

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

Building a 64 Node Hadoop Cluster

Last Updated: May 13, 2014



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Acknowledgments

The authors acknowledge contributions of Ashwin Manjunatha and Sindhu Sudhir for their contributions in developing this document.

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

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. Cloudera is the leading provider of enterprise-grade Hadoop infrastructure software and services, and the leading contributor to the Apache Hadoop project overall. Cloudera provides an enterprise-ready Hadoop-based solution known as Cloudera Enterprise, which includes their market leading open source Hadoop distribution (CDH), their comprehensive management system (Cloudera Manager), and technical support. The combination of Cloudera and Cisco Unified Computing System (Cisco UCS) provides industry-leading platform for Hadoop based applications.

Audience

This document describes the architecture and deployment procedures of Cloudera on a 64 node cluster based Cisco UCS Common Platform Architecture version 2 (CPAv2) for Big Data. The intended audience of this document includes, but is not limited to, sales engineers, field consultants, professional services, IT managers, partner engineering and customers who want to deploy Cloudera on the Cisco UCS CPAv2 for Big Data.

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

The Cisco UCS solution for Cloudera 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 C240 M3 Rack-Mount Servers** are 2-socket servers based on Intel Xeon E5-2600 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 UCS, 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.

Cloudera (CDH 5.0)

CDH is a popular enterprise-grade, hardened distribution of Apache Hadoop and related projects. CDH is 100 percent Apache-licensed open source and offers unified batch processing, interactive SQL, and interactive search, and role-based access controls. More enterprises have downloaded CDH than all other such distributions combined.

Similar to Linux distribution, which gives you more than Linux, CDH delivers the core elements of Hadoop; scalable storage and distributed computing, along with additional components such as a user interface, plus necessary enterprise capabilities such as security, and integration with a broad range of hardware and software solutions.

The integration and the entire solution is thoroughly tested and fully documented. By taking the guesswork out of building a Hadoop deployment, CDH provides a streamlined path to success in solving real business problems.

For more information about what projects are included in CDH, see CDH Version and Packaging information:

<http://www.cloudera.com/content/cloudera-content/cloudera-docs/CDH5/latest/CDH-Version-and-Packaging-Information/CDH-Version-and-Packaging-Information.html>

Solution Overview

The current version of the Cisco UCS CPA Version 2 for Big Data offers the following configuration depending on the compute and storage requirements:

Table 1 Cisco UCS CPA v2 Configuration Details

Performance and Capacity Balanced	Capacity Optimized	Capacity Optimized with Flash Memory
16 Cisco UCS C240 M3 Rack Servers, each with: <ul style="list-style-type: none"> • 2 Intel Xeon processors E5-2660 v2 • 256 GB of memory • LSI MegaRaid 9271CV 8i card • 24 1-TB 7.2K SFF SAS drives (384 TB total) 	16 Cisco UCS C240 M3 Rack Servers, each with: <ul style="list-style-type: none"> • 2 Intel Xeon processors E5-2640 v2 • 128 GB of memory • LSI MegaRaid 9271CV 8i card • 12 4-TB 7.2 LFF SAS drives (768 TB total) 	16 Cisco UCS C240 M3 Rack Servers, each with: <ul style="list-style-type: none"> • 2 Intel Xeon processors E5-2660 v2 • 128 GB of memory • Cisco UCS Nytro MegaRAID 200-GB Controller • 12 4-TB 7.2K LFF SAS drives (768 TB total)



Note This CVD describes the install 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 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.



Note 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 (Master Rack)

Cisco 42URack	Master Rack
42	Cisco UCS FI 6296UP
41	
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	

Table 3 *Rack 2-4 (Expansion Racks)*

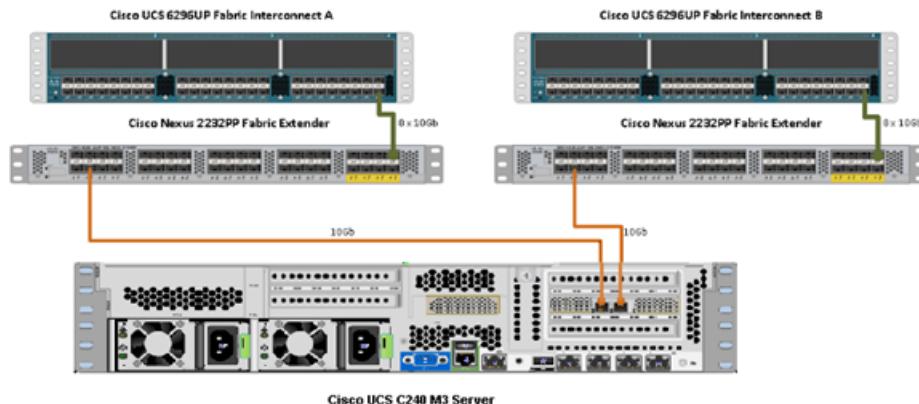
Cisco 42URack	Expansion Rack
42	Unused
41	Unused
40	Unused
39	Unused
38	Cisco Nexus FEX 2232PP
37	Cisco Nexus FEX 2232PP
36	Unused
35	Unused
34	Unused
33	Unused
32	Cisco UCS C240M3
31	
30	Cisco UCS C240M3
29	
28	Cisco UCS C240M3
27	
26	Cisco UCS C240M3
25	
24	Cisco UCS C240M3
23	
22	Cisco UCS C240M3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

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 SAS disk drives.

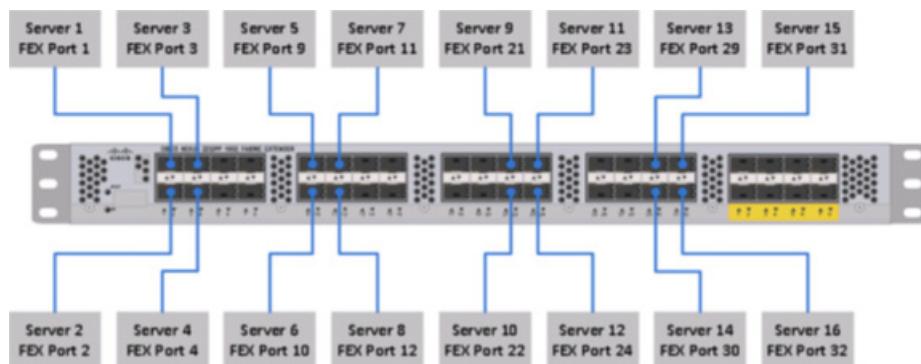
[Figure 1](#) illustrates the ports on the Cisco Nexus 2232PP fabric extender connecting to the Cisco UCS C240M3 Servers. Sixteen Cisco UCS C240M3 rack servers are used in Master rack configurations.

Figure 1 *Fabric Topology*



[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:

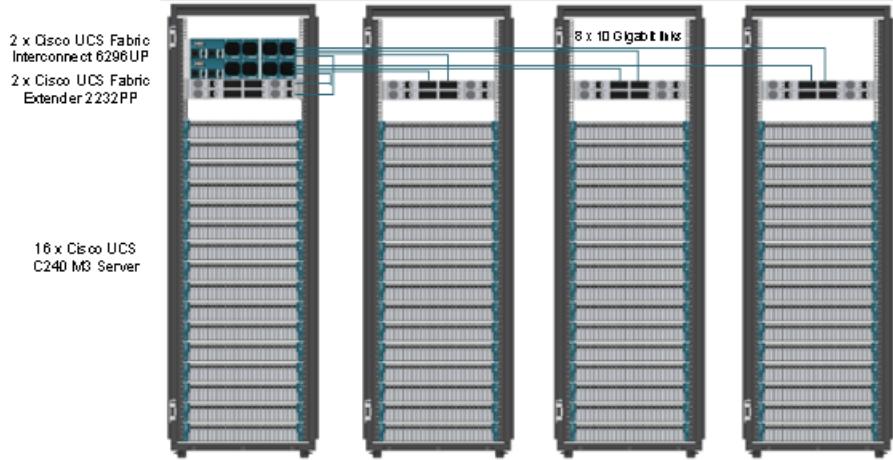
http://www.cisco.com/en/US/docs/unified_computing/ucs/c-series_integration/ucsm2.1/b_UCSM2-1_C-Integration_chapter_010.html

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, and each link represents 8 x 10 Gigabit links.

Figure 3 **64 Node Cluster Configurations**



Software Distributions and Versions

The required software distributions versions are listed in the following sections.

Cloudera Enterprise

The Cloudera software for Cloudera Distribution for Apache Hadoop is version 5.0. For more information visit www.cloudera.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](#).

Table 4 Software Versions

Layer	Component	Version or Release
Compute	Cisco UCS C240-M3	1.5.4f
Network	Cisco UCS 6296UP	UCS 2.2(1b)A
	Cisco UCS VIC1225 Firmware	2.2(1b)
	Cisco UCS VIC1225 Driver	2.1.1.41
	Cisco Nexus 2232PP	5.2(3)N2(2.21b)
Storage	LSI 9271-8i Firmware	23.12.0-0021
	LSI 9271-8i Driver	06.602.03.00
Software	Red Hat Enterprise Linux Server	6.4 (x86_64)
	Cisco UCS Manager	2.2(1b)
	CDH	5.0b2



The latest drivers can be downloaded from this link:

<http://software.cisco.com/download/release.html?mdfid=284296254&flowid=31743&softwareid=283853158&release=1.5.1&relind=AVAILABLE&rellifecycle=&reltype=latest>

Fabric Configuration

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

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 policies 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 the initial setup of the Cisco UCS 6296 Fabric Interconnects A and B.

Configure Fabric Interconnect A

Follow these steps to configure the 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

Follow these steps to configure the 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.
8. 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)

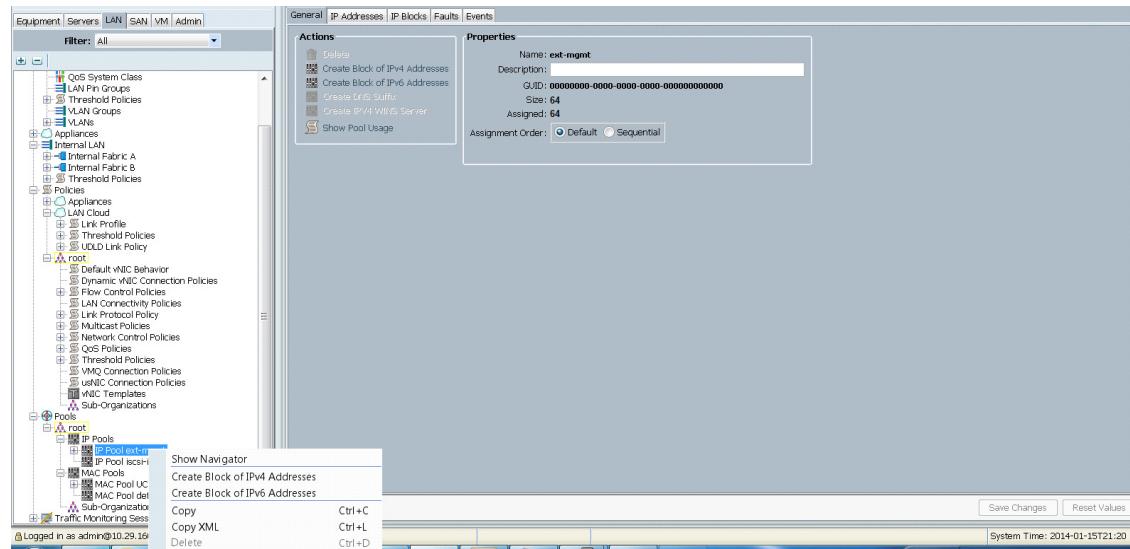
This document assumes the use of Cisco UCS 2.2(1b). Refer to [Upgrading between Cisco UCS 2.0 Releases](#) to upgrade the Cisco UCS Manager software and Cisco UCS 6296 Fabric Interconnect software to version 2.2(1b). Also, make sure the Cisco UCS C-Series version 2.2(1b) software bundles is installed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

Adding Block of IP Addresses for KVM Access

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

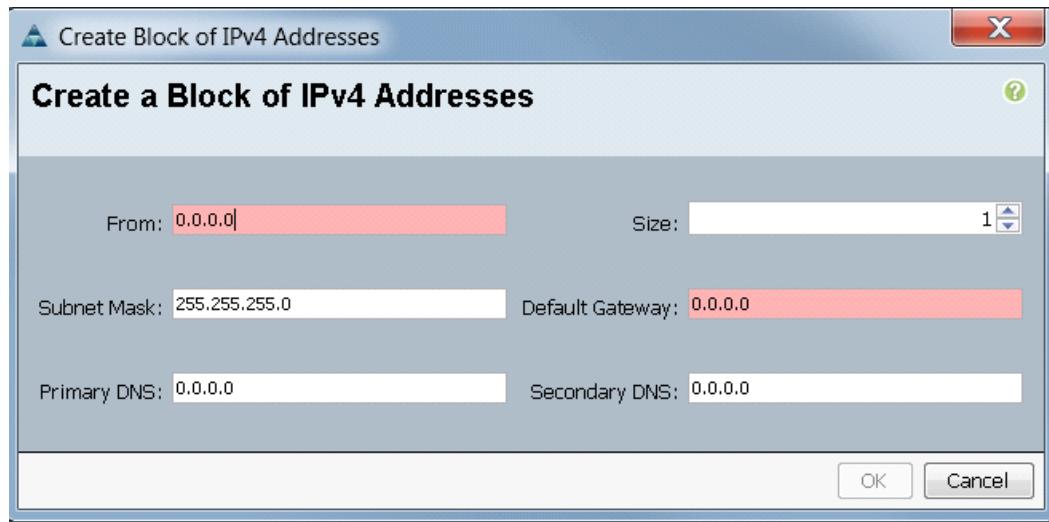
1. Select the LAN tab at the top of the left window.
2. Select Pools > IpPools > Ip Pool ext-mgmt.
3. Right-click IP Pool ext-mgmt
4. Select Create Block of IPv4 Addresses.

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



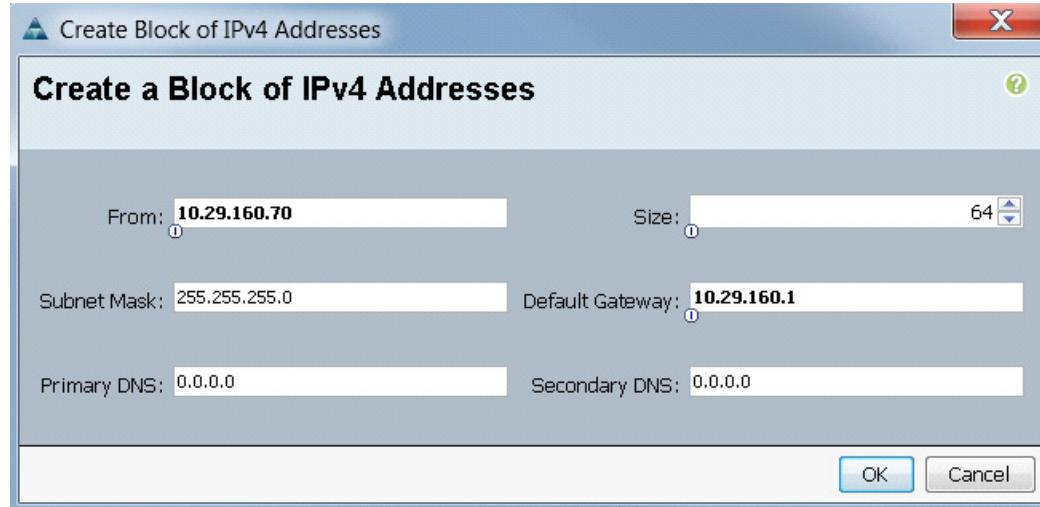
- Enter the starting IP address of the block and number of IPs needed, as well as the subnet and gateway information.

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



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

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

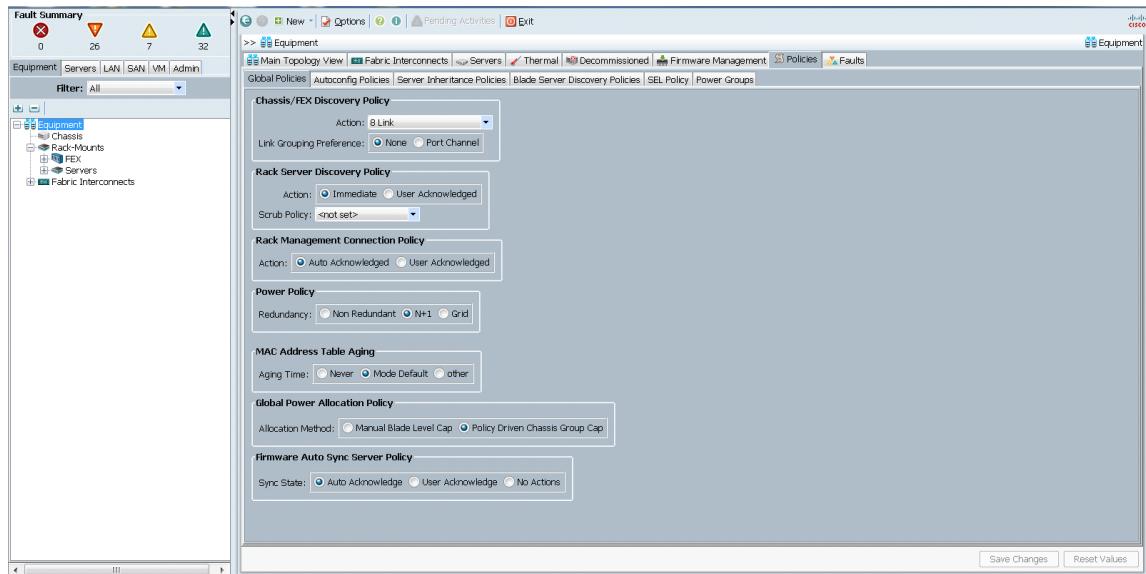


Editing Chassis and FEX Discovery Policy

The following steps provide the 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 other 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 Chassis and FEX Discovery Policy



Enabling Server Ports and Uplink Ports

The following steps provide details for enabling server and uplinks ports:

1. Select the Equipment tab on the top left of the window.
2. 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.
8. 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

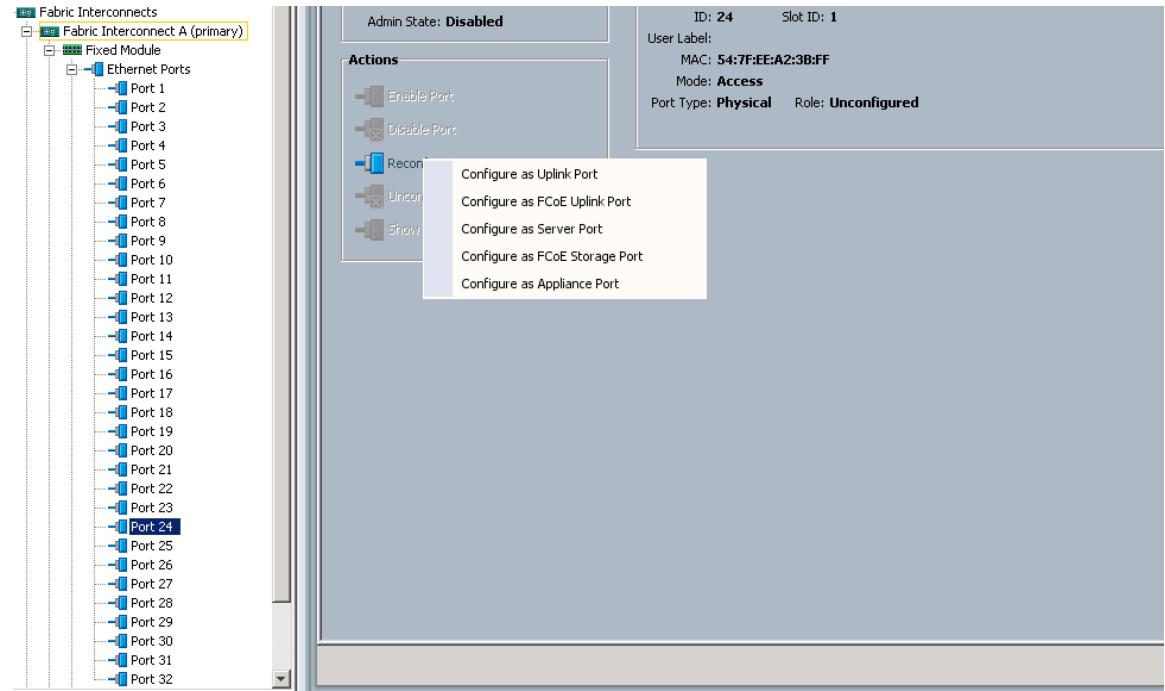


Figure 9 Servers and Uplink Ports

This screenshot displays two windows side-by-side. The left window is the 'Fault Summary' tool, showing a summary of faults across four categories: Chassis (0), Fabric Interconnects (24), LAN (7), and SAN (32). The right window is the 'Equipment' management interface, showing the 'Equipment' tree on the left with nodes like Chassis, Rack-Mounts, FEX, Servers, and Fabric Interconnects. The main pane displays a table of port details for 'Fabric Interconnect A (primary) > Fixed Module > Ethernet Ports'. The table includes columns for Slot, Port ID, MAC, If Role, If Type, Overall Status, and Administrative State. All ports are listed as 'Server' type, physical, and up, with most in an 'Enabled' state except for a few which are 'Unenabled'.

Slot	Port ID	MAC	If Role	If Type	Overall Status	Administrative State
1	1	00:2A:6A:6B:E1:88	Network	Physical	↑ Up	Enabled
1	2	00:2A:6A:6B:E1:89	Server	Physical	↑ Up	Enabled
1	3	00:2A:6A:6B:E1:8A	Server	Physical	↑ Up	Enabled
1	4	00:2A:6A:6B:E1:8B	Server	Physical	↑ Up	Enabled
1	5	00:2A:6A:6B:E1:8C	Server	Physical	↑ Up	Enabled
1	6	00:2A:6A:6B:E1:8D	Server	Physical	↑ Up	Enabled
1	7	00:2A:6A:6B:E1:8E	Server	Physical	↑ Up	Enabled
1	8	00:2A:6A:6B:E1:8F	Server	Physical	↑ Up	Enabled
1	9	00:2A:6A:6B:E1:90	Server	Physical	↑ Up	Enabled
1	10	00:2A:6A:6B:E1:91	Server	Physical	↑ Up	Enabled
1	11	00:2A:6A:6B:E1:92	Server	Physical	↑ Up	Enabled
1	12	00:2A:6A:6B:E1:93	Server	Physical	↑ Up	Enabled
1	13	00:2A:6A:6B:E1:94	Server	Physical	↑ Up	Enabled
1	14	00:2A:6A:6B:E1:95	Server	Physical	↑ Up	Enabled
1	15	00:2A:6A:6B:E1:96	Server	Physical	↑ Up	Enabled
1	16	00:2A:6A:6B:E1:97	Server	Physical	↑ Up	Enabled
1	17	00:2A:6A:6B:E1:98	Server	Physical	↑ Up	Enabled
1	18	00:2A:6A:6B:E1:99	Server	Physical	↑ Up	Enabled
1	19	00:2A:6A:6B:E1:9A	Server	Physical	↑ Up	Enabled
1	20	00:2A:6A:6B:E1:9B	Server	Physical	↑ Up	Enabled
1	21	00:2A:6A:6B:E1:9C	Server	Physical	↑ Up	Enabled
1	22	00:2A:6A:6B:E1:9D	Server	Physical	↑ Up	Enabled
1	23	00:2A:6A:6B:E1:9E	Server	Physical	↑ Up	Enabled
1	24	00:2A:6A:6B:E1:9F	Server	Physical	↑ Up	Enabled
1	25	00:2A:6A:6B:E1:A0	Server	Physical	↑ Up	Enabled
1	26	00:2A:6A:6B:E1:A1	Server	Physical	↑ Up	Enabled
1	27	00:2A:6A:6B:E1:A2	Server	Physical	↑ Up	Enabled
1	28	00:2A:6A:6B:E1:A3	Server	Physical	↑ Up	Enabled
1	29	00:2A:6A:6B:E1:A4	Server	Physical	↑ Up	Enabled
1	30	00:2A:6A:6B:E1:A5	Server	Physical	↑ Up	Enabled
1	31	00:2A:6A:6B:E1:A6	Server	Physical	↑ Up	Enabled
1	32	00:2A:6A:6B:E1:A7	Server	Physical	↑ Up	Enabled

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:

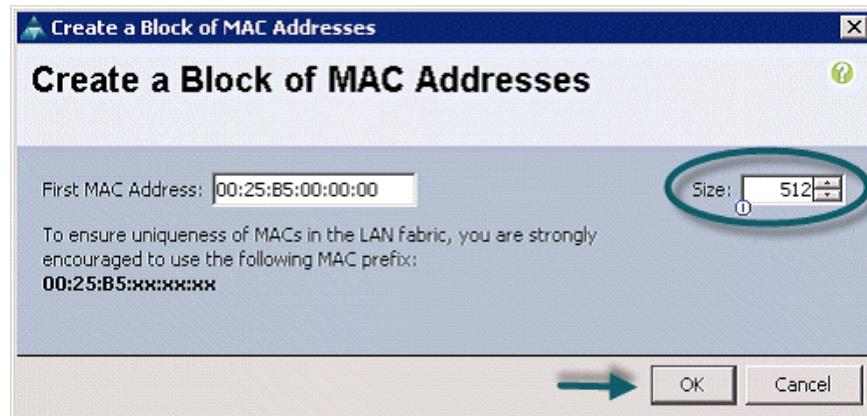
1. Click New on the top left corner in the right pane in the Cisco UCS Manager GUI.
2. Select Create Organization from the options.
3. Enter a name for the organization.
4. (Optional) Enter a description for the organization.
5. Click OK.
6. Click OK in the success message box.

Creating MAC Address Pools

Follow these steps to create MAC address pools:

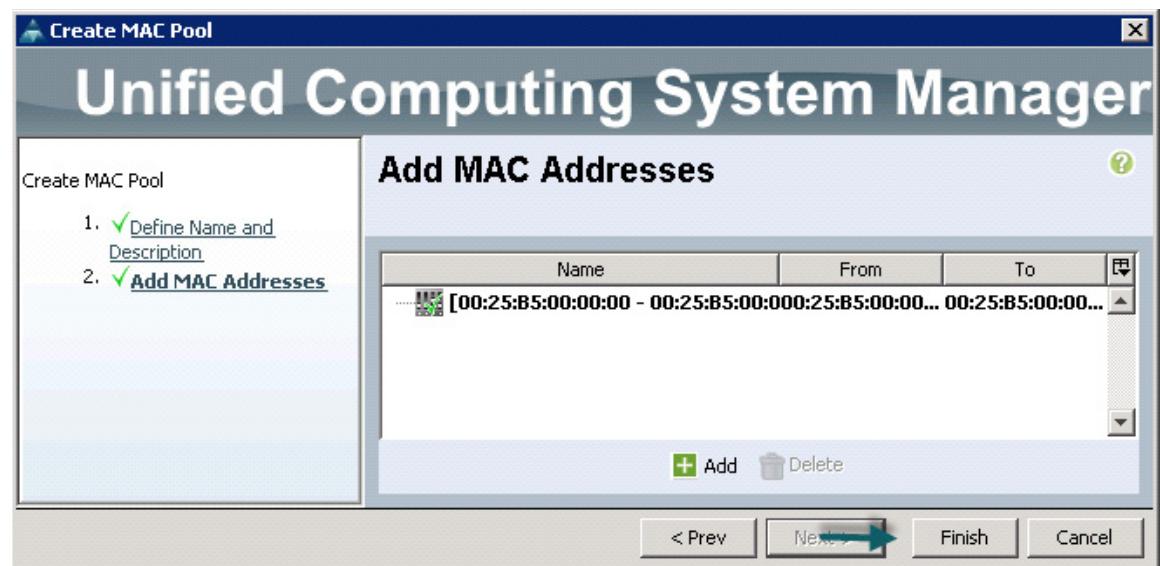
1. Select the LAN tab on the left of the window.
2. Select Pools > root.
3. Right-click MAC Pools under the root organization.
4. Select Create MAC Pool to create the MAC address pool. Enter ucs for the name of the MAC pool.
5. (Optional) Enter a description of the MAC pool.
6. Click Next.
7. Click Add.
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 the First MAC Address and Size



11. Click Finish.

Figure 11 Adding MAC Addresses



12. When the message box displays, click OK.

Figure 12 Confirming the Newly Added MAC Pool



Configuring VLANs

VLANs are configured as shown in [Table 5](#).

Table 5 *VLAN Configurations*

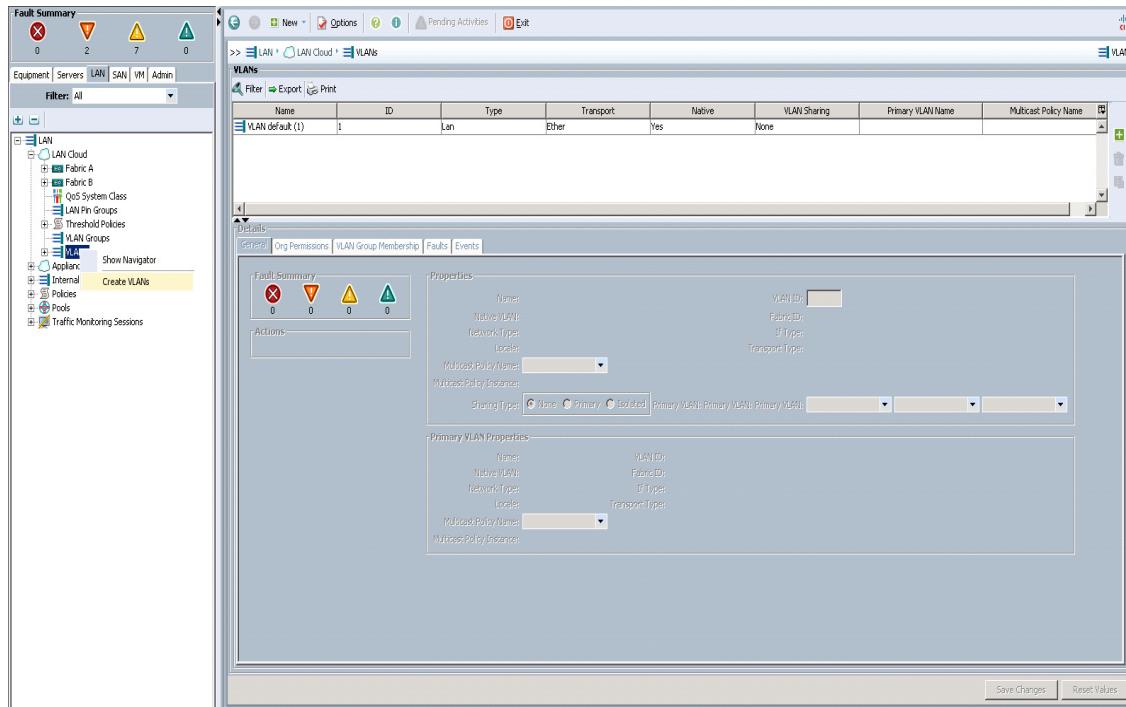
VLAN	Fabric	NIC Port	Function	Failover
vlan160_mgmt	A	eth0	Management, User connectivity	Fabric Failover to B
vlan12_HDFS	B	eth1	Hadoop	Fabric Failover to A
vlan11_DATA	A	eth2	Hadoop and/or SAN/NAS access, ETL	Fabric Failover to B

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.

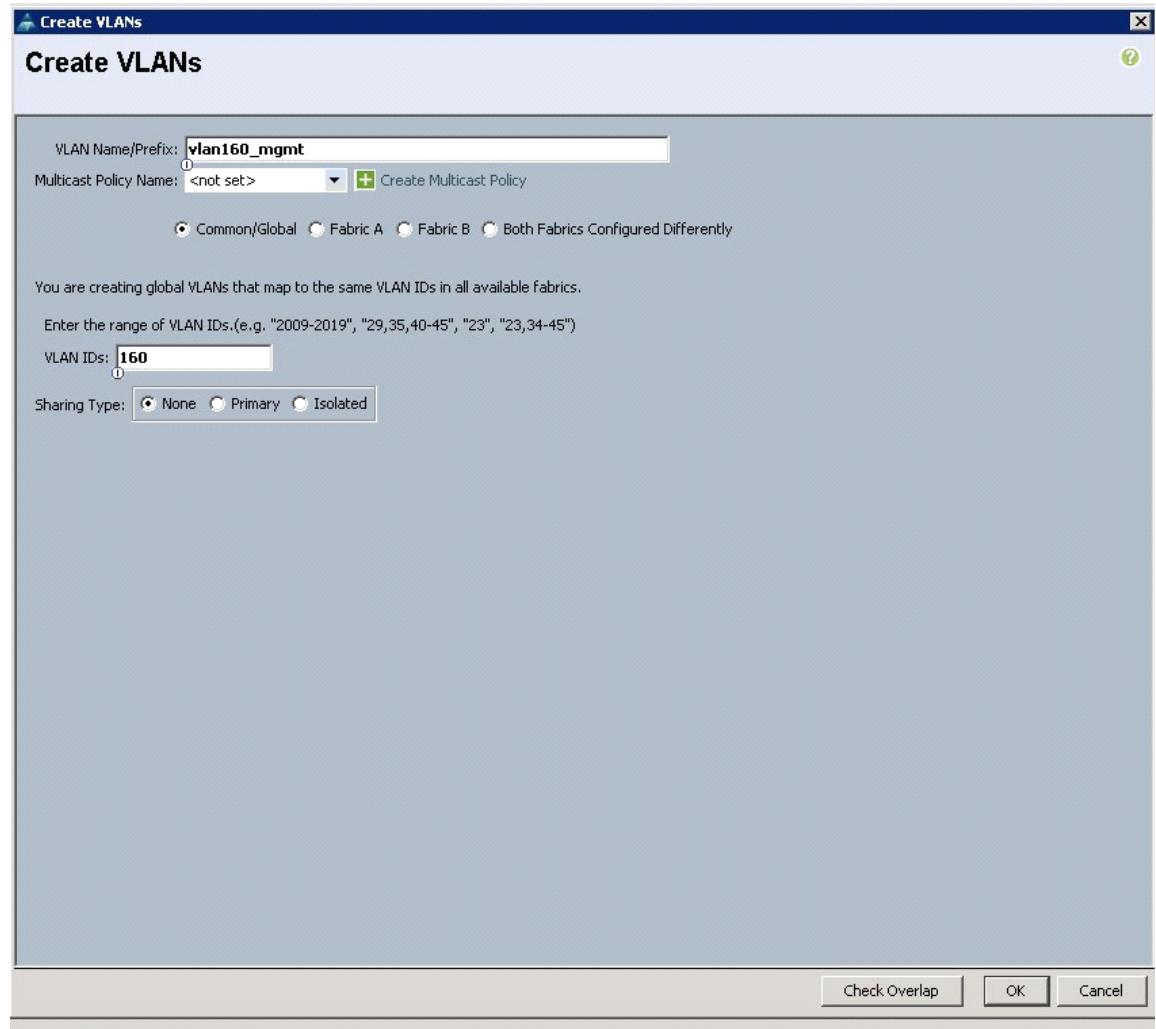
Figure 13 *Creating a VLAN*



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.

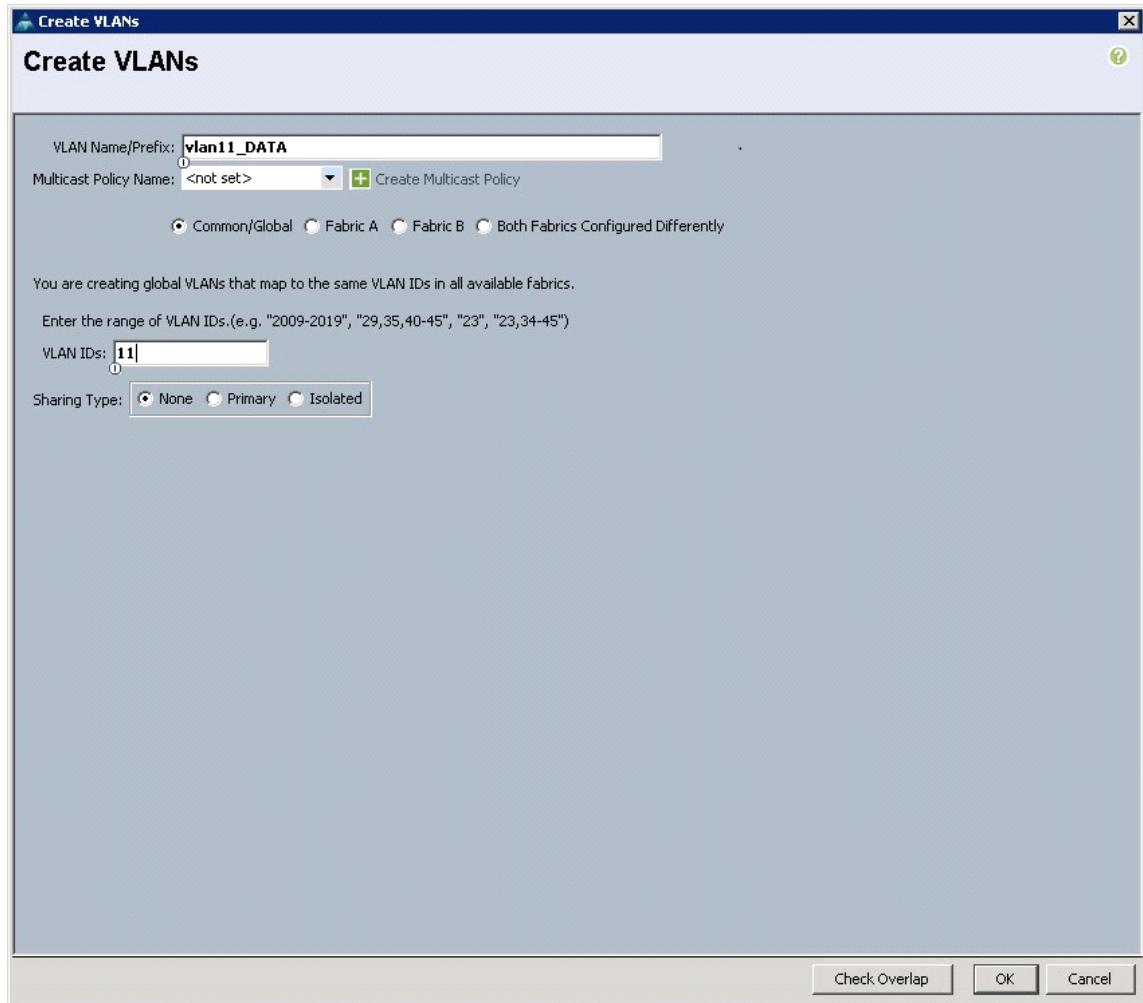
Figure 14 Creating a Management VLAN



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

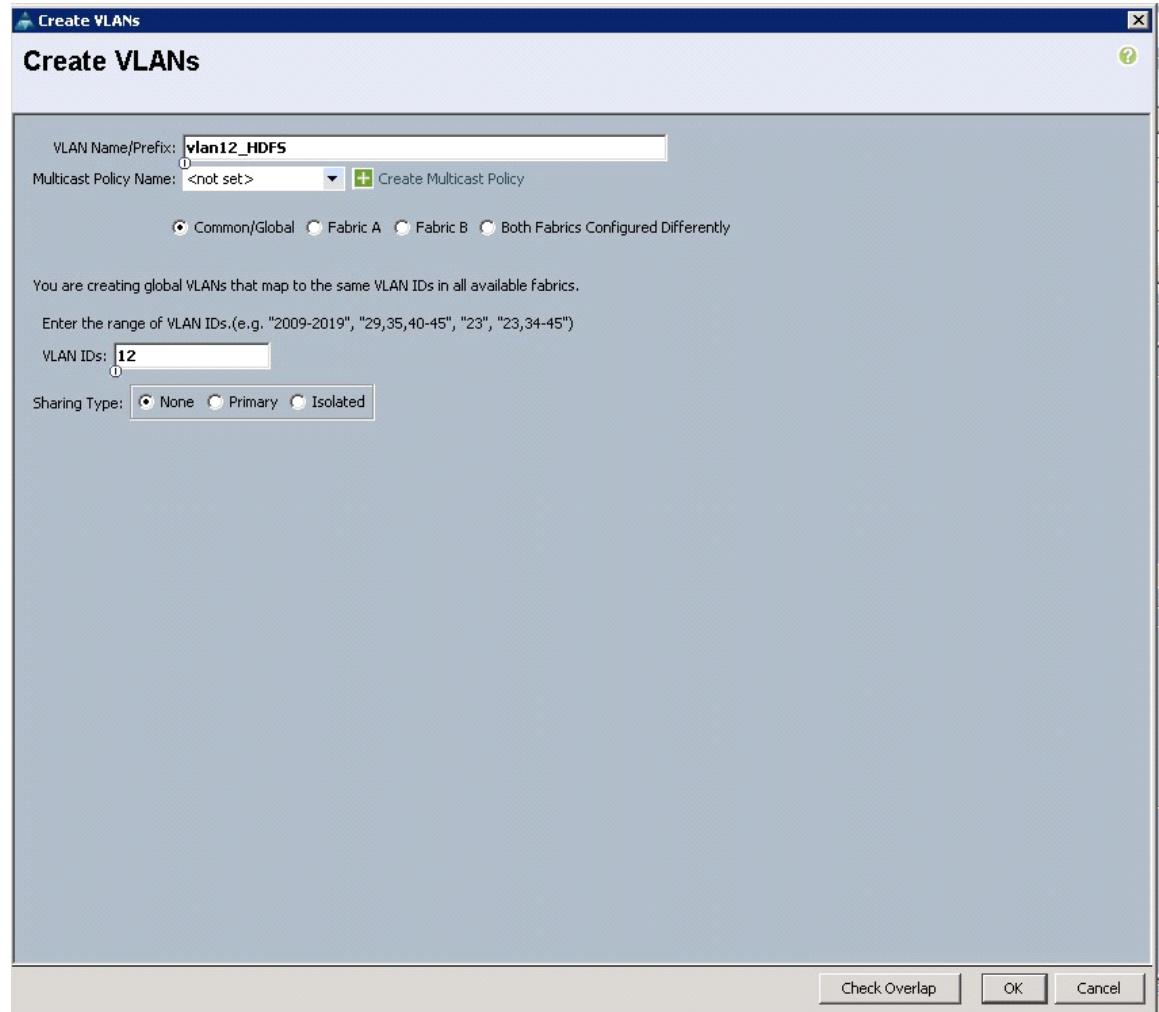
18. Click OK in the success message box.

Figure 15 *Creating VLAN Data*



19. Select the LAN tab in the left pane.
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 Server Pool

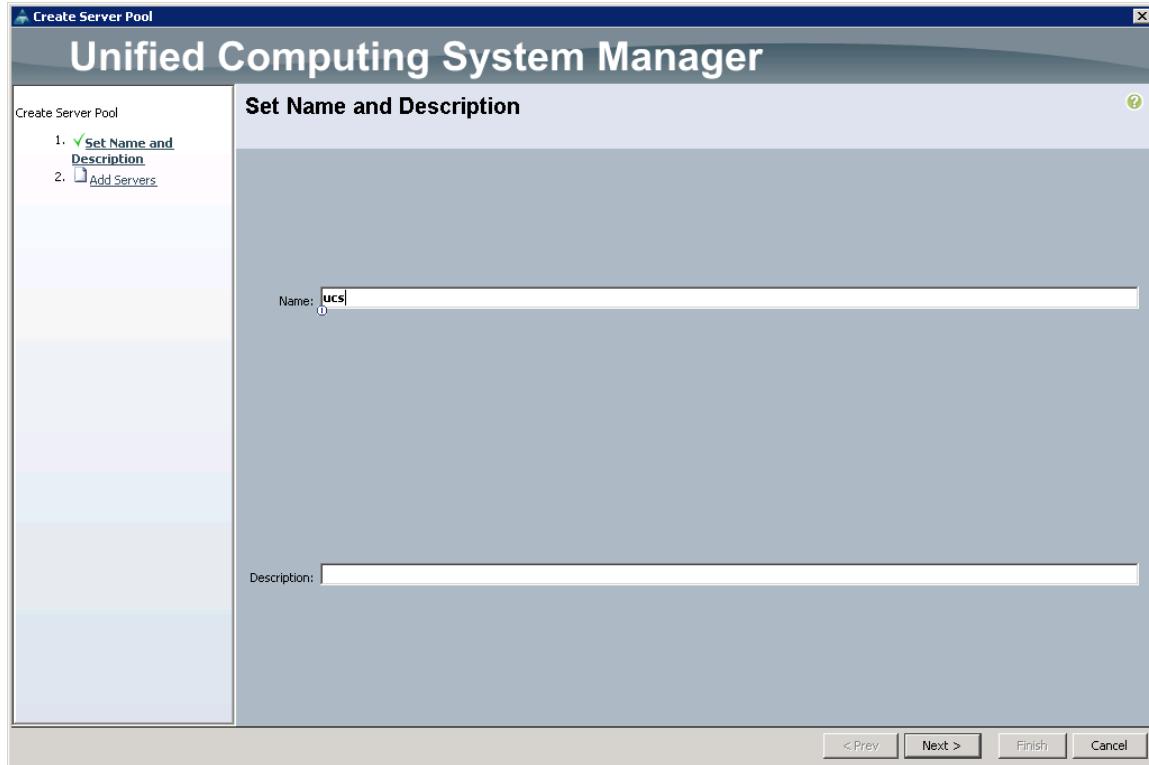
A server pool contains a set of servers. These servers typically share the same characteristics. Those characteristics can be their location in the chassis, or an attribute such as server type, amount of memory, local storage, type of CPU, or local drive configuration. You can manually assign a server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

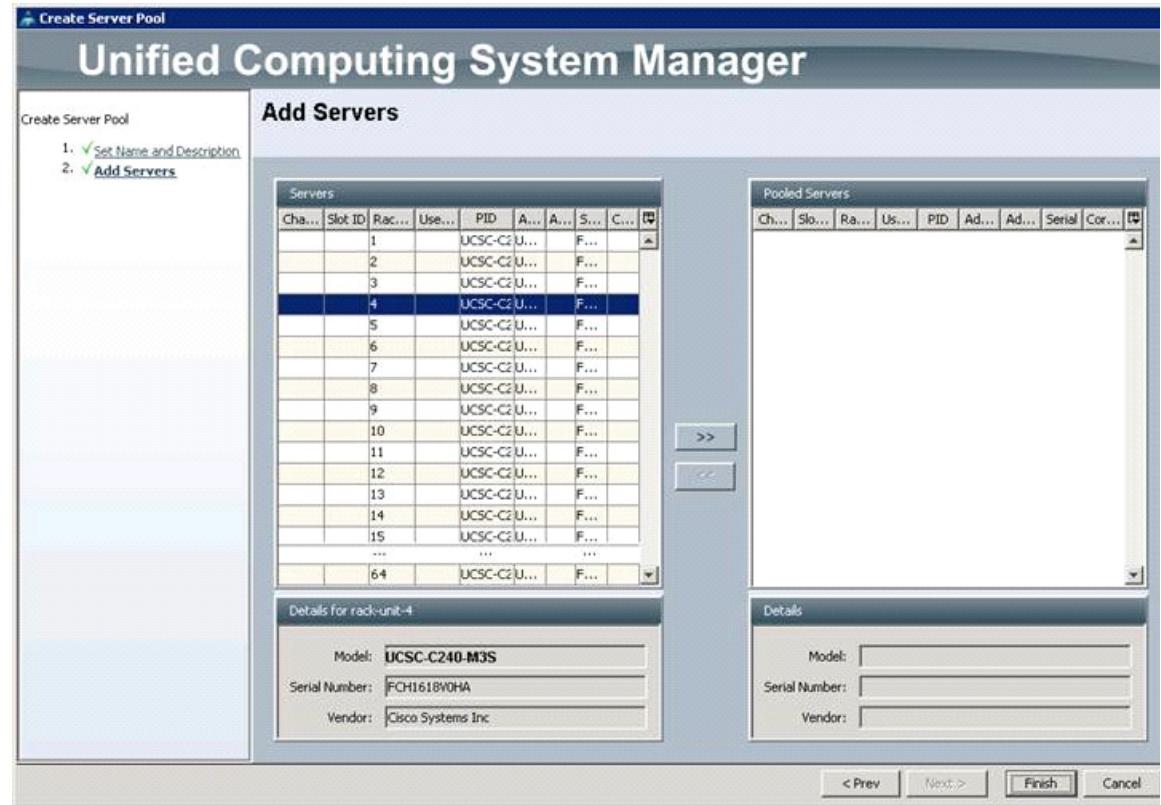
7. Click Next to add the servers.

Figure 17 Setting the 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

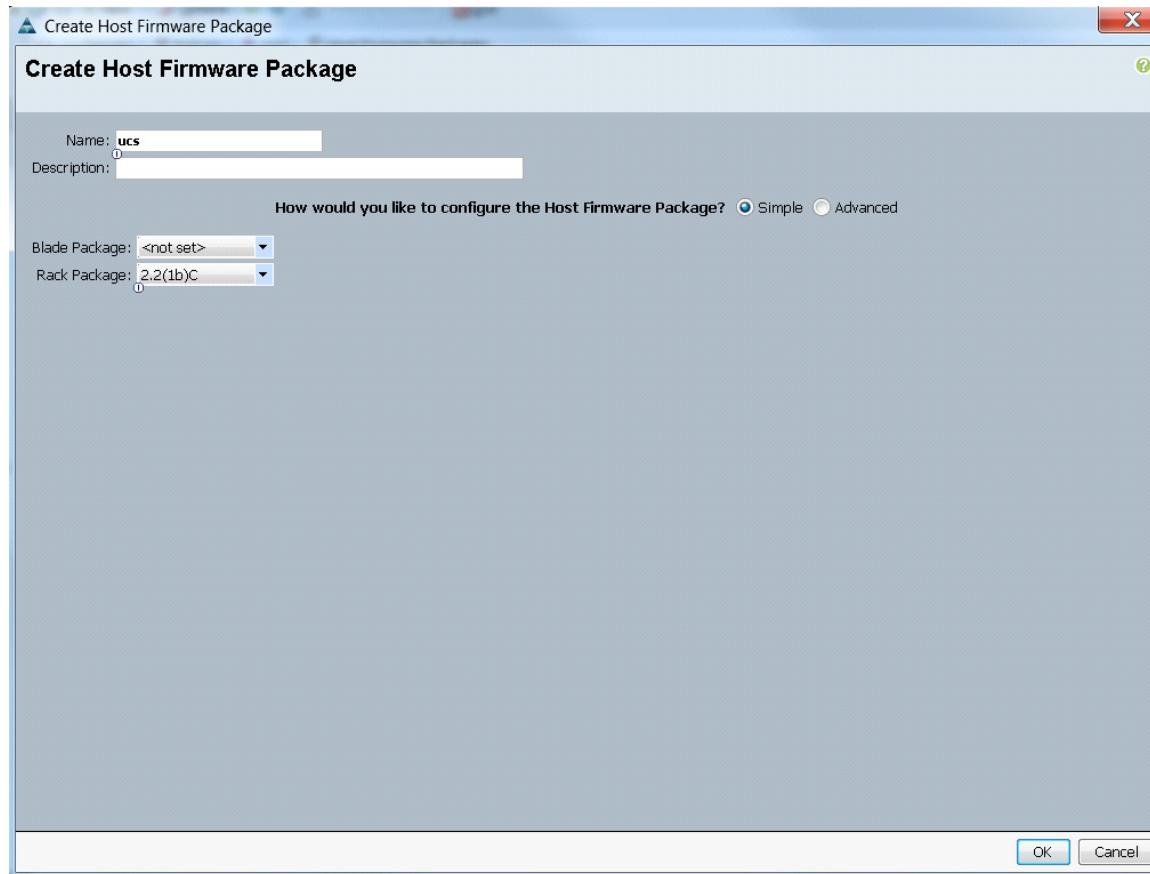
Firmware management policies allow the administrator to select the corresponding packages for a given server configuration. These include adapters, BIOS, board controllers, FC adapters, HBA options, ROM and storage controller properties as applicable.

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 the 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 a Host Firmware Package*



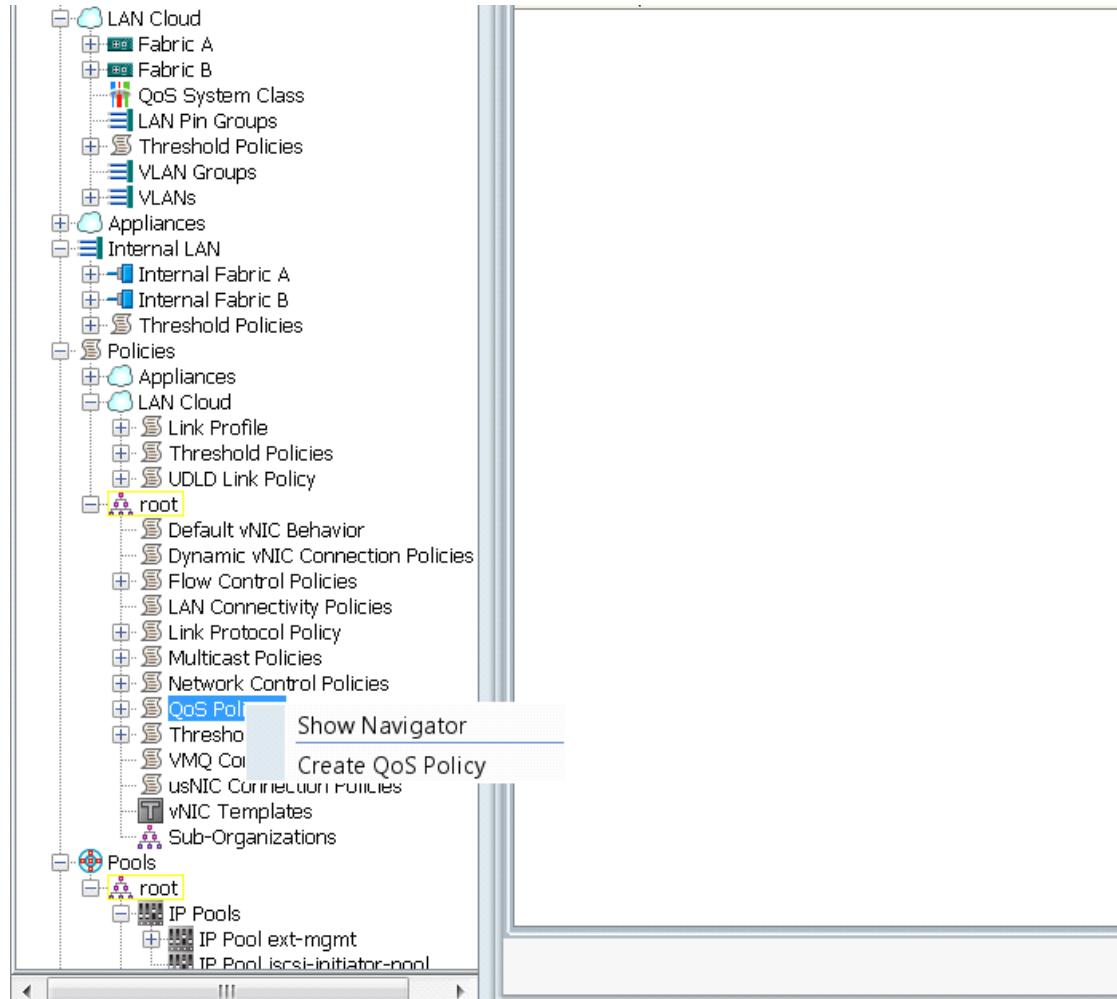
Creating QoS Policies

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 UCS Manager GUI.
2. Select Policies > root.
3. Right-click QoS Policies.
4. Select Create QoS Policy.

Figure 20 Creating a QoS Policy

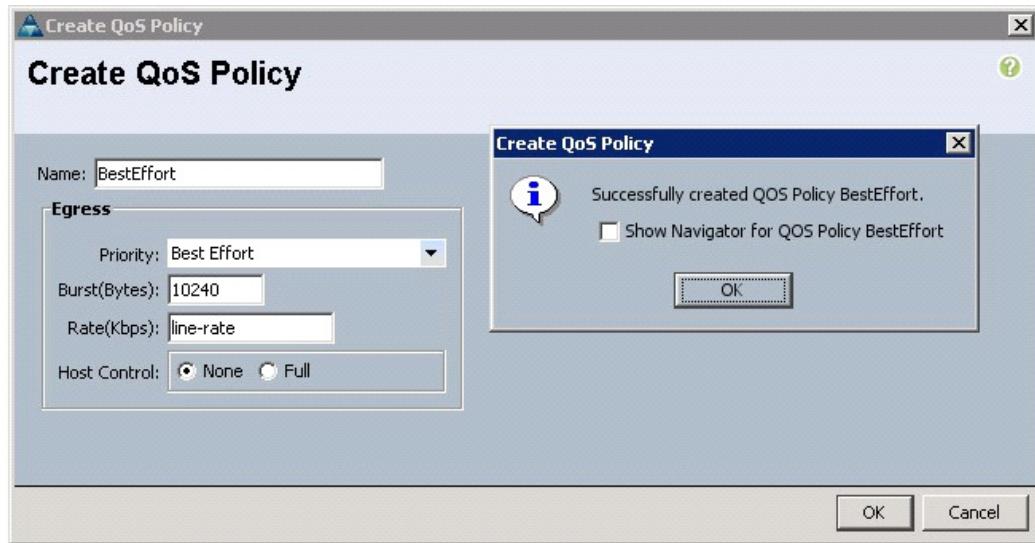


Show Navigator

Create QoS Policy

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

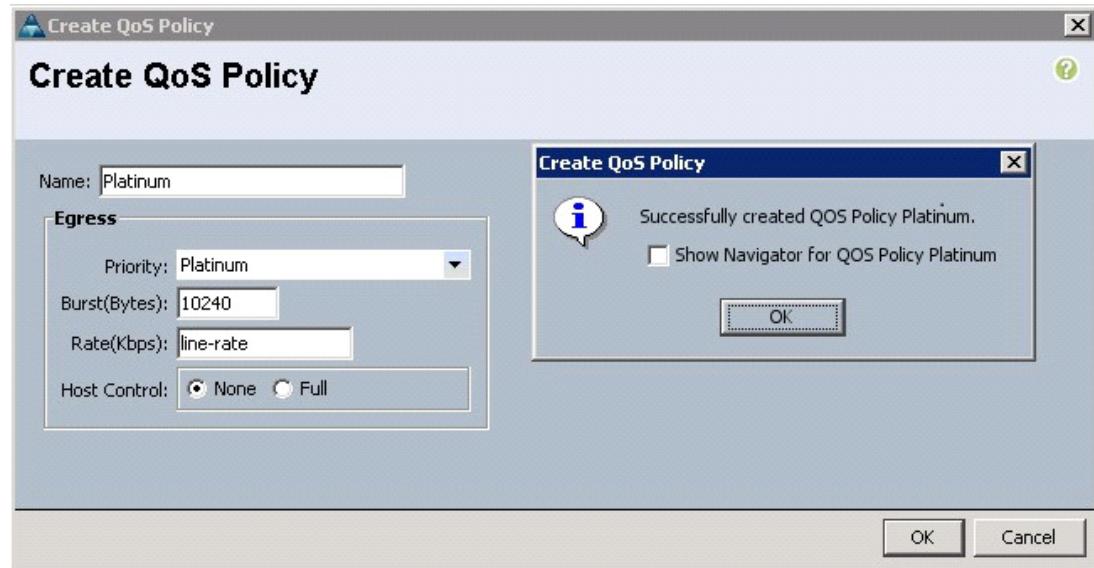
Figure 21 Creating a BestEffort Policy



Platinum 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.
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 a Platinum QoS Policy

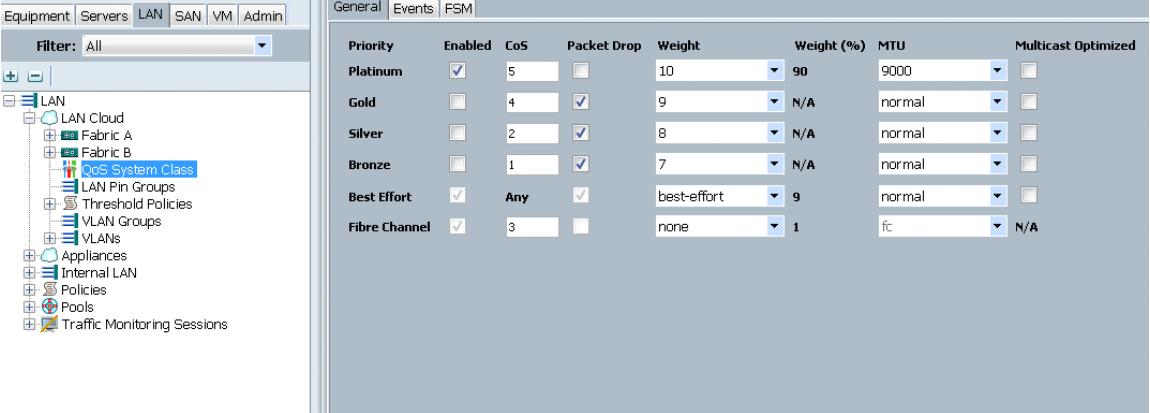


Setting Jumbo Frames

Follow these steps for setting Jumbo frames and enabling QoS:

1. Select the LAN tab in the left pane in the Cisco UCS Manager 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**



The screenshot shows the Cisco UCS Manager interface with the 'LAN' tab selected. On the left, a tree view shows categories like LAN, SAN, VM, and Admin. The 'General' tab is selected in the top right. A table lists QoS System Classes with columns for Priority, Enabled, CoS, Packet Drop, Weight, Weight (%), MTU, and Multicast Optimized.

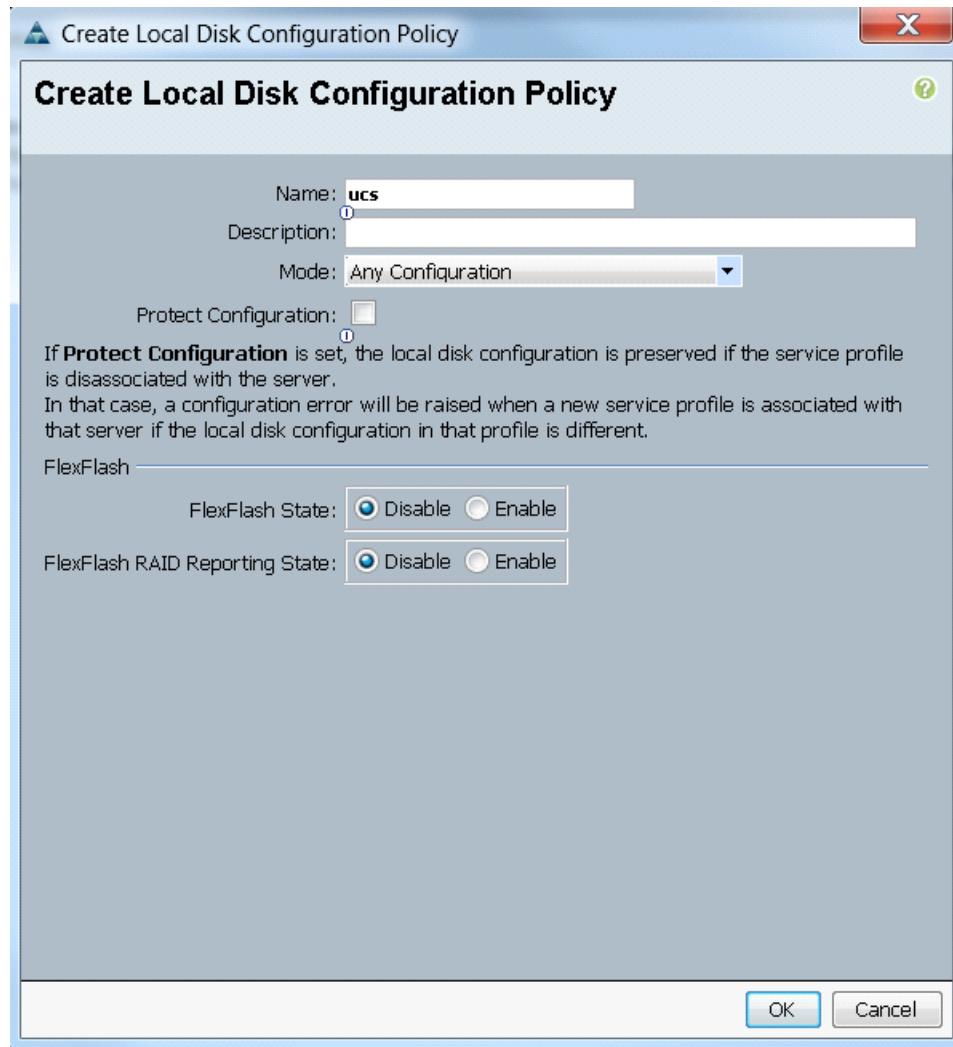
Priority	Enabled	CoS	Packet Drop	Weight	Weight (%)	MTU	Multicast Optimized
Platinum	<input checked="" type="checkbox"/>	5	<input type="checkbox"/>	10	<input type="checkbox"/>	90	9000
Gold	<input type="checkbox"/>	4	<input checked="" type="checkbox"/>	9	<input type="checkbox"/>	N/A	normal
Silver	<input type="checkbox"/>	2	<input checked="" type="checkbox"/>	8	<input type="checkbox"/>	N/A	normal
Bronze	<input type="checkbox"/>	1	<input checked="" type="checkbox"/>	7	<input type="checkbox"/>	N/A	normal
Best Effort	<input checked="" type="checkbox"/>	Any	<input checked="" type="checkbox"/>	best-effort	<input type="checkbox"/>	9	normal
Fibre Channel	<input checked="" type="checkbox"/>	3	<input type="checkbox"/>	none	<input type="checkbox"/>	1	fc

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 a Local Disk Policy



Creating Server BIOS Policy

The BIOS policy feature in Cisco Unified Computing System 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.



Note

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 shown in the following figures:

Figure 25 *Creating a Server BIOS Policy*

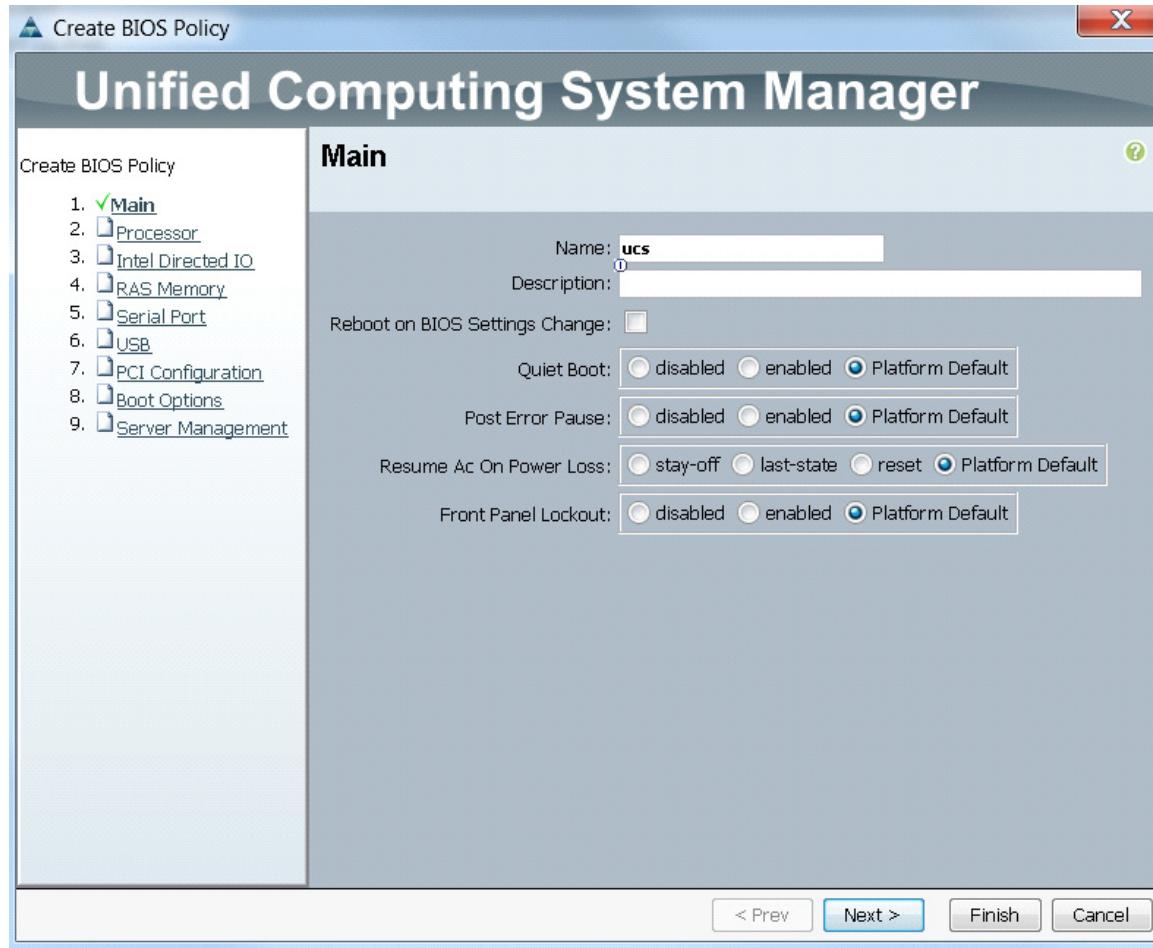


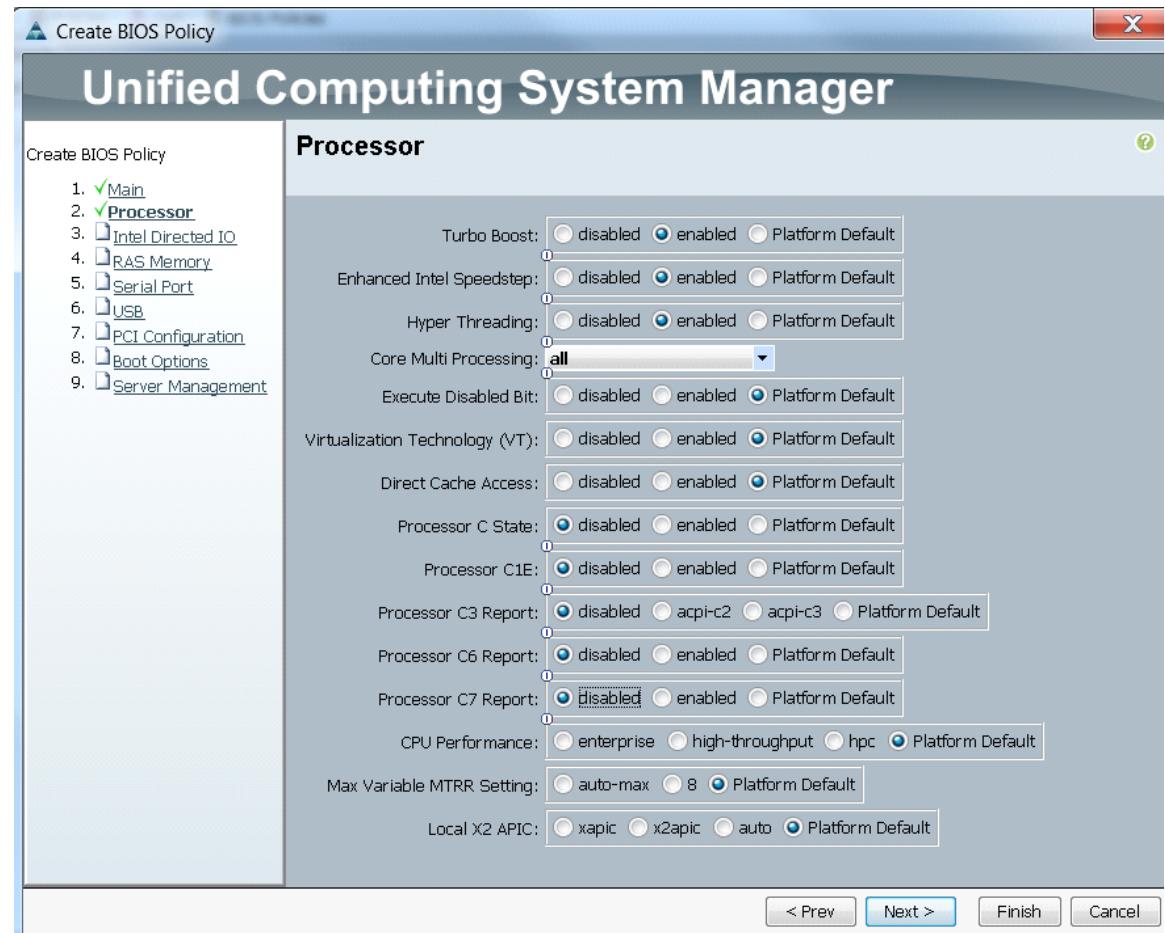
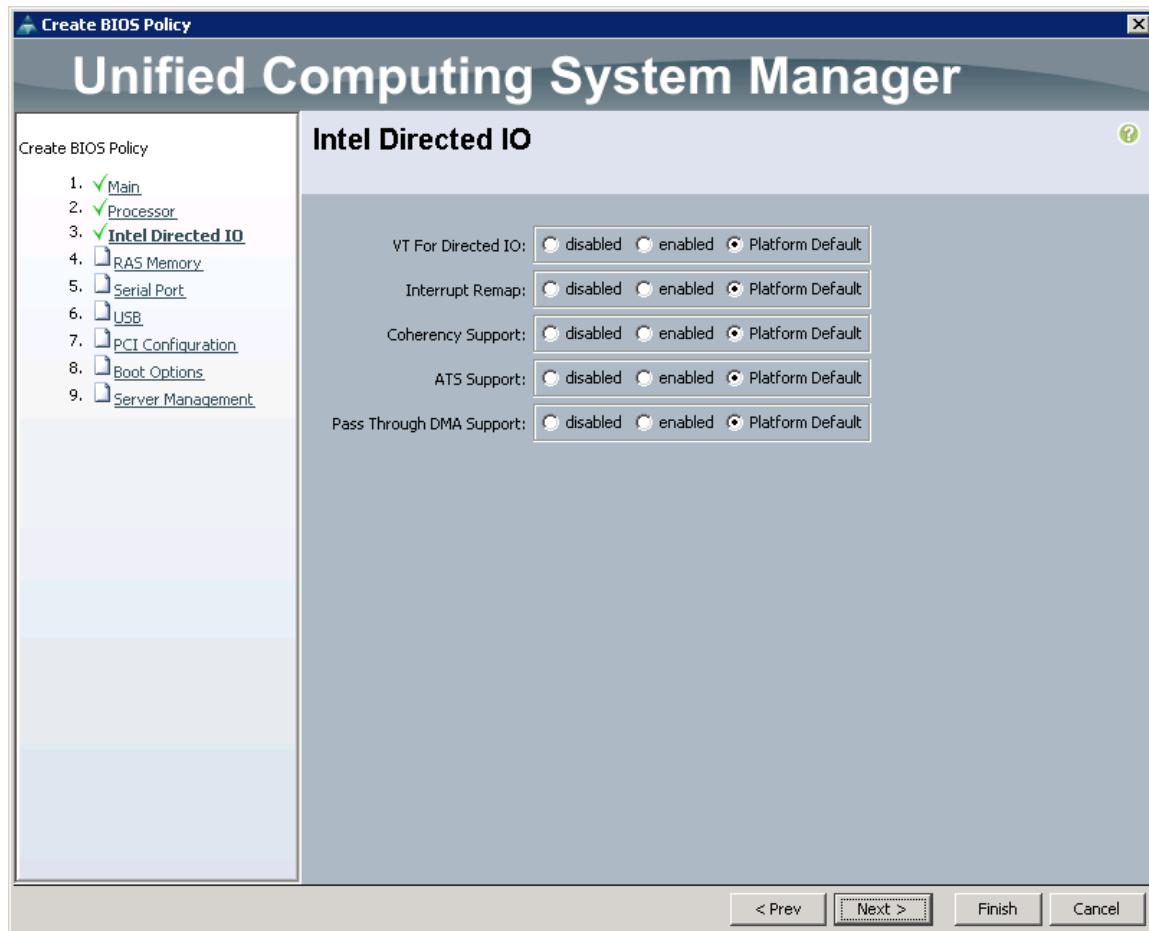
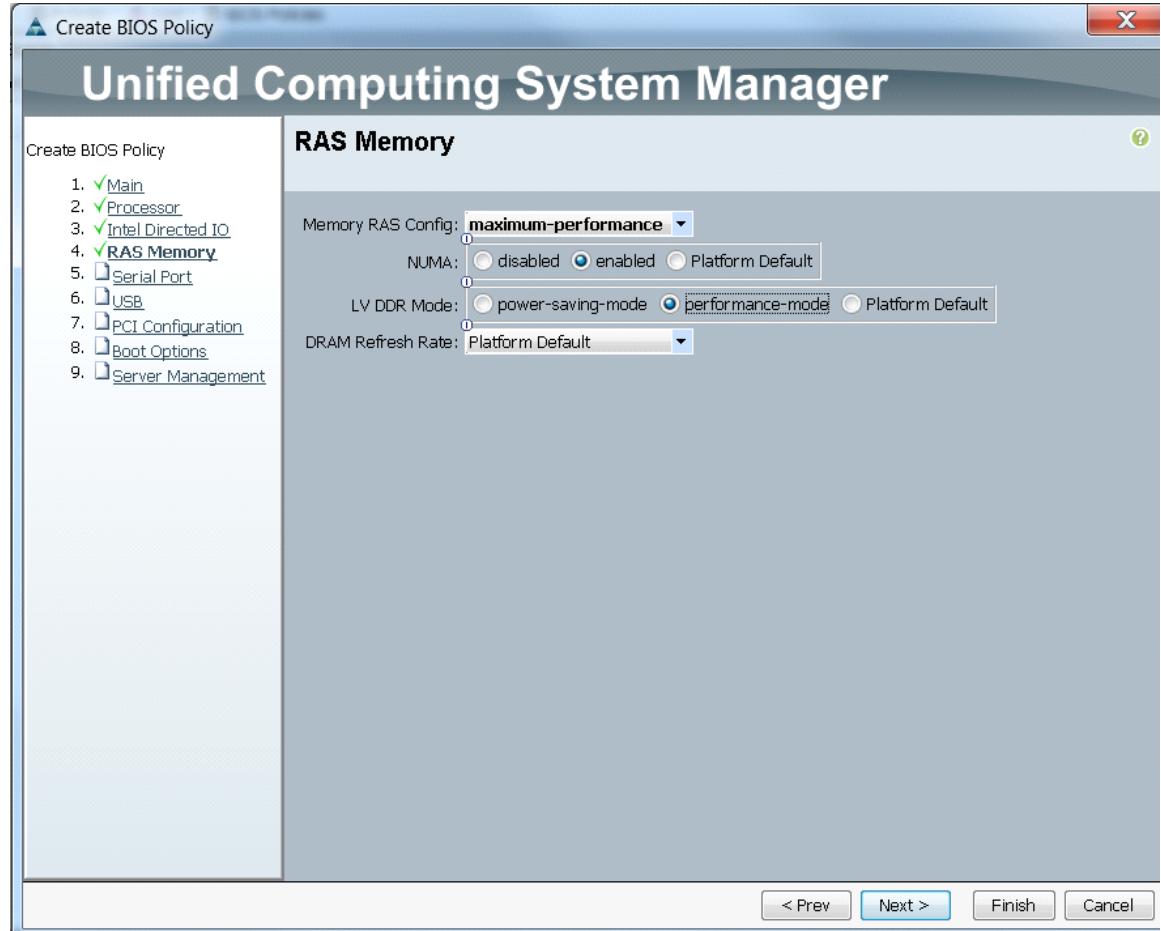
Figure 26 Creating a Server BIOS Policy for Processor

Figure 27 Creating a Server BIOS Policy for Intel Directed IO



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

Figure 28 Creating a Server BIOS Policy for Memore

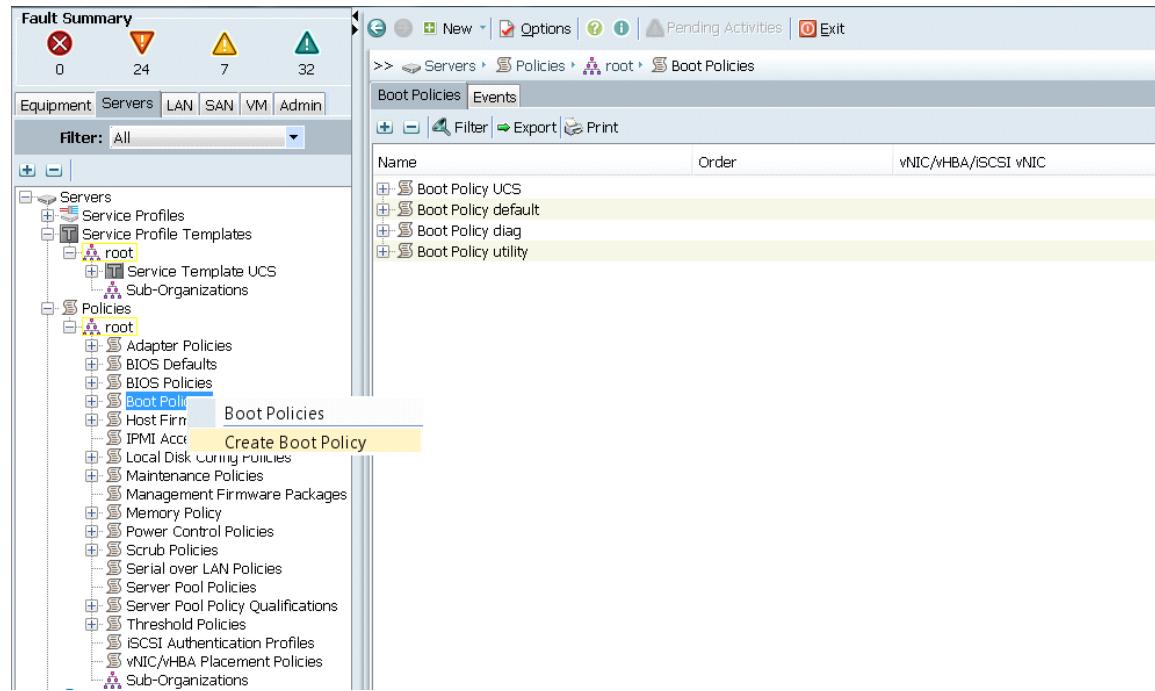


Creating Boot Policy

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

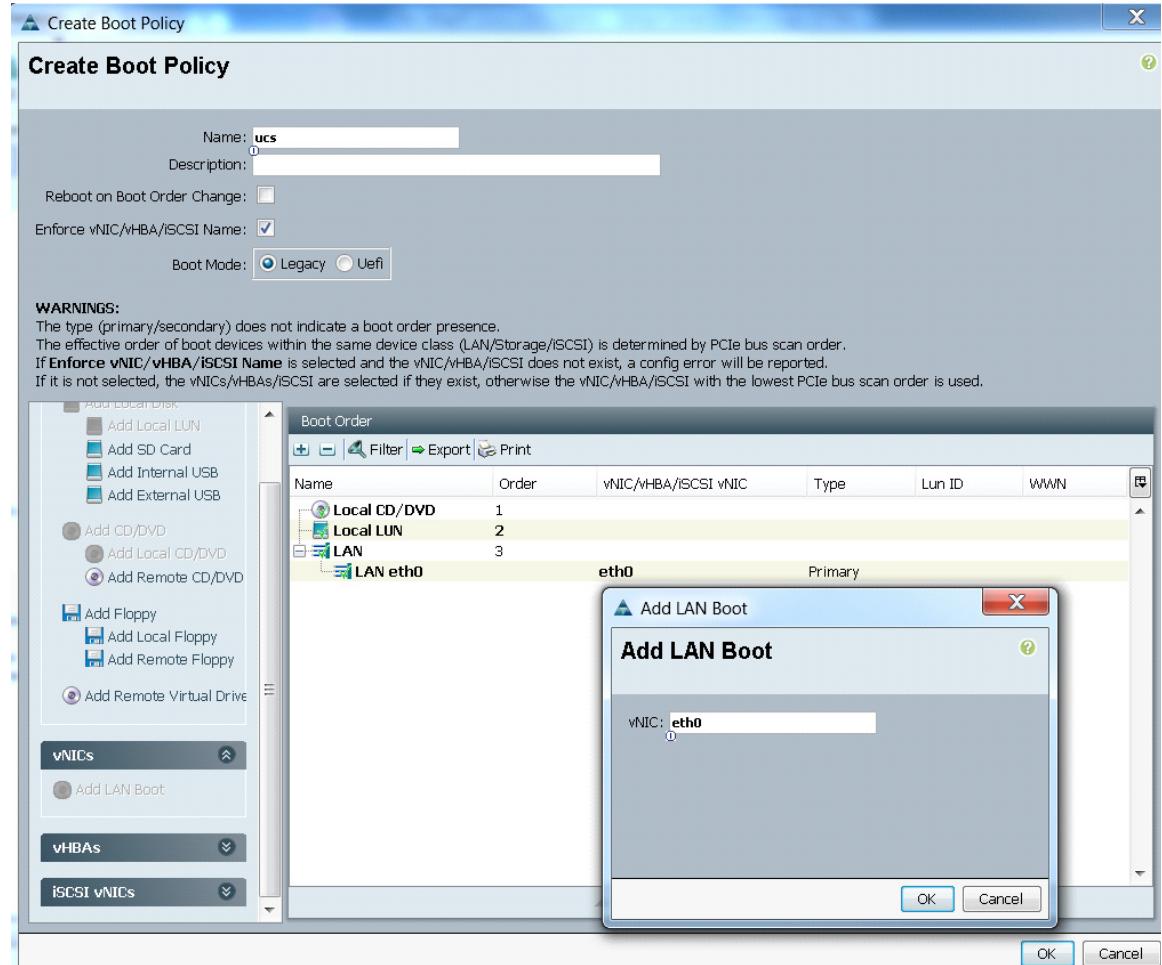
1. Select the **Servers** tab in the left pane in the Cisco UCS Manager GUI.
2. Select **Policies** > **root**.
3. Right-click the **Boot Policies**.
4. Select **Create Boot Policy**.

Figure 29 Creating a Boot Policy Part 1



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



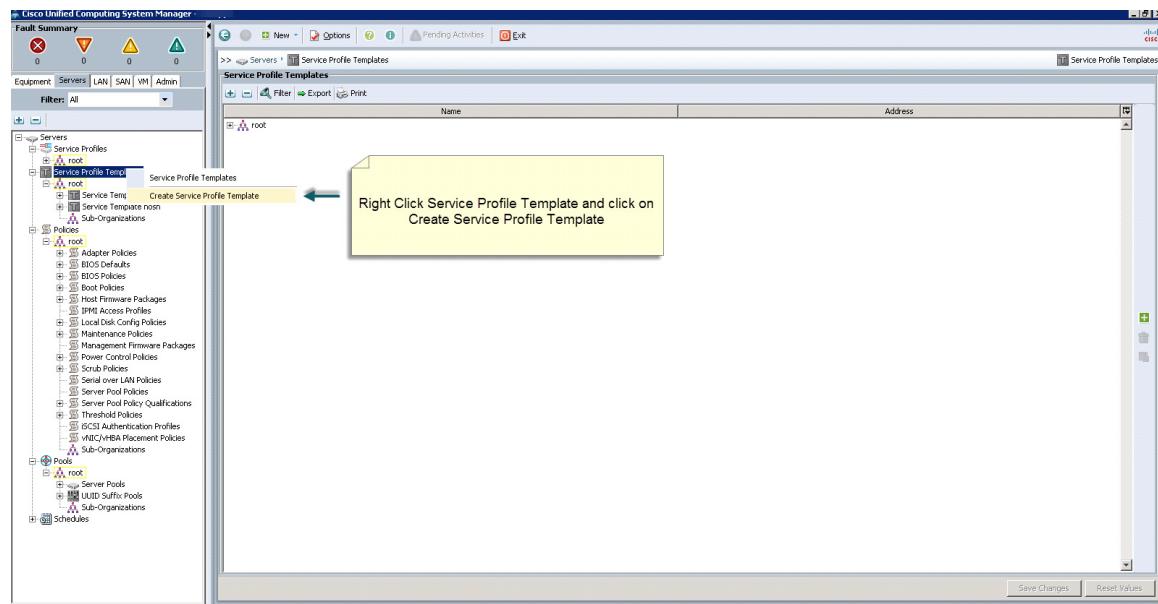
Creating Service Profile Template

Follow these steps to create a service profile template:

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

■ Creating Service Profile Template

Figure 31 *Creating a Service Profile Template*

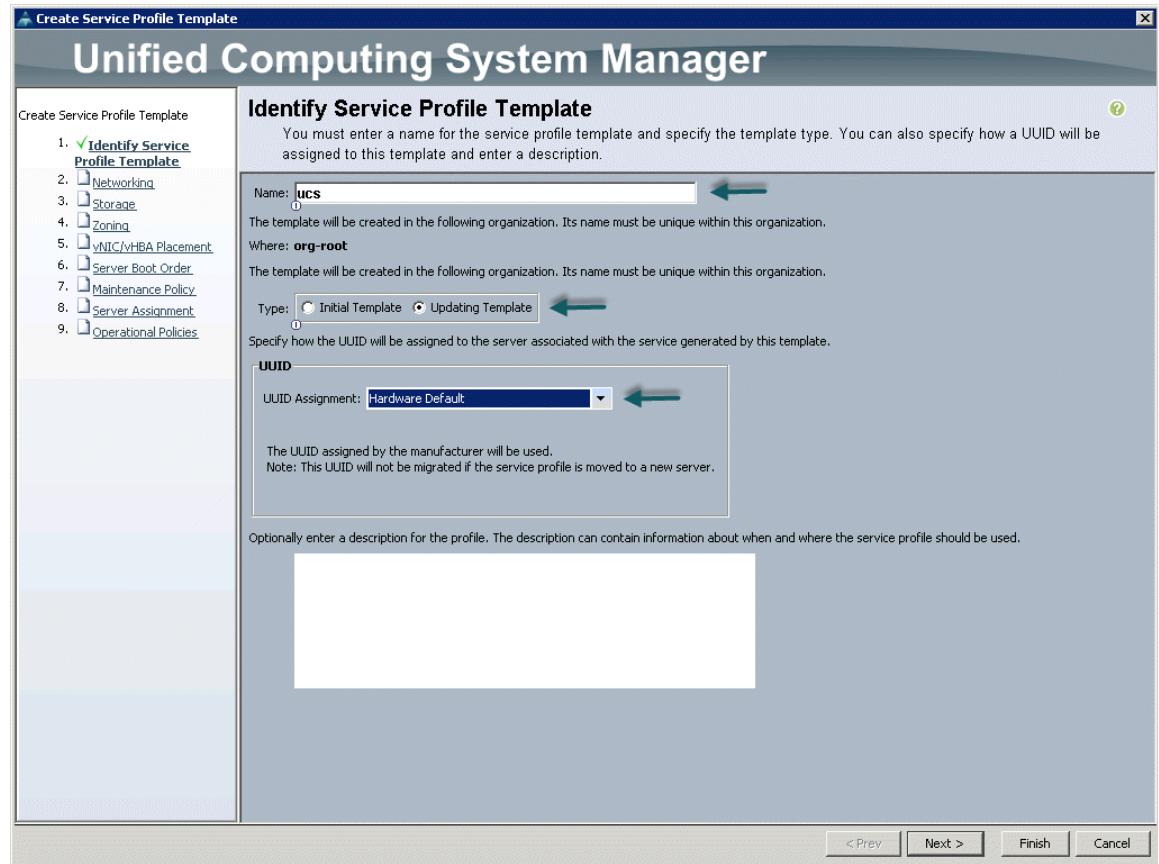


The Create Service Profile Template window appears.

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

- a. Name the service profile template ucs. Select the **Updating Template** radio button.
- b. In the **UUID** section, select **Hardware Default** as the **UUID pool**.
- c. Click **Next** to continue to the next section.

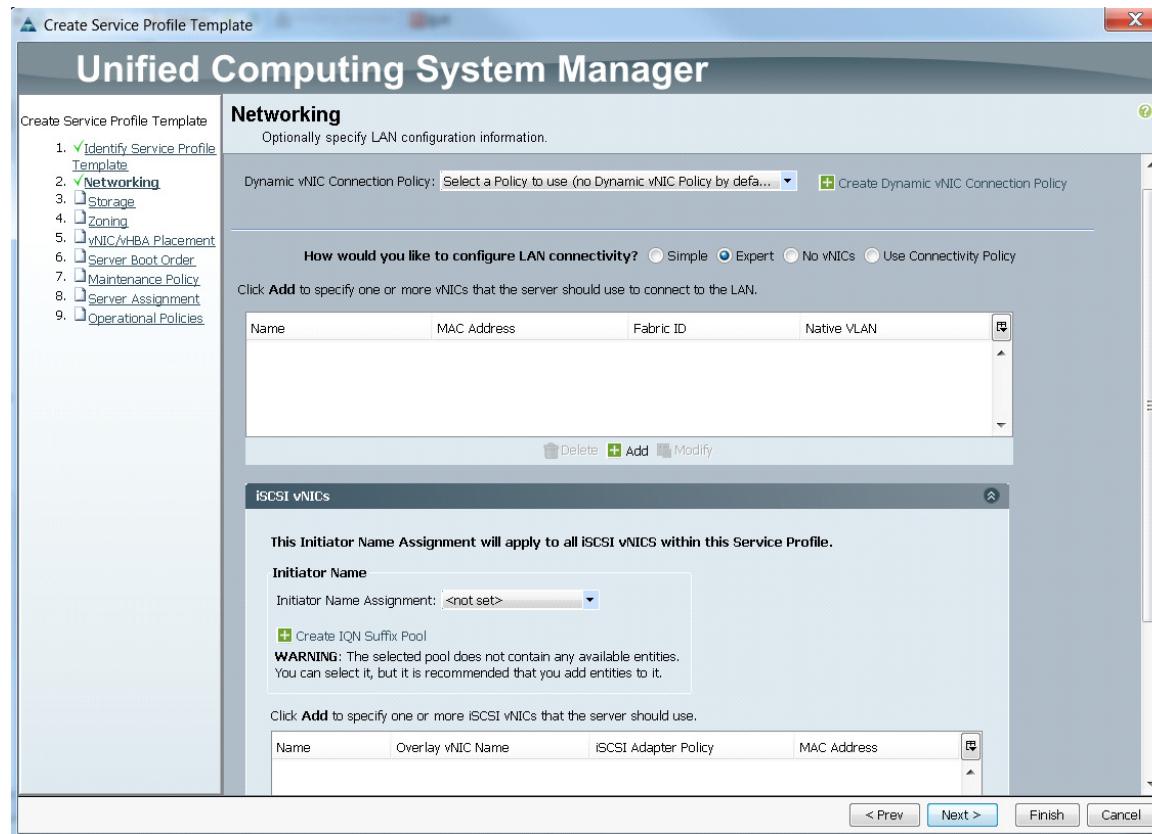
Figure 32 Identify a Service Profile Template



Configuring Network Settings for the Template

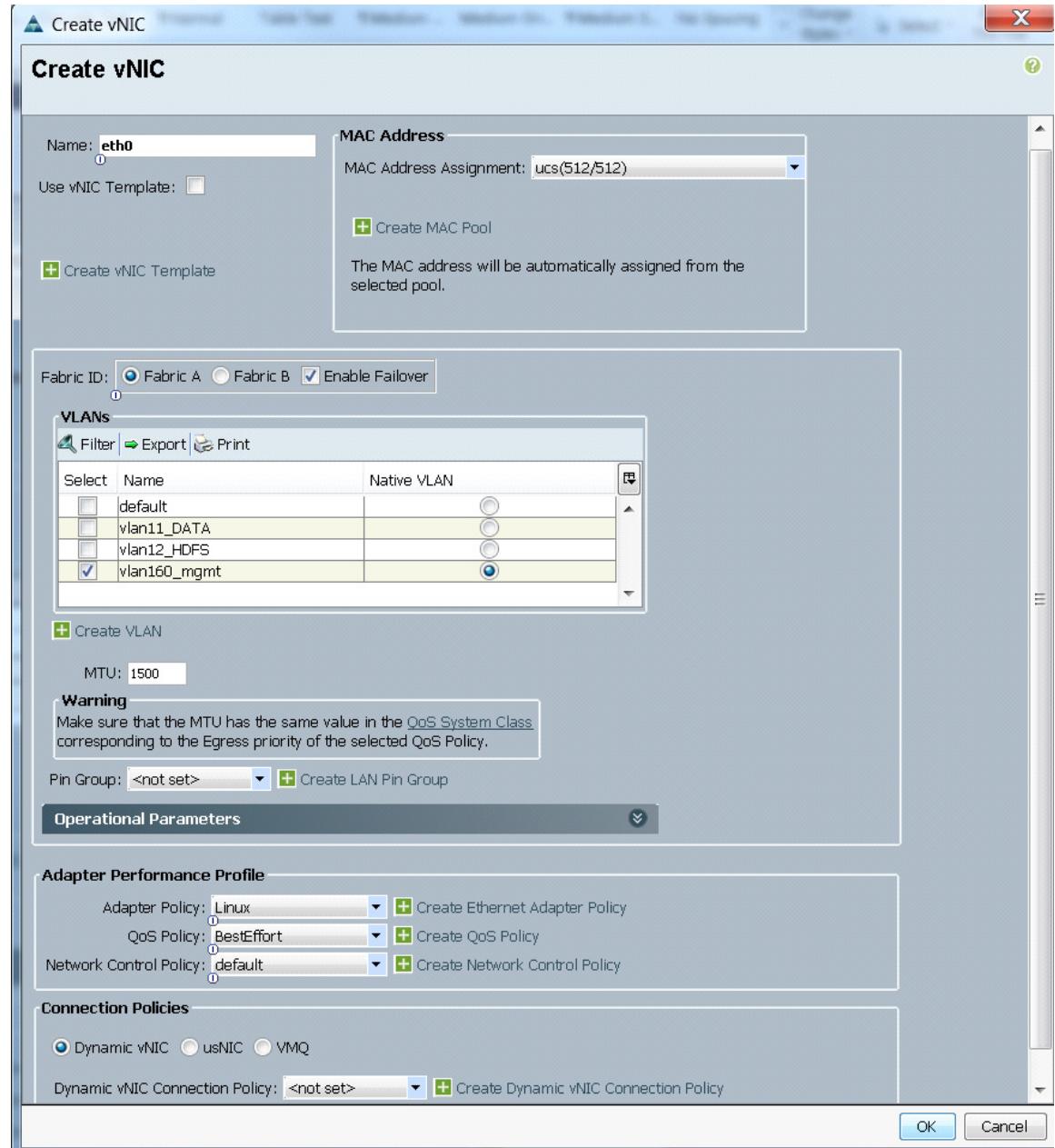
1. Keep the Dynamic vNIC Connection Policy field at the default.
2. Select Expert radio button for the option how would you like to configure LAN connectivity?
3. Click Add to add a vNIC to the template.

Figure 33 Configuring Network Settings for the 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.

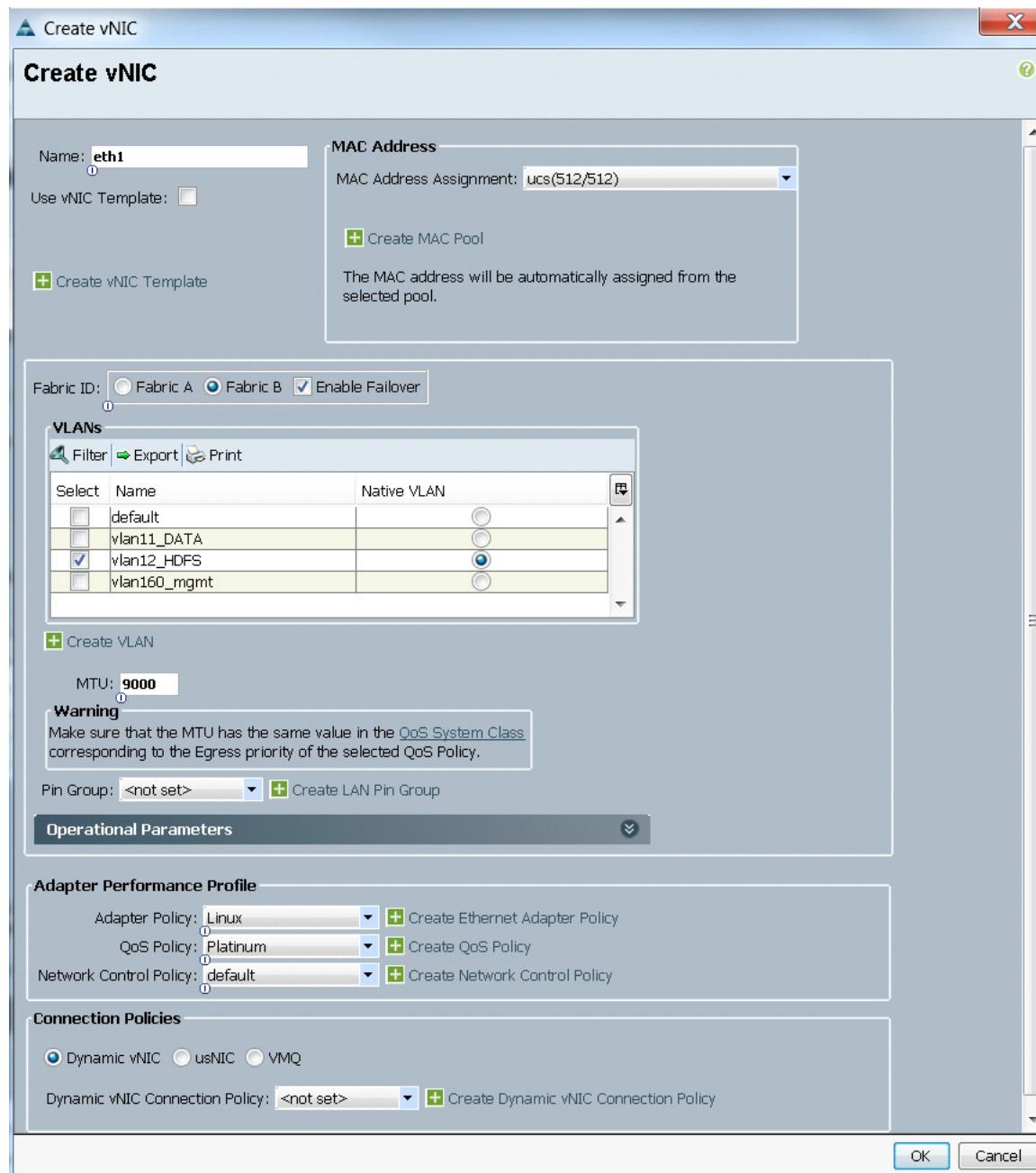
Figure 34 Configuring vNIC eth0



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.

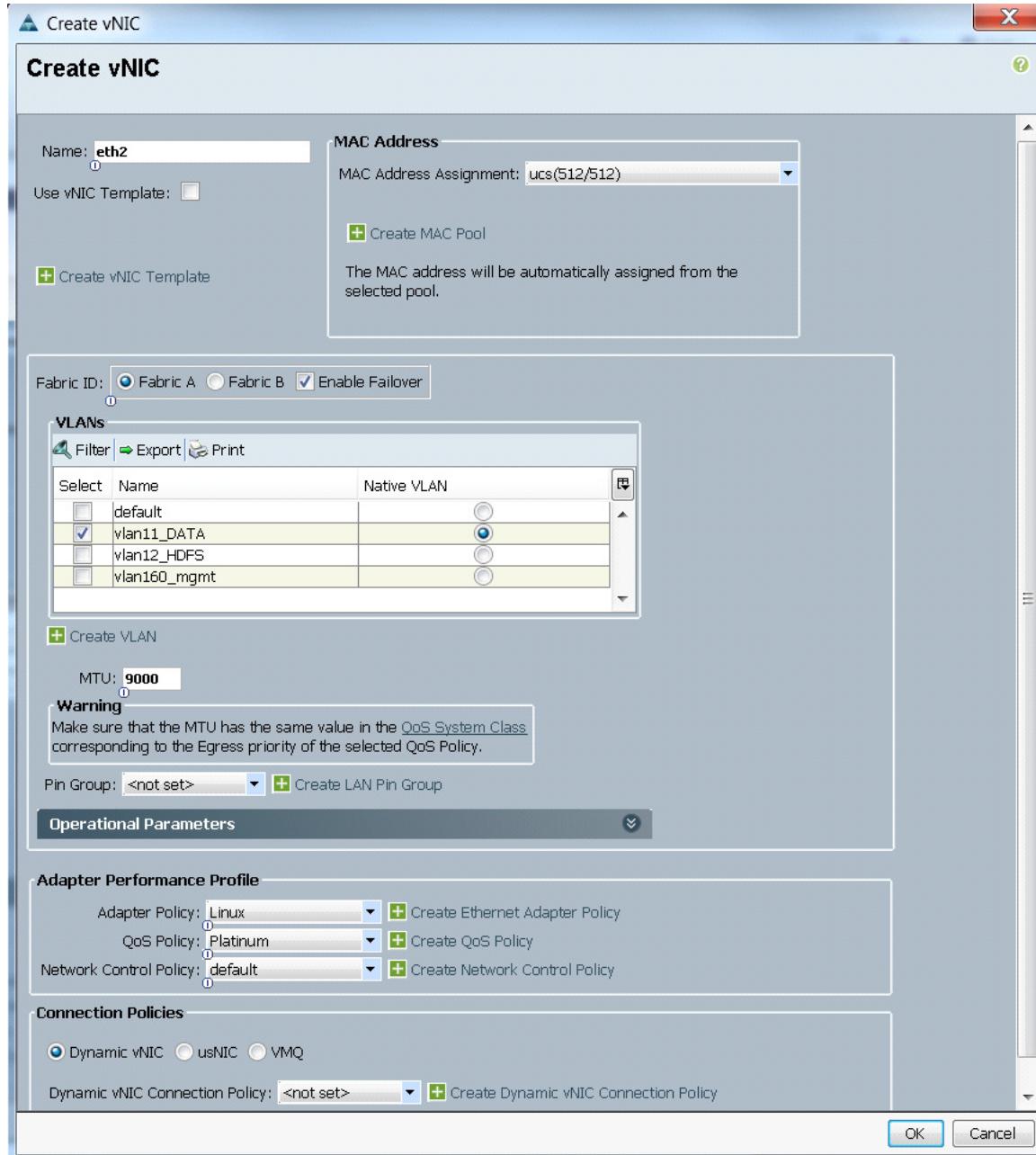
23. Keep the Connection Policies as Dynamic vNIC.
24. Keep the Dynamic vNIC Connection Policy as <not set>.
25. Click OK.

Figure 35 Configuring vNIC eth1



26. The Create vNIC window appears. 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.

Figure 36 Configuring vNIC eth2

Configuring Storage Policy for the Template

Follow these steps to configure storage policies:

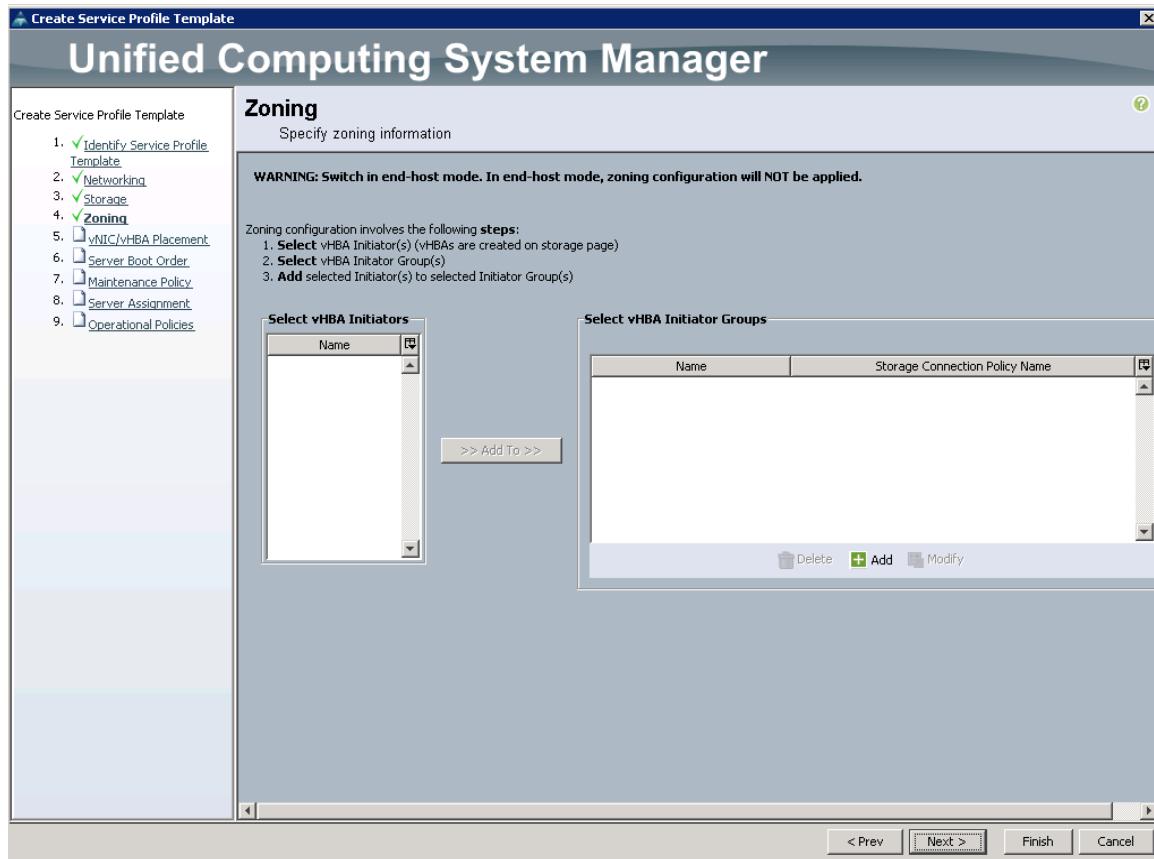
1. Select ucs for the local disk configuration policy.
2. Select the No vHBAs radio button for the option for How would you like to configure SAN connectivity?
3. Click Next to continue to the next section.

Figure 37 Configuring Storage Settings



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

Figure 38 *Configure Zoning*

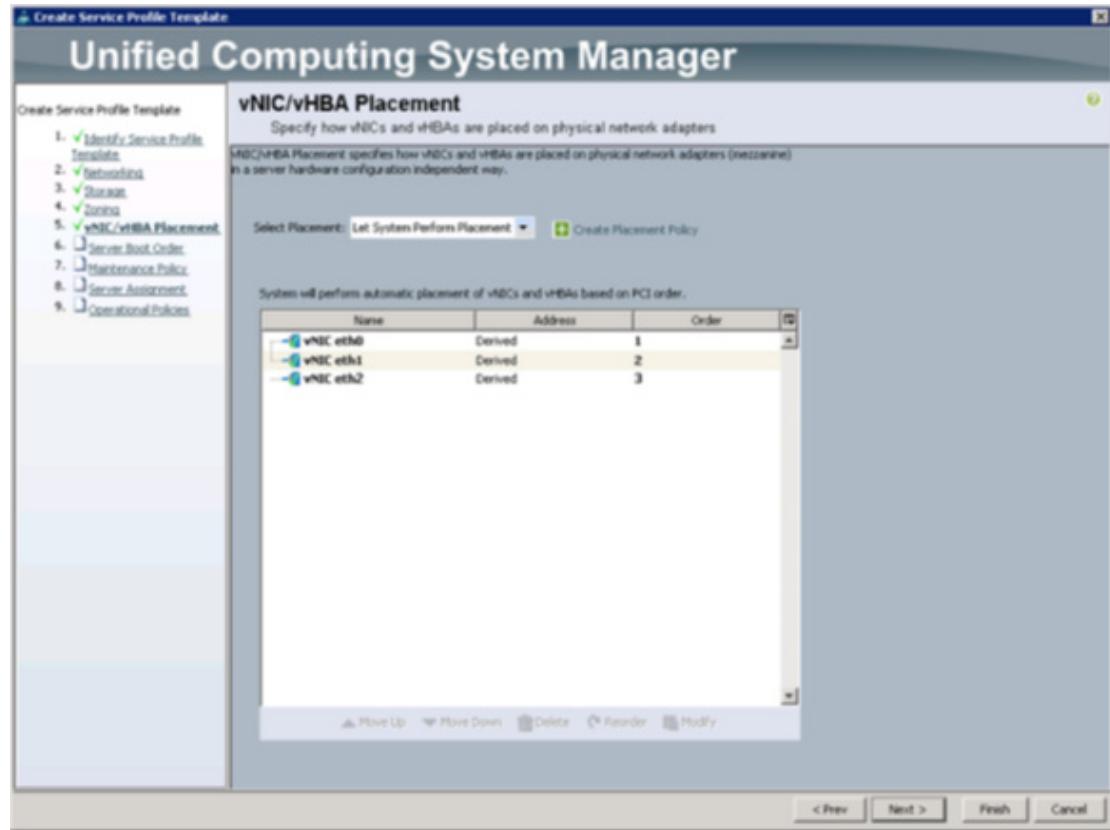


Configuring vNIC/vHBA Placement for the Template

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

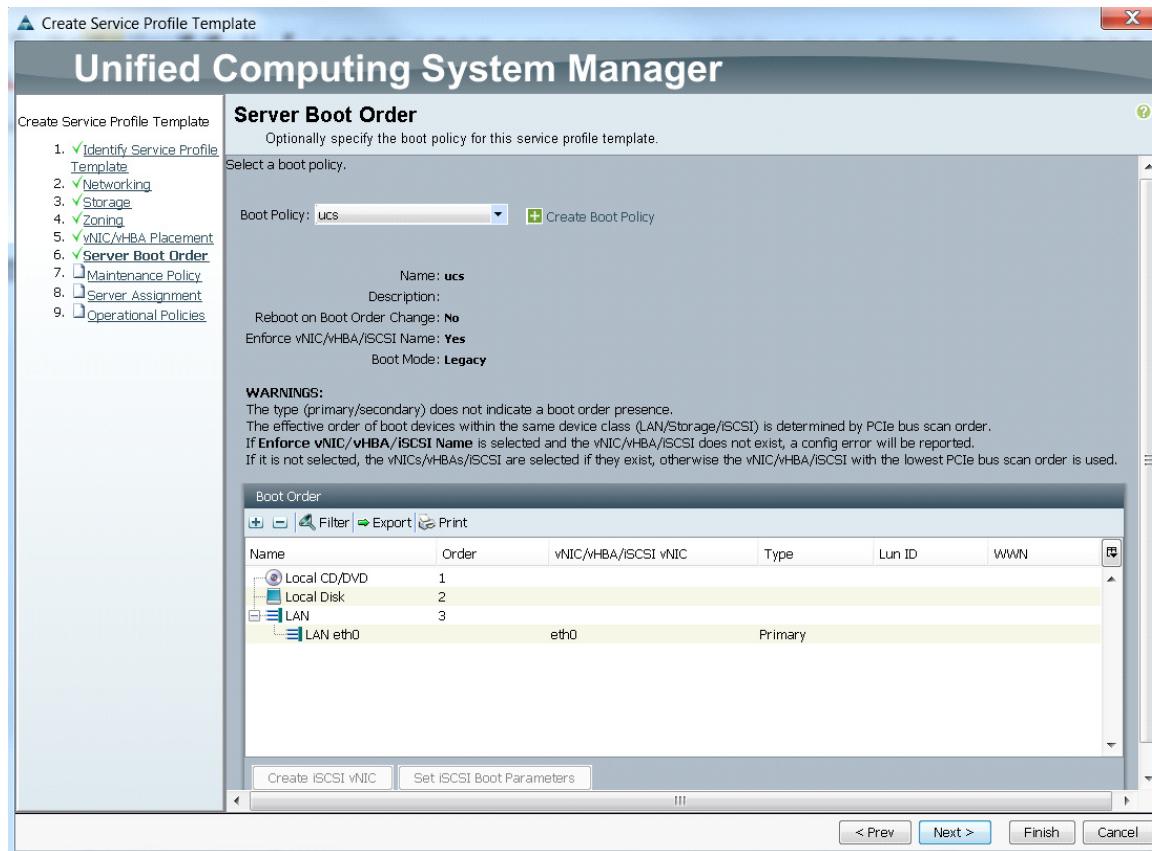


Configuring Server Boot Order for the Template

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.

Figure 40 Creating a Boot Policy



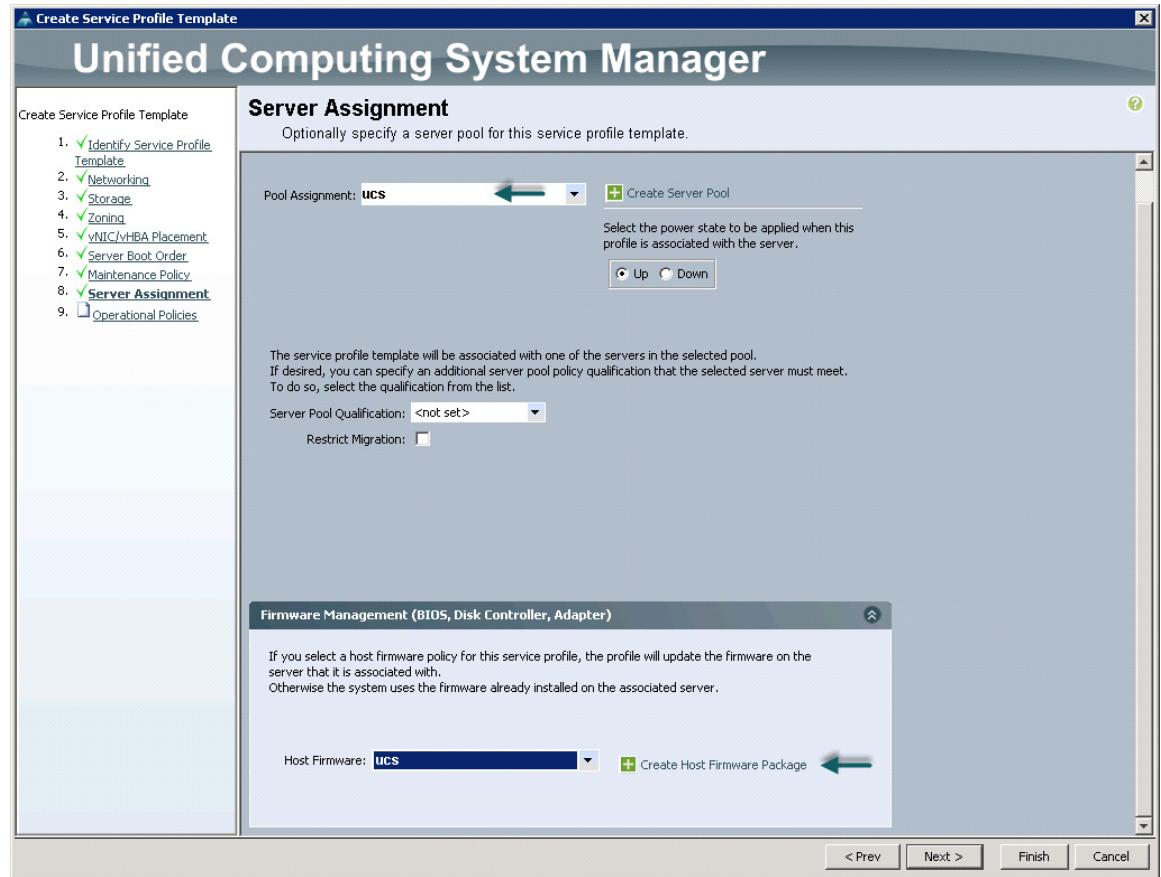
7. In the Maintenance Policy window, follow these steps to apply the maintenance policy:
 - a. Keep the Maintenance policy at no policy used by default.
 - b. Click Next to continue to the next section.

Configuring a Server Assignment for the 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.

Figure 41 **Server Assignment**

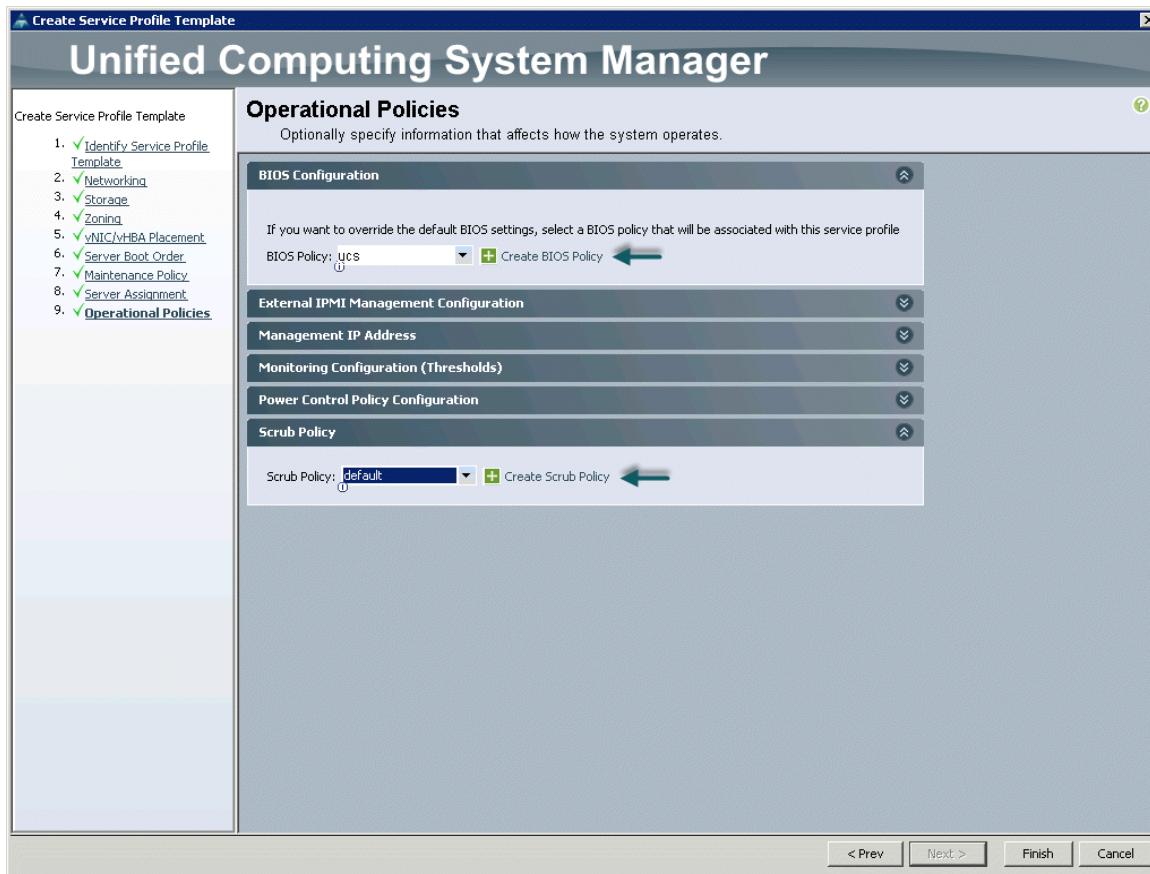


Configuring Operational Policies for the Template

In the Operational Policies Window, follow these steps:

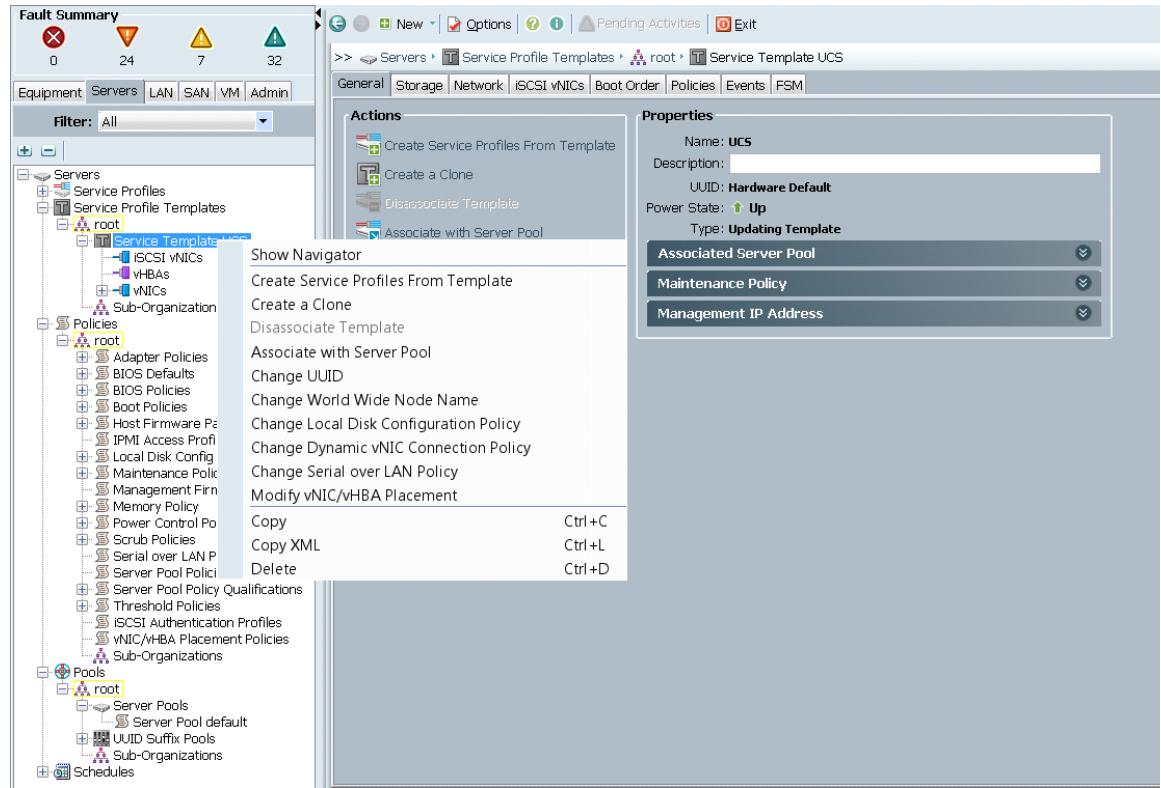
1. Select ucs in the BIOS Policy field.
2. Click Finish to create the Service Profile template.
3. Click OK in the pop-up window to proceed.

Figure 42 Selecting a BIOS Policy



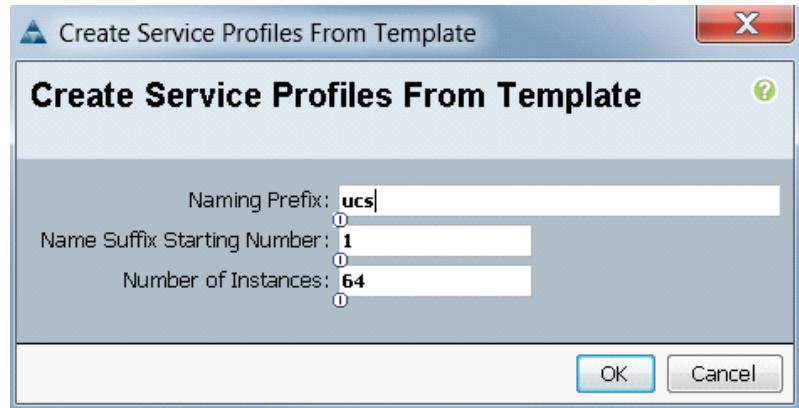
4. Select the Servers tab in the left pane of the Cisco UCS Manager GUI.
 - a. Go to Service Profile Templates > root.
 - b. Right-click Service Profile Templates ucs.
 - c. Select Create Service Profiles From Template.

Figure 43 Creating Service Profiles from a Template



The Create Service Profile from Template window appears.

Figure 44 Selecting a Name and Total Number of Service Profiles



The 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.

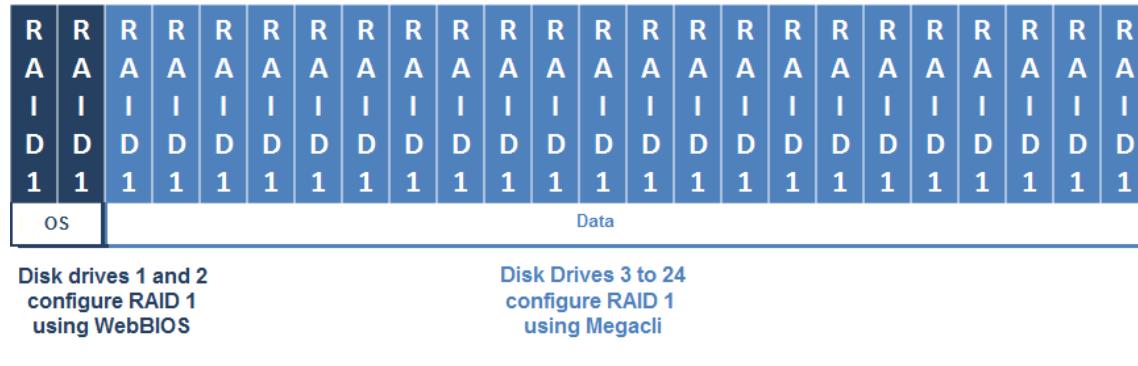
Figure 45 Cisco UCS Manager Displaying All Nodes

Name	Overall Status	PID	Model	User Label	Cores	Memory	Adapters	NICs	HBAs	Operability	Power State	Assoc State	Profile	Fault Suppression State
Server 1	OK	UCSC-C240...	Cisco UCS C2...		20	262144	1	3	0	Operable	On	Associated	org-root@sc-U...	N/A
Server 2	OK	UCSC-C240...	Cisco UCS C2...		20	262144	1	3	0	Operable	On	Associated	org-root@sc-U...	N/A
Server 3	OK	UCSC-C240...	Cisco UCS C2...		20	262144	1	3	0	Operable	On	Associated	org-root@sc-U...	N/A
Server 4	OK	UCSC-C240...	Cisco UCS C2...		20	262144	1	3	0	Operable	On	Associated	org-root@sc-U...	N/A
Server 5	OK	UCSC-C240...	Cisco UCS C2...		20	262144	1	3	0	Operable	On	Associated	org-root@sc-U...	N/A
Server 6	OK	UCSC-C240...	Cisco UCS C2...		20	262144	1	3	0	Operable	On	Associated	org-root@sc-U...	N/A
Server 7	OK	UCSC-C240...	Cisco UCS C2...		20	262144	1	3	0	Operable	On	Associated	org-root@sc-U...	N/A
Server 8	OK	UCSC-C240...	Cisco UCS C2...		20	262144	1	3	0	Operable	On	Associated	org-root@sc-U...	N/A
Server 9	OK	UCSC-C240...	Cisco UCS C2...		20	262144	1	3	0	Operable	On	Associated	org-root@sc-U...	N/A
Server 10	OK	UCSC-C240...	Cisco UCS C2...		20	262144	1	3	0	Operable	On	Associated	org-root@sc-U...	N/A
Server 11	OK	UCSC-C240...	Cisco UCS C2...		20	262144	1	3	0	Operable	On	Associated	org-root@sc-U...	N/A
Server 12	OK	UCSC-C240...	Cisco UCS C2...		20	262144	1	3	0	Operable	On	Associated	org-root@sc-U...	N/A
Server 13	OK	UCSC-C240...	Cisco UCS C2...		20	262144	1	3	0	Operable	On	Associated	org-root@sc-U...	N/A
Server 14	OK	UCSC-C240...	Cisco UCS C2...		20	262144	1	3	0	Operable	On	Associated	org-root@sc-U...	N/A
Server 15	OK	UCSC-C240...	Cisco UCS C2...		20	262144	1	3	0	Operable	On	Associated	org-root@sc-U...	N/A
Server 16	OK	UCSC-C240...	Cisco UCS C2...		20	262144	1	3	0	Operable	On	Associated	org-root@sc-U...	N/A

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 (rhel1 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 completion of the Operating system Installation.



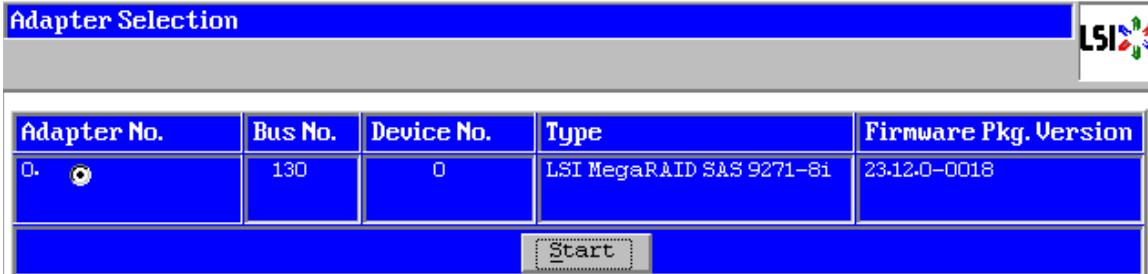
Follow these steps to create RAID1 on the first two disk drives to install the operating system:

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

The Adapter Selection window appears.

- Click Start to continue.
- Click Configuration Wizard.

Figure 46 Adapter Selection for FAID Configuration



Adapter No.	Bus No.	Device No.	Type	Firmware Pkg. Version
0. <input checked="" type="radio"/>	130	0	LSI MegaRAID SAS 9271-8i	23.12.0-0018

Start

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

Figure 47 Clearing Current Configuration on the Controller



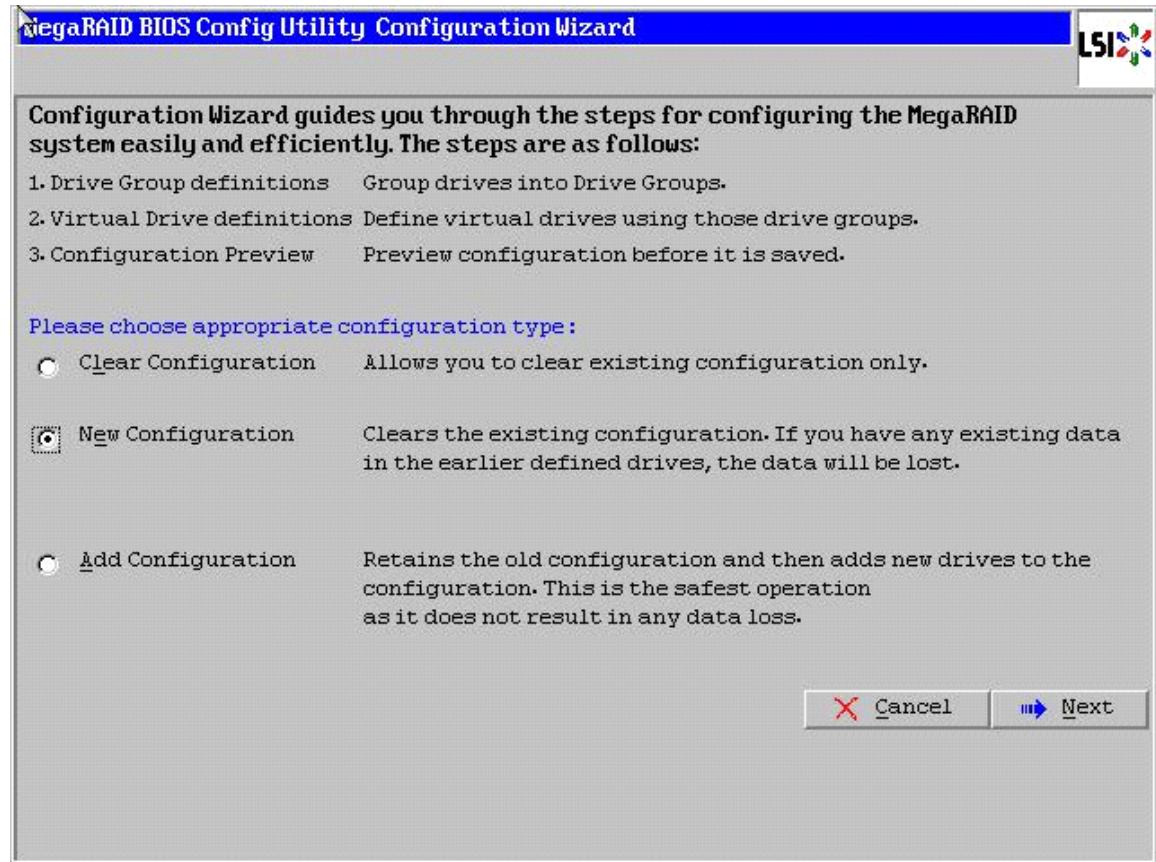
5. Choose Yes when asked to confirm the wiping of the current configuration.
6. In the Physical View, ensure that all the drives are Unconfigured Good.
7. Click Configuration Wizard.

Figure 48 Confirming Clearance of the Previous Configuration on the Controller



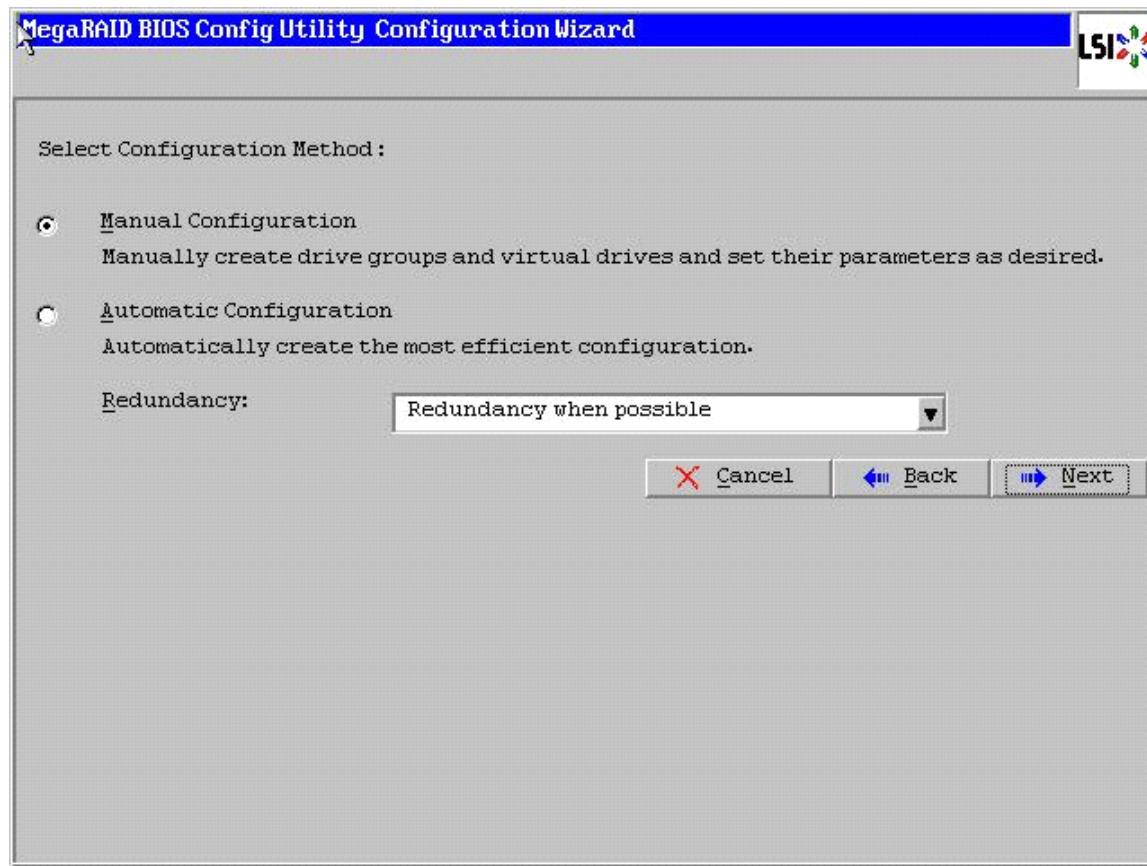
8. In the Configuration Wizard window, choose the configuration type to be New Configuration and click Next.

Figure 49 Creating a New Configuration



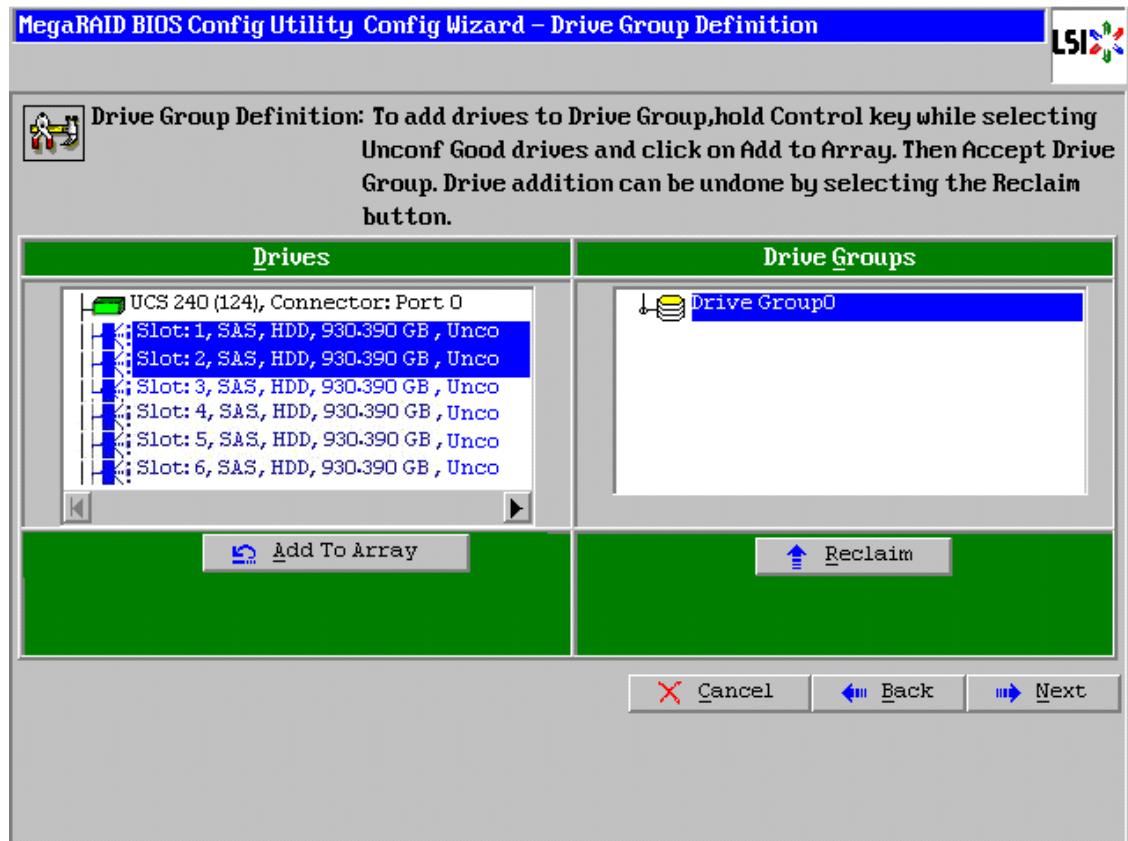
9. Select the configuration method to be Manual Configuration; this enables you to have complete control over all attributes of the new storage configuration, such as, the drive groups, virtual drives and the ability to set their parameters.
10. Click Next.

Figure 50 Manual Configuration Method



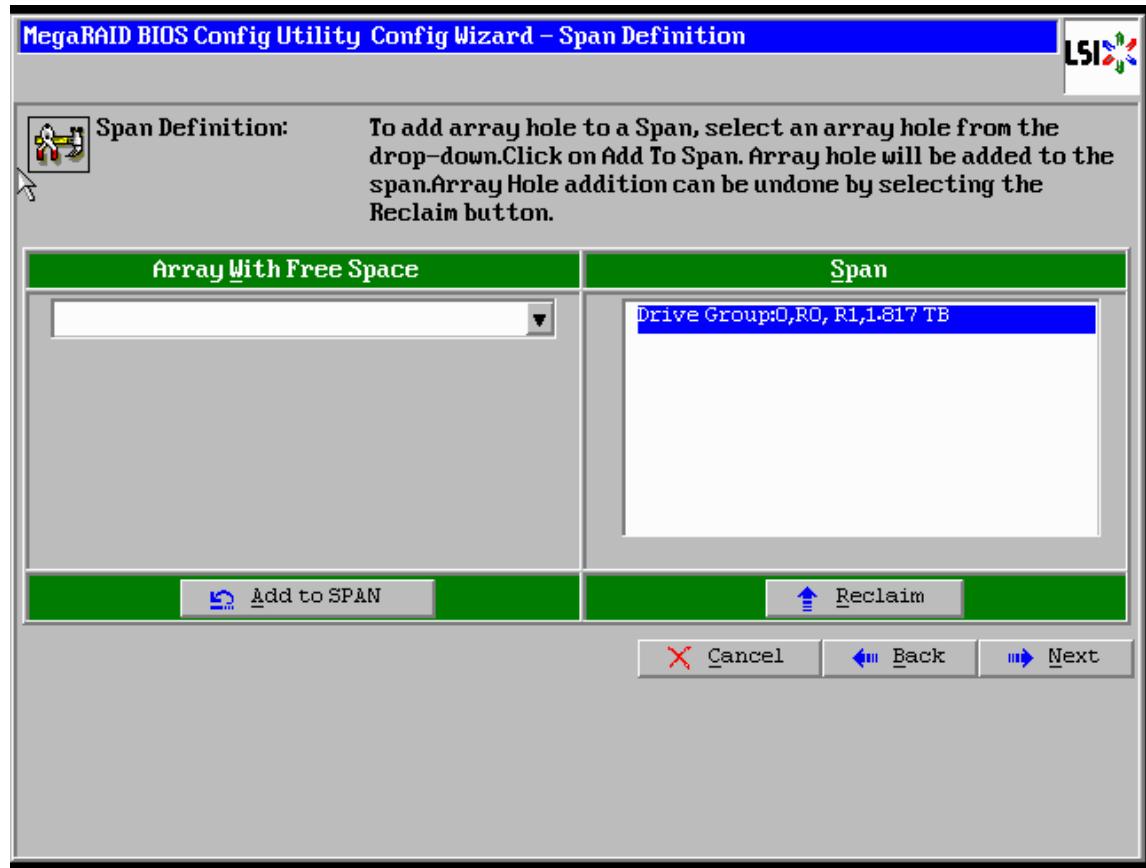
11. The Drive Group Definition window appears. Use this window to choose the first two drives to create drive group.
12. Click Add to Array to move the drives to a proposed drive group configuration in the Drive Groups pane. Click Accept DG and then, click Next.

Figure 51 Selecting First Drive and Adding to Drive Group



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

Figure 52 Span Definition Window

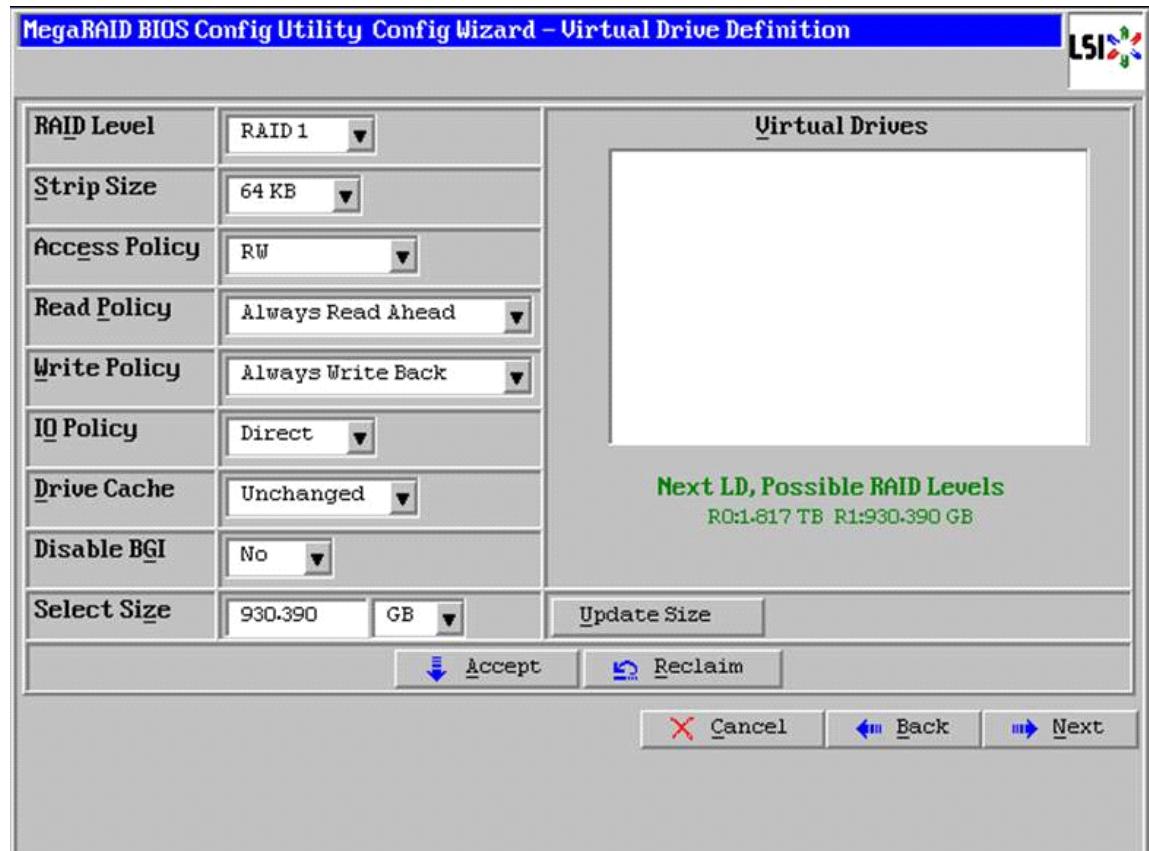


14. In the Virtual Drive definitions window,
- Click Update Size.
 - Change Strip Size to 64 KB. A larger strip size produces higher read performance.
 - From the Read Policy drop-down list, choose Always Read Ahead.
 - From the Write Policy drop-down list, choose Write Back with BBU.
 - Make sure RAID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



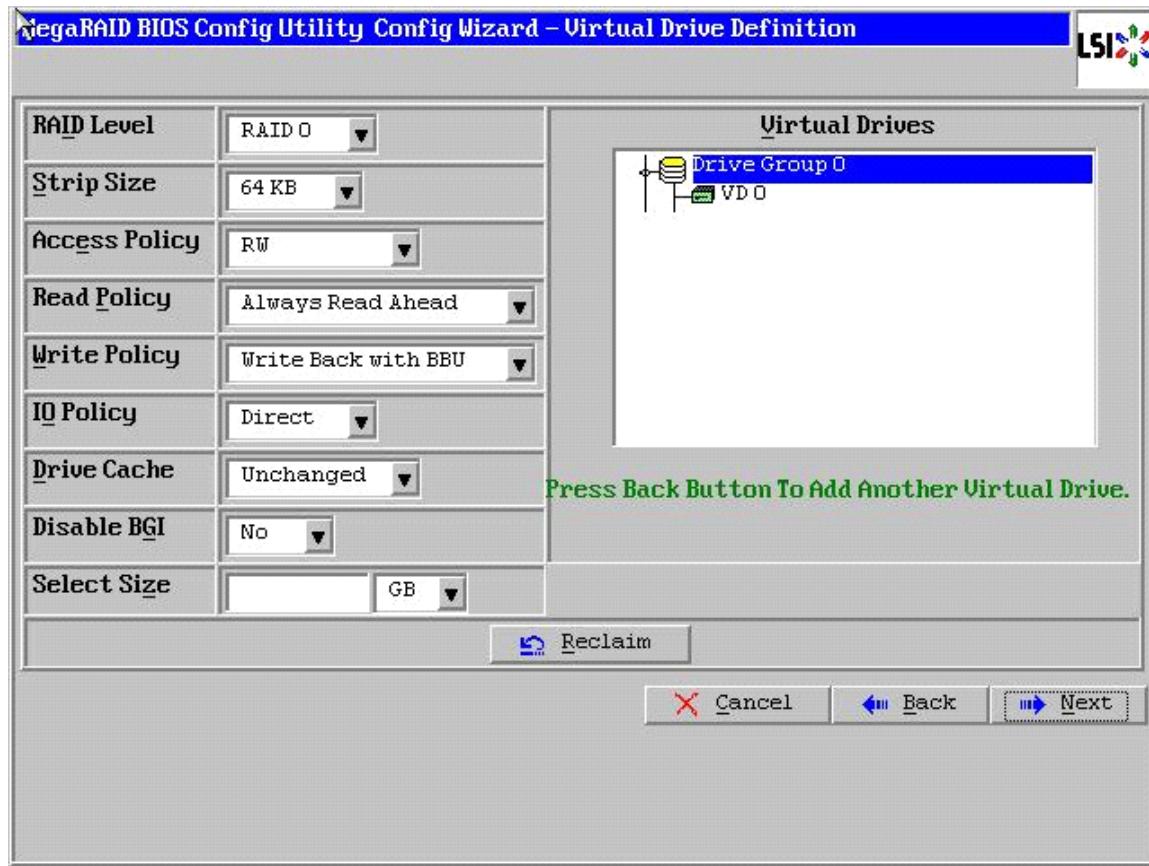
Note Clicking Update Size might change some of the settings in the window. Make sure all settings are correct before accepting.

Figure 53 Virtual Drive Definition Window



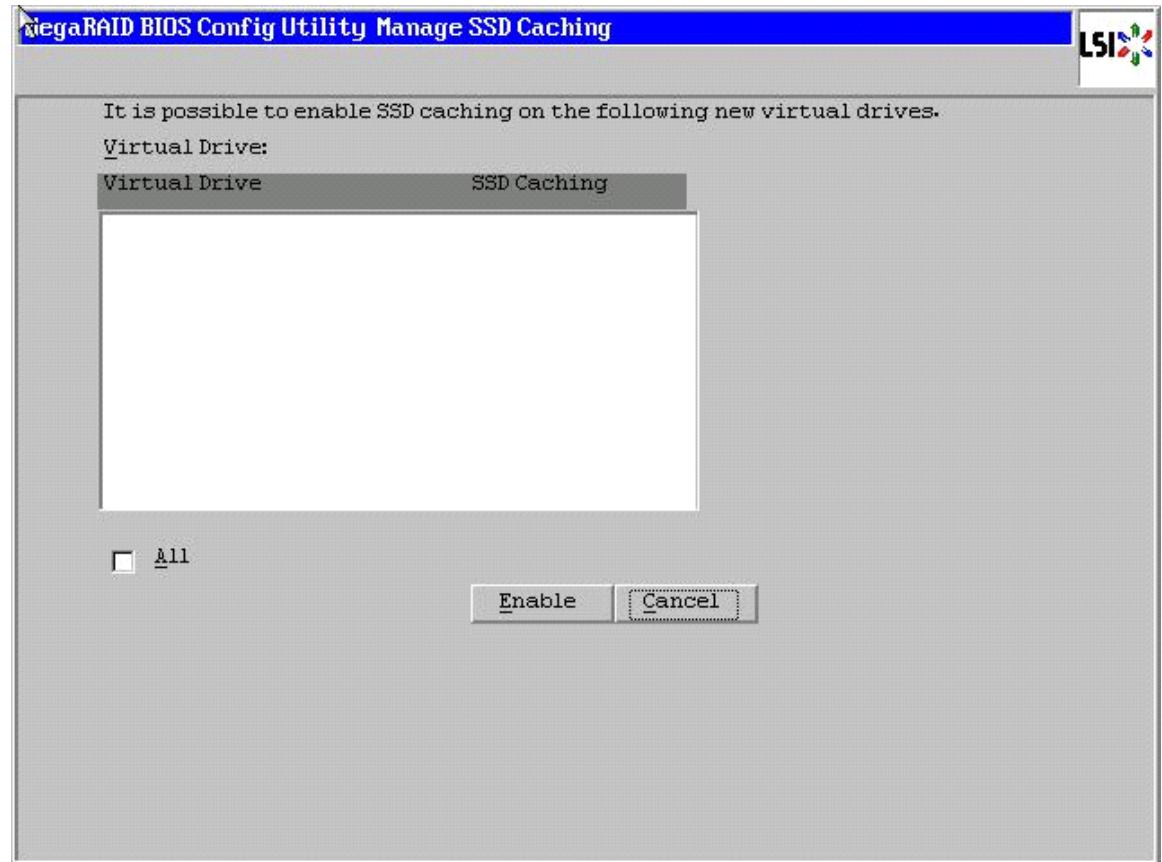
15. After you finish the virtual drive definitions, click Next. The Configuration Preview window appears showing VD0.
16. Check the virtual drive configuration in the Configuration Preview window and click Accept to save the configuration.

Figure 54 Completed Virtual Drive Definition



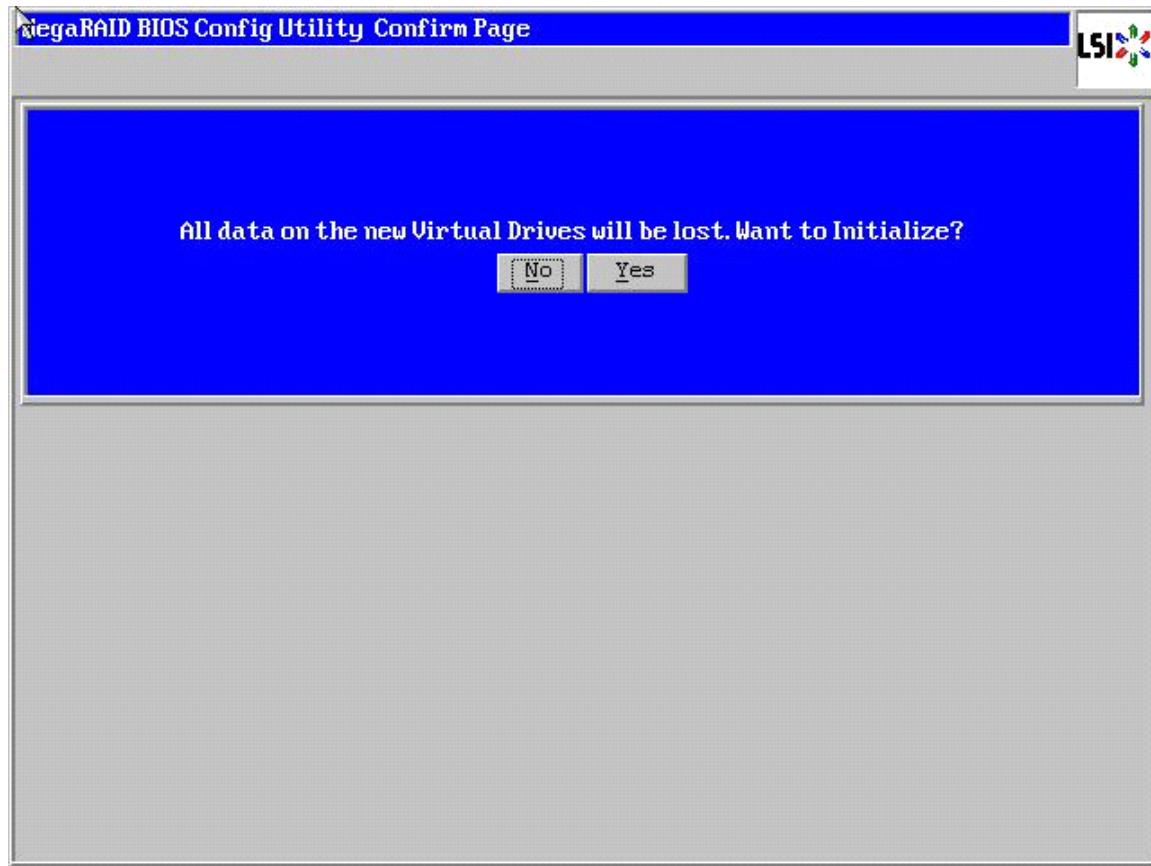
17. Click Yes to save the configuration.
18. In the managing SSD Caching Window, click Cancel.

Figure 55 SSD Caching Window



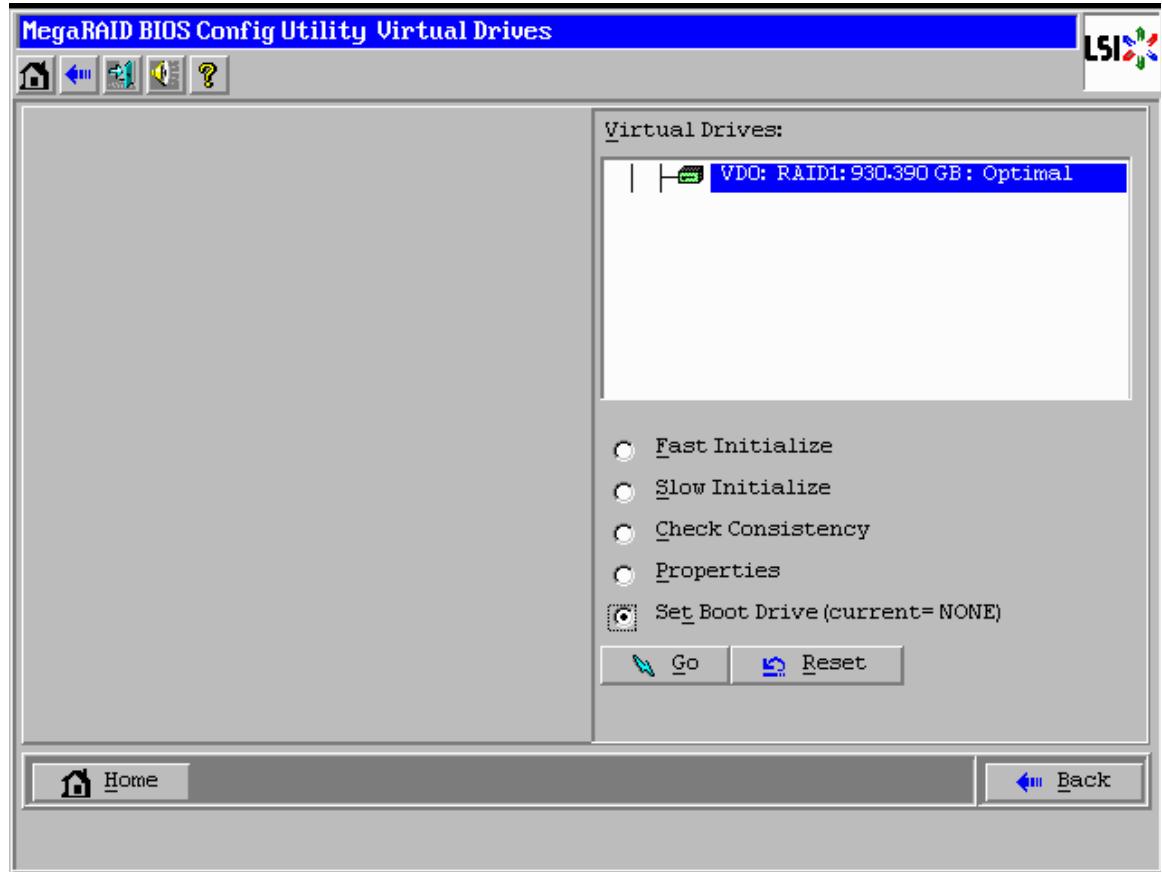
19. Click Yes. When asked to confirm the initialization.

Figure 56 *Initializing Virtual Drive Window*



20. Set VD0 as the Boot Drive and click Go.
21. Click Home.
22. Review the Configuration and Click Exit.

Figure 57 Setting Virtual Drive as Boot Drive



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 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.



Note

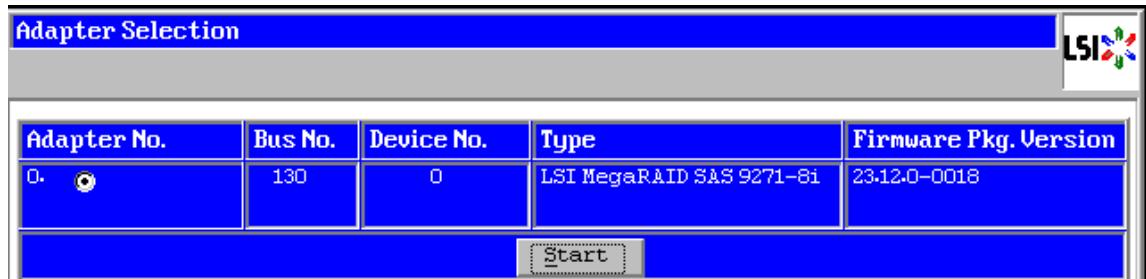
In the case of High Capacity Configuration featuring 12 4TB LFF disk drives, the disk drives are configured as individual RAID0 volumes with 1MB stripe size. Read ahead cached is enable and write cache is enabled while battery is present. Two partitions of 1TB and 3TB are created on the first disk drive,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

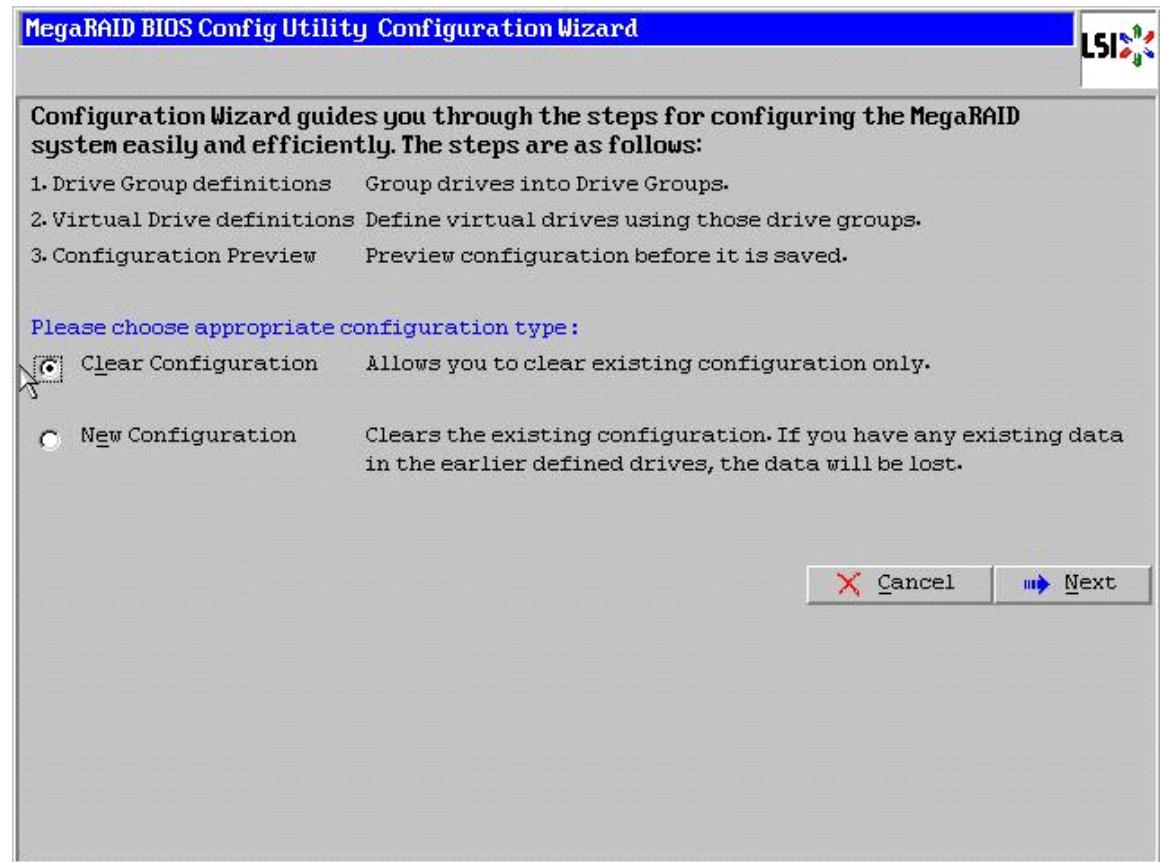
1. When the server is booting, the following text appears on the screen:
 - a. Press `<Ctrl><H>` to launch the WebBIOS.
 - b. Press `Ctrl+H` immediately.The Adapter Selection window appears.
2. Click Start to continue.
3. Click Configuration Wizard.

Figure 58 Adapter Selection for RAID Configuration



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

Figure 59 *Clearing the Current Configuration*



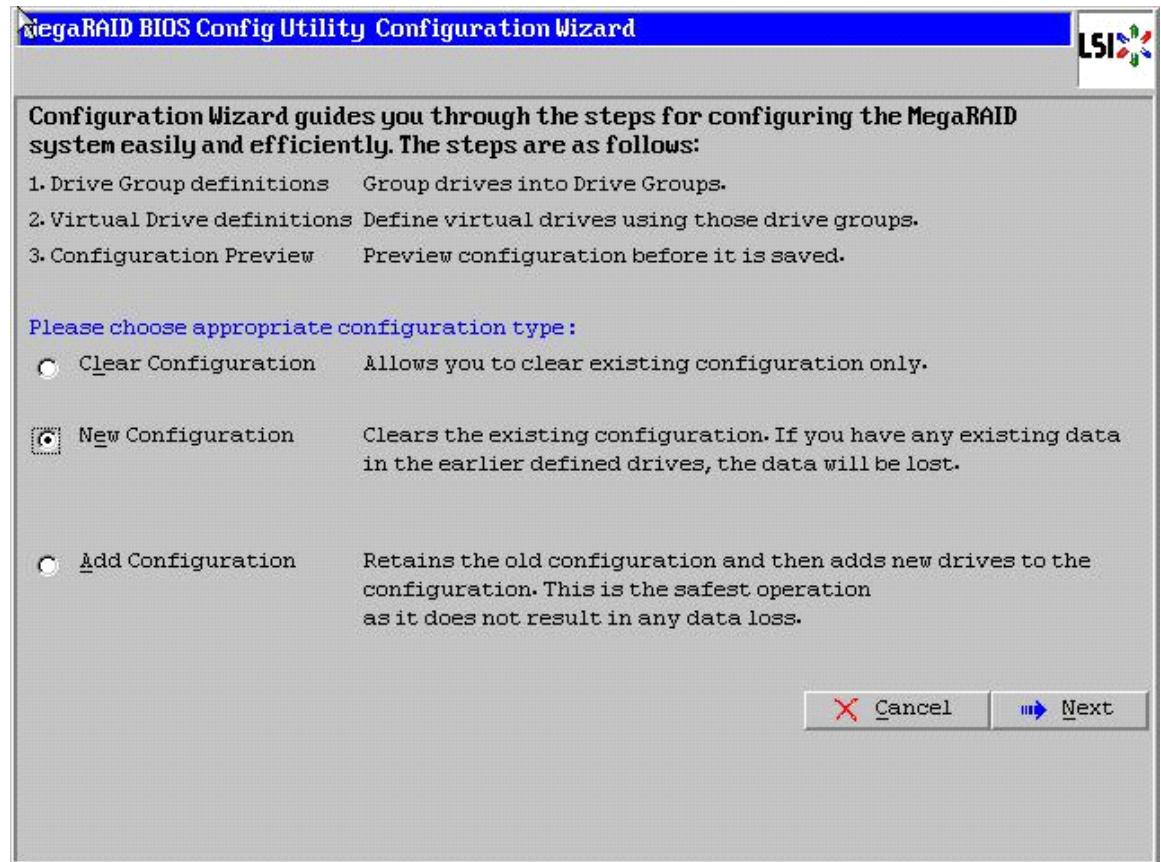
5. Choose Yes when asked to confirm the wiping of the current configuration.
6. In the Physical View, ensure that all the drives are Unconfigured Good.
7. Click Configuration Wizard.

Figure 60 Confirming the Clearance of the Previous Configuration on the Controller



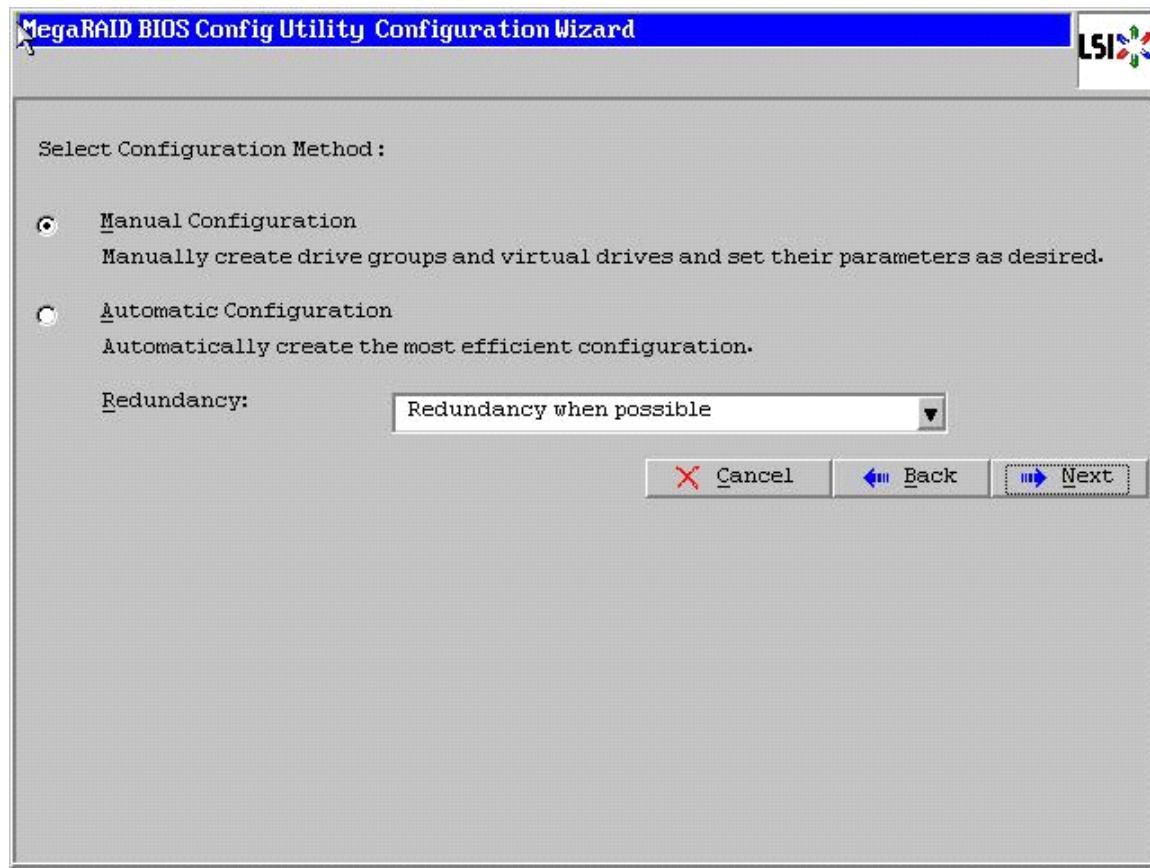
8. In the Configuration Wizard window choose the configuration type to be New Configuration and click Next.

Figure 61 Creating 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.

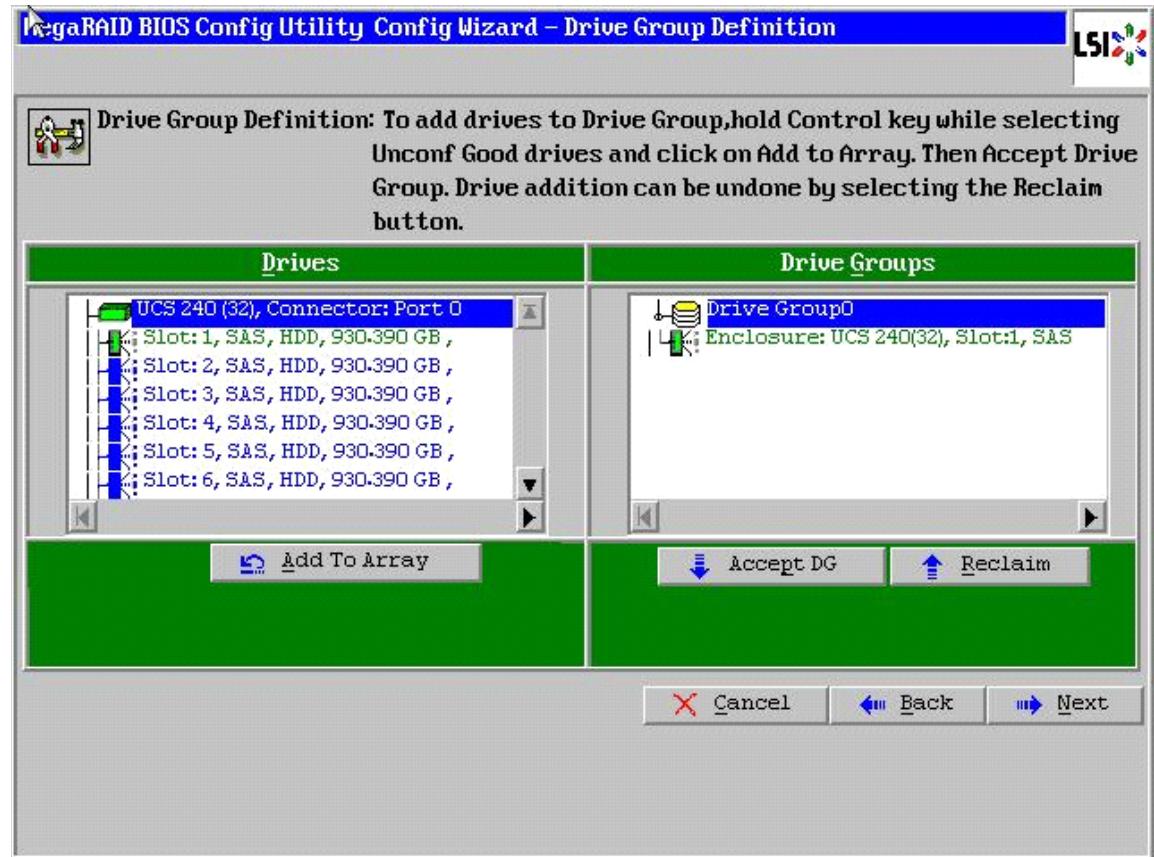
Figure 62 Manual Configuration Method



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

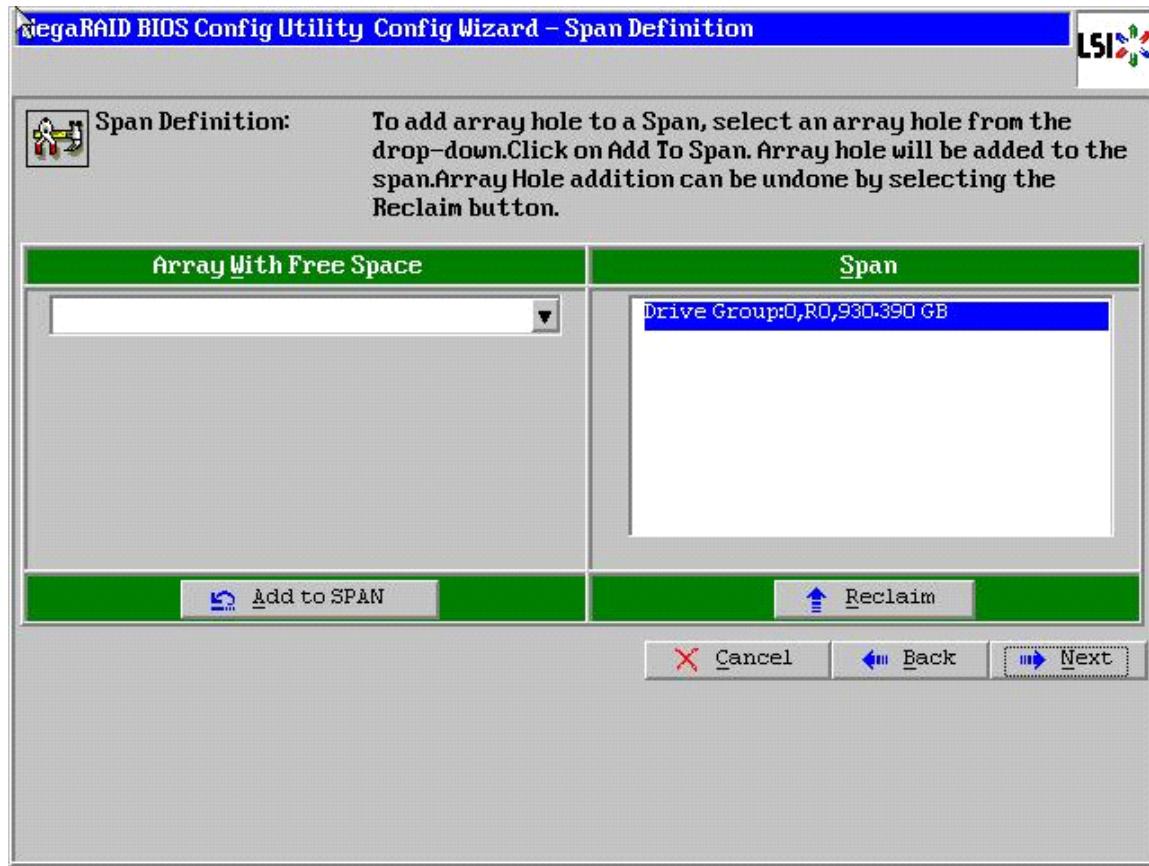
11. Click Add to Array to move the drives to a proposed drive group configuration in the Drive Groups pane.
12. Click Accept DG and then, click Next.

Figure 63 Selecting First Drive and Adding to Drive Group



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

Figure 64 Span Definition Window



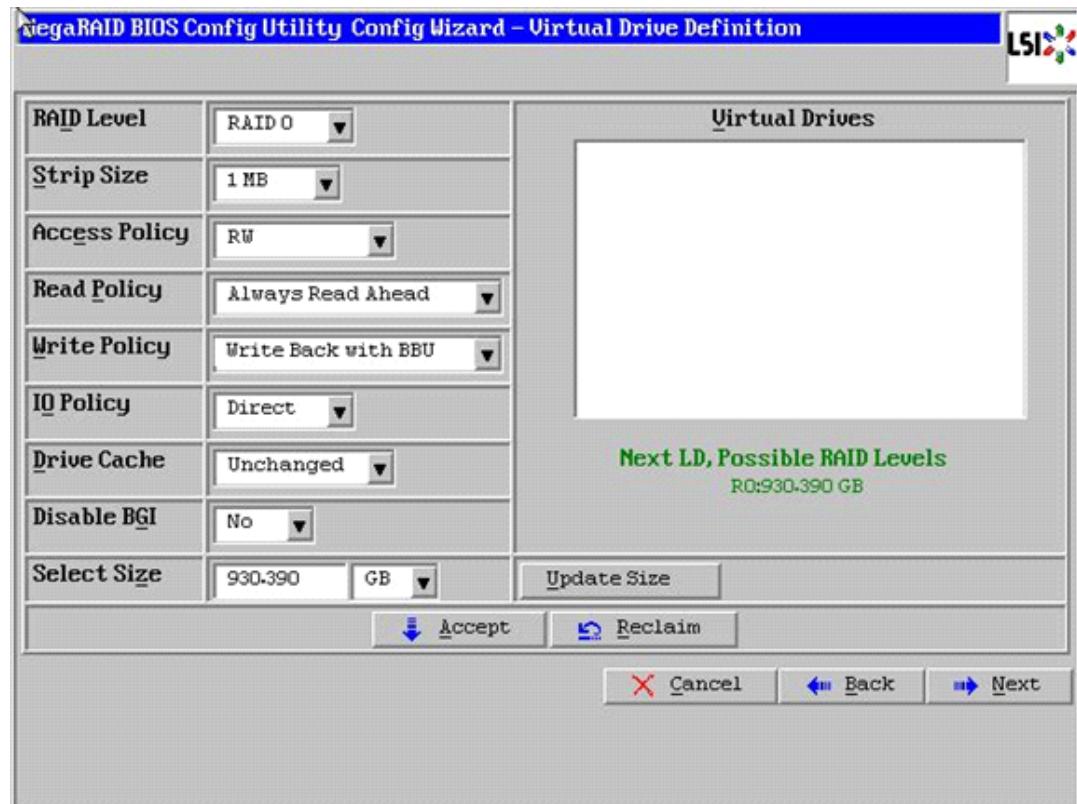
14. In the Virtual Drive definitions window:

- a. Click 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.



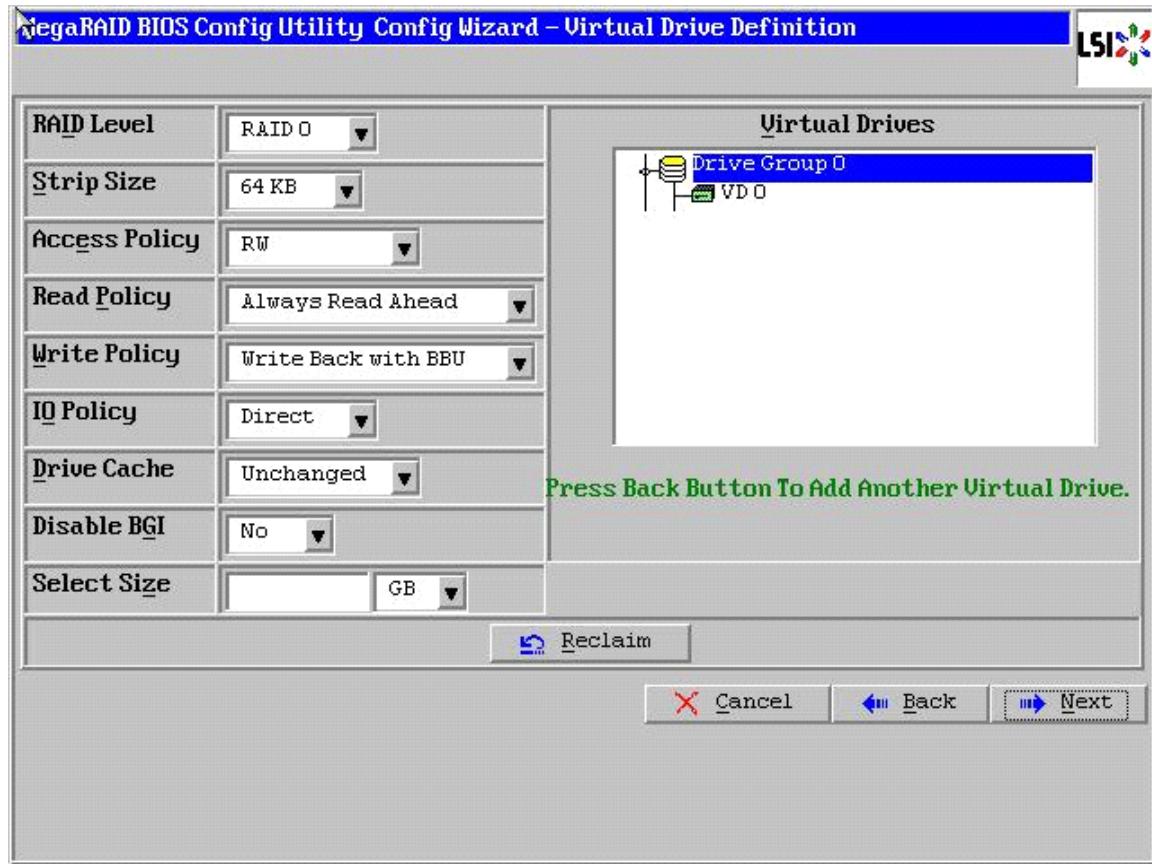
Note Clicking Update Size might change some of the settings in the window. Make sure all settings are correct before accepting.

Figure 65 Virtual Drive Definition Window



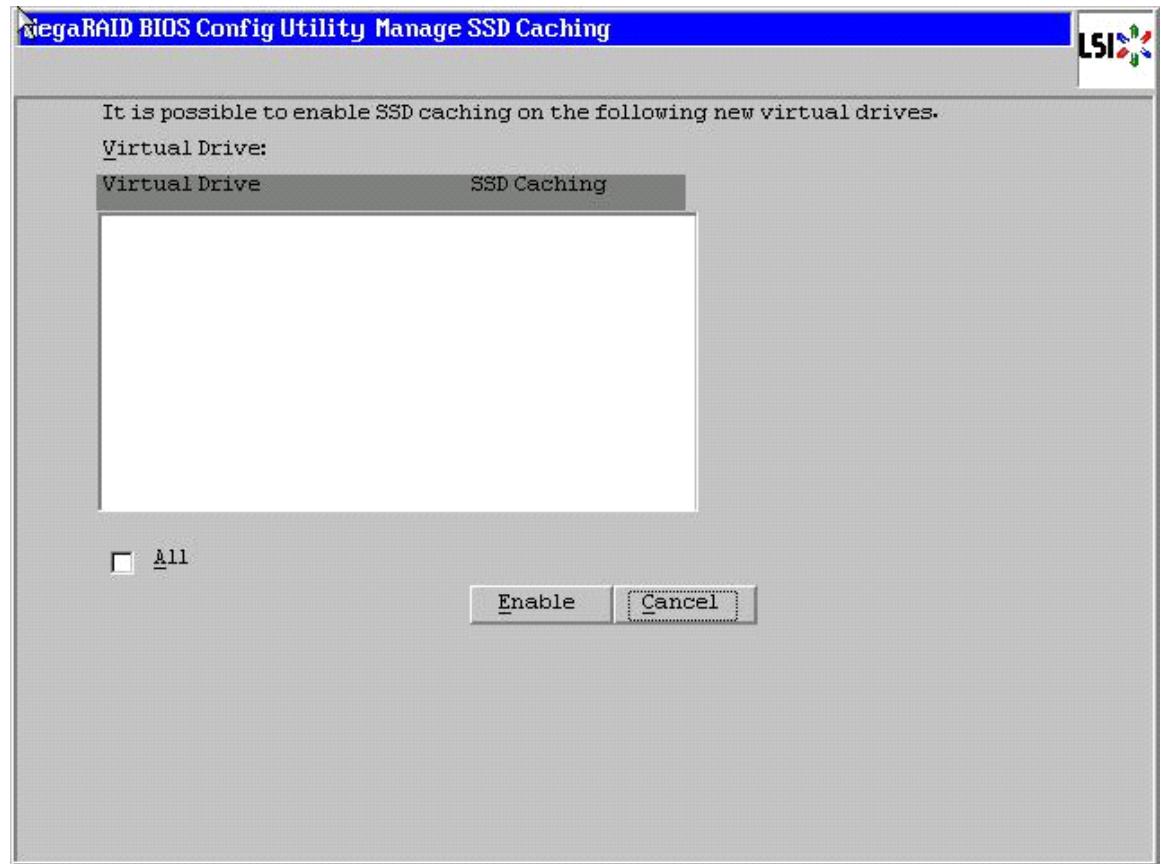
15. After finishing the virtual drive definitions, click Next. The Configuration Preview window appears showing VD0.
16. Check the virtual drive configuration in the Configuration Preview window and click Accept to save the configuration.

Figure 66 Completed Virtual Drive Definition



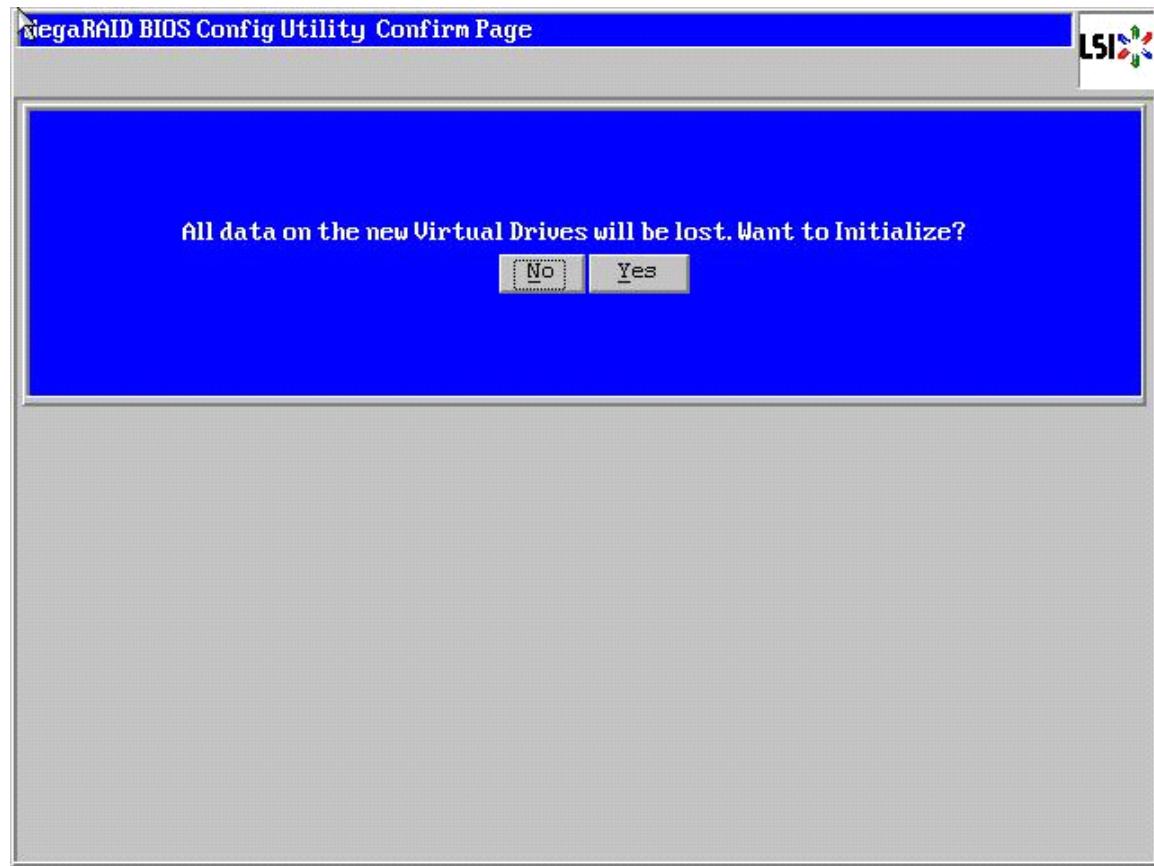
17. Click Yes to save the configuration.
18. In the managing SSD Caching Window, click Cancel.

Figure 67 SSD Caching Window



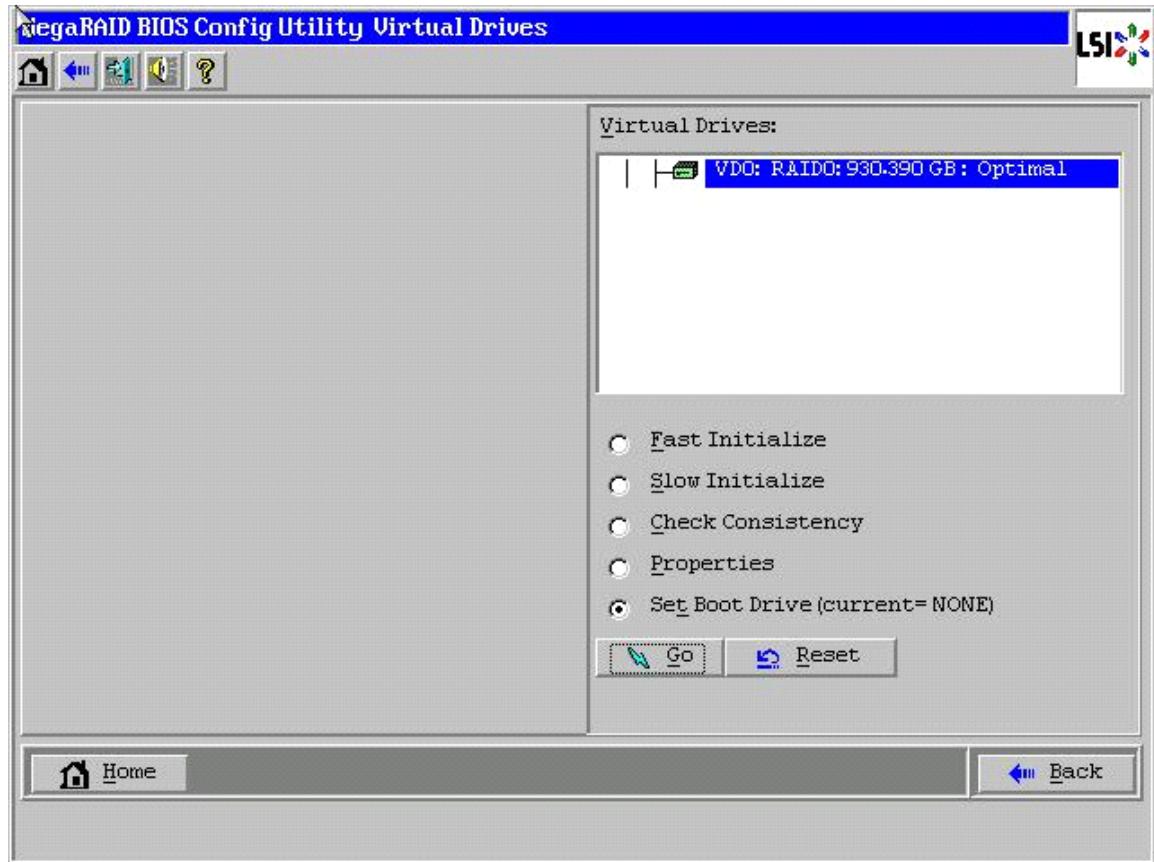
19. Click Yes when asked to confirm the initialization.

Figure 68 *Initializing the Virtual Drive Window*



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

Figure 69 *Setting Virtual Drive as Boot Drive*



21. Click Home.
22. Review the Configuration and click Exit.

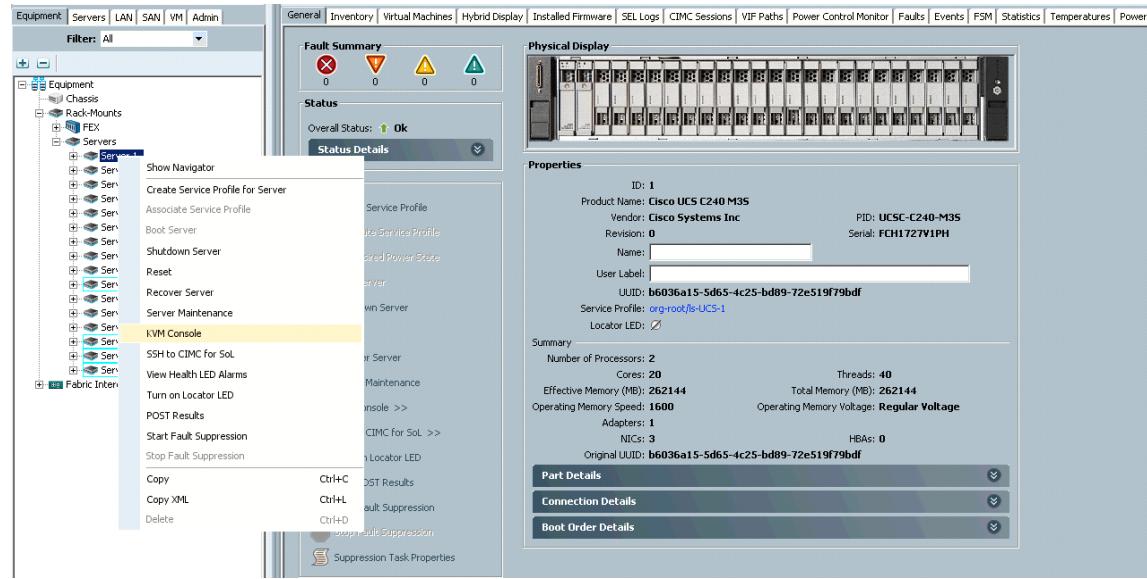
The steps above can be repeated to configure disks 2-24 or using Linux based MegaCLI commands as described in Section on Configuring Data Drives later in this document.

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.

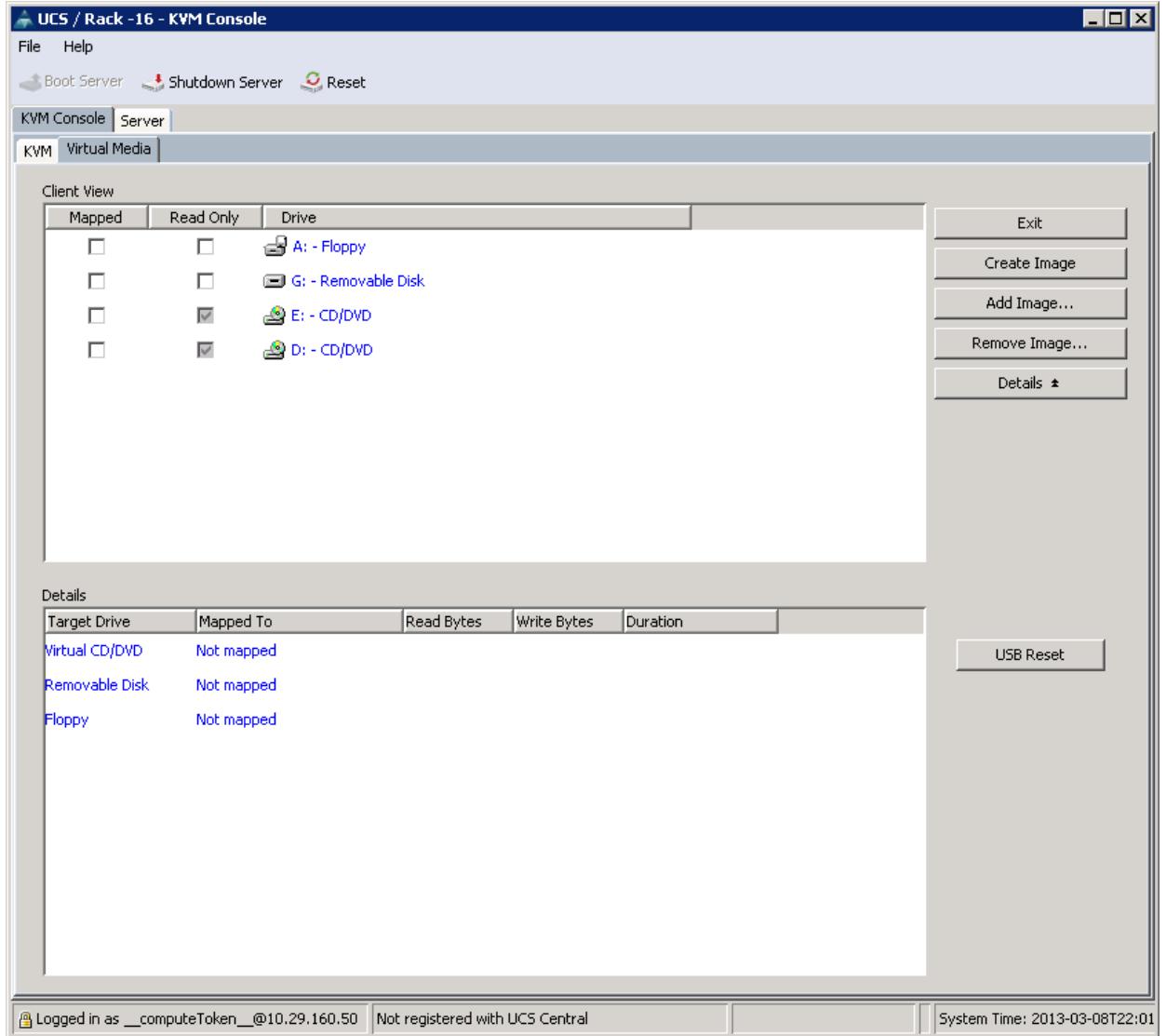
1. Log in to the Cisco UCS 6296 Fabric Interconnect and launch the Cisco UCS Manager application.
2. Select the Equipment tab.
3. In the navigation pane expand Rack-mounts and Servers.
4. Right-click the server and select KVM Console.

Figure 70 Selecting KVM Console Option

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 6.4 installer ISO image file.

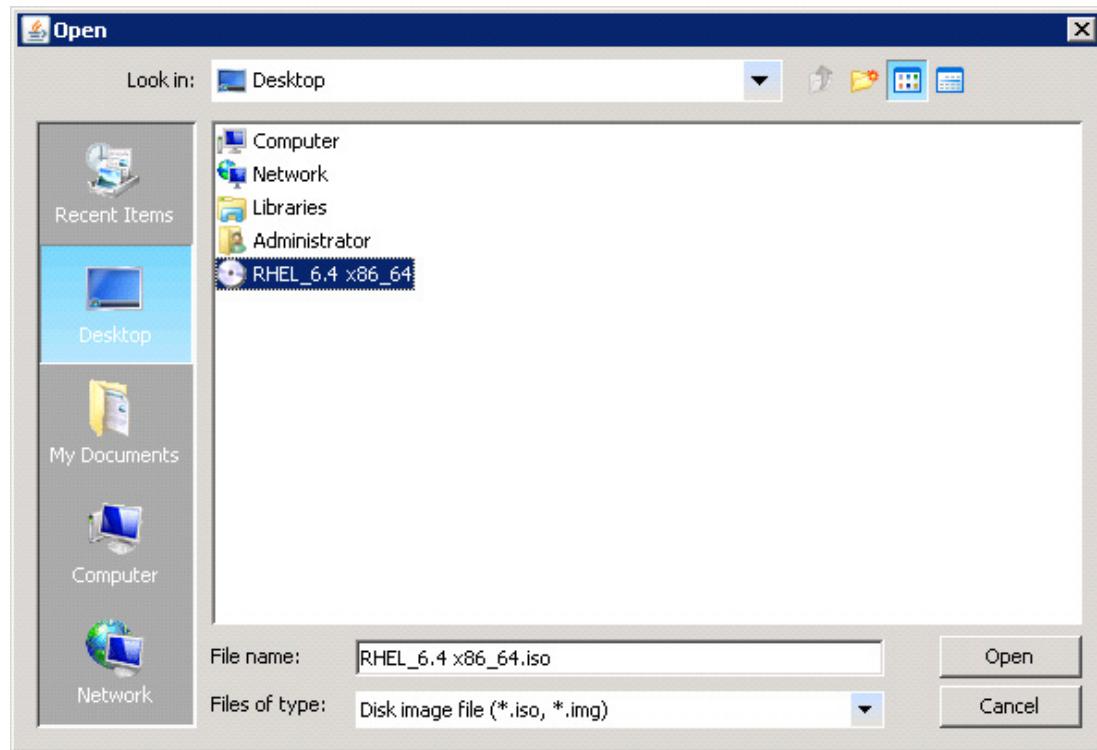


Note The Red Hat Enterprise Linux 6.4 DVD is assumed to be on the client machine.

Figure 71 Adding an ISO Image

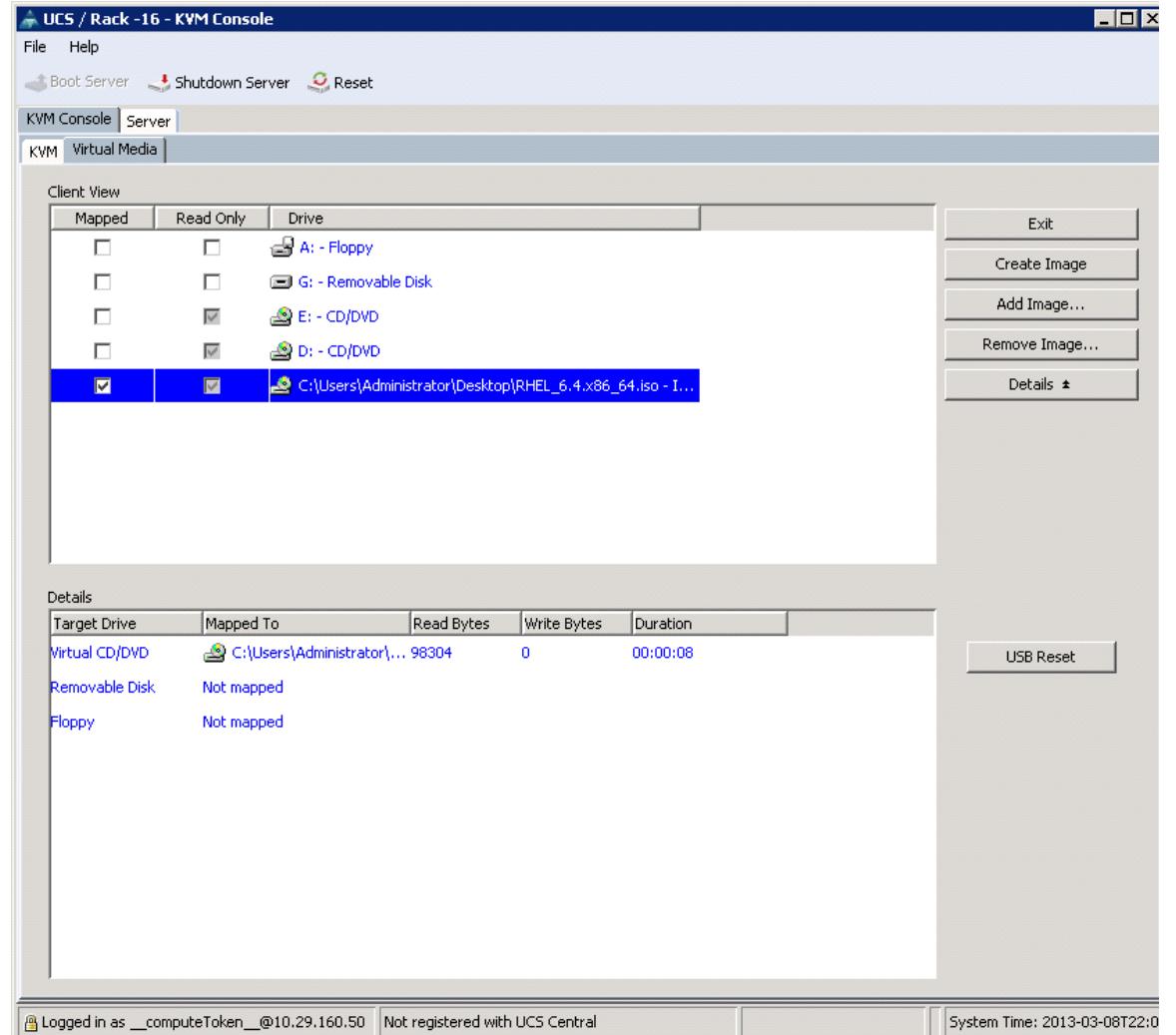
8. Click Open to add the image to the list of virtual media.

Figure 72 *Browse to the Red Hat Enterprise Linux ISO Image*



9. Check the check box for Mapped, next to the entry corresponding to the image you just added.
10. In the KVM window, select the KVM tab to monitor during boot.
11. In the KVM window, select the Boot Server button in the upper left corner.
12. Click OK.
13. Click OK to reboot the system.

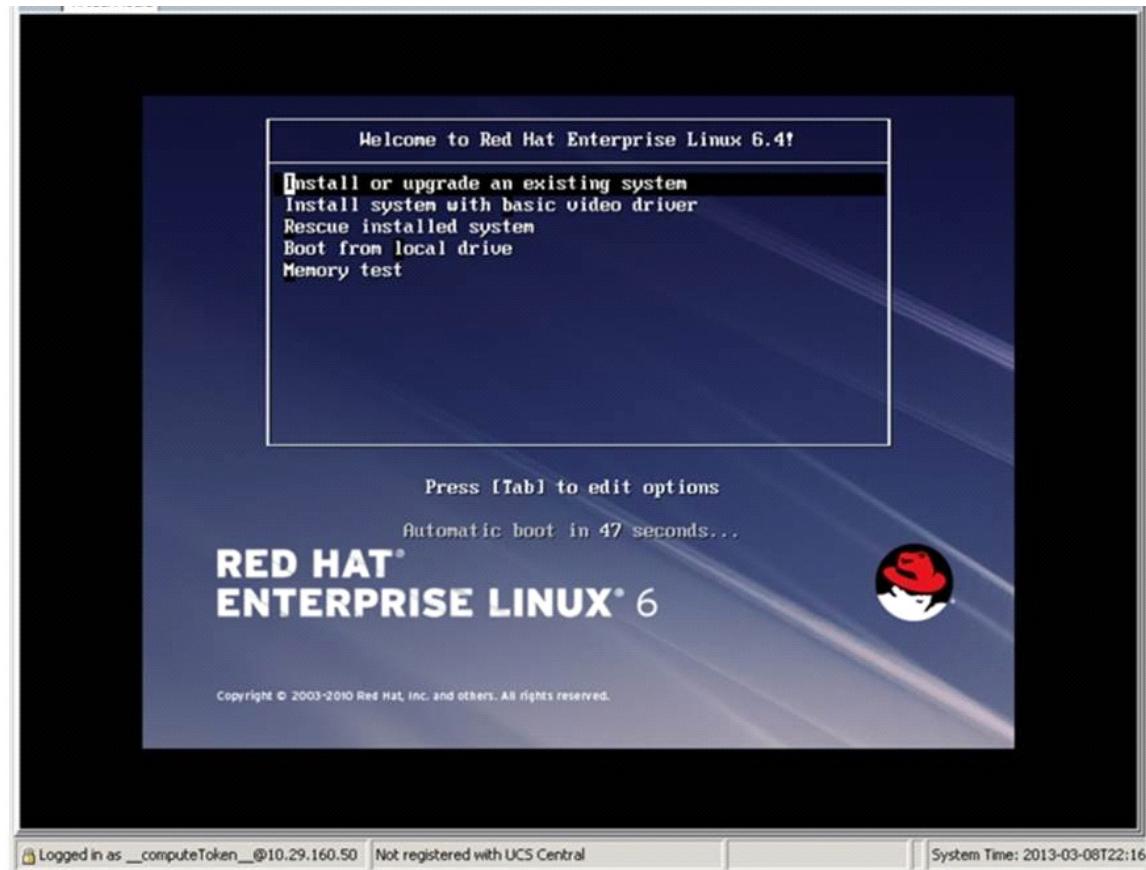
Figure 73 **Mapping ISO Image**



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

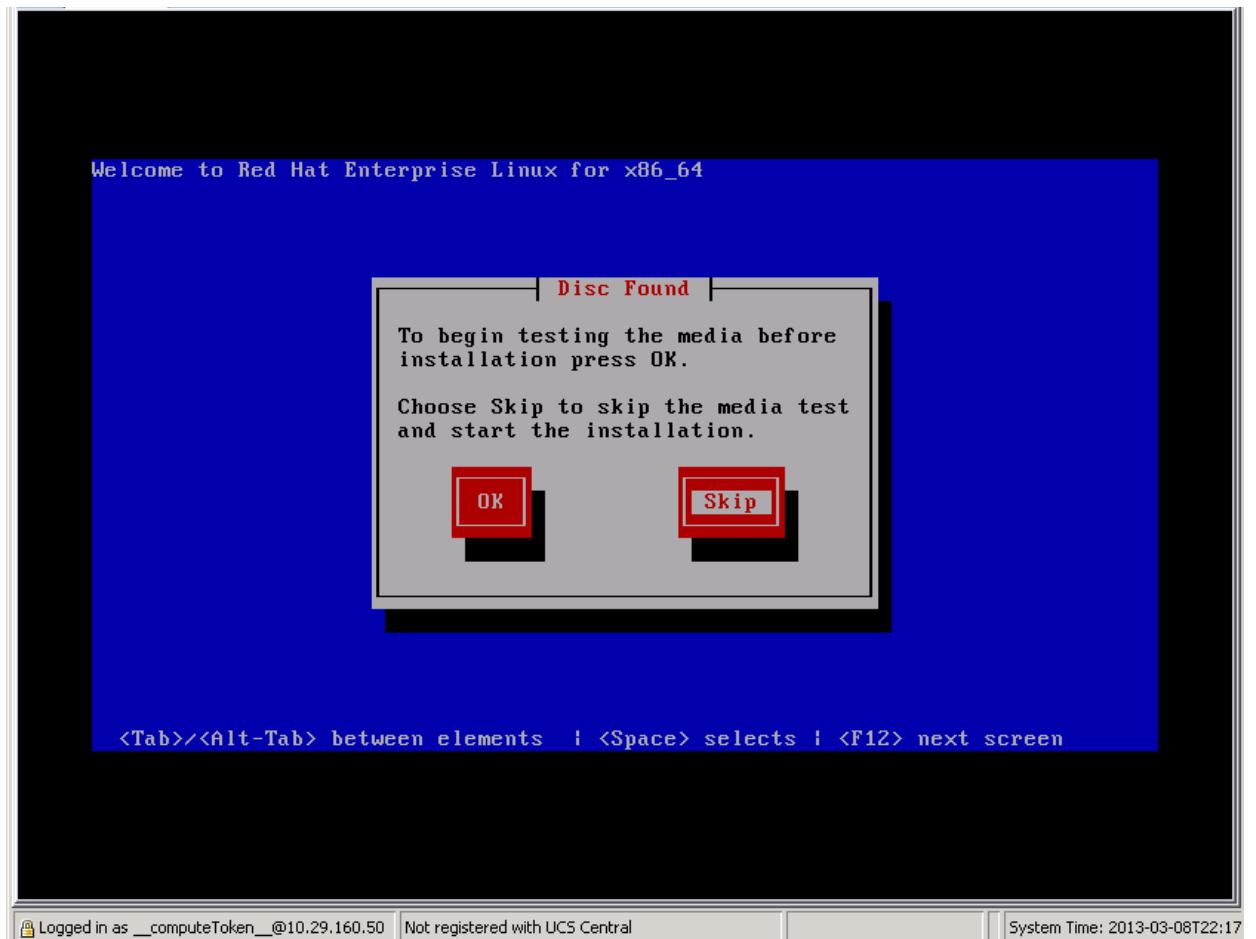
Figure 74

Select the Install Option



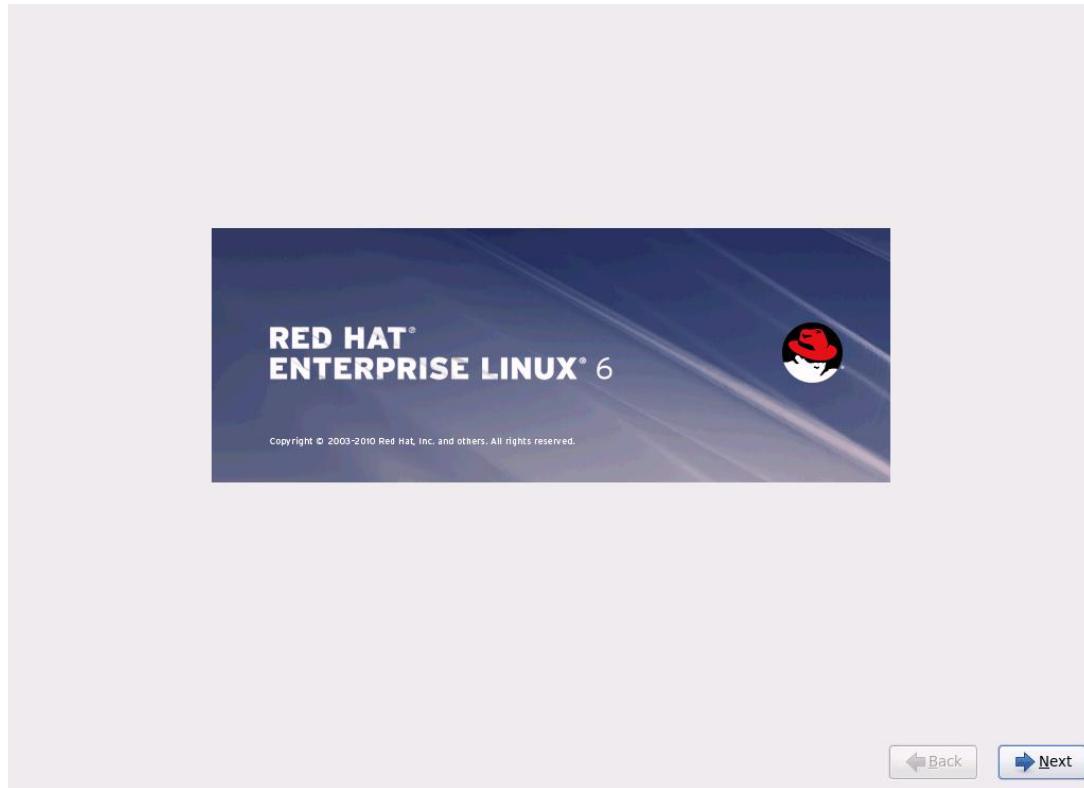
16. Skip the Media test.

Figure 75 Skip the Media Test



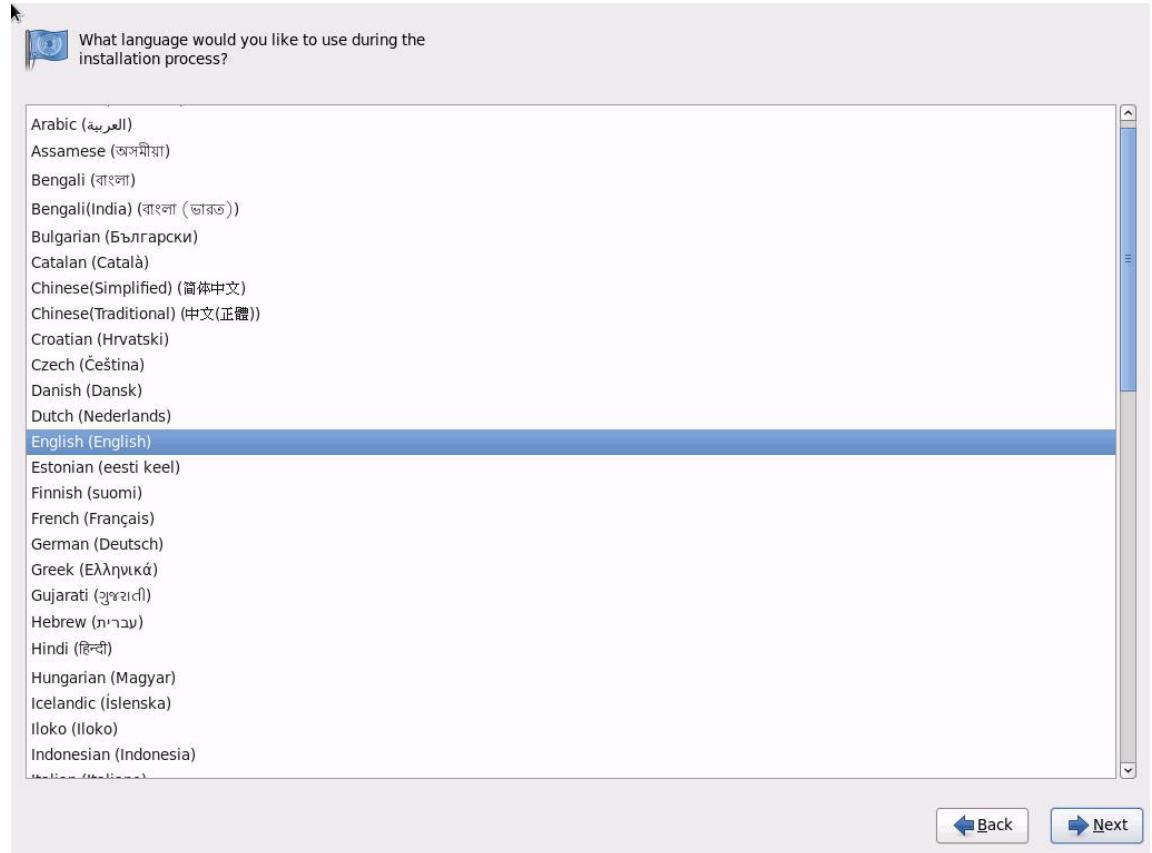
17. Click Next.

Figure 76 *Red Hat Linux Welcome Screen*



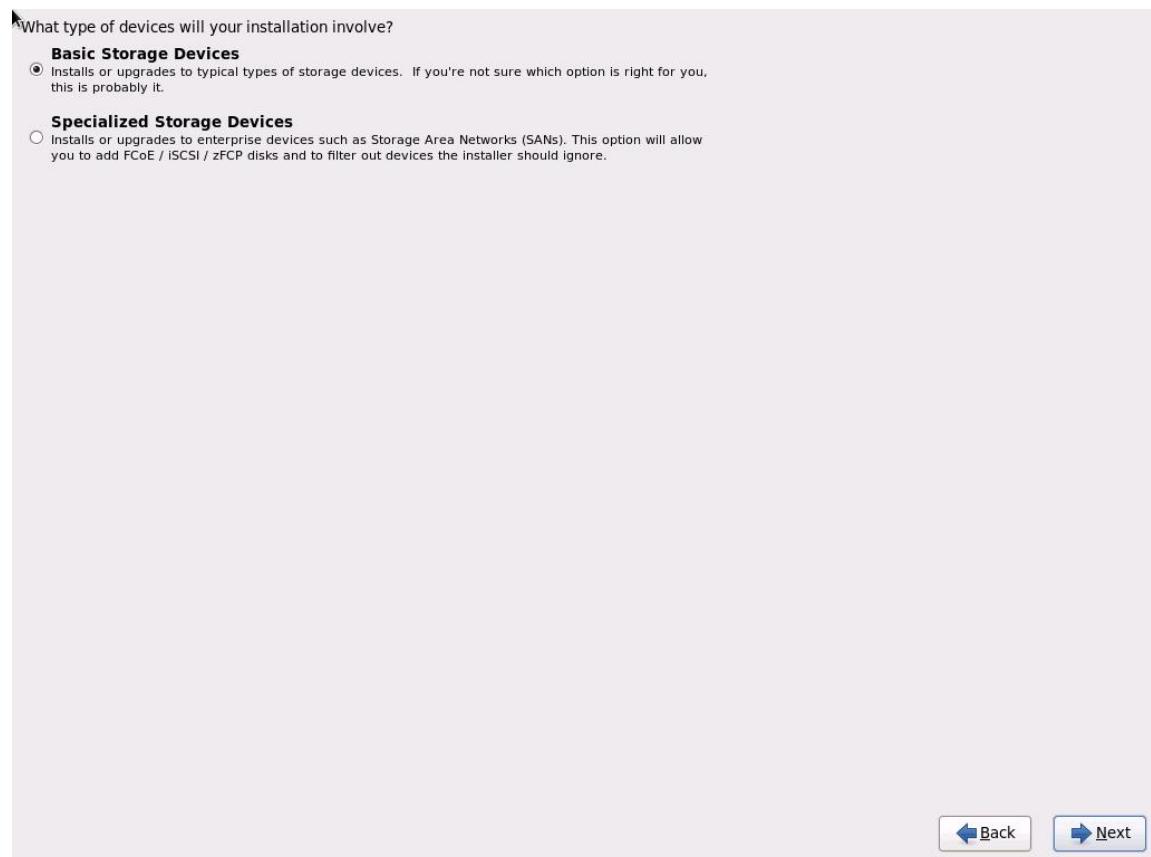
18. Select the Language for the Installation.

Figure 77 Select the Language for the Installation



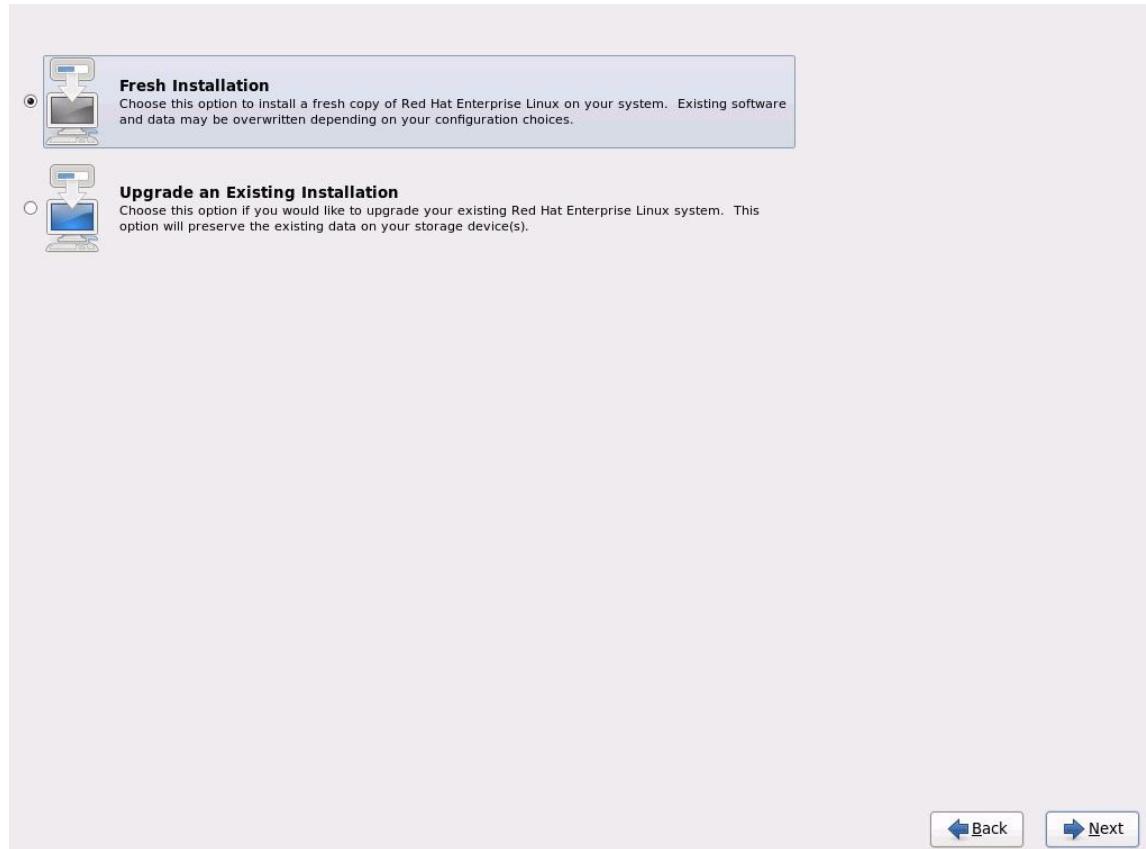
19. Select Basic Storage Devices.

Figure 78 Select the Basic Storage Device



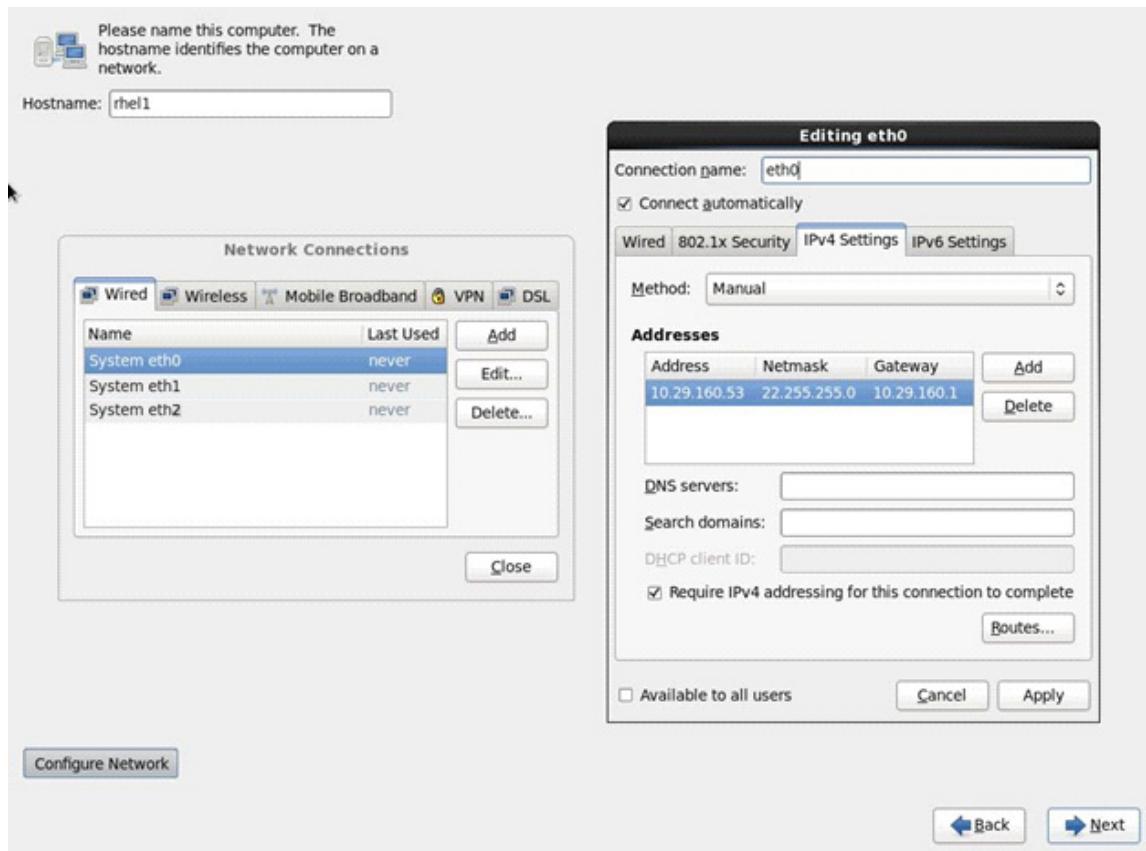
20. Select Fresh Installation.
21. Enter the Host name of the server and click Next.

Figure 79 **Select Fresh Installation**



22. Click Configure Network. The Network Connections window should then appear.
23. In the Network Connections window, select the wired tab.
24. Select the interface System eth0 and click Edit.
25. Editing System eth0 appears.
26. Check the check box Connect automatically.
27. In the drop down menu select Manual Method.
28. Click Add and enter IP Address, Netmask and the Gateway.
29. For this demonstration we use the following:
 - IP Address: 10.29.160.53
 - Netmask: 255.255.255.0
 - Gateway: 10.29.160.1
30. Add DNS servers (optional).
31. Click Apply.

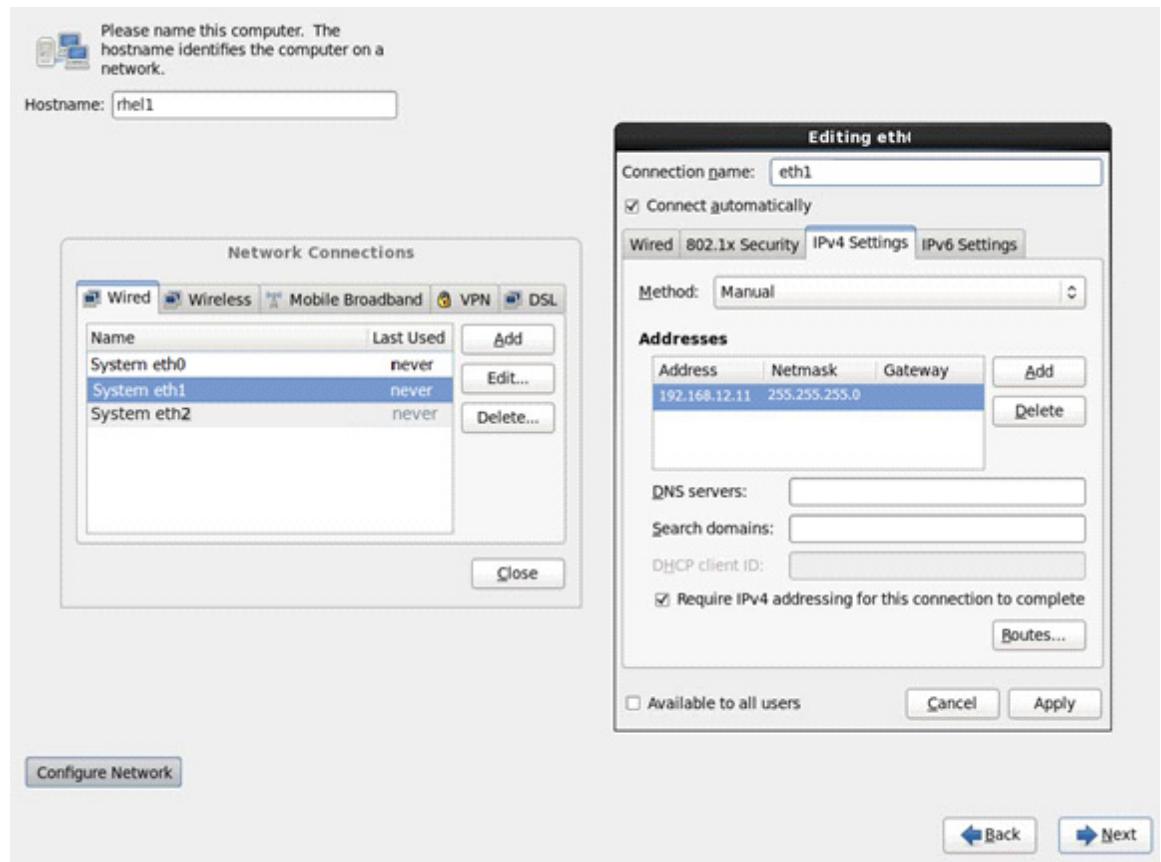
Figure 80 Configure the Network for eth0



32. Repeat the steps 26 to steps 32 for system eth1 with the following:

IP Address: 192.168.12.11
Netmask: 255.255.255.0

Figure 81 Configure the Network for eth1



33. Repeat the steps 26 to steps 32 for system eth2 with the following:

IP Address: 192.168.11.11

Netmask: 255.255.255.0

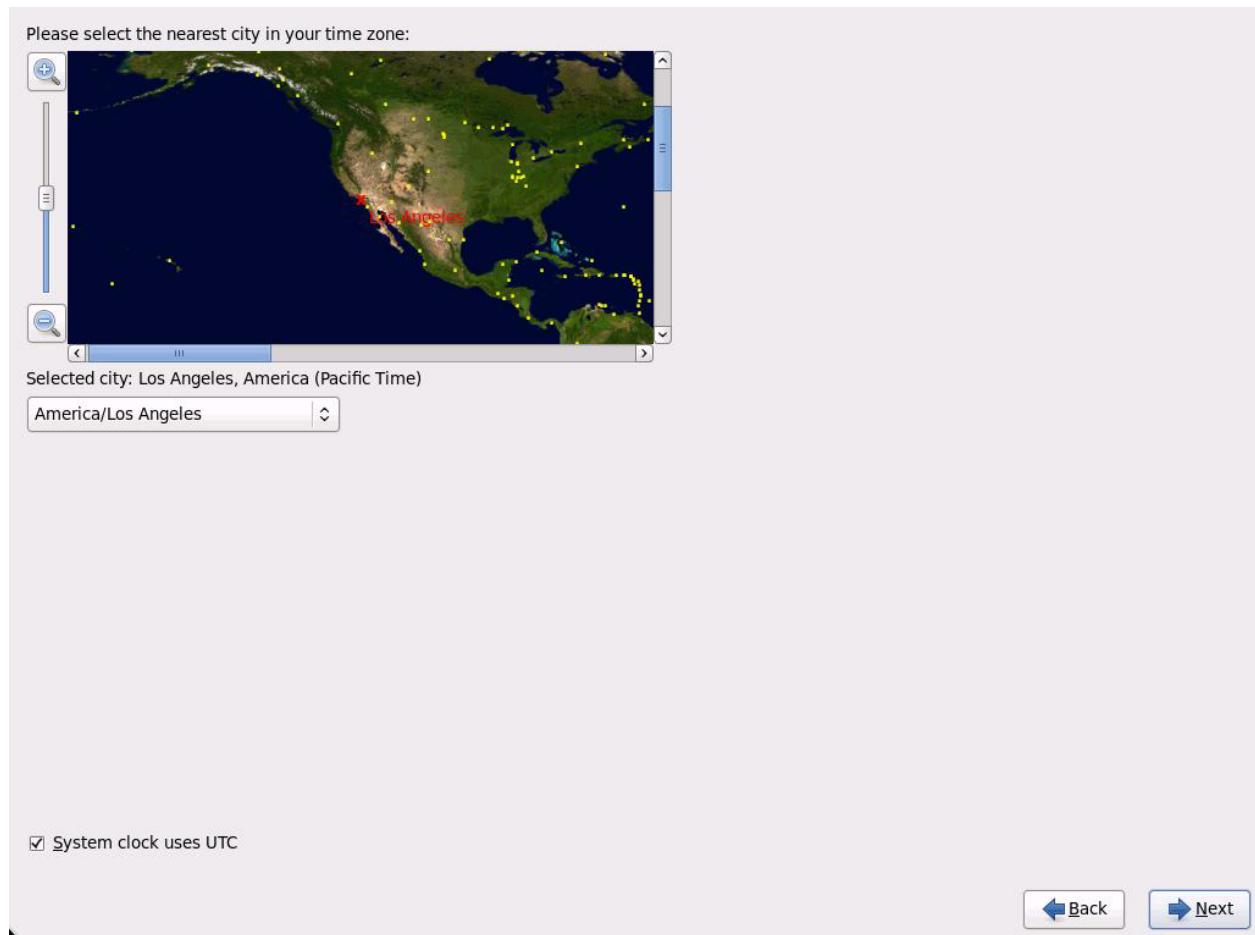


Note Table 6 lists the IP address of nodes in the cluster.

34. Select the appropriate Time Zone.

Figure 82

Select the Time Zone



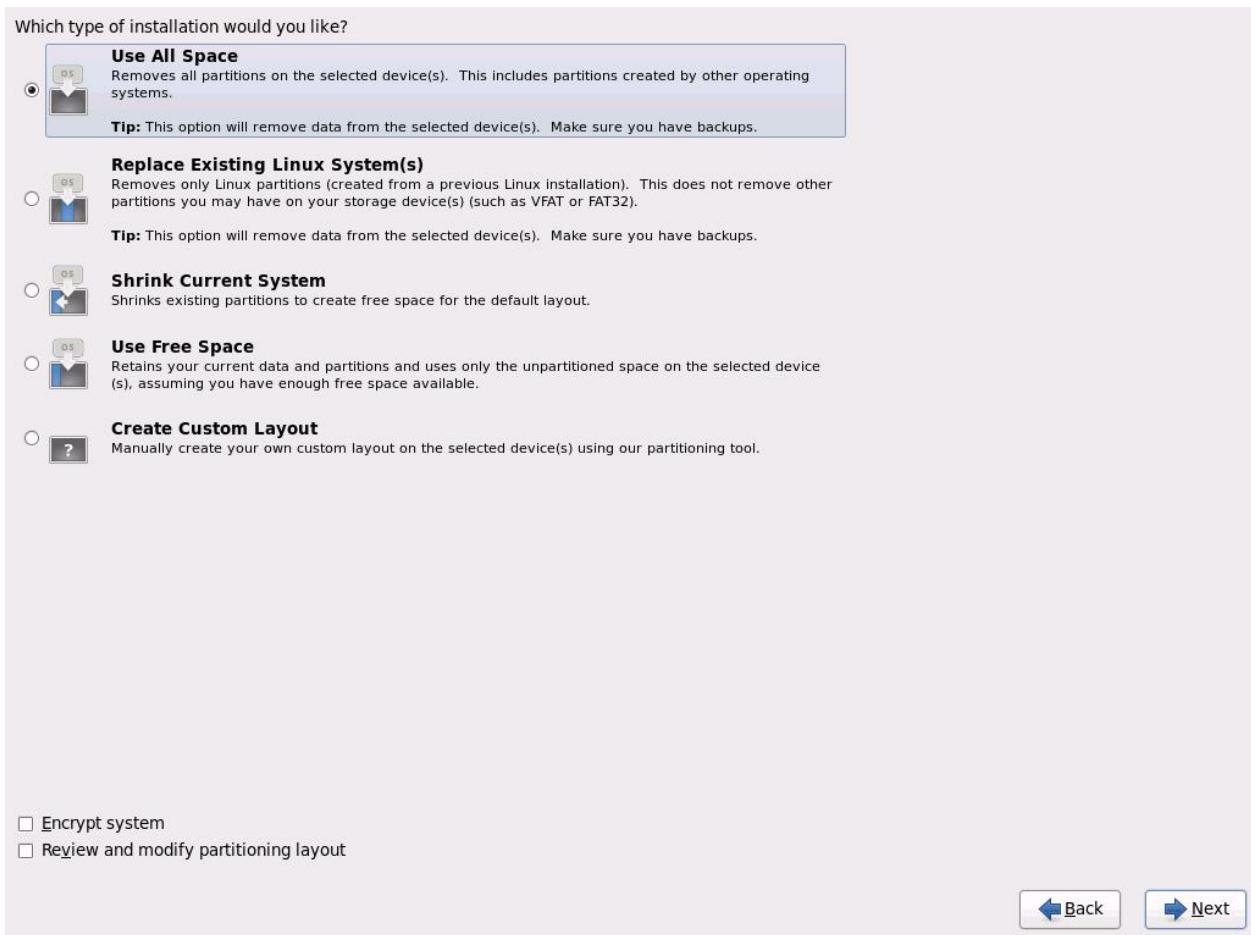
35. Enter the root Password and click Next.

Figure 83 Enter the Root Password



36. Select Use All Space and click Next.
37. Choose an appropriate boot drive.

Figure 84 *Select the Installation Options*



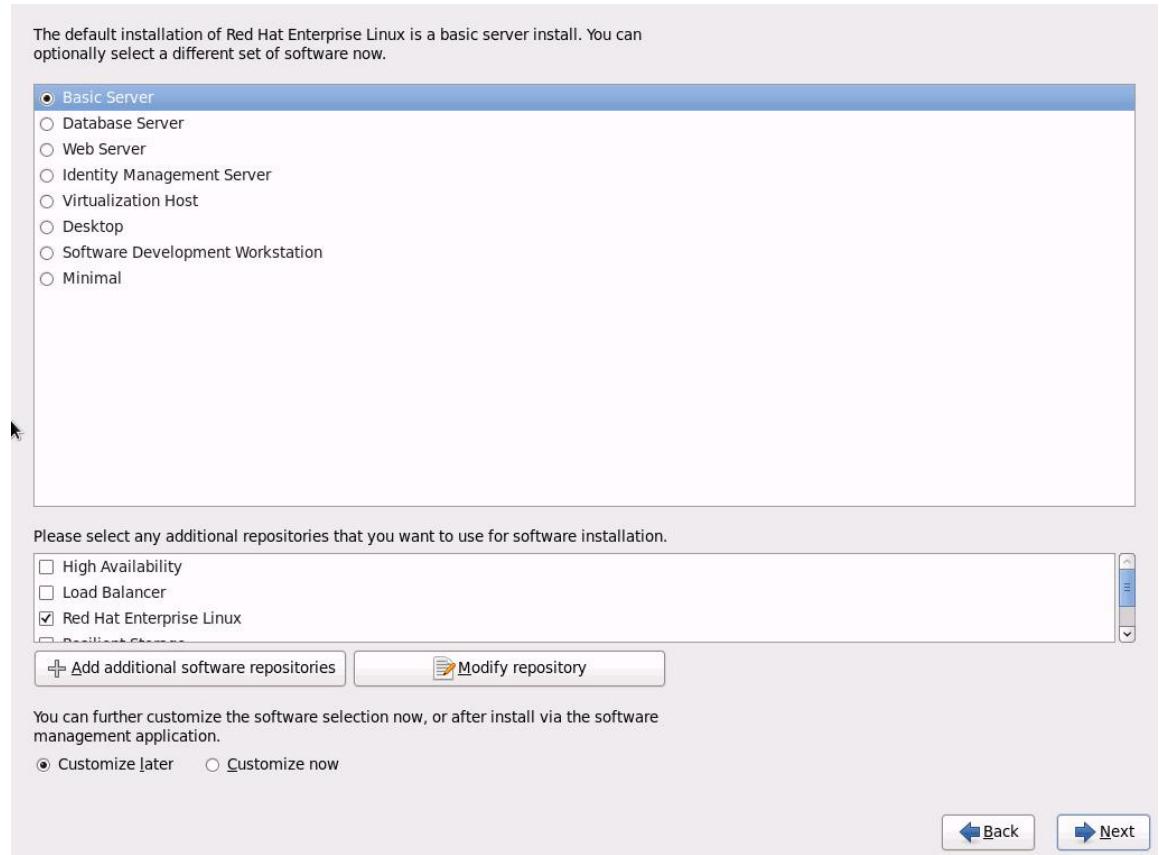
38. Click Write changes to the disk and click Next.

Figure 85 *Confirm the Disk Format*



39. Select Basic Server Installation and click Next.

Figure 86 Select the Type of Installation



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

Figure 87

Starting the Installation

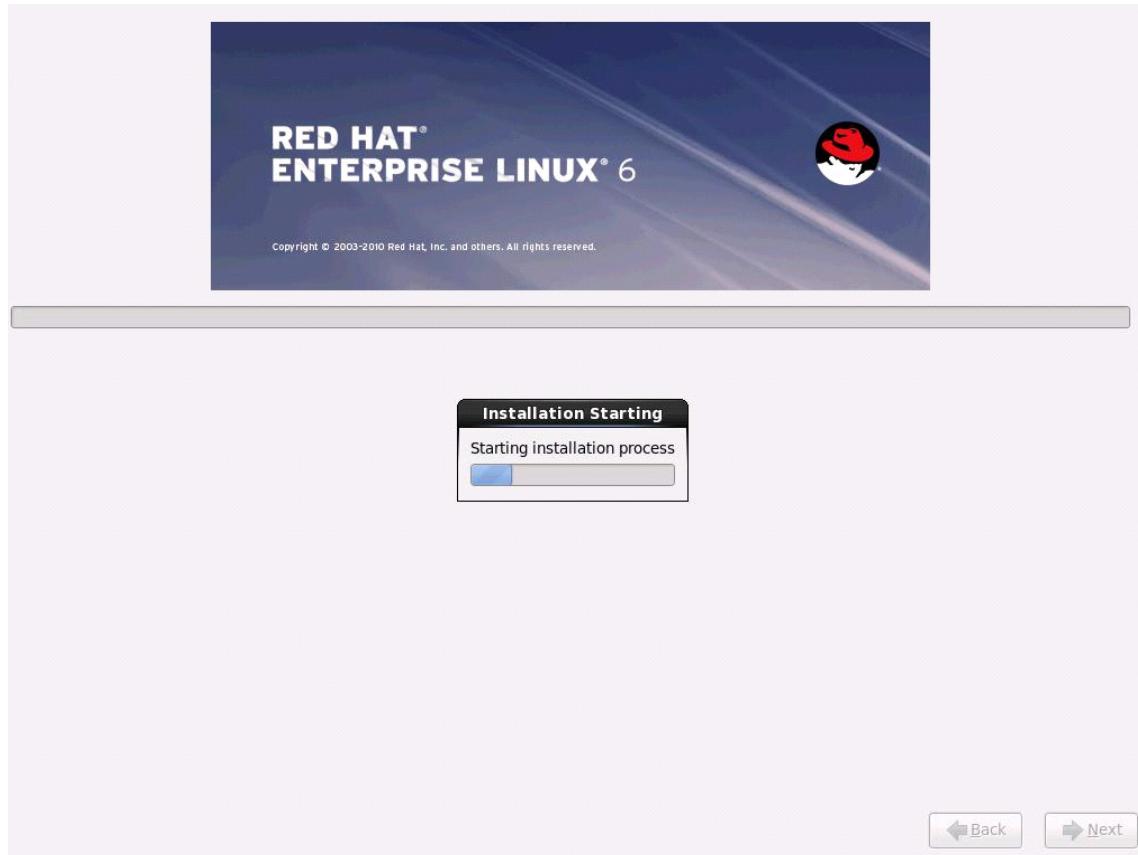
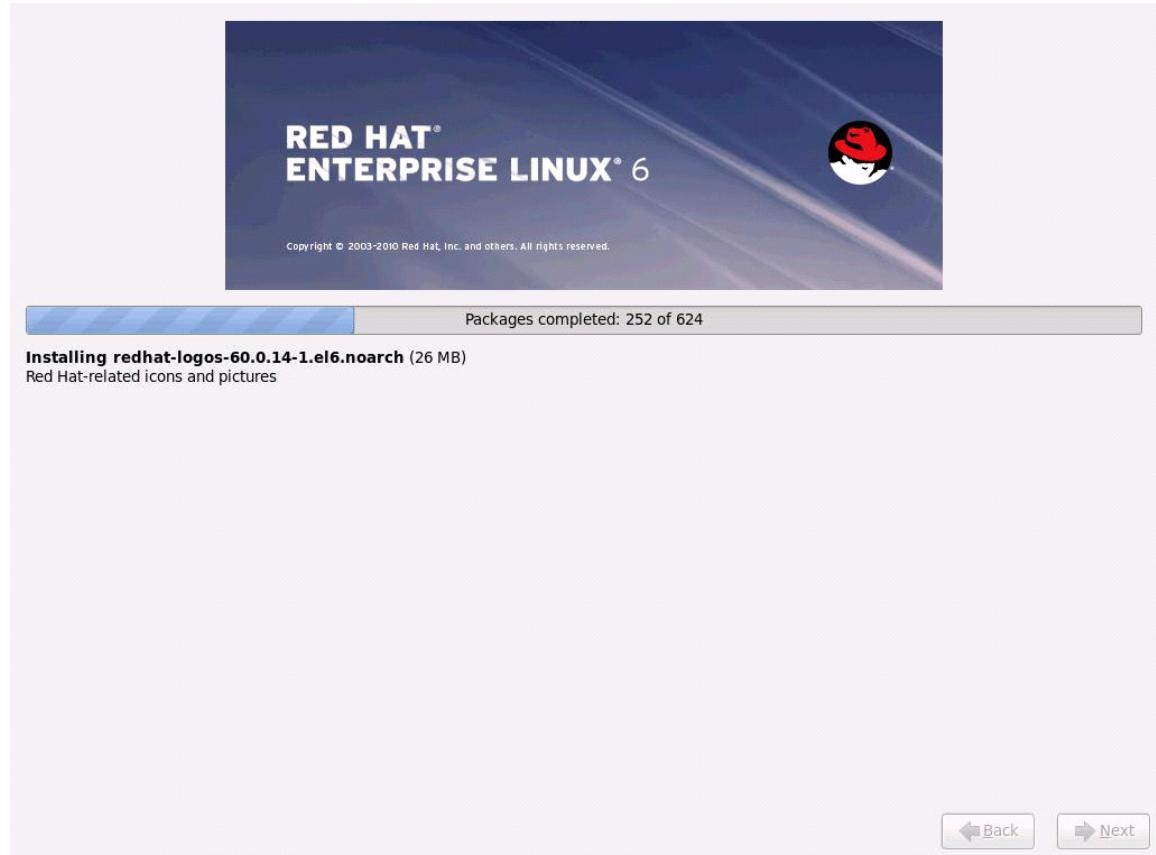


Figure 88 Installation in Progress



41. When the installation is complete reboot the system.
42. Repeat steps (step1 to 41) to install Red Hat Linux on Servers 2 through 64.



Note You can automate the OS installation and configuration of the nodes through the Preboot Execution Environment (PXE) boot or through third party tools.

The hostnames and their corresponding IP addresses are shown in [Table 6](#).

Table 6 Hostnames and IP Addresses

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
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 Installation Configuration

Choose one of the nodes of the cluster or a separate node as Admin Node for management such as CDH installation, parallel shell, creating a local Red Hat repository and others. In this document, we use rhel1 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 root@rhel1
The key's randomart image is:
+--[ RSA 2048]----+
| .ooo.          |
| ..+           |
| +.            |
| +.           |
| . +.   S      |
| .oo .o   .    |
| .o.o. o .    |
| +. .o .      |
| E.. .o       |
+-----+
```

- 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
```

- Enter yes for Are you sure you want to continue connecting (yes/no) ?
- Enter the password of the remote host.

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.

- Log into the Admin Node (rhel1)

```
ssh 10.29.160.53
```

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

```
[root@rhell ~]# 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 root@rhell
The key's randomart image is:
+--[ RSA 2048]----+
|   .ooo.      |
|   ..+       |
|   +.        |
|   +.        |
| . +.   S    |
| .oo .o   .  |
| .o.o. o .  |
| +. .o .    |
|E.. .o      |
+-----+
```

1. 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
```

2. Enter yes for Are you sure you want to continue connecting (yes/no) ?
3. 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
```

```
[root@redhat ~]# wget https://parallel-ssh.googlecode.com/files/pssh-2.3.1.tar.gz
--2013-04-24 05:39:42-- https://parallel-ssh.googlecode.com/files/pssh-2.3.1.tar.gz
Resolving parallel-ssh.googlecode.com... 74.125.129.82, 2607:f8b0:400e:c02::52
Connecting to parallel-ssh.googlecode.com[74.125.129.82]:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 23427 (23K) [application/x-gzip]
Saving to: ápssh-2.3.1.tar.gz.lâ

100%[=====] 2013-04-24 05:39:43 (240 KB/s) - ápssh-2.3.1.tar.gz.lâ
```

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
```

```
[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 'rhel1' (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_eqq_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
```

3. Extract and Install pssh on the Admin node.
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

- From the system connected to the Internet download Cluster shell (clush) and install it on rhel1. 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/

```

- Login to rhel1 and install cluster shell

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

- Edit /etc/clustershell/groups file to include hostnames for all the nodes of the cluster.
- 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:

- Populate the host file with IP addresses and corresponding hostnames on the Admin node (rhel1).

```

vi /etc/hosts
127.0.0.1 localhost.localdomain localhost4 localhost4.localdomain4
::1 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
192.168.12.18 rhel8
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
...
192.168.12.74 rhel64

```

- Deploy /etc/hosts from the admin node (rhel1) to all the nodes via the following pscp command:

```
pscp -h /root/allnodes /etc/hosts /etc/hosts
```

```
[root@rhel1 ~]# pscp -h /root/allnodes /etc/hosts /etc/hosts
[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 rhel1 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 into rhel1. 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.

4. Copy the contents of the ISO to the /var/www/html/rhelrepo directory
 5. On rhel1 create a.repo file to enable the use of the yum command.
- ```
mkdir -p /mnt/rheliso
mount -t iso9660 -o loop /root/rhel-server-6.4-x86_64-dvd.iso /mnt/rheliso/
cp -r /mnt/rheliso/* /var/www/html/rhelrepo
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
```



**Note** Based on this repo file yum requires httpd to be running on rhel1 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.repo /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
: : : :
[64] 15:00:09 [SUCCESS] 10.29.160.116
```

7. To make use of repository files on rhel1 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"

```
[root@rhel1 ~]# pssh -h /root/allnodes "yum clean 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

1. 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 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=283853158&release=1.5.1&relind=AVAILABLE&rellifecycle=&reltype=latest>

1. 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\LSI92xx\RHEL\RHEL6.4
2. 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/
```

```
[root@rhel1 ~]# pscp -h /root/allnodes kmod-megaraid_sas-06.602.03.00_rhel6.4-2.x86_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-megaraid_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
```

3. 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.el6.x86_64/extramegaraid_sas/megaraid_sas.ko
description: LSI MegaRAID SAS Driver
author: megaraidlinux@lsi.com
version: 06.602.03.00
license: GPL
```

## Installing 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.

```
yum -y install httpd
```

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

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

```
#ServerName www.example.com:80
ServerName 10.29.160.53:80

#
UseCanonicalName: Determines how Apache constructs self-referencing
URLs and the SERVER_NAME and SERVER_PORT variables.
When set "Off", Apache will use the Hostname and Port supplied
by the client. When set "On", Apache will use the value of the
ServerName directive.
#
UseCanonicalName Off
```

3. Make sure 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

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

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

```
[root@rhel1 ~]# pssh -h /root/allnodes "yum -y install xfsprogs"
[1] 12:26:34 [SUCCESS] 10.29.160.57
[2] 12:26:35 [SUCCESS] 10.29.160.56
[3] 12:26:35 [SUCCESS] 10.29.160.53
[4] 12:26:35 [SUCCESS] 10.29.160.59
[5] 12:26:35 [SUCCESS] 10.29.160.61
[6] 12:26:35 [SUCCESS] 10.29.160.63
[7] 12:26:35 [SUCCESS] 10.29.160.54
[8] 12:26:35 [SUCCESS] 10.29.160.62
[9] 12:26:35 [SUCCESS] 10.29.160.66
[10] 12:26:35 [SUCCESS] 10.29.160.60
[11] 12:26:35 [SUCCESS] 10.29.160.68
[12] 12:26:35 [SUCCESS] 10.29.160.58
[13] 12:26:35 [SUCCESS] 10.29.160.64
[14] 12:26:35 [SUCCESS] 10.29.160.55
[15] 12:26:35 [SUCCESS] 10.29.160.65
[16] 12:26:35 [SUCCESS] 10.29.160.67
```

## 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.



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

- 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
```

- Create /root/ntp.conf on the admin node (rhel1) 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@rheli1 ~]# for SERVER in {54..116}; do scp /root/ntp.conf 10.29.160.$SERVER:/etc/ntp.conf; done
ntp.conf 100% 142 0.1KB/s 00:00
```

- Copy ntp.conf file from the admin node to /etc of all the nodes by executing the following command in the admin node (rheli1)

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



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

```
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 rheli1"
pssh -h /root/allnodes "service ntpd start"
```

```
[root@rheli1 ~]# pssh -h /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
[8] 13:38:55 [SUCCESS] 10.29.160.59
[9] 13:38:55 [SUCCESS] 10.29.160.64
[10] 13:38:55 [SUCCESS] 10.29.160.62
[11] 13:38:55 [SUCCESS] 10.29.160.61
[12] 13:38:55 [SUCCESS] 10.29.160.66
[13] 13:38:55 [SUCCESS] 10.29.160.63
[14] 13:38:55 [SUCCESS] 10.29.160.65
[15] 13:38:55 [SUCCESS] 10.29.160.67
[16] 13:38:55 [SUCCESS] 10.29.160.68
: : : :
[64] 13:38:55 [SUCCESS] 10.29.160.116
```

- Make sure to restart the NTP daemon across reboots

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

```
[root@rhel1 ~]# pssh -h /root/allnodes "chkconfig ntpd on"
[1] 13:52:55 [SUCCESS] 10.29.160.54
[2] 13:52:55 [SUCCESS] 10.29.160.55
[3] 13:52:55 [SUCCESS] 10.29.160.57
[4] 13:52:55 [SUCCESS] 10.29.160.56
[5] 13:52:55 [SUCCESS] 10.29.160.60
[6] 13:52:55 [SUCCESS] 10.29.160.61
[7] 13:52:55 [SUCCESS] 10.29.160.58
[8] 13:52:55 [SUCCESS] 10.29.160.53
[9] 13:52:55 [SUCCESS] 10.29.160.59
[10] 13:52:55 [SUCCESS] 10.29.160.63
[11] 13:52:55 [SUCCESS] 10.29.160.62
[12] 13:52:55 [SUCCESS] 10.29.160.64
[13] 13:52:55 [SUCCESS] 10.29.160.65
[14] 13:52:55 [SUCCESS] 10.29.160.67
[15] 13:52:55 [SUCCESS] 10.29.160.66
[16] 13:52:55 [SUCCESS] 10.29.160.68
: : : :
[64] 13:52:55 [SUCCESS] 10.29.160.116
```

## 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 steps:



**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.

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 CDH 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"
```

```
[root@rheli1 ~]# pssh -h /root/allnodes "sed -i 's/enforcing/disabled/g' /etc/selinux/config"
[1] 14:07:40 [SUCCESS] 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
[6] 14:07:40 [SUCCESS] 10.29.160.59
[7] 14:07:40 [SUCCESS] 10.29.160.58
[8] 14:07:40 [SUCCESS] 10.29.160.63
[9] 14:07:40 [SUCCESS] 10.29.160.61
[10] 14:07:40 [SUCCESS] 10.29.160.60
[11] 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
[16] 14:07:40 [SUCCESS] 10.29.160.68
: : : :
[64] 14:07:40 [SUCCESS] 10.29.160.116
```

```
pssh -h /root/allnodes "setenforce 0"
```



**Note** 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 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"
```

```
[root@rhel1 ~]# pssh -h /root/allnodes "service iptables stop"
[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"
```

```
[root@rhel1 ~]# pssh -h /root/allnodes "chkconfig iptables off"
[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
```

# Configuring Data Drives on NameNode

In the section on Configuring Disk Drives for OS on Namenodes describes the steps to configure the first two disk drives for the operating system for nodes rhel1 and rhel2. Remaining disk drives can also be configured Raid 1 similarly or by using MegaCli as described below.

- From the LSI website

<http://www.lsi.com/support/Pages/Download-Results.aspx?keyword=9271-8i> 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/

- Copy all three files to all the nodes using the following commands:

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

```
[root@rhel1 ~]# pscp -h /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] 13:00:40 [SUCCESS] 10.29.160.55
[11] 13:00:40 [SUCCESS] 10.29.160.68
[12] 13:00:40 [SUCCESS] 10.29.160.54
[13] 13:00:40 [SUCCESS] 10.29.160.63
[14] 13:00:40 [SUCCESS] 10.29.160.64
[15] 13:00:40 [SUCCESS] 10.29.160.65
[16] 13:00:40 [SUCCESS] 10.29.160.67
:
[64] 13:00:40 [SUCCESS] 10.29.160.116
```

- pscp -h /root/allnodes /root/Lib\_Utils\* /root/

```
[root@rhel1 ~]# pscp -h /root/allnodes /root/Lib_Utils* /root/
[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
```

- 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
```

- 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. Run the following command to get enclosure id.

```
./MegaCli64 pdlist -a0 | grep Enc | grep -v 252 | awk '{print $4}' | sort |
uniq -c | awk '{print $2}'
chmod 755 raid1.sh
```

5. Run MegaCli script as follows:

```
./raid1.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](http://www.lsi.com)

## Configuring the Filesystem for NameNodes

```
vi /root/driveconf.sh
#!/bin/bash
#disks_count=`lsblk -id | grep sd | wc -l`
#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 Datanodes

In the section on Configuring Disk Drives for OS on Datanodes describes the steps 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



**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](http://www.lsi.com).

---



**Note**

---

Make sure all drives are up by running the following command.

---

```
./MegaCli64 -PDList -aAll |grep -i "Firmware state"
```

```
[root@rhell1 ~]# ./MegaCli64 -PDList -aAll |grep -i "Firmware state"
Firmware state: Online, Spun Up
```

## Configuring the Filesystem for Datanodes

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

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
```

- Run the following command to copy driveconf.sh to all the datanodes

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

- Run the following command from the admin node to run the script across all data nodes

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

```
[root@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 [SUCCESS] 10.29.160.64
[13] 16:15:25 [SUCCESS] 10.29.160.56
[14] 16:15:25 [SUCCESS] 10.29.160.55
[15] 16:15:25 [SUCCESS] 10.29.160.53
[16] 16:15:35 [SUCCESS] 10.29.160.68
:
:
:
[64] 16:15:35 [SUCCESS] 10.29.160.116
```

## Installing Cloudera

Cloudera's Distribution including Apache Hadoop is an enterprise grade, hardened Hadoop distribution. CDH offers Apache Hadoop and several related projects into a single tested and certified product. It offers the latest innovations from the open source community with the testing and quality you expect from enterprise quality software.

## Pre-Requisites for CDH Installation

This section details the pre-requisites for CDH Installation such as setting up of CDH Repository.

## Cloudera Repository

From a host connected to the Internet, download the Cloudera's repositories as shown below and transfer it to the admin node.

```
mkdir -p /tmp/clouderarepo/
```

1. Download Cloudera Manager Repo

```
cd /tmp/clouderarepo/
wget
http://archive.cloudera.com/cm5/redhat/6/x86_64/cm/cloudera-manager.repo
```

```
[root@redhat clouderarepo]# wget http://archive.cloudera.com/cm5/redhat/6/x86_64
--2014-02-28 13:55:06-- http://archive.cloudera.com/cm5/redhat/6/x86_64/cm/cloudera-manager.repo
Resolving archive.cloudera.com... 184.73.217.71
Connecting to archive.cloudera.com|184.73.217.71|:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: 289 [text/plain]
Saving to: "cloudera-manager.repo"

100%[=====] 2014-02-28 13:55:06 (24.4 MB/s) - "cloudera-manager.repo"
```

```
reposync --config=./cloudera-manager.repo --repoid=cloudera-manager
```

```
[root@redhat clouderarepo]# reposync --config=./cloudera-manager.repo --repoid=cloudera-manager
cloudera-manager | 951 B 00:00
cloudera-manager/primary | 4.0 kB 00:00
[cloudera-manager: 1 of 7] Downloading RPMS/x86_64/cloudera-manager-agent-5.0.0-0.cm5b2.p0.119.el6.x86_64.rpm | 3.7 MB 00:05
[cloudera-manager: 2 of 7] Downloading RPMS/x86_64/cloudera-manager-daemons-5.0.0-0.cm5b2.p0.119.el6.x86_64.rpm | 324 MB 01:52
[cloudera-manager: 3 of 7] Downloading RPMS/x86_64/cloudera-manager-server-5.0.0-0.cm5b2.p0.119.el6.x86_64.rpm | 7.9 kB 00:00
[cloudera-manager: 4 of 7] Downloading RPMS/x86_64/cloudera-manager-server-db-2-5.0.0-0.cm5b2.p0.119.el6.x86_64.rpm | 9.7 kB 00:00
[cloudera-manager: 5 of 7] Downloading RPMS/x86_64/enterprise-debuginfo-5.0.0-0.cm5b2.p0.119.el6.x86_64.rpm | 668 kB 00:00
[cloudera-manager: 6 of 7] Downloading RPMS/x86_64/jdk-6u31-linux-amd64.rpm | 68 MB 00:20
[cloudera-manager: 7 of 7] Downloading RPMS/x86_64/oracle-j2sdk1.7-1.7.0+update25-1.x86_64.rpm | 91 MB 00:33
```

2. Download Cloudera Manager Installer.

```
cd /tmp/clouderarepo/
wget
http://archive.cloudera.com/cm5/installer/latest/cloudera-manager-installer.bin
```

```
[root@redhat clouderarepo]# wget http://archive.cloudera.com/cm5/installer/latest/cloudera-manager-installer.bin
--2014-02-28 14:11:30-- http://archive.cloudera.com/cm5/installer/latest/cloudera-manager-installer.bin
Resolving archive.cloudera.com... 184.73.217.71
Connecting to archive.cloudera.com[184.73.217.71]:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: 510866 (499K) [application/octet-stream]
Saving to: `cloudera-manager-installer.bin'

100%[=====] 510,866 565K/s in 0.9s

2014-02-28 14:11:31 (565 KB/s) - `cloudera-manager-installer.bin'
```

### 3. Download CDH5 Repo

```
cd /tmp/clouderarepo/
wget http://archive.cloudera.com/cdh5/redhat/6/x86_64/cdh/cloudera-cdh5.repo
reposync --config=./cloudera-cdh5.repo --repoid=cloudera-cdh5
```

```
[root@redhat clouderarepo]# reposync --config=./cloudera-cdh5.repo --repoid=cloudera-cdh5
cloudera-cdh5
cloudera-cdh5/primary
[cloudera-cdh5: 1 of 112] Downloading RPMS/noarch/avro-doc-1.7.5+cdh5.0.0+8-0.cdh5b2.p0.30.el6.noarch.rpm
avro-doc-1.7.5+cdh5.0.0+8-0.cdh5b2.p0.30.el6.noarch.rpm | 1.0 MB 00:01
[cloudera-cdh5: 2 of 112] Downloading RPMS/noarch/avro-libs-1.7.5+cdh5.0.0+8-0.cdh5b2.p0.30.el6.noarch.rpm
avro-libs-1.7.5+cdh5.0.0+8-0.cdh5b2.p0.30.el6.noarch.rpm | 12 MB 00:10
[cloudera-cdh5: 3 of 112] Downloading RPMS/noarch/avro-tools-1.7.5+cdh5.0.0+8-0.cdh5b2.p0.30.el6.noarch.rpm
avro-tools-1.7.5+cdh5.0.0+8-0.cdh5b2.p0.30.el6.noarch.rpm | 2.5 kB 00:00
[cloudera-cdh5: 4 of 112] Downloading RPMS/x86_64/bigtop-jsvc-0.6.0+cdh5.0.0+389-0.cdh5b2.p0.25.el6.x86_64.rpm
bigtop-jsvc-0.6.0+cdh5.0.0+389-0.cdh5b2.p0.25.el6.x86_64.rpm | 27 kB 00:00
[cloudera-cdh5: 5 of 112] Downloading RPMS/x86_64/bigtop-jsvc-debuginfo-0.6.0+cdh5.0.0+389-0.cdh5b2.p0.25.el6.x86_64.rpm
bigtop-jsvc-debuginfo-0.6.0+cdh5.0.0+389-0.cdh5b2.p0.25.el6.x86_64.rpm | 55 kB 00:00
[cloudera-cdh5: 6 of 112] Downloading RPMS/noarch/bigtop-tomcat-0.7.0+cdh5.0.0+0-0.cdh5b2.p0.25.el6.noarch.rpm
bigtop-tomcat-0.7.0+cdh5.0.0+0-0.cdh5b2.p0.25.el6.noarch.rpm | 7.2 MB 00:02
[cloudera-cdh5: 7 of 112] Downloading RPMS/noarch/bigtop-utils-0.7.0+cdh5.0.0+0-0.cdh5b2.p0.30.el6.noarch.rpm
bigtop-utils-0.7.0+cdh5.0.0+0-0.cdh5b2.p0.30.el6.noarch.rpm | 8.8 kB 00:00
[cloudera-cdh5: 8 of 112] Downloading RPMS/noarch/crunch-0.9.0+cdh5.0.0+19-0.cdh5b2.p0.30.el6.noarch.rpm
crunch-0.9.0+cdh5.0.0+19-0.cdh5b2.p0.30.el6.noarch.rpm | 50 MB 00:33
[cloudera-cdh5: 9 of 112] Downloading RPMS/noarch/crunch-doc-0.9.0+cdh5.0.0+19-0.cdh5b2.p0.30.el6.noarch.rpm
crunch-doc-0.9.0+cdh5.0.0+19-0.cdh5b2.p0.30.el6.noarch.rpm | 49 MB 00:15
[cloudera-cdh5: 10 of 112] Downloading RPMS/noarch/flume-ng-1.4.0+cdh5.0.0+90-0.cdh5b2.p0.18.el6.noarch.rpm
```

### 4. Download Impala Repo:

```
cd /tmp/clouderarepo/
wget
http://archive.cloudera.com/impala/redhat/6/x86_64/impala/cloudera-impala.repo
```

```
[root@redhat clouderarepo]# wget http://archive.cloudera.com/impala/redhat/6/x86_64/impala/cloudera-impala.repo
--2014-02-28 14:22:42-- http://archive.cloudera.com/impala/redhat/6/x86_64/impala/cloudera-impala.repo
Resolving archive.cloudera.com... 184.73.217.71
Connecting to archive.cloudera.com|184.73.217.71|:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: 205 [text/plain]
Saving to: `cloudera-impala.repo'

100%[=====] 205 --.-K/s in 0s

2014-02-28 14:22:42 (38.3 MB/s) - `cloudera-impala.repo'
```

reposync --config=./cloudera-impala.repo --repoid=cloudera-impala

```
[root@redhat clouderarepo]# reposync --config=./cloudera-impala.repo --repoid=cloudera-impala
cloudera-impala | 951 B 00:00
cloudera-impala/primary | 2.3 kB 00:00
[cloudera-impala: 1 of 8] Downloading RPMS/noarch/bigtop-utils-0.4+300-1.cdh4.0.1.p0.1.el6.noarch.rpm | 7.4 kB 00:00
bigtop-utils-0.4+300-1.cdh4.0.1.p0.1.el6.noarch.rpm
[cloudera-impala: 2 of 8] Downloading RPMS/x86_64/impala-1.2.3-1.p0.352.el6.x86_64.rpm | 148 MB 01:46
impala-1.2.3-1.p0.352.el6.x86_64.rpm
[cloudera-impala: 3 of 8] Downloading RPMS/x86_64/impala-catalog-1.2.3-1.p0.352.el6.x86_64.rpm | 4.3 kB 00:00
impala-catalog-1.2.3-1.p0.352.el6.x86_64.rpm
[cloudera-impala: 4 of 8] Downloading RPMS/x86_64/impala-debuginfo-1.2.3-1.p0.352.el6.x86_64.rpm | 0.0 B 00:00
```

## 5. Copy the repository directory to the admin node.

```
[root@redhat clouderarepo]# scp -r /tmp/clouderarepo/ rhel1:/var/www/html
cloudera-manager-installer.bin 100% 499KB 498.9KB/s 00:00
impala-server-1.2.3-1.p0.352.el6.x86_64.rpm 100% 4368 4.3KB/s 00:00
impala-udf-devel-1.2.3-1.p0.352.el6.x86_64.rpm 100% 33KB 33.4KB/s 00:00
impala-shell-1.2.3-1.p0.352.el6.x86_64.rpm 100% 695KB 695.5KB/s 00:00
impala-catalog-1.2.3-1.p0.352.el6.x86_64.rpm 100% 4396 4.3KB/s 00:00
impala-debuginfo-1.2.3-1.p0.352.el6.x86_64.rpm 100% 280MB 40.0MB/s 00:07
impala-1.2.3-1.p0.352.el6.x86_64.rpm 100% 148MB 49.4MB/s 00:03
impala-state-store-1.2.3-1.p0.352.el6.x86_64.rpm 100% 4456 4.4KB/s 00:00
bigtop-utils-0.4+300-1.cdh4.0.1.p0.1.el6.noarch.rpm 100% 7572 7.4KB/s 00:00
cloudera-impala.repo 100% 112 0.1KB/s 00:00
cloudera-manager.repo 100% 204 0.2KB/s 00:00
cloudera-manager-daemons-5.0.0-0.cm5b2.p0.119.el6.x86_64.rpm 100% 324MB 40.5MB/s 00:08
cloudera-manager-server-db-2-5.0.0-0.cm5b2.p0.119.el6.x86_64.rpm 100% 9884 9.7KB/s 00:00
oracle-j2sdk1.7-1.7.0+update25-1.x86_64.rpm 100% 91MB 45.7MB/s 00:02
jdk-6u31-linux-amd64.rpm 100% 68MB 34.0MB/s 00:02
enterprise-debuginfo-5.0.0-0.cm5b2.p0.119.el6.x86_64.rpm 100% 668KB 667.9KB/s 00:00
cloudera-manager-agent-5.0.0-0.cm5b2.p0.119.el6.x86_64.rpm 100% 3746KB 3.7MB/s 00:00
cloudera-manager-server-5.0.0-0.cm5b2.p0.119.el6.x86_64.rpm 100% 8128 7.9KB/s 00:00
hue-impala-3.5.0+cdh5.0.0+186-0.cdh5b2.p0.22.el6.x86_64.rpm 100% 22KB 21.7KB/s 00:00
hue-server-3.5.0+cdh5.0.0+186-0.cdh5b2.p0.22.el6.x86_64.rpm 100% 4544 4.4KB/s 00:00
hue-doc-3.5.0+cdh5.0.0+186-0.cdh5b2.p0.22.el6.x86_64.rpm 100% 1152KB 1.1MB/s 00:00
hue-zookeeper-3.5.0+cdh5.0.0+186-0.cdh5b2.p0.22.el6.x86_64.rpm 100% 34KB 34.0KB/s 00:00
hadoop-0.20-mapreduce-jobtracker-2.2.0+cdh5.0.0+1610-0.cdh5b2.p0 100% 5212 5.1KB/s 00:00
hadoop-client-2.2.0+cdh5.0.0+1610-0.cdh5b2.p0.51.el6.x86_64.rpm 100% 25KB 24.7KB/s 00:00
hadoop-htdfs-2.2.0+cdh5.0.0+1610-0.cdh5b2.p0.51.el6.x86_64.rpm 100% 20MB 19.9MB/s 00:01
hue-plugins-3.5.0+cdh5.0.0+186-0.cdh5b2.p0.22.el6.x86_64.rpm 100% 3168 3.1KB/s 00:00
hadoop-yarn-nodemanager-2.2.0+cdh5.0.0+1610-0.cdh5b2.p0.51.el6.x 100% 5064 5.0KB/s 00:00
zookeeper-debuginfo-3.4.5+cdh5.0.0+27-0.cdh5b2.p0.29.el6.x86_64. 100% 185KB 184.5KB/s 00:00
hbase-0.96.1.1+cdh5.0.0+23-0.cdh5b2.p0.20.el6.x86_64.rpm 100% 44MB 44.0MB/s 00:01
hadoop-hdfs-zkfc-2.2.0+cdh5.0.0+1610-0.cdh5b2.p0.51.el6.x86_64.r 100% 5176 5.1KB/s 00:00
hadoop-debuginfo-2.2.0+cdh5.0.0+1610-0.cdh5b2.p0.51.el6.x86_64.r 100% 1610KB 1.6MB/s 00:00
hbase-regionserver-0.96.1.1+cdh5.0.0+23-0.cdh5b2.p0.20.el6.x86_6 100% 7088 6.9KB/s 00:00
hadoop-0.20-mapreduce-2.2.0+cdh5.0.0+1610-0.cdh5b2.p0.51.el6.x86 100% 28MB 28.1MB/s 00:01
```

## 6. On admin node (rhel1) run create repo command.

cd /var/www/html/clouderarepo/

```
createrepo --baseurl http://10.29.160.53/clouderarepo/cloudera-manager/
/var/www/html/clouderarepo/cloudera-manager
```

```
[root@rhel1 clouderarepo]#createrepo --baseurl http://10.29.160.53/clouderarepo/cloudera-manager/ /var/www/html/clouderarepo/cloudera-manager
Spawning worker 0 with 7 pkgs
Workers Finished
Gathering worker results

Saving Primary metadata
Saving file lists metadata
Saving other metadata
Generating sqlite DBs
Sqlite DBs complete

createrepo --baseurl http://10.29.160.53/clouderarepo/cloudera-cdh5
/var/www/html/clouderarepo/cloudera-cdh5

[root@rhel1 clouderarepo]#createrepo --baseurl http://10.29.160.53/clouderarepo/cloudera-cdh5/ /var/www/html/clouderarepo/cloudera-cdh5
Spawning worker 0 with 112 pkgs
Workers Finished
Gathering worker results

Saving Primary metadata
Saving file lists metadata
Saving other metadata
Generating sqlite DBs
Sqlite DBs complete

createrepo --baseurl http://10.29.160.53/clouderarepo/cloudera-impala
/var/www/html/clouderarepo/cloudera-impala

[root@rhel1 clouderarepo]#createrepo --baseurl http://10.29.160.53/clouderarepo/cloudera-impala/ /var/www/html/clouderarepo/cloudera-impala
Spawning worker 0 with 8 pkgs
Workers Finished
Gathering worker results

Saving Primary metadata
Saving file lists metadata
Saving other metadata
Generating sqlite DBs
Sqlite DBs complete
```



**Note** Visit <http://10.29.160.53/clouderarepo> to verify the files.

#### 7. Create the Cloudera Manager repo file with following contents:

```
vi /var/www/html/clouderarepo/cloudera-manager/cloudera-manager.repo
[cloudera-manager]
name=Cloudera Manager
baseurl=http://10.29.160.53/clouderarepo/cloudera-manager/
gpgcheck = 0
```

#### 8. Create the CDH repo file with following contents:

```
vi /var/www/html/clouderarepo/cloudera-cdh5/cloudera-cdh5.repo
[cloudera-cdh5]
name=Cloudera's Distribution for Hadoop, Version 5
baseurl= http://10.29.160.53/clouderarepo/cloudera-cdh5
gpgcheck = 0
```

#### 9. Create the Impala repo file with following contents:

```
vi /var/www/html/clouderarepo/cloudera-impala/cloudera-impala.repo
[cloudera-impala]
name=Impala
baseurl= http://10.29.160.53/clouderarepo/cloudera-impala
gpgcheck = 0
```

10. Copy the file cloudera-manager.repo, cloudera-cdh5.repo, cloudera-impala.repo into /etc/yum.repos.d/ on the admin node to enable it to find the packages that are locally hosted.

```
cp /var/www/html/clouderarepo/cloudera-manager/cloudera-manager.repo
/etc/yum.repos.d/
cp /var/www/html/clouderarepo/cloudera-cdh5/cloudera-cdh5.repo
/etc/yum.repos.d/
cp /var/www/html/clouderarepo/cloudera-impala/cloudera-impala.repo
/etc/yum.repos.d/
```

11. 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/ cloudera-manager.repo
/etc/yum.repos.d/
pscp -h /root/allnodes /etc/yum.repos.d/ cloudera-cdh5.repo
/etc/yum.repos.d/
pscp -h /root/allnodes /etc/yum.repos.d/ cloudera-impala.repo
/etc/yum.repos.d/
```

## Cloudera Installation

### Prerequisites

```
pssh -h /root/allnodes "sysctl -w vm.swappiness=0"
pssh -h /root/allnodes "echo never >
/sys/kernel/mm/redhat_transparent_hugepage/enabled"
```

### Installing Cloudera Manager

Cloudera Manager, an end to end management application, is used to install and configure CDH. During CDH Installation, Cloudera Manager's Wizard will help to install Hadoop services on all nodes using the following procedure:

- Discovery of the cluster nodes
- Configure the Cloudera parcel or package repositories
- Install Hadoop, Cloudera Manager Agent (CMA) and Impala on all the cluster nodes
- Install the Oracle JDK if it is not already installed across all the cluster nodes
- Assign various services to nodes
- Start the Hadoop services

Follow the steps below to install Cloudera Manager:

1. Update the repo files to point to local repository.

```
rm -f /var/www/html/clouderarepo/*.repo
cp /etc/yum.repos.d/c*.repo /var/www/html/clouderarepo/
```

2. Change the permission of Cloudera Manager Installer on the admin node.

```
cd /var/www/html/clouderarepo
chmod +x cloudera-manager-installer.bin
```

3. Execute the following command in the admin node (rhel1) to start Cloudera Manager Installer.

```
cd /var/www/html/clouderarepo/
./cloudera-manager-installer.bin
```

4. This displays the Cloudera Manager Read Me file. Click Next.

**Cloudera Manager README**

The Cloudera Manager Installer enables you to install Cloudera Manager and bootstrap an entire CDH cluster, requiring only that you have SSH access to your cluster's machines, and that those machines have Internet access.

The Cloudera Manager Installer will automatically:

- \* Detect the operating system on the Cloudera Manager host
- \* Install the package repository for Cloudera Manager and the Java Runtime Environment (JRE)
- \* Install the JRE if it's not already installed
- \* Install and configure an embedded PostgreSQL database
- \* Install and run the Cloudera Manager Server

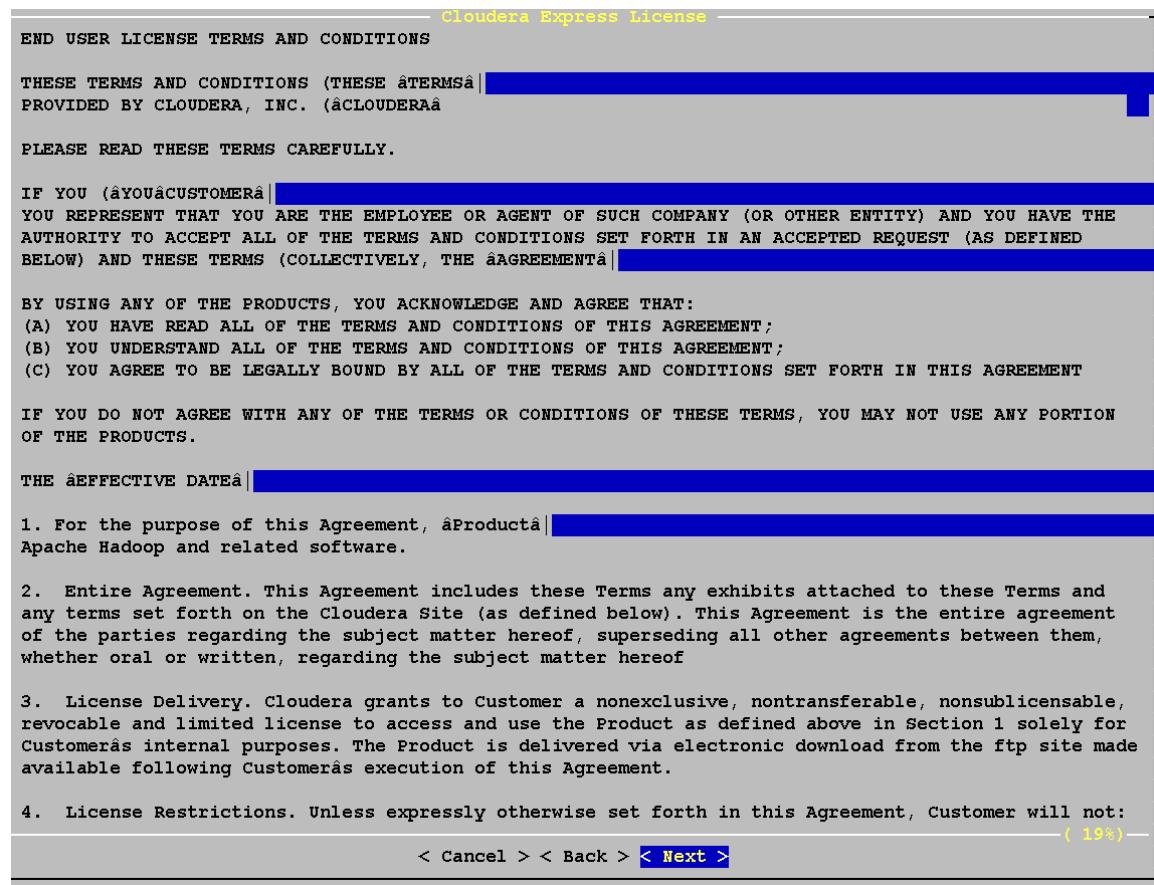
Once server installation is complete, you can browse to Cloudera Manager's web interface and use the cluster installation wizard to set up your CDH cluster.

Cloudera Manager supports the following 64-bit operating systems:

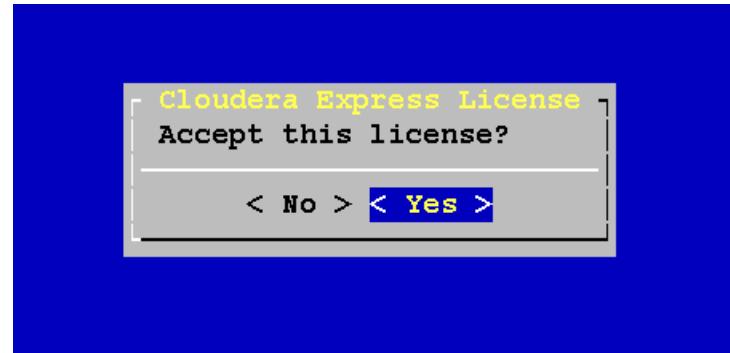
- \* Red Hat Enterprise Linux 5 (Update 7 or later recommended)
- \* Red Hat Enterprise Linux 6 (Update 2 or later recommended)
- \* Oracle Enterprise Linux 5 (Update 6 recommended)
- \* CentOS 5 (Update 7 or later recommended)
- \* CentOS 6 (Update 2 or later recommended)
- \* SUSE Linux Enterprise Server 11 (Service Pack 1 or later required)
- \* Ubuntu 10.04 LTS (Only supports CDH 4.x)
- \* Ubuntu 12.04 LTS
- \* Debian 6.0 (Only supports CDH 4.x)
- \* Debian 7.0

[< Cancel >](#) [< Next >](#)

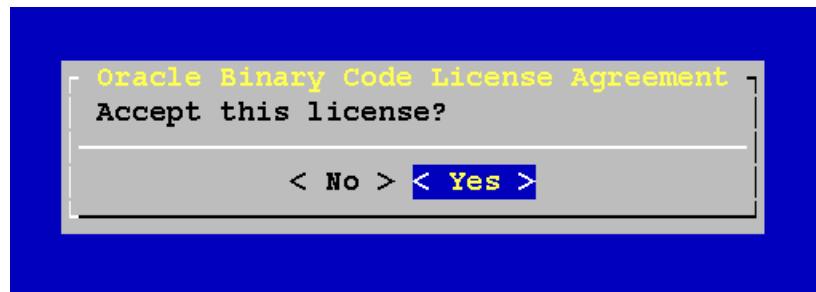
5. Click Next in the End User License agreement page.



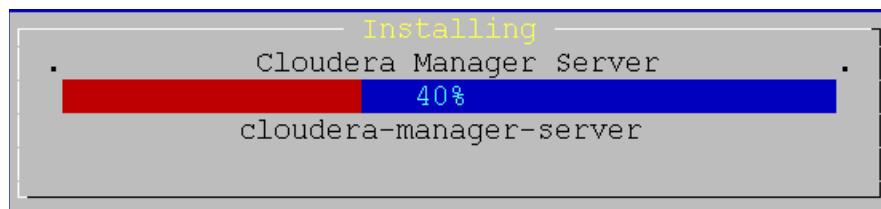
6. Click Yes in the license agreement confirmation page.



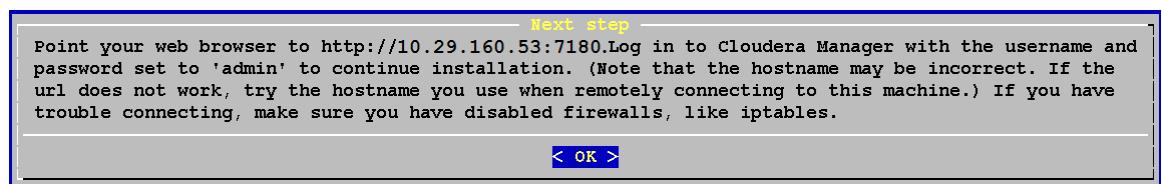
7. Click Next in Oracle Binary Code License Agreement and Yes in the Oracle Binary Code License Agreement for the Java SE Platform Products page.



- Wait for the installer to install the packages needed for Cloudera Manager.



- Save the URL displayed <http://10.29.160.53:7180>. You will need this url to access Cloudera Manager. If you are unable to connect to the server, check to see if iptables and SELinux are disabled.



- Click OK.



- When the installation of Cloudera Manager is complete. Install CDH5 using the Cloudera Manager web interface.

## Installing Cloudera Enterprise Data Hub (CDH5)

Follow these steps to install the Cloudera Enterprise Data Hub:

- Access the Cloudera Manager using the URL displayed by the Installer, <http://10.29.160.53:7180>.
- Login to the Cloudera Manager. Enter "admin" for both the Username and Password fields.

**Login**

Username:

Password:

Remember me on this computer.

**Login**

3. If you do not have a Cloudera license, click Cloudera Enterprise Data Hub Trial Edition. If you do have a Cloudera license, Click "Upload License" and select your license.
4. Based on requirement Choose appropriate Cloudera Editions for Installation.

### Welcome to Cloudera. Which edition do you want to deploy?

Upgrading to **Cloudera Enterprise Data Hub** provides important features that help you manage and monitor your Hadoop clusters in mission-critical environments.

|                                                                      | Cloudera Express | Cloudera Enterprise Data Hub Trial<br>✓<br>60 Days                                                                                               | Cloudera Enterprise Data Hub<br>Annual Subscription(s)<br><b>Upload License</b>                                                                                                                              |
|----------------------------------------------------------------------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>License</b>                                                       | Free             |                                                                                                                                                  |                                                                                                                                                                                                              |
|                                                                      |                  | Post trial period, the product will continue to function as <b>Cloudera Express</b> . Your cluster and your data will remain <b>unaffected</b> . | Cloudera Enterprise Data Hub enables access to individual SKUs in the Enterprise Data Hub: <ul style="list-style-type: none"><li>• Basic Edition</li><li>• Flex Edition</li><li>• Data Hub Edition</li></ul> |
| <b>Node Limit</b>                                                    | Unlimited        | Unlimited                                                                                                                                        | Unlimited                                                                                                                                                                                                    |
| CDH                                                                  | ✓                | ✓                                                                                                                                                | ✓                                                                                                                                                                                                            |
| Core Cloudera Manager Features                                       | ✓                | ✓                                                                                                                                                | ✓                                                                                                                                                                                                            |
| Advanced Cloudera Manager Features<br>(click link below for details) |                  | ✓                                                                                                                                                | ✓                                                                                                                                                                                                            |
| Backup & Disaster Recovery                                           |                  | ✓                                                                                                                                                | ✓                                                                                                                                                                                                            |
| Cloudera Navigator Auditing                                          |                  | ✓                                                                                                                                                | ✓                                                                                                                                                                                                            |
| Cloudera Navigator Discovery and Lineage                             |                  |                                                                                                                                                  | ✓                                                                                                                                                                                                            |
| Cloudera Support                                                     |                  |                                                                                                                                                  | ✓                                                                                                                                                                                                            |

For full list of features available in **Cloudera Express** and **Cloudera Enterprise Data Hub**, [click here](#).

**Continue**

5. Click Continue.

**Thank you for choosing Cloudera Manager and Cloudera's Distribution Including Apache Hadoop (CDH).**

This installer will enable you to later choose packages for the Services below (there may be some license implications).

- Apache Hadoop (Common, HDFS, MapReduce, YARN)
- Apache HBase
- Apache ZooKeeper
- Apache Oozie
- Apache Hive
- Hue (Apache licensed)
- Apache Flume
- Cloudera Impala (Apache licensed)
- Apache Sqoop
- Cloudera Search (Apache licensed)
- Apache Spark

You are using Cloudera Manager to install and configure your system. You can learn more about Cloudera Manager by clicking on the **Support** menu above.

Continue

6. Specify the hosts that are part of the cluster using their IP addresses or hostname. The figure below shows use of a pattern to specify IP addresses range.

192.168.12. [11-74]

7. After the IP addresses are entered, click Search.

**Specify hosts for your CDH cluster installation.**

Cloudera recommends including Cloudera Manager server's host because it is often used for the Cloudera Management Service. This will also enable health monitoring for that host.

Hosts should be specified using the same hostname (FQDN) that they will identify themselves with.

**Hint:** Search for hostnames and/or IP addresses using [patterns](#).

192.168.12.[11-74]

SSH Port: 22 Search

8. Cloudera Manager will "discover" the nodes in the cluster. Verify that all desired nodes have been found and selected for installation.
9. Click Install CDH On Selected Host. CDH is Cloudera Distribution for Apache Hadoop.

64 hosts scanned, 64 running SSH. [New Search](#)

| <input checked="" type="checkbox"/> Expanded Query | Hostname (FQDN) | IP Address    | Currently Managed | Result                                                               |
|----------------------------------------------------|-----------------|---------------|-------------------|----------------------------------------------------------------------|
| <input checked="" type="checkbox"/> 192.168.12.11  | rhel1           | 192.168.12.11 | No                | <span style="color: green;">✓ Host ready: 0 ms response time.</span> |
| <input checked="" type="checkbox"/> 192.168.12.12  | rhel2           | 192.168.12.12 | No                | <span style="color: green;">✓ Host ready: 1 ms response time.</span> |
| <input checked="" type="checkbox"/> 192.168.12.13  | rhel3           | 192.168.12.13 | No                | <span style="color: green;">✓ Host ready: 1 ms response time.</span> |
| <input checked="" type="checkbox"/> 192.168.12.14  | rhel4           | 192.168.12.14 | No                | <span style="color: green;">✓ Host ready: 1 ms response time.</span> |
| <input checked="" type="checkbox"/> 192.168.12.15  | rhel5           | 192.168.12.15 | No                | <span style="color: green;">✓ Host ready: 1 ms response time.</span> |
| <input checked="" type="checkbox"/> 192.168.12.16  | rhel6           | 192.168.12.16 | No                | <span style="color: green;">✓ Host ready: 2 ms response time.</span> |
| <input checked="" type="checkbox"/> 192.168.12.17  | rhel7           | 192.168.12.17 | No                | <span style="color: green;">✓ Host ready: 1 ms response time.</span> |
| <input checked="" type="checkbox"/> 192.168.12.18  | rhel8           | 192.168.12.18 | No                | <span style="color: green;">✓ Host ready: 1 ms response time.</span> |
| <input checked="" type="checkbox"/> 192.168.12.19  | rhel9           | 192.168.12.19 | No                | <span style="color: green;">✓ Host ready: 2 ms response time.</span> |
| <input checked="" type="checkbox"/> 192.168.12.20  | rhel10          | 192.168.12.20 | No                | <span style="color: green;">✓ Host ready: 1 ms response time.</span> |
| <input checked="" type="checkbox"/> 192.168.12.21  | rhel11          | 192.168.12.21 | No                | <span style="color: green;">✓ Host ready: 1 ms response time.</span> |
| <input checked="" type="checkbox"/> 192.168.12.22  | rhel12          | 192.168.12.22 | No                | <span style="color: green;">✓ Host ready: 2 ms response time.</span> |
| <input checked="" type="checkbox"/> 192.168.12.23  | rhel13          | 192.168.12.23 | No                | <span style="color: green;">✓ Host ready: 1 ms response time.</span> |
| <input checked="" type="checkbox"/> 192.168.12.24  | rhel14          | 192.168.12.24 | No                | <span style="color: green;">✓ Host ready: 1 ms response time.</span> |
| <input checked="" type="checkbox"/> 192.168.12.25  | rhel15          | 192.168.12.25 | No                | <span style="color: green;">✓ Host ready: 1 ms response time.</span> |
| <input checked="" type="checkbox"/> 192.168.12.26  | rhel16          | 192.168.12.26 | No                | <span style="color: green;">✓ Host ready: 1 ms response time.</span> |

[Back](#) [Continue](#)

10. For the method of installation, select the Use Package radio button.
11. For the CDH version, select the CDH5 radio button.
12. For the specific release of CDH you want to install in your hosts, select Custom Repository radio button.
13. Enter the following URL for the repository within the admin node.  
`http://10.29.160.53/clouderarepo/cloudera-cdh5`
14. For the specific Impala release, select the Custom Repository radio button.
15. For the specific release of Cloudera Manager, select the Custom Repository radio button.
16. Enter the URL for the repository within the admin node.  
`http://10.29.160.53/clouderarepo/cloudera-manager`

## Express Cluster Installation - Add Hosts

### Select Repository

**Cloudera Manager Parcels** are the easiest way for Cloudera Manager to manage the software on your cluster, by automating the deployment and upgrade of service binaries. Electing not to use parcels will require you to manually upgrade packages on all hosts in your cluster when software updates are available, and will prevent you from using Cloudera Manager's rolling upgrade capabilities.

Choose Method  Use Packages [?](#)  
 Use Parcels (Recommended) [?](#)

#### Select the version of CDH

CDH5  
 CDH4

#### Select the specific release of CDH you want to install on your hosts.

**Note:** Impala is supported only on CDH 4.1 or later deployments, and Solr is supported only on CDH 4.3 or later deployments. If you are installing an older CDH version, please deselect them.

Latest Release of CDH 5  
 CDH 5.0.0  
 Custom Repository

Example for SLES, Redhat or other RPM based distributions:

[http://archive.cloudera.com/cdh5/redhat/6/x86\\_64/cdh/5/](http://archive.cloudera.com/cdh5/redhat/6/x86_64/cdh/5/)

Example for Ubuntu or other Debian based distributions:

`deb http://archive.cloudera.com/cdh5/ubuntu/lucid/amd64/cdh/ lucid-cdh5 contrib`

#### Select the specific release of the Cloudera Manager Agent you want to install on your hosts.

Matched release for this Cloudera Manager server  
 Custom Repository

x

Example for SLES, Redhat or other RPM based distributions:

[http://archive.cloudera.com/cm5/redhat/6/x86\\_64/cm/5/](http://archive.cloudera.com/cm5/redhat/6/x86_64/cm/5/)

Example for Ubuntu or other Debian based distributions:

`deb http://archive.cloudera.com/cm5/ubuntu/lucid/amd64/cm/ lucid-cm5 contrib`

Enter a custom URL for the location of the GPG signing key (applies to all custom repositories and without Internet access).

Custom GPG Key URL:

Example for SLES, Redhat or other RPM based distributions:

[http://archive.cloudera.com/cm5/redhat/6/x86\\_64/cm/RPM-GPG-KEY-cloudera](http://archive.cloudera.com/cm5/redhat/6/x86_64/cm/RPM-GPG-KEY-cloudera)

Example for Ubuntu or other Debian based distributions:

<http://archive.cloudera.com/cm5/debian/squeeze/amd64/cm/archive.key>

1 2 3 4 5

Back

Continue

- Provide SSH login credentials for the cluster and click Start Installation.

**Provide SSH login credentials.**

Root access to your hosts is required to install the Cloudera packages. This installer will connect to your hosts via SSH and log in either directly as root or as another user with password-less sudo privileges to become root.

Login to all hosts as:  root  
 Another User:

You may connect via password or public-key authentication for the user selected above.

Authentication Method:  All hosts accept same password  
 All hosts accept same private key

Enter Password:  \*\*\*\*\*

Confirm Password:  \*\*\*\*\*

SSH Port:  22

Number of simultaneous installations:

10

(Running a large number of installations at once can consume large amounts of network bandwidth and other system resources)

 Back

Start Installation 

18. Make sure the installation across all the hosts is complete.
19. After the installation is complete, click Continue.

**Installation completed successfully.**

64 of 64 host(s) completed successfully.

| Hostname | IP Address    | Progress                                                    | Status                                 |                                                                                                               |
|----------|---------------|-------------------------------------------------------------|----------------------------------------|---------------------------------------------------------------------------------------------------------------|
| rhel1    | 192.168.12.11 | <div style="width: 100%; background-color: #2e6b2e;"></div> | ✓ Installation completed successfully. | <a href="#">Details</a>    |
| rhel2    | 192.168.12.12 | <div style="width: 100%; background-color: #2e6b2e;"></div> | ✓ Installation completed successfully. | <a href="#">Details</a>    |
| rhel3    | 192.168.12.13 | <div style="width: 100%; background-color: #2e6b2e;"></div> | ✓ Installation completed successfully. | <a href="#">Details</a>    |
| rhel4    | 192.168.12.14 | <div style="width: 100%; background-color: #2e6b2e;"></div> | ✓ Installation completed successfully. | <a href="#">Details</a>    |
| rhel5    | 192.168.12.15 | <div style="width: 100%; background-color: #2e6b2e;"></div> | ✓ Installation completed successfully. | <a href="#">Details</a>    |
| rhel6    | 192.168.12.16 | <div style="width: 100%; background-color: #2e6b2e;"></div> | ✓ Installation completed successfully. | <a href="#">Details</a>    |
| rhel7    | 192.168.12.17 | <div style="width: 100%; background-color: #2e6b2e;"></div> | ✓ Installation completed successfully. | <a href="#">Details</a>    |
| rhel8    | 192.168.12.18 | <div style="width: 100%; background-color: #2e6b2e;"></div> | ✓ Installation completed successfully. | <a href="#">Details</a>   |
| rhel9    | 192.168.12.19 | <div style="width: 100%; background-color: #2e6b2e;"></div> | ✓ Installation completed successfully. | <a href="#">Details</a>  |
| rhel10   | 192.168.12.20 | <div style="width: 100%; background-color: #2e6b2e;"></div> | ✓ Installation completed successfully. | <a href="#">Details</a>  |
| rhel11   | 192.168.12.21 | <div style="width: 100%; background-color: #2e6b2e;"></div> | ✓ Installation completed successfully. | <a href="#">Details</a>  |
| rhel12   | 192.168.12.22 | <div style="width: 100%; background-color: #2e6b2e;"></div> | ✓ Installation completed successfully. | <a href="#">Details</a>  |
| rhel13   | 192.168.12.23 | <div style="width: 100%; background-color: #2e6b2e;"></div> | ✓ Installation completed successfully. | <a href="#">Details</a>  |
| rhel14   | 192.168.12.24 | <div style="width: 100%; background-color: #2e6b2e;"></div> | ✓ Installation completed successfully. | <a href="#">Details</a>  |
| rhel15   | 192.168.12.25 | <div style="width: 100%; background-color: #2e6b2e;"></div> | ✓ Installation completed successfully. | <a href="#">Details</a>  |
| rhel16   | 192.168.12.26 | <div style="width: 100%; background-color: #2e6b2e;"></div> | ✓ Installation completed successfully. | <a href="#">Details</a>  |

 Back

1 2 3 4 5

 Continue

20. Wait for Cloudera Manager to inspect the hosts on which it has just performed the installation.
21. Review and verify the summary. Click Continue.

### Express Cluster Installation - Add Hosts

Inspect hosts for correctness C Run Again

#### Validations

- ✓ Inspector ran on all 64 hosts.
- ✓ Individual hosts resolved their own hostnames correctly.
- ✓ No errors were found while looking for conflicting init scripts.
- ✓ No errors were found while checking /etc/hosts.
- ✓ All hosts resolved localhost to 127.0.0.1.
- ✓ All hosts checked resolved each other's hostnames correctly and in a timely manner.
- ✓ Host clocks are approximately in sync (within ten minutes).
- ✓ Host time zones are consistent across the cluster.
- ✓ No users or groups are missing.
- ✓ No kernel versions that are known to be bad are running.
- ✓ All hosts have /proc/sys/vm/swappiness set to 0.
- ✓ No performance concerns with Transparent Huge Pages settings.
- ✓ 0 hosts are running CDH 4 and 64 hosts are running CDH5.
- ✓ All checked hosts in each cluster are running the same version of components.
- ✓ All managed hosts have consistent versions of Java.
- ✓ All checked Cloudera Management Daemons versions are consistent with the server.
- ✓ All checked Cloudera Management Agents versions are consistent with the server.

Back

1 2 3 4 5

Continue

22. Select services that need to be started on the cluster.

### Express Cluster Installation - Add Services

Choose the CDH 5 services that you want to install on your cluster.

Choose a combination of services to install.

- Core Hadoop**  
HDFS, YARN (Includes MapReduce 2), ZooKeeper, Oozie, Hive, Hue, and Sqoop
- Core with Real-Time Delivery**  
HDFS, YARN (Includes MapReduce 2), ZooKeeper, Oozie, Hive, Sqoop, and HBase
- Core with Real-Time Query**  
HDFS, YARN (Includes MapReduce 2), ZooKeeper, Oozie, Hive, Sqoop, and Impala
- Core with Real-Time Search**  
HDFS, YARN (Includes MapReduce 2), ZooKeeper, Oozie, Hive, Sqoop, and Solr
- Core with Spark**  
HDFS, YARN (Includes MapReduce 2), ZooKeeper, Oozie, Hive, Sqoop, and Spark
- All Services**  
HDFS, YARN (Includes MapReduce 2), ZooKeeper, Oozie, Hive, Sqoop, HBase, Impala, Solr, Spark, and Keystore Indexer  
Note: Cloudera Impala, Solr, HBase, and Spark are features that are independently licensed from the core Cloudera Enterprise offering. Please ensure that you have sufficient licenses for this functionality or contact your Cloudera representative for additional licenses or trial licensing.
- Custom Services**  
Choose your own services. Services required by chosen services will automatically be included. Note that Flume can be added after your initial cluster has been set up.

This wizard will also install the **Cloudera Management Services**. These are a set of components that enable monitoring, reporting, events, and alerts; these components require databases to store information, which will be configured on the next page.

**Include Cloudera Navigator**

Note: Cloudera Navigator is a feature that is independently licensed from the core Cloudera Enterprise offering. Please ensure that you have sufficient licenses for this functionality or contact your Cloudera representative for additional licenses or trial licensing.

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1 2 3 4 5 6

Continue

23. This is a critical steps in the installation. Inspect and customize the role assignments of all the nodes based on your requirements and click Continue.
24. Reconfigure the service assignment to match the table below.

| Service Name                 | Host                |
|------------------------------|---------------------|
| NameNode                     | rhel1               |
| SNameNode                    | rhel2               |
| HistoryServer                | rhel1               |
| ResourceManager              | rhel1               |
| Hue Server                   | rhel1               |
| HiveMetastore Server         | rhel1               |
| HiveServer2                  | rhel2               |
| HBase Master                 | rhel2               |
| Oozie Server                 | rhel1               |
| Zookeeper                    | rhel1, rhel2, rhel3 |
| DataNode                     | rhel3 to rhel64     |
| NodeManager                  | rhel3 to rhel64     |
| RegionServer                 | rhel3 to rhel64     |
| Sqoop Server                 | rhel1               |
| Impala Catalog Server Daemon | rhel2               |
| Solr Server                  | rhel1               |
| Spark Master                 | rhel1               |
| Spark Worker                 | rhel2               |

### Express Cluster Installation - Add Services

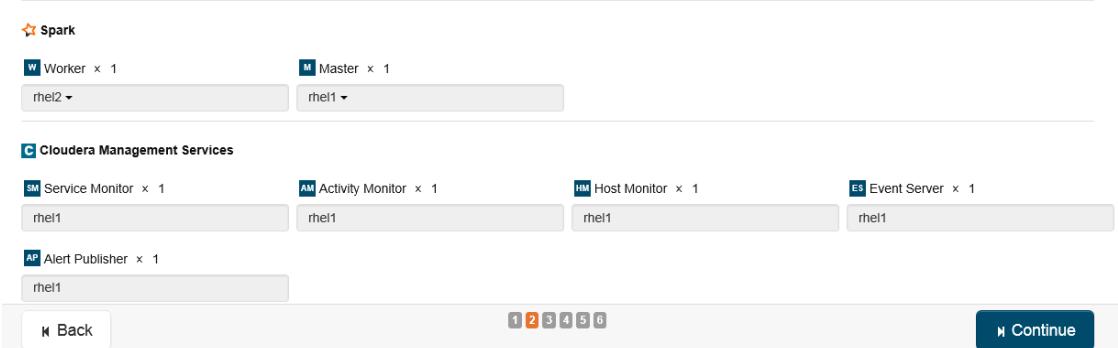
#### Customize Role Assignments

You can customize the role assignments for your new cluster here, but note that if assignments are made incorrectly, such as assigning too many roles to a single host, this can significantly impact the performance of your services. Cloudera does not recommend altering assignments unless you have specific requirements, such as having pre-selected a specific host for a specific role.

You can also view the role assignments by host: [View By Host](#)

The screenshot shows the 'Add Services' section of the Cloudera Express Cluster Installation interface. It lists various services and their assigned hosts:

- HDFS**:
  - NN NameNode x 1: rhe1
  - SN SecondaryNameNode x 1: rhe1
  - HFs HttpFS: Click to add new
  - NFS NFS Gateway: Click to add new
  - DN DataNode x 62: rhe1[3-64]
- YARN (MR2 Included)**:
  - RM ResourceManager x 1: rhe1
  - JHS JobHistory Server x 1: rhe1
  - NM NodeManager x 62: Same As DataNode
- Oozie**:
  - OS Oozie Server x 1: rhe1
- Hive**:
  - G Gateway x 64: rhe1[1-64]
  - HMS Hive Metastore Server x 1: rhe1
  - WH WebHCat Server: Click to add new
  - HS HiveServer2 x 1: rhe1
- Hue**:
  - HS Hue Server x 1: rhe1
- Sqoop**:
  - SS Sqoop Server x 1: rhe1
- ZooKeeper**:
  - S Server x 3: rhe1[1-3]
- HBase**:
  - M Master x 1: rhe1
  - HRS HBase REST Server: Click to add new
  - HBT HBase Thrift Server: Click to add new
  - RS RegionServer x 62: Same As DataNode
- Impala**:
  - ICD Impala Catalog Server Daemon ...: rhe1
  - ISD Impala StateStore Daemon x 1: rhe1
  - ID Impala Daemon x 62: Same As DataNode
- Solr**:
  - SS Solr Server x 1: rhe1
- Key-Value Store Indexer**:
  - LH Lily HBase Indexer x 1: rhe1



## Scaling the Cluster

The role assignment recommendation above is for clusters of up to 64 servers. For clusters of 16 to 64 nodes the recommendation is to dedicate one server for name node and a second server for secondary name node and YARN Resource Manager. For larger clusters larger than 64 nodes the recommendation is to dedicate one server each for name node, secondary name node and YARN Resource Manager.

1. Select the Use Embedded Database radio button.
2. Click Test Connection and click Continue.

### Express Cluster Installation - Add Services

**Database Setup**

On this page you configure and test database connections. If using custom databases, create the databases first according to the [Installing and Configuring an External Database](#) section of the [Installation Guide](#).

Use Custom Databases  
 Use Embedded Database

When using the Embedded Database, passwords are auto generated. Please copy them down.

**Activity Monitor** ✓ Successful

Currently assigned to run on **rhe1**.

|                     |                |                 |           |            |
|---------------------|----------------|-----------------|-----------|------------|
| Database Host Name: | Database Type: | Database Name : | Username: | Password:  |
| rhe1:7432           | PostgreSQL     | amon            | amon      | uX4p0Tqe7W |

**Reports Manager** ✓ Successful

Currently assigned to run on **rhe1**.

|                     |                |                 |           |            |
|---------------------|----------------|-----------------|-----------|------------|
| Database Host Name: | Database Type: | Database Name : | Username: | Password:  |
| rhe1:7432           | PostgreSQL     | rman            | rman      | w0iqjYlRTQ |

**Navigator Audit Server** ✓ Successful

Currently assigned to run on **rhe1**.

|                     |                |                 |           |            |
|---------------------|----------------|-----------------|-----------|------------|
| Database Host Name: | Database Type: | Database Name : | Username: | Password:  |
| rhe1:7432           | PostgreSQL     | nav             | nav       | BYIIYR8ons |

**1 2 3 4 5 6**

**Back** **Continue**

3. Review and customize the configuration changes based on your requirements.

## Configuring Yarn (MR2 Included) and HDFS Services

The following parameters are used for CPAv2 cluster configuration described in this document. These parameters are to be changed based on the cluster configuration, number of nodes and specific workload.

### Yarn-MR2 Included

| Service                                   | Value    |
|-------------------------------------------|----------|
| mapreduce.map.memory.mb                   | 3GiB     |
| mapreduce.reduce.memory.mb                | 3GiB     |
| mapreduce.map.java.opts.max.heap          | 2560 MiB |
| yarn.nodemanager.resource.memory-mb       | 180 GiB  |
| yarn.nodemanager.resource.cpu-vcores      | 32       |
| yarn.scheduler.minimum-allocation-mb      | 4 GiB    |
| yarn.scheduler.maximum-allocation-mb      | 180 GiB  |
| yarn.scheduler.maximum-allocation-vc-ores | 40       |
| mapreduce.task.io.sort.mb                 | 256MiB   |

### HDFS

|                                               |          |
|-----------------------------------------------|----------|
| dfs.datanode.failed.volumes.tolerated         | 11       |
| dfs.datanode.du.reserved                      | 10 GiB   |
| dfs.datanode.data.dir.perm                    | 755      |
| Java Heap Size of Namenode in Bytes           | 2628 MiB |
| dfs.namenode.handler.count                    | 54       |
| dfs.namenode.service.handler.count            | 54       |
| Java Heap Size of Secondary namenode in Bytes | 2628 MiB |

**Review Changes**

Set the following configuration values for your new role(s). Required values are marked with \*.

| Parameter                                                                                          | Group ⓘ                                                     | Recommended Value                                                                                                                                                                                                                                                                                                                                                                                                        | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------------------------------------------------------------------------------------------------|-------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Service YARN (MR2 Included)</b>                                                                 |                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| NodeManager Local Directory List*<br>yarn.nodemanager.local-dir                                    | NodeManager Default Group<br><a href="#">Show Members</a> ⓘ | /DATA/sdb1/yarn/nm<br><br>/DATA/sdc1/yarn/nm<br><br>/DATA/sdd1/yarn/nm<br><br>/DATA/sde1/yarn/nm<br><br>/DATA/sdf1/yarn/nm<br><br>/DATA/sdg1/yarn/nm<br><br>/DATA/sdh1/yarn/nm<br><br>/DATA/sdi1/yarn/nm<br><br>/DATA/sdj1/yarn/nm<br><br>/DATA/sdk1/yarn/nm<br><br>/DATA/sdl1/yarn/nm<br><br>/DATA/sdm1/yarn/nm<br><br>/DATA/sdn1/yarn/nm<br><br>/DATA/sdo1/yarn/nm<br><br>/DATA/sdp1/yarn/nm<br><br>/DATA/sdq1/yarn/nm | <a href="#">+</a> <a href="#">-</a><br><a href="#">+</a> <a href="#">-</a> |
| <a href="#">1</a> <a href="#">2</a> <a href="#">3</a> <b>4</b> <a href="#">5</a> <a href="#">6</a> |                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <a href="#">Back</a>                                                                               |                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                          | <a href="#">Continue</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

| <b>Service hbase</b>                                                                               |                                                          |                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------------------------------------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Parameter                                                                                          | Group                                                    | Value                                                                                                                                                                                                                                              | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| HDFS Root Directory*<br>hbase.rootdir                                                              | Service-Wide                                             | /hbase<br>default value                                                                                                                                                                                                                            | The HDFS directory shared by HBase RegionServers.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Enable Replication<br>hbase.replication                                                            | Service-Wide                                             | <input checked="" type="checkbox"/><br><a href="#">Reset to the default value: false</a> ⓘ                                                                                                                                                         | Allow HBase tables to be replicated.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Enable Indexing                                                                                    | Service-Wide                                             | <input checked="" type="checkbox"/><br><a href="#">Reset to the default value: false</a> ⓘ                                                                                                                                                         | Allow indexing of tables in HBase by Lily HBase Indexer.<br><b>Note:</b> Replication must be enabled for indexing to work.                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Service hdfs</b>                                                                                |                                                          |                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Parameter                                                                                          | Group                                                    | Value                                                                                                                                                                                                                                              | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| DataNode Data Directory*<br>dfs.datanode.data.dir                                                  | DataNode Default Group<br><a href="#">Show Members</a> ⓘ | /DATA/sdb1/dfs/dn<br><br>/DATA/sdc1/dfs/dn<br><br>/DATA/sdd1/dfs/dn<br><br>/DATA/sde1/dfs/dn<br><br>/DATA/sdf1/dfs/dn<br><br>/DATA/sdg1/dfs/dn<br><br>/DATA/sdh1/dfs/dn<br><br>/DATA/sdi1/dfs/dn<br><br>/DATA/sdj1/dfs/dn<br><br>/DATA/sdk1/dfs/dn | <a href="#">+</a> <a href="#">-</a><br><a href="#">+</a> <a href="#">-</a> |
| <a href="#">1</a> <a href="#">2</a> <a href="#">3</a> <b>4</b> <a href="#">5</a> <a href="#">6</a> |                                                          |                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <a href="#">Back</a>                                                                               |                                                          |                                                                                                                                                                                                                                                    | <a href="#">Continue</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

| Service oozie                           |                                                              |                                      |                                                                                                              |
|-----------------------------------------|--------------------------------------------------------------|--------------------------------------|--------------------------------------------------------------------------------------------------------------|
| Oozie Server Data Directory             | Oozie Server Default Group<br><a href="#">Show Members</a> ↗ | /var/lib/oozie/data<br>default value | Directory where the Oozie Server will place its data. Only applicable when using Derby as the database type. |
| Service solr                            |                                                              |                                      |                                                                                                              |
| ZooKeeper Znode*                        | Service-Wide                                                 | /solr<br>default value               | ZooKeeper znode used to store information about this Search service.                                         |
| HDFS Data Directory*                    | Service-Wide                                                 | /solr<br>default value               | HDFS directory used for storage by this Search service.                                                      |
| Service sqoop                           |                                                              |                                      |                                                                                                              |
| Sqoop Server Metastore Directory*       | Sqoop Server Default Group<br><a href="#">Show Members</a> ↗ | /var/lib/sqoop2<br>default value     | Directory where the Sqoop Server will place its metastore data.                                              |
| Service zookeeper                       |                                                              |                                      |                                                                                                              |
| Data Directory<br>dataDir               | Server Default Group<br><a href="#">Show Members</a> ↗       | /var/lib/zookeeper<br>default value  | The disk location that ZooKeeper will use to store its database snapshots.                                   |
| Transaction Log Directory<br>dataLogDir | Server Default Group<br><a href="#">Show Members</a> ↗       | /var/lib/zookeeper<br>default value  | The disk location that ZooKeeper will use to store its transaction logs.                                     |
| <a href="#">Back</a>                    |                                                              | 1 2 3 4 5 6                          | <a href="#">Continue</a>                                                                                     |

- Click Continue to start running the cluster services.

## Express Cluster Installation - Add Services

### Progress

| Command     | Context | Status   | Started at                 | Ended at                   |
|-------------|---------|----------|----------------------------|----------------------------|
| ✓ First Run |         | Finished | Mar 3, 2014 3:39:46 PM EST | Mar 3, 2014 3:48:18 PM EST |

Finished First Run of all services successfully.

### Command Progress

|                                                                                                                                                               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Completed 33 of 33 steps.                                                                                                                                     |
| <div style="width: 100%; background-color: #0072bc; height: 10px;"></div>                                                                                     |
| ✓ Waiting for ZooKeeper Service to initialize<br>Finished waiting<br><a href="#">Details</a> ↗                                                                |
| ✓ Starting ZooKeeper Service<br>Completed 3/3 steps successfully<br><a href="#">Details</a> ↗                                                                 |
| ✓ Checking if the name directories of the NameNode are empty. Formatting HDFS only if empty.<br>Successfully formatted NameNode.<br><a href="#">Details</a> ↗ |
| ✓ Starting HDFS Service<br>Successfully started HDFS service<br><a href="#">Details</a> ↗                                                                     |
| ✓ Creating HDFS /tmp directory<br>Successfully created HDFS directory /tmp.                                                                                   |

- ✓ Creating HBase root directory  
Successfully created HBase root directory.  
[Details ↗](#)
- ✓ Starting HBase Service  
Service started successfully.  
[Details ↗](#)
- ✓ Initializing Solr in ZooKeeper  
Successfully initialized Solr service.  
[Details ↗](#)
- ✓ Creating HDFS home directory for Solr  
Successfully created Solr HDFS home directory.  
[Details ↗](#)
- ✓ Starting Solr Service  
Service started successfully.  
[Details ↗](#)
- ✓ Execute command CreateSparkUserDirCommand on service spark  
Successfully created Spark HDFS user directory.  
[Details ↗](#)
- ✓ Starting Spark Service  
Service started successfully.  
[Details ↗](#)
- ✓ Creating MR2 job history directory  
Successfully created MR2 job history directory.  
[Details ↗](#)
- ✓ Creating NodeManager remote application log directory  
Successfully created NodeManager remote application log directory.  
[Details ↗](#)
- ✓ Starting YARN (MR2 Included) Service  
Successfully started service  
[Details ↗](#)

- ✓ Creating Hive Metastore Database  
Created Hive Metastore Database.  
[Details ↗](#)
- ✓ Creating Hive Metastore Database Tables  
Created Hive Metastore Database Tables successfully.  
[Details ↗](#)
- ✓ Creating Hive user directory  
Successfully created Hive user directory.  
[Details ↗](#)
- ✓ Creating Hive warehouse directory  
Successfully created Hive warehouse directory.  
[Details ↗](#)
- ✓ Starting Hive Service  
Service started successfully.  
[Details ↗](#)
- ✓ Starting Key-Value Store Indexer Service  
Service started successfully.  
[Details ↗](#)
- ✓ Creating Oozie database  
Oozie database created successfully.  
[Details ↗](#)
- ✓ Installing Oozie ShareLib in HDFS  
Successfully installed Oozie ShareLib  
[Details ↗](#)
- ✓ Starting Oozie Service  
Service started successfully.  
[Details ↗](#)

The screenshot shows a list of service installations with green checkmarks:

- Creating Sqoop user directory  
Successfully created Sqoop user directory.  
[Details ↗](#)
- Starting Sqoop Service  
Service started successfully.  
[Details ↗](#)
- Creating Impala Catalog Database  
Created Impala Catalog Database.  
[Details ↗](#)
- Creating Impala Catalog Database Tables  
This is a placeholder command for when Impala adds this feature in CDH5.0 GA  
[Details ↗](#)
- Creating Impala user directory  
Successfully created Impala user directory.  
[Details ↗](#)
- Starting Impala Service  
Service started successfully.  
[Details ↗](#)
- Starting Hue Service  
Service started successfully.  
[Details ↗](#)
- Starting Cloudera Management Services Service  
Service started successfully.  
[Details ↗](#)
- Deploying Client Configuration  
Successfully deployed all client configurations  
[Details ↗](#)

At the bottom are navigation buttons: [Back](#), a page number indicator (1 2 3 4 5 6), and a [Continue](#) button.

5. Hadoop services are installed, configured and now running on all the nodes of the cluster. Click Continue to complete the installation.

### Express Cluster Installation - Add Services

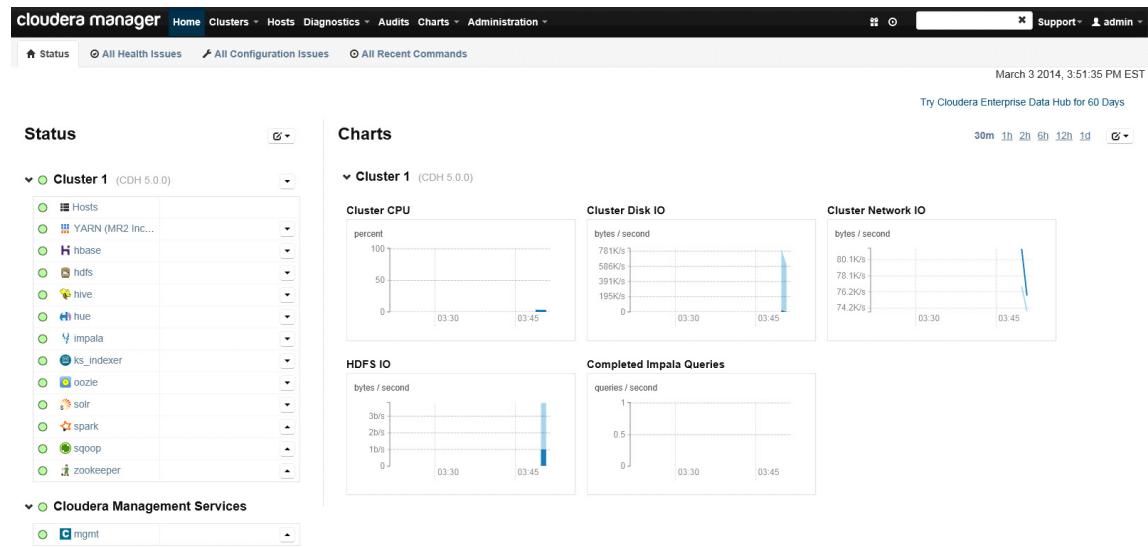
#### Congratulations!

The Hadoop services are installed, configured, and running on your cluster.

The screenshot shows the Cloudera Manager interface displaying the status of various services, including HDFS, YARN, and MapReduce, all shown as green (running).

At the bottom are navigation buttons: [Back](#), a page number indicator (1 2 3 4 5 6), and a [Continue](#) button.

6. Cloudera Manager will now show the status of all Hadoop services running on the cluster.



## Conclusion

Hadoop has become a popular data management across all verticals. The Cisco CPAv2 for Big Data for Cloudera 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 Cisco 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 Cisco UCS domains using Cisco 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 Material

This section gives the BOM for the 64 node Performance and Capacity Balanced Cluster. See [Table 7](#) for BOM for the master rack, [Table 8](#) for expansion racks (rack 2 to 4), [Table 9](#) and [Table 10](#) for software components.

**Table 7 Bill of Material for Base Rack**

| 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-8I | MegaRAID 9271CV with 8 internal SAS/SATA ports with Supercap | 16       |
| 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 8 Bill of Material for Expansion Racks**

| 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<br>(Country Specific) | 18 |
|----------------|-----------------------------------------------------------------------------|----|

**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 10 Cloudera Software**

| Cloudera                                |          |    |
|-----------------------------------------|----------|----|
| NA [Procured directly from<br>Cloudera] | Cloudera | 64 |