elcome	Install Options
Hect Stack	Enter the list of hosts to be included in the cluster and provide your SSH key.
stall Options	Target Hosts
infirm Hosts	Enter a list of hosts using the Fully Qualified Domain Name (FQDN), one per line. Or use Pattern Expressions
oose Services	rhel[1-64]
sign Masters	
sign Slaves and Clients	
stomize Services	
view	
tall, Start and Test	Host Registration Information
mmary	Provide your SSH Private Key to automatically register hosts
	Browse. No file selected.
	SSH user (root or passwordless sudo account) root

Hostname Pattern Expressions

Install Options	
Host name pattern expressions	X Druse Pattern Expressions
	-
rhel1	
rhel2	
rhel3	
rhel5	
rhel6	
rhei7	ber nosts
rhel8	
rhel9	
rhei10	
mailt	-
Ca	ncel
P. Use a Local Botware Repository instead of downloading software	e packages from the internet
P Path to 64-bit JOK JAVA_HOME	

Confirm Hosts

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The following screen allows you to make sure that Ambari has located the correct hosts for the cluster and to check those hosts to make sure they have the correct directories, packages, and processes to continue the install.

If any hosts were selected in error, it can be removed by selecting the appropriate checkboxes and clicking the grey Remove Selected button. To remove a single host, click the small white Remove button in the Action column.

When the lists of hosts are confirmed, click Next.

Select Stack Install Options	istering your hosts. ase confirm the host list a	nd remove any hosts that yo	u do not want to include	in the cluster.	
Confirm Hosts	Remove Selected	c	hour AT(55) Linetalling (3)	Registering (0) Success	(64) 1 5 48 (0)
Choose Services	Host	Progress	Status	Action	-
Assign Masters Assign Slaves and Clients	rhel1		Success	8 Remove	
Customize Services	rhel2		Success	8 Remove	
Review	rhel3		Success	8 Remove	
nstall, Start and Test	rhel4		Success	8 Remove	
ummary	rhel5		Success	8 Renove	
	rhel6		Success	8 Remove	
	rhel7		Success	8 Remove	
	rhel8		Success	8 Remove	
	rhel9		Success	8 Remove	
	rhel10		Success	8 Renove	

Choose Services

HDP is made up of a number of components. See Understand the Basics for more information.

1

1. Select all to preselect all items

I

2. When you have made your selections, click Next.

STER INSTALL WIZARD	Choose Ser	vices				
lect Stack	Choose which services y	Choose which services you want to install on your cluster.				
tall Options	Service all none	Version	Description			
ose Services	F HDFS	2.2.0.2.0.6.0	Apache Hadoop Distributed File System			
gn Masters	VARN + MapReduce2	2.2.0.2.0.6.0	Apache Hadoop NextGen MapReduce (YARN)			
gn Slaves and Clients	IF Nagios	3.5.0	Nagios Monitoring and Alerting system			
omize Services ew	🕫 Ganglia	3.5.0	Ganglia Metrics Collection system			
I, Start and Test	F Hive + HCat	0.12.0.2.0.6.1	Data warehouse system for ad-hoc queries & analysis of large datasets and table & storage management service			
mary	F HBase	0.96.1.2.0.6.1	Non-relational distributed database and centralized service for configuration management & synchronization			
	Pig	0.12.0.2.0.6.1	Scripting platform for analyzing large datasets			
	🔽 Sqoop	1.4.4.2.0.6.1	Tool for transferring bulk data between Apache Hadoop and structured data stores such as relational databases			
	P Oozie	4.0.0.2.0.6.0	System for workflow coordination and execution of Apache Hadoop jobs This also includes the installation of the optional Oode Web Console which relies on and will install the ExLIS Library.			
	₽ ZooKeeper	3.4.5.2.0.6.0	Centralized service which provides highly reliable distributed coordinatio			
	- Back		Next -			

Assign Masters

The Ambari install wizard attempts to assign the master nodes for various services that have been selected to appropriate hosts in the cluster. The right column shows the current service assignments by host, with the hostname and its number of CPU cores and amount of RAM indicated.

1. Reconfigure the service assignment to match the table shown below.

Service Name	Host
NameNode	rhel1
SNameNode	rhel2
HistoryServer	rhel2
ResouceManager	rhel2
Nagios Server	rhel1
Ganglia Collector	rhel1
HiveServer2	rhel2
HBase Master	rhel2
Oozie Server	rhel1
Zookeeper	rhel1, rhel2, rhel3

LUSTER INSTALL WIZARD	Assign Ma	sters		
Select Stack	Assign master comp	d on the same server.		
Install Options	- Interesting inte			
Confirm Hosts	NameNode:	rhei1 (252.2 GB, 40 cores)	-	rhel1 (252.2 GB, 40 cores)
Choose Services				NameNode Nagios Server
Assign Masters	SNameNode:	rhel2 (252.2 GB, 40 cores)	-	Ganglia Server Oozie Server
Assign Slaves and Clients	History Server:	rhel2 (252.2 GB, 40 cores)	-	ZooKeeper
Customize Services			_	
Review	ResourceManager.	rhel2 (252.2 GB, 40 cores)	-	rhel2 (252.2 GB, 40 cores)
Install, Start and Test	Nagios Server:	rhei1 (252.2 GB, 40 cores)	-	SNameNode History Server ResourceManager HiveServer2
Summary			_	Hive Metastore WebHCat Server
	Ganglia Server:	rhel1 (252.2 GB, 40 cores)	-	HBase Master Zockeeper
	HiveServer2	rhel2 (252.2 GB, 40 cores)		
	Hive Metastore:	mel2 •		rhei3 (252.2 GB, 40 cores) ZooKeeper
	WebHCat Server:	rhei2 •		
	HBase Master.	[rhel2 (252 2 GB, 40 cores)		61 hosts not running master services
	Oozie Server:	rhei1 (252.2 GB, 40 cores)		
	Zookeeper:	rhel1 (252.2 GB, 40 cores)		
	Zookeeper:	rhel2 (252.2 GB, 40 cores)		
	Zookeeper:	rhel3 (252.2 GB, 40 cores)	. 00	



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On a small cluster (<16 nodes), consolidate all master services to run on a single node. For large clusters (> 64 nodes), deploy master services across 4 nodes.

2. Click Next.

Assign Slaves and Clients

The Ambari install wizard attempts to assign the slave components (DataNodes, NodeManagers, and RegionServers) to appropriate hosts in the cluster. Reconfigure the service assignment to match the table below:

Client Service Name	Host
DataNode	rhel3 to rhel64
NodeManager	rhel3 to rhel64
RegionServer	rhel3 to rhel64
Client	All nodes, rhel1-rhel64

- 1. Assign DataNode, NodeManager, RegionServer nodes to rhel3- rhel64.
- 2. Assign Client to all nodes.
- **3.** Click Next.

1

come	Assig	in olarco (and Clients		
ect Stack			ints to hosts you want to run		
all Options			components are shown with MapReduce 2 Client, YARN C	lient, Hive Client, HCat Client,	HBase Client, Pig,
ifirm Hosts	Sqoop, Or	zie Client and Zookee	eper Client.		
ose Services	Host	all none	all none	all none	all none
ign Masters					
gn Slaves and Clients	rhei1 🖷	DataNode	NodeManager	RegionServer	R Client
tomize Services	rhei2 🖷	DataNode	NodeManager	RegionServer	R Client
iew.	rhei3 🖷	🗵 DataNode	☑ NodeManager	RegionServer	I Client
ill, Start and Test	rhei4	R DataNode	R NodeManager	RegionServer	R Client
mary	rhel5	☑ DataNode	R NodeManager	RegionServer	🗹 Client
	rhel6	P DataNode	R NodeManager	RegionServer	R Client
	rhel7	☑ DataNode	☑ NodeManager	RegionServer	🗹 Client
	rhei8	P DataNode	R NodeManager	RegionServer	R Client
	rhel9	☑ DataNode	R NodeManager	RegionServer	R Client
	rhel10	P DataNode	R NodeManager	RegionServer	P Client
	← Back				Nex

Customize Services

This section details the configuration settings for Hadoop components. The wizard attempts to set reasonable defaults for each of the options here, but this can be modified to meet specific requirements. The following sections provide configuration guidance that should be refined to meet specific use case requirements.

1

HDFS

Update the following HDFS configurations:

Property Name	Value
NameNode Java Heap Size	4096
Hadoop maximum Java heap size	4096
DataNode maximum Java heap size	4096
Datanode Volumes Failure Toleration	5

Welcome	Customize Se	ervices				
Select Stack Install Options Confirm Hosts	We have come up with reco	mmended configurations f	lor the	services you select	ed. Customize the	m as you see
Choose Services Assign Masters	HDFS YARN MapRedux Ganglia Misc	ce 2 Hive 🚺 WebHC	at H	HBase ZooKeepe	Cozie 🚹 🕴	Vagios 📀
Assign Slaves and Clients						
Customize Services	Group HDFS Default (16	Manage Config	Group	s (Filter	
Review						
Install, Start and Test	 NameNode 					
Summary	NameNode hosts	rhei1				
	NameNode directories	/DATA/sdb1/hadoop/hdf /DATA/sdc1/hadoop/hdf /DATA/sdd1/hadoop/hdf /DATA/sde1/hadoop/hdf /DATA/sdf1/hadoop/hdf	s/nam s/nam s/nam	enode enode enode	শ	
	NameNode Java heap size	4096	MB	OUndo		
	NameNode new generation size	200	MB			

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SNameNode host	rhel2	rhel2				
SecondaryNameNode Checkpoint directory	/DATA/sdb1/ha					
DataNode						
DataNode hosts	rhel3 and 61 of	thers				
DataNode directories	/DATA/sdb1/hadoop/hdfs/data /DATA/sdc1/hadoop/hdfs/data /DATA/sdd1/hadoop/hdfs/data /DATA/sdd1/hadoop/hdfs/data					
DataNode maximum Java heap size	4096	MB	Override	OUndo		
DataNode volumes	5				Override O	
failure toleration						

WebHDFS enabled	N	
Hadoop maximum Java heap size	4096	MB Override OUndo
Reserved space for HDFS	1073741824	bytes Override
HDFS Maximum Checkpoint Delay	21600	seconds Override
HDFS Maximum Edit Log Size for Checkpointing	67108864	bytes Override
Advanced		
Custom core-site xml		
Custom hdfs-site xml		

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YARN

Update the following YARN configurations:

Property Name	Value
ResourceManager Java heap size	4096
NodeManager Java heap size	2048
yarn.nodemanager.resource.memory-mb	184320
YARN Java heap size	4096
yarn.scheduler.minimum-allocation-mb	4096
yarn.scheduler.maximum-allocation-mb	184320

elcome	Customize Se	anvioan				
	Customize Se	ervices				
ect Stack	We have come up with reco	ommended configural	ions for the ser	vices you selecte	d. Customize them	as you see
all Options	ft.					
firm Hosts						
ose Services	HDFS YARN MapRedu	ce 2 Hive 🚺 W	ebHCat HBas	e Zookeeper	Oozie 1 N	agios 2
gn Masters	Ganglia Misc					
ign Slaves and Clients						
stomize Services	Group YARN Default (64	n) 🔹 Manage Co	onfig Groups	F	iter	-
iew						
all, Start and Test	Resource Manager					
nmary		1.122				
	ResourceManager	rhel2				
	ResourceManager Java	4096	мв 😊	Undo		
	heap size					
	yam.acl.enable	Override				
	yam.admin.acl	•			00	Verride
	yam.log-aggregation-	Override				

NodeManager	rhel3 and 61 oth	iers			
NodeManager Java heap size	4096	MB	Override	OUndo	
rarn nodemanager resou ce.memory-mb	184320				Override
yarn.nodemanager.∨mem pmem-ratio	2.1				Override
yam.nodemanager.log-di rs	/DATA/sdb1/har /DATA/sdc1/har /DATA/sdd1/har /DATA/sde1/har /DATA/sde1/har	doop/yam/log doop/yam/log doop/yam/log			▲ Override
/arn.nodemanager.local- dirs	/DATA/sdj1/hadoop/yarn/local		Override		
yarn.nodemanager.remot e-app-log-dir	/app-logs				Override
yarn.nodemanager.remot e-app-log-dir-suffix	logs				Override
yarn.nodemanager.aux- services	mapreduce_sh	uffle			Override
yarn.nodemanager.log.re tain-second	604800				Override

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General			
YARN Java heap size	4096	MB	OUndo
Scheduler			
Advanced			
Custom yarn-site xml			
Attention: Some configu	rations need your a	ttention before	you can proceed.
← Back			${\sf Next} \to$

MapReduce

Update the following MapReduce configurations:

Property Name	Value
Default virtual memory for a job's map-task	4096
Default virtual memory for a job's reduce-task	8192
Map-side sort buffer memory	1638
yarn.app.mapreduce.am.resource.mb	8192
mapreduce.map.java.opts	-Xmx3276m
mapreduce.reduce.java.opts	-Xmx6552m
yarn.app.mapreduce.am.command-opts	-Xmx6552m

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LUSTER INSTALL WIZARD Welcome Select Stack	Customize Services
Install Options Confirm Hosts	We have come up with recommended configurations for the services you selected. Customize them as you see fit.
Choose Services Assign Masters	HDFS YARN MapReduce 2 Hive () WebHCat HBase Zookeeper Oozie () Nagios () Ganglia Misc
Assign Slaves and Clients	
Customize Services Review	Group MapReduce2 Default (84) Manage Config Groups Filter.
Install, Start and Test	History Server
Summary	History Server rhel2
	General
	Default vitual memory 4096 MB Overnide OUndo for a job's map-task
	Default vitual memory 8192 MB Overnide Oundo for a job's reduce-task
	Map-side sort buffer 1638 MB Override OUndo memory

Mapreduce Log Dir Prefix	/var/log/hadoop-mapreduce	
Mapreduce PID Dir Prefix	/var/run/hadoop-mapreduce	
/arn.app.mapreduce.am.	8192	Override
resource.mb		
mapreduce.admin.map.c hild.java.opts	-Djava.net.preferlPv4Stack=true -Dhadoop.metrics.log.level=W/	Override
mapreduce.admin.reduc e.child.java.opts	-Djava.net.preferIPv4Stack=true -Dhadoop.metrics.log.level=W	Override
mapreduce.admin.user.e nv	LD_LIBRARY_PATH=/usr/lib/hadoop/lib/native:/usr/lib/hadoop/li	Override
mapreduce.am.max- attempts	2	Override
mapreduce.application.cl	\$HADOOP_MAPRED_HOME/share/hadoop/mapreduce/*,\$HAD	Override
mapreduce.cluster.admin strators	hadoop	Override
mapreduce.framework.na me	yarn	Override
		Override
mapreduce.job.reduce.sl owstart.completedmaps	0.05	Overnde
mapreduce.jobhistory.ad dress	rhel2: 10020	Override
	[we billed date]	
mapreduce.jobhistory.do ne-dir	/mr-history/done	Override
mapreduce.jobhistory.int	/mr-history/tmp	Override
ermediate-done-dir	The control of the co	

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mapreduce.jobhistory.we bapp.address	rhel2:19888	Override
mapreduce.map.java.opt	-Xmx3276m	Override 🕇
S	Undo	
mapreduce.map.log.level	INFO	Override
mapreduce.map.output.c ompress	false	Override
mapreduce.map.sort.spill .percent	0.7	Override 0
mapreduce.map.speculat ive	false	Override
mapreduce.output.fileout putformat.compress	false	Override
mapreduce.output.fileout putformat.compress.type	BLOCK	Override
mapreduce.reduce.input. buffer.percent	0.0	Override
mapreduce.reduce.java.	-Xmx6552m	Override 🗧
opts	Undo	
mapreduce.reduce.log.le vel	INFO	Override
mapreduce.reduce.shuffl e.input.buffer.percent	0.7	Override
mapreduce.reduce.shuffl e.merge.percent	0.66	Override 0
mapreduce.reduce.shuffl e.parallelcopies	30	Override

mapreduce.task.io.sort.fa ctor	100	Override
mapreduce.task.timeout	300000	Override
yarn.app.mapreduce.am. admin-command-opts	-Djava net preferlPv4Stack=true -Dhadoop.metrics log.level=W/	Override
yarn.app.mapreduce.am. command-opts	-Xmx6552m	Override
yarn.app.mapreduce.am. log.level	INFO	Override
yarn.app.mapreduce.am. staging-dir	/user	Override
Custom mapred-site xm	L. C.	
Attention: Some configural	tions need your attention before you can proceed.	
← Back		Next

Hive/HCat

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Enter the hive database password as per the organizational policy.

Welcome Select Stack	Customize S	bervices				
Install Options		commended configurations for t	he services you se	elected. Custom	ize them as yo	u see
Confirm Hosts	fit.					
Choose Services	HDFS YARN MapRed	duce 2 Hive WebHCat HE	aco Teol/ooner	Contin CO	Nacios 🙃	Ganglia
		Auto 2 nine Medinical ne	ase zuoneeper	Could U	Hagios 2	Gangia
Assign Masters	Misc					
Assign Slaves and Clients						
Customize Services	Group Hive Default (6-	4) • Manage Config Grou	ps	Filter		•
Review						
Install, Start and Test	 Hive Metastore 					
Summary	Hive Metastore host	rhel2				
	Database Type	MySQL				
	Hive Database	R New MySQL Database				
	Hive Database	C Existing MySQL Database				
		C Existing Oracle Database				
	Database Host	rhei2				
	Database Name	hive				
	Database Username	hive				
	Database Password	••••	••••	0	Undo	
	Database URL	jdbc:mysql.//mei2/hive?cre	ateDatabaselfNotE	xist=true		
	Advanced					

WebHCat

No changes are required.

LUSTER INSTALL WIZARD	Customize Services
Select Stack Install Options Confirm Hosts	We have come up with recommended configurations for the services you selected. Customize them as you see fit.
Choose Services Assign Masters	HDFS YARN MapReduce 2 Hive WebHCat HBase Zookkeeper Oozie 1 Nagios 2 Gangka
Assign Slaves and Clients Customize Services	Group WebHCat Default (64) Manage Config Groups Filter Filter
Review Install, Start and Test Summary	WebHCat Server
	WebHCat Server host mei2
	Custom webhcat-site xml
	Attention: Some configurations need your attention before you can proceed.
	+ Back Next

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HBase

Update the following HBASE configurations:

Property Name	Value
HBase Master Maximum Java Heap Size	4096
HBase RegionServers Maximum Java Heap	32768
Size	

Install Options	R.
Confirm Hosts	
Choose Services	HDFS VARN MapReduce 2 Hive WebHCat HBase ZooKeeper Oozie (1) Nagios (2) Gangla
Assign Masters	Misc
Assign Slaves and Clients	
Customize Services	Group HBase Default (64) Manage Config Groups Fiter .
Review	
Install, Start and Test	 HBase Master
Summary	HBase Master hosts mei2
	HBase Master Maximum 4096 MB Java heap size
	✓ RegonServer
	RegionServer hosts rhei3 and 61 others
	HBase RegionServers 32768 MB Override
	HBase RegionServer 60 Override Handler
	HBase Region Major 86400000 ms. Override Compaction
	HBase Region Block 2 Override
	HBase Region Memstore 134217728 bytes Otvernide Flush Size

Zookeeper

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No changes are required.

hoose Services ssign Masters	HDFS YARN MapRedu Misc	ce 2 Hive We	bHCat HBa	zookeeper	Oozie 1	Nagios 2	Ganglia
ssign Slaves and Clients							
ustomize Services	Group Zookeeper Defa	ult (64) - M	anage Config	Groups	Filter		•
eview							
stall, Start and Test	 ZooKeeper Server 						
ummary	Zookeeper Server hosts	rhel1 and 2 oth	ers.				
	Zookeeper directory	/DATA/sdb1/ha	doop/zookee;	ier		Overrid	e
	Length of single Tick	2000	ms				
	Ticks to allow for sync at Init	10					
	Ticks to allow for sync at Runtime	5					
	Port for running ZK Server	2181					
	Advanced						
	Attention: Some configura	ations need your a	ttention befor	e you can procee	d.		
	+ Back						Next

Oozie

Enter the oozie database password as per organizational policy.

Choose Services	HDFS YARN MapRed	duce 2 Hive WebHC	at HBase ZooKeeper	Oozie Nagios (2)	Ganglia
Assign Masters	Misc				
Assign Slaves and Clients					
Customize Services	Group Oozie Default	(64) • Manage Co	ntig Groups	Filter	•
Review					
Install, Start and Test	 Oozie Server 				
Summary	Oozie Server host	rhei1			
	Database Type	Derby			
	Oozie Database	New Derby Datat			
		C Existing MySQL E C Existing Oracle D			
		C Entring Crother			
	Database Name	oozie			
	Database Username	oozie			
	Database Password	•••••	*****	ObnUC	
	Database URL	jdbc:derby:\${oozie	data.dir]/\${oozie.db.schem	a.name}-db;creat	
	Oozie Data Dir	/DATA/sdb1/hadoo	o/oozie/data		
	Advanced				
	- Autoliceu				
	Custom oozie-site xm	í.			

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Nagio

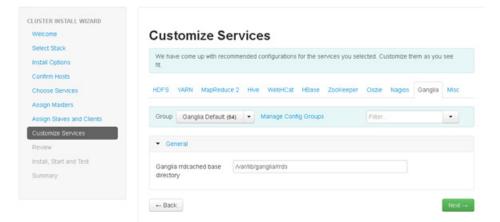
Provide the following:

- Nagios admin password as per organizational policy
- Hadoop admin email

Welcome	Customize Se	ervices					
Select Stack Install Options Confirm Hosts	We have come up with reco	ommended configuration	s for the services you sel	ected. Cu	stomize tr	nem as you	see
Choose Services	HDFS YARN MapRedu	ce 2 Hive WebHCat	HBase Zookeeper	Oozie	Nagios	Ganglia	Misc
Assign Masters Assign Slaves and Clients Customize Services	Group Nagios Default (6	4) • Manage Conf	lig Groups	Filter.			·
eview	• General						
stall, Start and Test	Nagios Admin username	nagiosadmin					
ummary	Nagios Admin password		•••••		OUndo		
	Hadoop Admin email	admin.email@example	e.com			OUndo	

Ganglia

No changes are required.



Misc

No changes are required.

Assign Masters	Users and Groups		
Assign Slaves and Clients			
Customize Services	Proxy group for Hive,	users	
Review	WebHCat, and Oozie		
Install, Start and Test	HDFS User	hdfs	
Summary	MapReduce User	mapred	
	YARN User	yam	
	HBase User	hbase	
	Hive User	hive	
	HCat User	hcat	
	WebHCat User	hcat	
	Oozie User	oozie	
	Zookeeper User	zookeeper	
	Ganglia User	nobody	
	Naglos User	nagios	
	Naglos Group	nagios	
	Smoke Test User	ambari-ga	
	Hadoop Group	hadoop	

Review

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The assignments that have been made are displayed. Check to make sure everything is correct before clicking the Deploy button. If any changes are to be made, use the left navigation bar to return to the appropriate screen.

Deploy

When the review is complete, click the Deploy button.

CLUSTER INSTALL WIZARD	Review	
Welcome	Review	
Select Stack	Please review the configuration before installation	
Install Options		
Confirm Hosts		Print
Choose Services	Admin Name : admin	_
Assign Masters	Cluster Name : Cisco_HDP2	
Assign Slaves and Clients	Total Hosts : 64 (64 new)	
Customize Services	Repositories: RHEL 6/CentOS 6/Oracle Linux 6 : http://thei1/Hortonworks/HDP/centos6/2 x/updates/2 0.6 0/	
Review	Services	
Install, Start and Test	HDFS	
Summary	NameNode : rhel1 SecondaryNameNode : rhel2 DotaNodes: 62 hosts	
	YARN + MapReduce2 NodeManager : 82 hosts ResourceManager : rhe12 History Server : rhe12	
	Nagios Server : rhei1 Administrator : nagiosadmin / (admin email@example.com)	
	Panalia	•
	- Back	Deploy

The progress of the install is shown on the screen. Each component is installed, started and validated. The next screen displays the overall status of the install in the progress bar at the top of the screen and a host-by-host status in the main section.

To see specific information on what tasks have been completed per host, click the link in the Message column for the appropriate host. In the Tasks pop-up, click the individual task to see the related log files. Select filter conditions by using the Show dropdown list. To see a larger version of the log contents, click the Open icon or to copy the contents to the clipboard, use the Copy icon.



Depending on which components are installing, the entire process may take 10 or more minutes.

When successfully installed and started the services appears, click Next.

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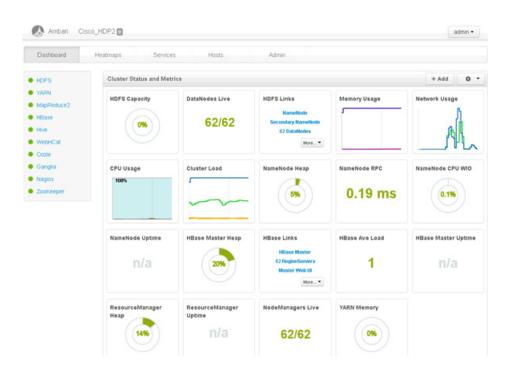
LUSTER INSTALL WIZARD	Install Sta	art and Test		
Welcome	mstan, ota	artana rest		
Select Stack	Please wait while the	selected services are installed a	and started.	
Install Options				100 % overall
Confirm Hosts				
hoose Services			Show: All (64)	Installing (0) Registering (0) Success (64) Fail (
ssign Masters	Host	Status		Message
ssign Slaves and Clients	rhel1		100%	Success
ustomize Services	rhei2		100%	Success
eview	rhel3		100%	Success
stall, Start and Test	rhel4		100%	Success
mmary	rhel5		100%	Success
	rhel6		100%	Success
	rhel7		100%	Success
	rhei8		100%	Success
	rhel9		100%	Success
	rhel10		100%	Success
	rhei11		100%	Success
	rhei12		100%	Success
	rhel13		100%	Success
	rhei14		100%	Success
	rhei15		100%	Success
	rhel16		100%	Success

Summary of Installation Process

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The Summary page gives a summary of the accomplished tasks. Click Complete.

Ambari		admin •
CLUSTER INSTALL WIZARD Welcome	Summary	
Select Stack	Here is the summary of the install process.	
Install Options		
Confirm Hosts	The cluster consists of 64 hosts	
Choose Services	Installed and started services successfully on 64 new hosts	
Assign Masters	Master services installed NameNode installed on rhe11	
Assign Slaves and Clients	SecondaryNameNode Installed on rhei2	
Customize Services	History Server Installed on rhel2 ResourceManager Installed on rhel2	
Review	Nagios Server installed on rhe11 Ganglia Server installed on rhe11	
Install, Start and Test	Hive Metastore installed on mel2	
Summary	HBase Master installed on rhel2 Oode Server installed on rhel1	
	All services started	
	All tests passed	



Conclusion

Hadoop has evolved into a leading data management platform across all verticals. The Cisco CPAv2 for Big Data for HDP 2.0 offers a dependable deployment model for enterprise Hadoop that offer a fast and predictable path for businesses to unlock value in big data.

The configuration detailed in the document can be extended to clusters of various sizes depending on what application demands. Up to 160 servers (10 racks) can be supported with no additional switching in a single UCS domain. Each additional rack requires two Cisco Nexus 2232PP 10GigE Fabric Extenders and 16 Cisco UCS C240 M3 Rack-Mount Servers. Scaling beyond 10 racks (160 servers) can be implemented by interconnecting multiple UCS domains using Nexus 6000/7000 Series switches, scalable to thousands of servers and to hundreds of petabytes storage, and managed from a single pane using UCS Central.

Bill of Materials

This section provides the BOM for the 64 node Performance and Capacity Balanced Cluster.

Part Number	Description	Quantity
UCS-SL-CPA2-PC	Performance and Capacity Balanced Cluster	1
UCSC-C240-M3S	UCS C240 M3 SFF w/o CPU mem HD PCIe w/ rail kit expdr	16
UCS-RAID9271CV-8	MegaRAID 9271CV with 8 internal SAS/SATA ports with	16
Ι	Supercap	

Table 7Bill of Materials for Base Rack

UCSC-PCIE-CSC-02	Cisco VIC 1225 Dual Port 10Gb SFP+ CNA	16
CAB-9K12A-NA	Power Cord 125VAC 13A NEMA 5-15 Plug North America	32
UCSC-PSU2-1200	1200W 2u Power Supply For UCS	32
UCSC-RAIL-2U	2U Rail Kit for UCS C-Series servers	16
UCSC-HS-C240M3	Heat Sink for UCS C240 M3 Rack Server	32
UCSC-PCIF-01F	Full height PCIe filler for C-Series	48
UCS-CPU-E52660B	2.20 GHz E5-2660 v2/95W 10C/25MB Cache/DDR3 1866MHz	128
UCS-MR-1X162RZ-A	16GB DDR3-1866-MHz RDIMM/PC3-14900/dual rank/x4/1.5v	256
UCS-HD1T7KS2-E	1TB SAS 7.2K RPM 2.5 inch HDD/hot plug/drive sled mounted	384
UCS-SL-BD-FI96	Cisco UCS 6296 FI w/ 18p LIC, Cables Bundle	2
N2K-UCS2232PF	Cisco Nexus 2232PP with 16 FET (2 AC PS, 1 FAN (Std Airflow)	2
SFP-H10GB-CU3M=	10GBASE-CU SFP+ Cable 3 Meter	28
RACK-UCS2	Cisco R42610 standard rack w/side panels	1
RP208-30-1P-U-2=	Cisco RP208-30-U-2 Single Phase PDU 20x C13 4x C19 (Country Specific)	2
CON-UCW3-RPDUX	UC PLUS 24X7X4 Cisco RP208-30-U-X Single Phase PDU 2x (Country Specific)	6

Table 8Bill of Materials for Expansion Racks

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Part Number	Description	Quantity
UCSC-C240-M3S	UCS C240 M3 SFF w/o CPU mem HD PCIe w/ rail kit expdr	48
UCS-RAID9271CV-8I	MegaRAID 9271CV with 8 internal SAS/SATA ports with Supercap	48
UCSC-PCIE-CSC-02	Cisco VIC 1225 Dual Port 10Gb SFP+ CNA	48
CAB-9K12A-NA	Power Cord 125VAC 13A NEMA 5-15 Plug North America	96
UCSC-PSU2-1200	1200W 2u Power Supply For UCS	96
UCSC-RAIL-2U	2U Rail Kit for UCS C-Series servers	48
UCSC-HS-C240M3	Heat Sink for UCS C240 M3 Rack Server	96
UCSC-PCIF-01F	Full height PCIe filler for C-Series	144
UCS-CPU-E52660B	2.20 GHz E5-2660 v2/95W 10C/25MB Cache/DDR3 1866MHz	96
UCS-MR-1X162RZ-A	16GB DDR3-1866-MHz RDIMM/PC3-14900/dual rank/x4/1.5v	768
UCS-HD1T7KS2-E	1TB SAS 7.2K RPM 2.5 inch HDD/hot plug/drive sled mounted	1152
N2K-UCS2232PF	Cisco Nexus 2232PP with 16 FET (2 AC PS, 1 FAN (Std Airflow)	6
CON-SNTP-UCS2232	SMARTNET 24X7X4 Cisco Nexus 2232PP	6
SFP-H10GB-CU3M=	10GBASE-CU SFP+ Cable 3 Meter	84
RACK-UCS2	Cisco R42610 standard rack w/side panels	3

RP208-30-1P-U-2=	Cisco RP208-30-U-2 Single Phase PDU 20x C13 4x C19 (Country Specific)	6
CON-UCW3-RPDUX	UC PLUS 24X7X4 Cisco RP208-30-U-X Single Phase PDU 2x (Country Specific)	18

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Table 9 Red Hat Enterprise Linux License

Red Hat Enterprise Linux					
RHEL-2S-1G-3A	Red Hat Enterprise Linux	64			
CON-ISV1-RH2S1G3A	3 year Support for Red Hat Enterprise Linux	64			

Table 10Hortonworks Software

Red Hat Enterprise Linux		
RHEL-2S-1G-3A	Red Hat Enterprise Linux	64
CON-ISV1-RH2S1G3A	3 year Support for Red Hat Enterprise Linux	64