FlexPod Validated with Microsoft Private Cloud Fast Track 1.0

Reference Architecture and Deployment Guide for Microsoft Windows Server 2008 R2 and Microsoft System Center 2007

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Cisco Validated Design

Building Architectures to Solve Business Problems

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CVD Document Title

FlexPod Validated with Microsoft Private Cloud

Overview

Industry trends indicate a vast data center transformation toward shared infrastructures. Enterprise customers are moving away from silos of information and toward shared infrastructures, to virtualized environments, and eventually to the cloud to increase agility and reduce costs.

FlexPod™ is a predesigned configuration that is built on the Cisco® Unified Computing System® (Cisco UCS™), the Cisco Nexus® family of data center switches, NetApp® FAS storage components, and Microsoft® Windows Server® and System Center software. FlexPod is a base configuration, but can scale up for greater performance and capacity, or it can scale out for environments that require consistent, multiple deployments. It has the flexibility to be sized and optimized to accommodate many different use cases.

FlexPod is a platform that can address current virtualization needs and simplify the evolution to IT-as-a-service (ITaaS) infrastructure. FlexPod for Microsoft Private Cloud can help improve agility and responsiveness, reduce total cost of ownership (TCO), and increase business alignment and focus.

This document focuses on deploying an infrastructure capable of supporting Windows Server, Microsoft Hyper-V™ and Microsoft System Center as the foundation for private cloud infrastructure. For a detailed study of several practical solutions deployed on FlexPod, refer to NetApp Technical Report 3884, FlexPod Solutions Guide.

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Audience

This document describes the architecture and deployment procedures of an infrastructure comprised of Cisco, NetApp and Microsoft virtualization. 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 the core FlexPod architecture.

Benefits of the Cisco Unified Computing System

Cisco Unified Computing System™ is the first converged data center platform that combines industry-standard, x86-architecture servers with networking and storage access into a single converged system. The system is entirely programmable using unified, model-based management to simplify and speed deployment of enterprise-class applications and services running in bare-metal, virtualized, and cloud computing environments.

The system's x86-architecture rack-mount and blade servers are powered by Intel® Xeon® processors. These industry-standard servers deliver world-record performance to power mission-critical workloads. Cisco servers, combined with a simplified, converged architecture, drive better IT productivity and superior price/performance for lower total cost of ownership (TCO). Building on Cisco's strength in enterprise networking, Cisco Unified Computing System is integrated with a standards-based, high-bandwidth, low-latency, virtualization-aware unified fabric. The system is wired once to support the desired bandwidth and carries all Internet protocol, storage, inter-process communication, and virtual machine traffic with security isolation, visibility, and control equivalent to physical networks. The system meets the bandwidth demands of today's multicore processors, eliminates costly redundancy, and increases workload agility, reliability, and performance.

Cisco Unified Computing System is designed from the ground up to be programmable and self integrating. A server's entire hardware stack, ranging from server firmware and settings to network profiles, is configured through model-based management. With Cisco virtual interface cards, even the number and type of I/O interfaces is programmed dynamically, making every server ready to power any workload at any time. With model-based management, administrators manipulate a model of a desired system configuration, associate a model's service profile with hardware resources, and the system configures itself to match the model. This automation speeds provisioning and workload migration with accurate and rapid scalability. The result is increased IT staff productivity, improved compliance, and reduced risk of failures due to inconsistent configurations.

Cisco Fabric Extender technology reduces the number of system components to purchase, configure, manage, and maintain by condensing three network layers into one. It eliminates both blade server and hypervisor-based switches by connecting fabric interconnect ports directly to individual blade servers and virtual machines. Virtual networks are now managed exactly as physical networks are, but with massive scalability. This represents a radical simplification over traditional systems, reducing capital and operating costs while increasing business agility, simplifying and speeding deployment, and improving performance.

Cisco Unified Computing System helps organizations go beyond efficiency; it helps them become more effective through technologies that breed simplicity rather than complexity. The result is flexible, agile, high-performance, self-integrating information technology, reduced staff costs with increased uptime through automation, and more rapid return on investment.

Benefits of Cisco Nexus 5548UP

The Cisco Nexus 5548UP Switch delivers innovative architectural flexibility, infrastructure simplicity, and business agility, with support for networking standards. For traditional, virtualized, unified, and high-performance computing (HPC) environments, it offers a long list of IT and business advantages, including:

- Architectural Flexibility
- Unified ports that support traditional Ethernet, Fibre Channel (FC), and Fibre Channel over Ethernet (FCoE)
- Synchronizes system clocks with accuracy of less than one microsecond, based on IEEE 1588
- Offers converged Fabric extensibility, based on emerging standard IEEE 802.1BR, with Fabric Extender (FEX) Technology portfolio, including:
  - Cisco Nexus 2000 FEX
  - Adapter FEX
  - VM-FEX

Infrastructure Simplicity

- Common high-density, high-performance, data-center-class, fixed-form-factor platform
- Consolidates LAN and storage
- Supports any transport over an Ethernet-based fabric, including Layer 2 and Layer 3 traffic
- Supports storage traffic, including iSCSI, NAS, FC, RoE, and IBoE
- Reduces management points with FEX Technology

Business Agility

- Meets diverse data center deployments on one platform
- Provides rapid migration and transition for traditional and evolving technologies
- Offers performance and scalability to meet growing business needs

Specifications at-a Glance

- A 1 -rack-unit, 1/10 Gigabit Ethernet switch
- 32 fixed Unified Ports on base chassis and one expansion slot totaling 48 ports
- The slot can support any of the three modules: Unified Ports, 1/2/4/8 native Fibre Channel, and Ethernet or FCoE
- Throughput of up to 960 Gbps

Benefits of the NetApp FAS Family of Storage Controllers

The NetApp Unified Storage Architecture provides customers with an agile and scalable storage platform. All NetApp storage systems use the Data ONTAP® operating system to provide SAN (FCoE, FC, iSCSI), NAS (CIFS, NFS), and primary and secondary storage within a single unified platform so that all virtual desktop data components can be hosted on the same storage array. A single process for activities such as installation, provisioning, mirroring, backup, and upgrading is used throughout the entire product line from the entry level to enterprise-class controllers. Having a single set of software and processes simplifies even the most complex enterprise data management challenges Unifying storage and data management software and processes streamlined data ownership, enables companies to adapt to their changing business needs without interruption, and reduces total cost of ownership.

In a shared infrastructure, the availability and performance of the storage infrastructure are critical because storage outages or performance issues can affect thousands of users. The storage architecture must provide a high level of availability and performance. For detailed documentation about best practices, NetApp and its technology partners have developed a variety of best practice documents.

Recommended support documents include:

- NetApp storage systems: www.netapp.com/us/products/storage-systems/
- NetApp TR-3437: Storage Best Practices and Resiliency Guide
- NetApp TR-3450: Active-Active Controller Overview and Best Practices Guidelines
- NetApp TR-3702 - NetApp Storage Best Practices for Microsoft Virtualization and NetApp SnapManager for Hyper- V
- NetApp TR-3884: FlexPod Solutions Guide
- NetApp TR-3824: MS Exchange 2010 Best Practices Guide

Benefits of Microsoft Private Cloud Solution

Microsoft private cloud solutions, built on Microsoft Windows Server and System Center, dramatically change the way that enterprise customers produce and consume IT services by creating a layer of abstraction over pooled IT resources.

Hyper-V is Microsoft's hypervisor which provides a scalable, reliable, and highly available platform with unlimited virtualization rights included in the Windows Server Datacenter Edition. Features in Windows Server increase availability and performance, improves management, and simplifies methods for deployment including live migration.

When combined with System Center, customers benefit from enterprise class virtualization, end-to-end service management and deep insight to keep applications up and running more reliably.

Microsoft private cloud solutions enable application-level management and monitoring providing deep applications insights with the ability to automatically orchestrate resources enable you to deliver applications as services, rapidly resolve problems, increase application uptime and meet desired SLAs. In addition, it supports Microsoft and non-Microsoft hypervisors, operating systems, and support for open source tools allowing you to leverage your existing infrastructure investments and skills.

Microsoft Private Cloud solutions offer the best economics by integrating a highly available and easy to manage multi-server platform with breakthrough efficiency and ubiquitous automation. It also provides Dynamic, multi-tenant virtualization, storage and networking infrastructure providing maximum flexibility for delivering and connecting to cloud services.

Go to http://microsoft.com/privatecloud to learn more about Microsoft offerings.

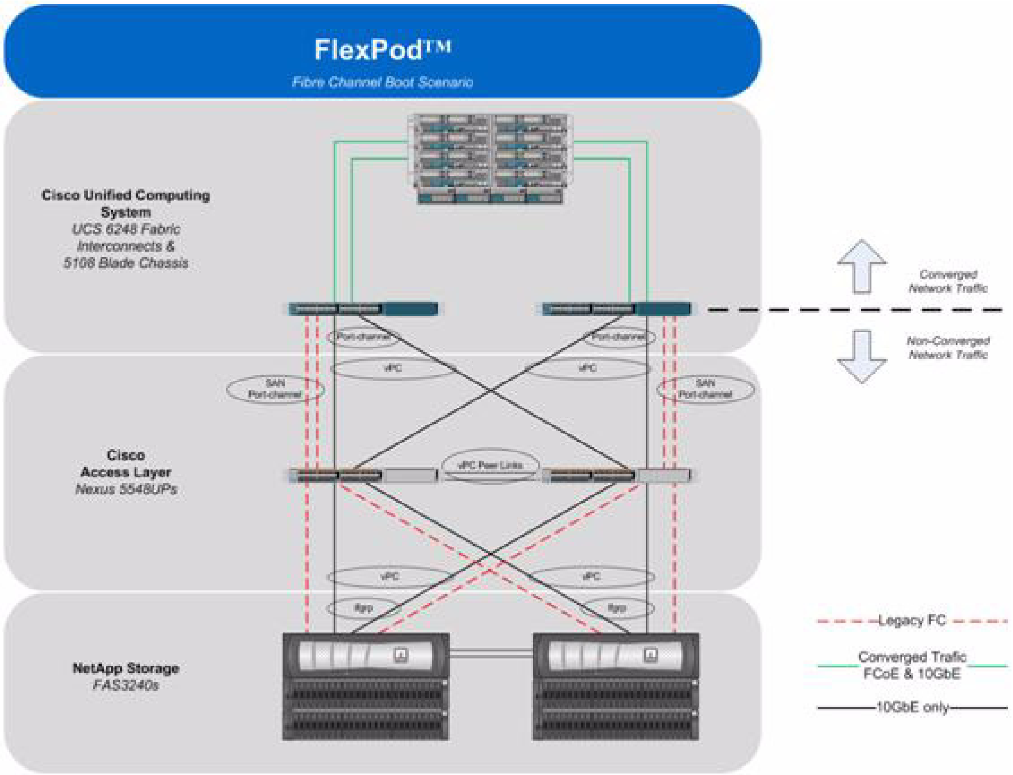
Architecture

The FlexPod architecture is highly modular or “pod like.” Although each customer's FlexPod unit might vary in its exact configuration, once a FlexPod unit is built, it can easily be scaled as requirements and demand change. This includes scaling both up (adding additional resources within a FlexPod unit) and out (adding additional FlexPod units).

Specifically, FlexPod is a defined set of hardware and software that serves as an integrated foundation for all virtualization solutions. FlexPod Validated with Microsoft Private Cloud includes NetApp storage, Cisco networking, the Cisco Unified Computing System, and Microsoft virtualization software in a single package. The computing and storage can fit in one data center rack with the networking residing in a separate rack or deployed according to a customer's datacenter design. Due to port density, the networking components can accommodate multiple such configurations.

This document details the deployment of Microsoft Hyper-V on top of a FlexPod infrastructure and therefore focuses on infrastructure deployment as well as OS provisioning and best practices. Figure 1 shows the FlexPod Validated with Microsoft Private Cloud components and the network connections for a configuration with FC and Ethernet based storage. One benefit of a FlexPod architecture is the ability to customize or "flex" the environment to suit a customers' requirements. For this reason, an alternate FCoE-based storage configuration is included in the Appendix.

Figure 1 FlexPod for Microsoft Private Cloud Components


FlexPod™
Fibre Channel Boot Scenario
Cisco Unified Computing System
UCS 6248 Fabric Interconnects & 5108 Blade Chassis
Port-channel
Port-channel
vPC
vPC
SAN Port-channel
SAN Port-channel
Cisco Access Layer
Nexus 5548UPs
vPC Peer Links
vPC
vPC
ifgrp
ifgrp
NetApp Storage
FAS3240s
Converged Network Traffic
Non-Converged Network Traffic
Legacy FC
Converged Trafic FCoE & 10GbE
10GbE only

The reference configuration includes:

- Two Cisco Nexus 5548 switches
- Two Cisco UCS 6248 fabric interconnects
- One chassis of Cisco UCS blades with two fabric extenders per chassis
- One FAS3240A (HA Pair)

Storage is provided by a NetApp FAS3240A (HA configuration within a single chassis) with accompanying disk shelves. All systems and fabric links feature redundancy, providing for end-to-end high availability (HA). For server virtualization, the deployment includes Microsoft Hyper-V. Although this is the base design, each of the components can be scaled flexibly to support the specific business requirements in question. For example, more (or different) blades and chassis could be deployed to increase compute capacity, additional disk shelves could be deployed to improve I/O capacity and throughput, or special hardware or software features could be added to introduce new features.

The remainder of this document guides you through the low-level steps of deploying the base architecture, as shown in Figure 1. This includes everything from physical cabling, to compute and storage configuration, to configuring virtualization with Microsoft Hyper-V.

Software Revisions

It is important to note the software versions used in this document. Table 1 details the software revisions used throughout this document.

Table 1 Software Revisions

Layer	Compute	Version or Release	Details
Compute	Cisco UCS Fabric Interconnect	2.0(1t)	Embedded management
	Cisco UCS B-200-M2	2.0(1t)	Hardware BIOS version
Network	Nexus Fabric Switch	5.0(3)N2(2a)	Operating system version
Storage	NetApp FAS3240 HA	Data ONTAP 8.0.2	Operating system version
Software	Cisco UCS Hosts	Microsoft Windows Server 2008 R2 SP1 Data Center Edition + Microsoft Hyper-V Role	Operating system version
	Microsoft .NET Framework	3.5.1	Feature enabled within Windows® operating system
	Microsoft Hotfixes	KB2517329 KB2552040 KB2494016 KB2520235 KB2531907 KB2522766 KB2528357	Miscellaneous Microsoft Hotfixes required
	NetApp SnapDrive® for Windows	6.4 64-bit	NetApp integration within Windows operating system
	Data ONTAP DSM	3.5	Windows MPIO software
	NetApp SnapManager for Hyper-V	1.0	Backup/Restore of Hyper-V Virtual Machines.
	Microsoft SQL Server	Windows 2008 SP2	VM (2): SQL Server DB
	Systems Center Operation Manager (SCOM)	2007 R2	VM (1):
	Systems Center Virtual Machine Manager (SCOM)	2008 R2 SP1	VM (1):
	Systems Center Opalis	6.3	VM (1):
	NetApp OnCommand Plug-In	3.0	NetApp Integration within Systems Center
	Cisco UCS Management Pack R2	2.1.0	Cisco Integration within System Center Operations Manager
	Cisco UCS Power Tools	0.9.3.1	Cisco UCS Power Shell Management Cmdlets

Configuration Guidelines

This document provides details for configuring a fully redundant, highly-available configuration. Therefore, references are made as to which component is being configured with each step whether it is A or B. For example, Controller A and Controller B, are used to identify the two NetApp storage controllers that are provisioned with this document while Nexus A and Nexus B identify the pair of Cisco Nexus switches that are configured. The Cisco UCS fabric interconnects are similarly configured. Additionally, this document details steps for provisioning multiple Cisco UCS hosts and these are identified sequentially, VM-Host-Infra-01 and VM-Host-Infra-02, and so on. Finally, to indicate that the reader should include information pertinent to their environment in a given step, <*italicized text*> appears as part of the command structure. See the following example for the vlan create command:

```
    controller A> vlan create
Usage:
    vlan create [-g {on|off}] <ifname> <vlanid_list>
    vlan add <ifname> <vlanid_list>
    vlan delete -q <ifname> [<vlanid_list>]
    vlan modify -g {on|off} <ifname>
    vlan stat <ifname> [<vlanid_list>]
Example:
controller A> vlan create vif0 <management VLAN ID>
```

This document is intended to allow the reader to fully configure the customer environment. In this process, various steps require the reader to insert customer specific naming conventions, IP addresses and VLAN schemes as well as too record appropriate WWPN, WWNN, or MAC addresses. Table 2 details the list of VLANs necessary for deployment as outlined in this guide. Note that in this document that the VM-Data VLAN is used for virtual machine management interfaces. The VM-Mgmt VLAN is used for management interfaces of the Microsoft Hyper-V hosts. A Layer-3 route must exist between the VM-Mgmt and VM-Data VLANS.

Table 2 Necessary VLANs

VLAN Name	VLAN Purpose	ID Used in this Document
VM-Mgmt	VLAN for management interfaces	805
Native	VLAN to which untagged frames are assigned	2
CSV	VLAN for cluster shared volume	801
iSCSI-A	VLAN for iSCSI traffic for fabric A	802
iSCSI-B	VLAN for iSCSI traffic for fabric B	807
Live Migration	VLAN designated for the movement of VM’s from one physical host to another	803
App Cluster	VLAN for cluster connectivity	806
Data	VLAN for application data	804

Deployment

This document details the necessary steps to deploy base infrastructure components as well as provisioning Microsoft Hyper-V as the foundation for virtualized workloads. At the end of these deployment steps, you will be prepared to provision applications on top of a Microsoft Hyper-V virtualized infrastructure. The outlined procedure includes:

- Initial NetApp Controller configuration
- Initial Cisco UCS configuration
- Initial Cisco Nexus configuration
- Creation of necessary VLANs and VSANs for management, basic functionality, and specific to the Microsoft virtualized infrastructure
- Creation of necessary vPCs to provide HA among devices
- Creation of necessary service profile pools: WWPN, world-wide node name (WWNN), MAC, server, and so forth
- Creation of necessary service profile policies: adapter, boot, and so forth
- Creation of two service profile templates from the created pools and policies: one each for fabric A and B
- Provisioning of two servers from the created service profiles in preparation for OS installation
- Initial configuration of the infrastructure components residing on the NetApp Controller
- Installation of Microsoft Windows Server 2008 R2 SP1 Data Center Edition
- Deployment of Microsoft Hyper-V Roles
- Deployment of Microsoft System Center
- Deployment of the NetApp plug-ins

The FlexPod Validated with Microsoft Private Cloud architecture is flexible; therefore, the exact configuration detailed in this section might vary for customer implementations depending on specific requirements. Although customer implementations might deviate from the information that follows, the best practices, features, and configurations listed in this section should still be used as a reference for building a customized FlexPod Validated with Microsoft Private Cloud architecture.

Cabling Information

The following information is provided as a reference for cabling the physical equipment in a FlexPod environment. The tables include both local and remote device and port locations in order to simplify cabling requirements.

The tables in this section contain details for the prescribed and supported configuration of the FAS3240 running Data ONTAP 8.0.2. This configuration leverages a dual-port 10GbE adapter as well as the native FC target ports and the onboard SAS ports for disk shelf connectivity. For any modifications of this prescribed architecture, consult the currently available NetApp Interoperability Matrix Tool (IMT).

This document assumes that out-of-band management ports are plugged into an existing management infrastructure at the deployment site.

Be sure to follow the cable directions in this section. Failure to do so will result in necessary changes to the deployment procedures that follow because specific port locations are mentioned.

It is possible to order a FAS3240A system in a different configuration from what is prescribed in the tables in this section. Before starting, be sure the configuration matches what is described in the tables and diagrams in this section

Figure 2 shows a FlexPod cabling diagram. The labels indicate connections to end points rather than port numbers on the physical device. For example, connection 1 is an FCoE target port connected from NetApp controller A to Nexus 5548 A. SAS connections 23, 24, 25, and 26 as well as ACP connections 27 and 28 should be connected to the NetApp storage controller and disk shelves according to best practices for the specific storage controller and disk shelf quantity.

Figure 2 FlexPod Cabling Diagram

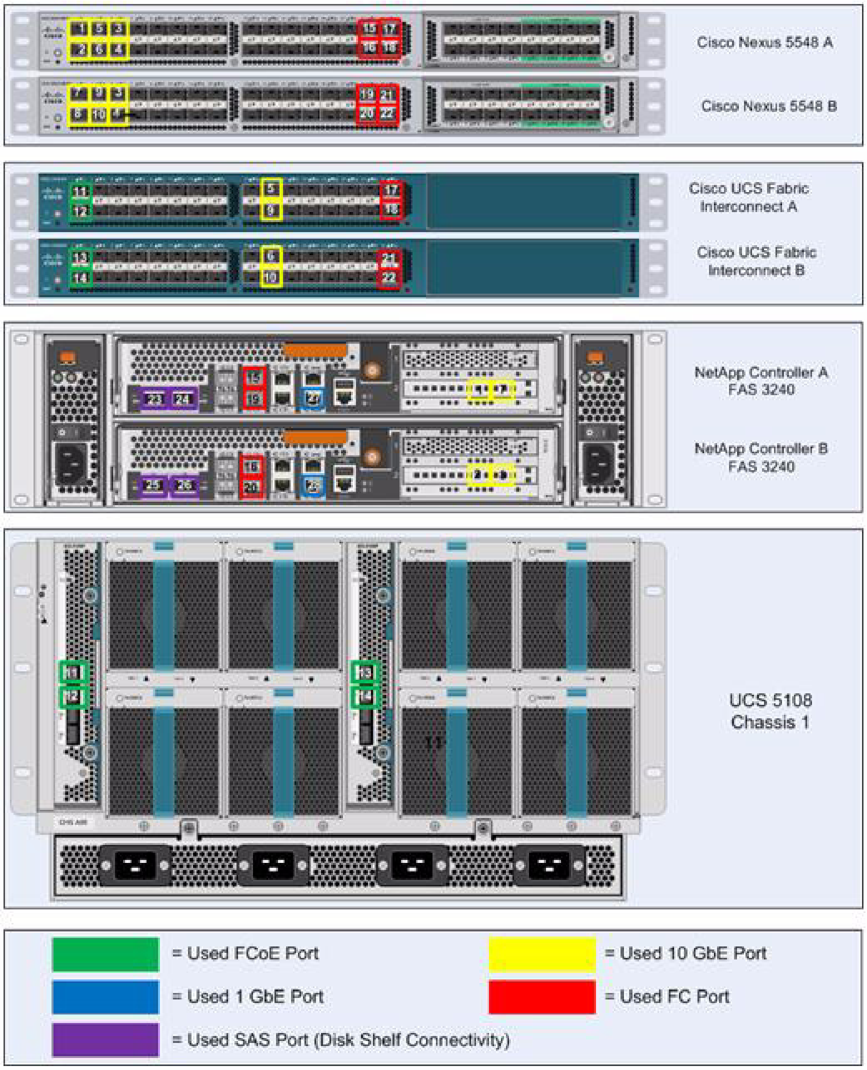

Cisco Nexus 5548 A
Cisco Nexus 5548 B
Cisco UCS Fabric Interconnect A
Cisco UCS Fabric Interconnect B
NetApp Controller A FAS 3240
NetApp Controller B FAS 3240
UCS 5108 Chassis 1
🟩 = Used FCoE Port
🟨 = Used 10 GbE Port
🟦 = Used 1 GbE Port
🟥 = Used FC Port
🟪 = Used SAS Port (Disk Shelf Connectivity)

Table 3 Cisco Nexus 5548 A Ethernet Cabling Information

Local Device	Local Port	Connection	Remote Device	Remote Port
Cisco Nexus 5548 A	Eth1/1	10GbE	NetApp controller A	e2a
	Eth1/2	10GbE	NetApp controller B	e2a
	Eth1/5	10GbE	Cisco Nexus 5548 B	Eth1/5
	Eth1/6	10GbE	Cisco Nexus 5548 B	Eth1/6
	Eth1/3	10GbE	Cisco UCS fabric interconnect A	Eth1/19
	Eth1/4	10GbE	Cisco UCS fabric interconnect B	Eth1/19
	MGMT0	100MbE	100MbE management switch	Any

Note For devices requiring GbE connectivity, use the GbE Copper SFP+s (GLC-T=).

Table 4 Cisco Nexus 5548 B Ethernet Cabling Information

Local Device	Local Port	Connection	Remote Device	Remote Port
Cisco Nexus 5548 B	Eth1/1	10GbE	NetApp controller A	e2b
	Eth1/2	10GbE	NetApp controller B	e2b
	Eth1/5	10GbE	Cisco Nexus 5548 A	Eth1/5
	Eth1/6	10GbE	Cisco Nexus 5548 A	Eth1/6
	Eth1/3	10GbE	Cisco UCS fabric interconnect A	Eth1/20
	Eth1/4	10GbE	Cisco UCS fabric interconnect B	Eth1/20
	MGMT0	100MbE	100MbE management switch	Any

Note For devices requiring GbE connectivity, use the GbE Copper SFP+s (GLC-T=).

Table 5 NetApp Controller A Ethernet Cabling Information

Local Device	Local Port	Connection	Remote Device	Remote Port
NetApp controller A	e0M	100MbE	100MbE management switch	Any
	e0P	GbE	SAS shelves	ACP port
	e2a	10GbE	Cisco Nexus 5548 A	Eth1/1
	e2b	10GbE	Cisco Nexus 5548 B	Eth1/1

Table 6 NetApp Controller B Ethernet Cabling Information

Local Device	Local Port	Connection	Remote Device	Remote Port
NetApp controller B	e0M	100MbE	100MbE management switch	Any
	e0P	GbE	SAS shelves	ACP port
	e2a	10GbE	Cisco Nexus 5548 A	Eth1/2
	e2b	10GbE	Cisco Nexus 5548 B	Eth1/2

Table 7 Cisco UCS Fabric Interconnect A Ethernet Cabling Information

Local Device	Local Port	Connection	Remote Device	Remote Port
Cisco UCS fabric interconnect A	Eth1/19	10GbE	Cisco Nexus 5548 A	Eth1/3
	Eth1/20	10GbE	Cisco Nexus 5548 B	Eth1/3
	Eth1/1	FCoE/10GbE	Chassis 1 FEX A	Port 1
	Eth1/2	FCoE/10GbE	Chassis 1 FEX A	Port 2
	Eth1/3	FCoE/10GbE	Chassis 2 FEX A (if required)	Port 1
	Eth1/4	FCoE/10GbE	Chassis 2 FEX A (if required)	Port 2
	Eth1/5	FCoE/10GbE	Chassis 3 FEX A (if required)	Port 1
	Eth1/6	FCoE/10GbE	Chassis 3 FEX A (if required)	Port 2
	MGMT0	100MbE	100MbE management switch	Any
	L1	GbE	Cisco UCS fabric interconnect B	L1
	L2	GbE	Cisco UCS fabric interconnect B	L2

Table 8 Cisco UCS Fabric Interconnect B Ethernet Cabling Information

Local Device	Local Port	Connection	Remote Device	Remote Port
Cisco UCS fabric interconnect B	Eth1/19	10GbE	Cisco Nexus 5548 A	Eth1/4
	Eth1/20	10GbE	Cisco Nexus 5548 B	Eth1/4
	Eth1/1	10GbE/FCoE	Chassis 1 FEX B	Port 1
	Eth1/2	10GbE/FCoE	Chassis 1 FEX B	Port 2
	Eth1/3	10GbE/FCoE	Chassis 2 FEX B (if required)	Port 1
	Eth1/4	10GbE/FCoE	Chassis 2 FEX B (if required)	Port 2
	Eth1/5	10GbE/FCoE	Chassis 3 FEX B (if required)	Port 1
	Eth1/6	10GbE/FCoE	Chassis 3 FEX B (if required)	Port 2
	MGMT0	100MbE	100 MbE management switch	Any
	L1	GbE	Cisco UCS fabric interconnect A	L1
	L2	GbE	Cisco UCS fabric interconnect A	L2

Table 9 Cisco Nexus 5548 A Fibre Channel Cabling Information

Local Device	Local Port	Connection	Remote Device	Remote Port
Cisco Nexus 5548 A	FC1/29	FC	Controller_A	0c
	FC1/30	FC	Controller_B	0c
	FC1/31	FC	Cisco UCS fabric interconnect A	Port 31
	FC1/32	FC	Cisco UCS fabric interconnect A	Port 32

Table 10 Cisco Nexus 5548 B Fibre Channel Cabling Information

Local Device	Local Port	Connection	Remote Device	Remote Port
Cisco Nexus 5548 B	FC1/29	FC	Controller_A	0d
	FC1/30	FC	Controller_B	0d
	FC1/31	FC	Cisco UCS fabric interconnect A	Port 31
	FC1/32	FC	Cisco UCS fabric interconnect A	Port 32

Table 11 Cisco UCS Fabric Interconnect A Fibre Channel Cabling Information

Local Device	Local Port	Connection	Remote Device	Remote Port
Cisco UCS fabric interconnect A	Port 31	FC	Cisco Nexus 5548 A	FC1/31
	Port 32	FC	Cisco Nexus 5548 A	FC1/32

Table 12 Cisco UCS Fabric Interconnect B Fibre Channel Cabling Information

Local Device	Local Port	Connection	Remote Device	Remote Port
Cisco UCS fabric interconnect B	Port 31	FC	Cisco Nexus 5548 B	FC1/31
	Port 32	FC	Cisco Nexus 5548 B	FC1/32

NetApp FAS3240A Deployment Procedure: Part 1

The following section provides a detailed procedure for configuring the NetApp FAS3240A for use in a FlexPod Validated with Microsoft Private Cloud environment. These steps should be followed precisely. Failure to do so could result in an improper configuration.

Note The configuration steps detailed in this section provides guidance for configuring the FAS3240A running Data ONTAP 8.0.2.

Assign Controller Disk Ownership

The following steps provide the details for assigning disk ownership, disk initialization and verification.

Controller A

1. During controller boot, when prompted for Boot Menu, press **CTRL-C**.
2. At the menu prompt, select option **5** for Maintenance mode boot.
3. Type **Yes** if prompted with Continue to boot?
4. Type **disk show**. No disks should be assigned to the controller.
5. Refer to the Local System ID: value for the following disk assignment.

Note Half the total number of disks in the environment are assigned to this controller and half to the other controller. Divide the number of disks in half and use the result in the following command for the <# of disks>.

6. Type **disk assign -n <#>**.
7. Type **halt** to reboot the controller.
8. If the controller stops at a LOADER-A> prompt, type **autoboot** to start Data ONTAP.
9. During controller boot, when prompted, press **CTRL-C**.
10. At the menu prompt, select option **4** for a clean configuration and initialize all disks.
11. The installer asks if you want to zero the disks and install a new file system. Answer **y**.
12. A warning is displayed that this will erase all of the data on the disks. Answer **y** that you are sure this is what you want to do.

Note The initialization and creation of the root volume can take 75 minutes or more to complete, depending on the number of disks attached. When initialization is complete, the storage system reboots.

Controller B

1. During controller boot, when prompted to press CTRL-C for special boot menu, press **CTRL-C**.
2. At the menu prompt, select option **5** for Maintenance mode boot.
3. Type **Yes** if prompted with Continue to boot?
4. Type **disk show**. No disks should be assigned to the controller.
5. Reference the Local System ID: value for the following disk assignment.

Note The initialization and creation of the root volume can take 75 minutes or more to complete, depending on the number of disks attached. When initialization is complete, the storage system reboots.

6. Type **disk assign -n <#>**.
7. Type **halt** to reboot the controller.
8. If the controller stops at a LOADER-B> prompt, type **autoboot** to start Data ONTAP.
9. During controller boot, when prompted to press CTRL-C for Boot Menu, press **CTRL-C**.
10. At the menu prompt, select option **4** for a clean configuration and initialize all disks.
11. The installer asks if you want to zero the disks and install a new file system. Answer **y**.
12. A warning displays that this will erase all of the data on the disks. Answer **y** that you are sure this is what you want to do.

Note The initialization and creation of the root volume can take 75 minutes or more to complete, depending on the number of disks attached. When initialization is complete, the storage system reboots.

Set Up Data ONTAP 8.0.2

The following steps provide the details for setting up Data ONTAP 8.0.2.

Controller A

1. After the disk initialization and the creation of the root volume, Data ONTAP setup begins.
2. Enter the hostname of the storage system.
3. Answer **y** for setting up interface groups.
4. Enter **1** for the number of interface groups to configure.
5. Name the interface **vif0**.
6. Enter **l** to specify the interface as LACP.
7. Enter **I** to specify IP load balancing
8. Enter **2** for the number of links for vif0.
9. Enter **e2a** for the name of the first link.

10. Enter **e2b** for the name of the second link.
11. Enter the controller in-band management address when prompted for an IP address for vif0.
12. Enter the netmask for the controller in-band management address.
13. Enter **y** for interface group vif0 taking over a partner interface.
14. Enter **vif0** for the name of the interface to be taken over.
15. Press **Enter** to accept the blank IP address for e0a.
16. Enter **n** for interface e0a taking over a partner interface.
17. Press **Enter** to accept the blank IP address for e0b.
18. Enter **n** for interface e0b taking over a partner interface.
19. Enter the IP address of the out-of-band management interface e0M.
20. Enter the subnet mask for e0M.
21. Enter **y** for interface e0M taking over a partner IP address during failover.
22. Enter **e0M** for the name of the interface to be taken over.
23. Press **Enter** to accept the default flow control of full.
24. Answer **n** to continuing setup through the Web interface.
25. Enter the IP address for the default gateway for the storage system.
26. Enter the IP address for the administration host.
27. Enter the local timezone (for example, PST, MST, CST, or EST).
28. Enter the location for the storage system.
29. Answer **y** to enable DNS resolution.
30. Enter the DNS domain name.
31. Enter the IP address for the first name server.
32. Answer **n** to finish entering DNS servers, or answer **y** to add up to two more DNS servers.
33. Answer **n** for running the NIS client.
34. Press **Enter** to acknowledge the AutoSupport message.
35. Answer **y** to configuring the SP LAN interface.
36. Answer **n** to setting up DHCP on the SP LAN interface.
37. Enter the IP address for the SP LAN interface.
38. Enter the subnet mask for the SP LAN interface.
39. Enter the IP address for the default gateway for the SP LAN interface.
40. Enter the fully qualified domain name for the mail host to receive SP messages and AutoSupport.
41. Enter the IP address for the mail host to receive SP messages and AutoSupport.
42. Enter the new administrative (root) password.
43. Enter the new administrative (root) password again to confirm.
44. After these steps are completed, the controller should display a password prompt. Enter the administrative password to login as root.

Controller B

1. After the disk initialization and the creation of the root volume, Data ONTAP setup begins.
2. Enter the hostname of the storage system.
3. Answer **y** for setting up interface groups.
4. Enter **1** for the number of interface groups to configure.
5. Name the interface **vif0**.
6. Enter **l** to specify the interface as LACP.
7. Enter **i** to specify IP load balancing
8. Enter **2** for the number of links for vif0.
9. Enter **e2a** for the name of the first link.
10. Enter **e2b** for the name of the second link.
11. Enter the controller in-band management address when prompted for an IP address for vif0.
12. Enter the netmask for the controller in-band management address.
13. Enter **y** for interface group vif0 taking over a partner interface.
14. Enter **vif0** for the name of the interface to be taken over.
15. Press **Enter** to accept the blank IP address for e0a.
16. Enter **n** for interface e0a taking over a partner interface.
17. Press **Enter** to accept the blank IP address for e0b.
18. Enter **n** for interface e0b taking over a partner interface.
19. Enter the IP address of the out-of-band management interface, e0M.
20. Enter the subnet mask for e0M.
21. Enter **y** for interface e0M taking over a partner IP address during failover.
22. Enter **e0M** for the name of the interface to be taken over.
23. Press **Enter** to accept the default flow control of full.
24. Answer **n** to continuing setup through the Web interface.
25. Enter the IP address for the default gateway for the storage system.
26. Enter the IP address for the administration host.
27. Enter the local timezone (for example, PST, MST, CST, or EST).
28. Enter the location for the storage system.
29. Answer **y** to enable DNS resolution.
30. Enter the DNS domain name.
31. Enter the IP address for the first nameserver.
32. Answer **n** to finish entering DNS servers, or answer **y** to add up to two more DNS servers.
33. Answer **n** for running the NIS client.
34. Press **Enter** to acknowledge the AutoSupport message.
35. Answer **y** to configuring the SP LAN interface.
36. Answer **n** to setting up DHCP on the SP LAN interface.
37. Enter the IP address for the SP LAN interface.

38. Enter the subnet mask for the SP LAN interface.
39. Enter the IP address for the default gateway for the SP LAN interface.
40. Enter the fully qualified domain name for the mail host to receive SP messages and AutoSupport.
41. Enter the IP address for the mail host to receive SP messages and AutoSupport.
42. Enter the new administrative (root) password.
43. Enter the new administrative (root) password again to confirm.
44. After these steps are completed, the controller should display a password prompt. Enter the administrative password to login as root.

Install Data ONTAP to Onboard Flash Storage

The following steps provide the details for installing Data ONTAP to the onboard flash storage.

Controller A and Controller B

1. Install the Data ONTAP image to the onboard flash device by using the software install and indicating the http or https Web address of the NetApp Data ONTAP 8.0.2 flash image.
2. After this is complete, type **download** and press **Enter** to download the software to the flash device.

Harden Storage System Logins and Security

The following steps the provide details for hardening the storage system logins and security.

Controller A and Controller B

1. Type **secureadmin disable ssh**.
2. Type **secureadmin setup -f ssh** to enable ssh on the storage controller.
3. If prompted, type **yes** to rerun ssh setup.
4. Accept the default values for ssh1.x protocol.
5. Enter **1024** for ssh2 protocol.
6. Enter **yes** if the information specified is correct and to create the ssh keys.
7. Type **options telnet.enable off** to disable telnet on the storage controller.
8. Type **secureadmin setup ssl** to enable ssl on the storage controller.
9. If prompted, type **yes** to rerun ssl setup.
10. Enter the country name code, state or province name; locality name; organization name, and organization unit name.
11. Enter the fully qualified domain name of the storage system.
12. Enter the administrator's e-mail address.
13. Accept the default for days until the certificate expires.
14. Enter **1024** for the ssl key length.
15. Enter **options httpd.admin.enable off** to disable http access to the storage system.
16. Enter **options httpd.admin.ssl.enable on** to enable secure access to FilerView.

Install Required Licenses

The following steps provide the details about storage licenses that are used in this reference architecture for feature enablement.

Recommended licenses include:

- near_store: To enable the NearStore® personality on a controller
- a_sis: To enable advanced single instance storage availability
- cluster (cf): To configure storage controllers into an HA pair
- CIFS: To enable the CIFS protocol
- FCP: To enable the FCP protocol
- iSCSI: To enable the iSCSI protocol
- flash_cache: To enable usage of the Flash Cache module
- flex_clone: To enable the provisioning of NetApp Flex-Clones® volumes
- snapdrive_windows: To enable storage-based usage of NetApp SnapDrive® for Windows
- snapmanager_hyperv; To enable the use of NetApp SnapManager® for Microsoft Hyper-V

Note If deduplication is required, license Near-Store before licensing a_sis.

Controller A and Controller B

1. Type **license add <*necessary licenses*>** to add licenses to the storage system.
2. Type **license** to double-check the installed licenses.
3. Type **reboot** to reboot the storage controller.

Configure Native FC Ports as FC Targets Adapters

The following steps provide the details for configuring the native FC ports as target ports.

Controller A and Controller B

1. Type **fcadmin config**.

Note This allows the administrator to confirm the state of the native FC ports. If the ports are configured as initiators as opposed to targets proceed to step 2. For the following changes to take effect, a reboot must occur.

2. Type **fc admin config -t target 0c**.
3. Type **fc admin config -t target 0d**.
4. Type **reboot** to reboot the storage controller.

Enable Active-Active Controller Configuration Between Two Storage Systems

This step provides the details for enabling active-active controller configuration between the two storage systems.

Controller A Only

1. After both controllers have rebooted, type **cf enable** and press **Enter** to enable active-active controller configuration.

Start FCP

This step provides details for enabling the Fibre Channel protocol.

Controller A and Controller B

1. Type **fcp** start.

Start iSCSI

This step provides details for enabling the iSCSI protocol.

Controller A and Controller B

1. Type **iscsi start**.

Set Up Storage System NTP Time Synchronization and CDP Enablement

The following steps provide the details for setting up storage system NTP time synchronization and enablement of Cisco Discovery Protocol (CDP).

Controller A and Controller B

1. Type **date CCyymmddhhmm** where CCyy is the four-digit year, mm is the two-digit month, dd is the two-digit day of the month, hh is the two-digit hour, and the second mm is the two-digit minute to set the storage system time to the actual time.
2. Type **options timed.proto ntp** to synchronize with an NTP server.
3. Type **options timed.servers <*NTP server IP*>** to add the NTP server to the storage system list.
4. Type **options timed.enable on** to enable NTP synchronization on the storage system.
5. Type **options cdpd.enable on**.

Create Data Aggregate aggr1

This step provides the details for creating the data aggregate aggr1.

Note In most cases, the following command finishes quickly, but depending on the state of each disk, it might be necessary to zero some or all of the disks in order to add them to the aggregate. This might take up to 60 minutes to complete.

Controller A

1. Type **aggr create aggr1 -B 64 <*# of disks for aggr1*>** to create aggr1 on the storage controller.

Controller B

1. Type **aggr create aggr1 -B 64 <*# of disks for aggr1*>** to create aggr1 on the storage controller.

Create SNMP Requests Role and Assign SNMP Login Privileges

The following steps provide the details for creating the SNMP requests role and assigning SNMP login privileges to it.

Controller A and Controller B

1. Run the following command: `useradmin role add <Controller SNMP request role> -a login-snmp`.

Create SNMP Management Group and Assign SNMP Request Role

The following step provides the details for creating an SNMP management group and assigning a SNMP request role to it.

Controller A and Controller B

1. Run the following command: `useradmin group add <Controller SNMP managers> -r <Controller SNMP request role>`.

Create SNMP User and Assign to SNMP Management Group

The following step provides the details for creating SNMP user and assigning it to an SNMP management group.

Controller A and Controller B

1.Run the following command: `useradmin user add <Controller SNMP users> -g <Controller SNMP managers>`.

After the user is created, the system prompts for a password. Enter the SNMP password when prompted.

Set Up SNMP v1 Communities on Storage Controllers

The following steps provide the details for setting up SNMP v1 communities on the storage controllers so that OnCommand System Manager can be used.

Controller A and Controller B

1. Run the following command: `snmp community delete all`.
2. Run the following command: `snmp community add ro <`*`Controller SNMP community`*`>`.

Set Up SNMP Contact Information for Each Storage Controller

The following step provides the details for setting SNMP contact information for each of the storage controllers.

Controller A and Controller B

1. Run the following command: `snmp contact <`*`Controller admin email address`*`>`.

Set SNMP Location Information for Each Storage Controller

The following step provides the details for setting SNMP location information for each of the storage controllers.

Controller A and Controller B

1. Run the following command: `snmp location <`*`Controller SNMP site name`*`>`.

Reinitialize SNMP on Storage Controllers

The following step provides the details for reinitializing SNMP on the storage controllers.

Controller A and Controller B

1. Run the following command: `snmp init 1`.

Enable Flash Cache

The following step provides the details for enabling the NetApp Flash Cache module, if installed.

Controller A and Controller B

1. Enter the following command to enable Flash Cache on each controller: `options flexscale.enable on`.

Add VLAN Interfaces

The following steps provide the details for adding VLAN interfaces on the storage controllers.

Controller A

1. Run the following command: `vlan add vif0-<iSCSI A VLAN ID>`.
2. Run the following command: `wrfile -a /etc/rc vlan add vif0-\<iSCSI A VLAN ID>`.
3. Run the following command: `ifconfig vif0-<iSCSI A VLAN ID> mtusize 9000 partner vif0-<iSCSI A VLAN ID>`.

4. Run the following command: `wrfile -a /etc/rc ifconfig vif0-<iSCSI A VLAN ID> mtusize 9000 partner vif0-<iSCSI A VLAN ID>`.
5. Run the following command: `ifconfig vif0-<iSCSI A VLAN ID> <Controller A iSCSI A VLAN IP> netmask <iSCSI A VLAN netmask>`.
6. Run the following command: `wrfile -a ifconfig vif0-<iSCSI A VLAN ID> <Controller A iSCSI A VLAN IP> netmask <iSCSI A VLAN netmask>`.
7. Run the following command: `vlan add vif0-<iSCSI B VLAN ID>`.
8. Run the following command: `wrfile -a /etc/rc vlan add vif0-<iSCSI B VLAN ID>`.
9. Run the following command: `ifconfig vif0-<iSCSI B VLAN ID> mtusize 9000 partner vif0-<iSCSI B VLAN ID>`.
10. Run the following command: `wrfile -a /etc/rc ifconfig vif0-<iSCSI B VLAN ID> mtusize 9000 partner vif0-<iSCSI B VLAN ID>`.
11. Run the following command: `ifconfig vif0-<iSCSI B VLAN ID> <Controller A iSCSI B VLAN IP> netmask <iSCSI B VLAN netmask>`.
12. Run the following command: `wrfile -a ifconfig vif0-<iSCSI VLAN ID> <Controller A iSCSI B VLAN IP> netmask <iSCSI B VLAN netmask>`.

Controller B

1. Run the following command: `vlan add vif0-<iSCSI A VLAN ID>`.
2. Run the following command: `wrfile -a /etc/rc vlan add vif0-<iSCSI A VLAN ID>`.
3. Run the following command: `ifconfig vif0-<iSCSI A VLAN ID> mtusize 9000 partner vif0-<iSCSI A VLAN ID>`.
4. Run the following command: `wrfile -a /etc/rc ifconfig vif0-<iSCSI A VLAN ID> mtusize 9000 partner vif0-<iSCSI A VLAN ID>`.
5. Run the following command: `ifconfig vif0-<iSCSI A VLAN ID> <Controller B iSCSI A VLAN IP> netmask <iSCSI A VLAN netmask>`.
6. Run the following command: `wrfile -a ifconfig vif0-<iSCSI VLAN ID> <Controller B iSCSI A VLAN IP> netmask <iSCSI A VLAN netmask>`.
7. Run the following command: `vlan add vif0-<iSCSI B VLAN ID>`.
8. Run the following command: `wrfile -a /etc/rc vlan add vif0-<iSCSI B VLAN ID>`.
9. Run the following command: `ifconfig vif0-<iSCSI B VLAN ID> mtusize 9000 partner vif0-<iSCSI B VLAN ID>`.
10. Run the following command: `wrfile -a /etc/rc ifconfig vif0-<iSCSI B VLAN ID> mtusize 9000 partner vif0-<iSCSI B VLAN ID>`.
11. Run the following command: `ifconfig vif0-<iSCSI B VLAN ID> <Controller B iSCSI B VLAN IP> netmask <iSCSI B VLAN netmask>`.
12. Run the following command: `wrfile -a ifconfig vif0-<iSCSI VLAN ID> <Controller B iSCSI B VLAN IP> netmask <iSCSI B VLAN netmask>`.

Add Infrastructure Volumes

The following steps provide the details for adding volumes on the storage controller for SAN boot of the Cisco UCS hosts as well as virtual machine provisioning.

Note Because this configuration calls for an active-active use of the storage controllers, volumes are created on both controllers and the load is distributed.

Controller A

1. Run the following command: `vol create CSV_A -s none aggr1 500g`.
2. Run the following command: `sis on /vol/CSV_A`.
3. Run the following command: `vol create win_boot_A -s none aggr1 1t`.
4. Run the following command: `sis on /vol/win_boot_A`.
5. Run the following command: `vol create Infra_iSCSI_A -s none aggr1 1500g`.
6. Run the following command: `sis on /vol/Infra_iSCSI_A`.
7. Run the following command: `vol create VHD_A -s none aggr1 1t`.
8. Run the following command: `sis on /vol/VHD_A`.

Controller B

1. Run the following command: `vol create CSV_B -s none aggr1 1t`.
2. Run the following command: `sis on /vol/CSV_B`.
3. Run the following command: `vol create win_boot_B -s none aggr1 1t`.
4. Run the following command: `sis on /vol/win_boot_B`.
5. Run the following command: `vol create Infra_iSCSI_B -s none aggr1 1500g`.
6. Run the following command: `sis on /vol/Infra_iSCSI_B`.
7. Run the following command: `vol create VHD_B -s none aggr1 1t`.
8. Run the following command: `sis on /vol/VHD_B`.

Cisco Nexus 5548 Deployment Procedure: Part 1

The following section provides a detailed procedure for configuring the Cisco Nexus 5548 switches for use in a FlexPod environment. Follow these steps precisely because failure to do so could result in an improper configuration.

Note The configuration steps detailed in this section provides guidance for configuring the Nexus 5548 UP running release 5.0(3)N2(2a).

This configuration also leverages the native VLAN on the trunk ports to discard untagged packets, by setting the native VLAN on the PortChannel, but not including this VLAN in the allowed VLANs on the PortChannel.

Set up Initial Cisco Nexus 5548 Switch

The following steps provide the details for the initial Cisco Nexus 5548 Switch setup.

Cisco Nexus 5548 A

On initial boot and connection to the serial or console port of the switch, the NX-OS setup should automatically start.

1. Enter **yes** to enforce secure password standards.
2. Enter the password for the admin user.
3. Enter the password a second time to commit the password.
4. Enter **yes** to enter the basic configuration dialog.
5. Create another login account (yes/no) [**n**]: **Enter**.
6. Configure read-only SNMP community string (yes/no) [n]: **Enter**.
7. Configure read-write SNMP community string (yes/no) [**n**]: **Enter**.
8. Enter the switch name: <***Nexus A Switch name***> **Enter**.
9. Continue with out-of-band (mgmt0) management configuration? (yes/no) [**y**]: **Enter**.
10. Mgmt0 IPv4 address: ***<Nexus A mgmt0 IP>*** **Enter**.
11. Mgmt0 IPv4 netmask: ***<Nexus A mgmt0 netmask>*** **Enter**.
12. Configure the default gateway? (yes/no) [**y**]: **Enter**.
13. IPv4 address of the default gateway: ***<Nexus A mgmt0 gateway>*** **Enter**.
14. Enable the telnet service? (yes/no) [**n**]: **Enter**.
15. Enable the ssh service? (yes/no) [**y**]: **Enter**.
16. Type of ssh key you would like to generate (dsa/rsa):**rsa**.
17. Number of key bits <768-2048> :**1024 Enter**.
18. Configure the ntp server? (yes/no) [**y**]: **Enter**.
19. NTP server IPv4 address: ***<NTP Server IP>*** **Enter**.
20. Enter basic FC configurations (yes/no) [**n**]: **Enter**.
21. Would you like to edit the configuration? (yes/no) [**n**]: **Enter**.
22. Be sure to review the configuration summary before enabling it.
23. Use this configuration and save it? (yes/no) [**y**]: **Enter**.
24. Configuration may be continued from the console or by using SSH. To use SSH, connect to the mgmt0 address of Nexus A.
25. Log in as user admin with the password previously entered.

Cisco Nexus 5548 B

On initial boot and connection to the serial or console port of the switch, the NX-OS setup should automatically start.

1. Enter **yes** to enforce secure password standards.
2. Enter the password for the admin user.
3. Enter the password a second time to commit the password.
4. Enter **yes** to enter the basic configuration dialog.
5. Create another login account (yes/no) [**n**]: **Enter**.
6. Configure read-only SNMP community string (yes/no) [**n**]: **Enter**.

7. Configure read-write SNMP community string (yes/no) [**n**]: **Enter**.
8. Enter the switch name: ***<Nexus B Switch name>*** **Enter**.
9. Continue with out-of-band (mgmt0) management configuration? (yes/no) [**y**]: **Enter**.
10. Mgmt0 IPv4 address: ***<Nexus B mgmt0 IP>*** **Enter**.
11. Mgmt0 IPv4 netmask: ***<Nexus B mgmt0 netmask>*** **Enter**.
12. Configure the default gateway? (yes/no) [**y**]: **Enter**.
13. IPv4 address of the default gateway: ***<Nexus B mgmt0 gateway>*** **Enter**.
14. Enable the telnet service? (yes/no) [**n**]: **Enter**.
15. Enable the ssh service? (yes/no) [**y**]: **Enter**.
16. Type of ssh key you would like to generate (dsa/rsa):**rsa**.
17. Number of key bits <768-2048> :**1024 Enter**.
18. Configure the ntp server? (yes/no) [**y**]: **Enter**.
19. NTP server IPv4 address: ***<NTP Server IP>*** **Enter**.
20. Enter basic FC configurations (yes/no) [**n**]: **Enter**.
21. Would you like to edit the configuration? (yes/no) [**n**]: **Enter**.
22. Be sure to review the configuration summary before enabling it.
23. Use this configuration and save it? (yes/no) [**y**]: **Enter**.
24. Configuration may be continued from the console or by using SSH. To use SSH, connect to the mgmt0 address of Nexus A.
25. Log in as user admin with the password previously entered.

Enable Appropriate Cisco Nexus Features

The following steps provide the details for enabling the appropriate Cisco Nexus features.

Nexus A and Nexus B

1. Type **config t** to enter the global configuration mode.
2. Type **feature lacp**.
3. Type **feature fcoe**.
4. Type **feature npiv**.
5. Type **feature vpc**.
6. Type **feature fport-channel-trunk**.

Set Global Configurations

The following steps provide the details for setting global configurations.

Nexus A and Nexus B

1. From the global configuration mode, type **spanning-tree port type network default** to make sure that, by default, the ports are considered as network ports in regards to spanning-tree.

2. Type **spanning-tree port type edge bpduguard default** to enable bpduguard on all edge ports by default.
3. Type **spanning-tree port type edge bpdufilter default** to enable bpdufilter on all edge ports by default.
4. Type **ip access-list classify_Silver**.
5. Type **10 permit ip <iSCSI-A net address>** anywhere the variable is the network address of the iSCSI-A VLAN in CIDR notation (i.e. 192.168.102.0/24).
6. Type **20 permit ip any <iSCSI-A net address>**.
7. Type **30 permit ip <iSCSI-B net address> any**.
8. Type **40 permit ip any <iSCSI-B net address>**.
9. Type **exit**.
10. Type **class-map type qos match-all class-gold**.
11. Type **match cos 4**.
12. Type **exit**.
13. Type **class-map type qos match-all class-silver**.
14. Type **match cos 2**.
15. Type **match access-group name classify_Silver**.
16. Type **exit**.
17. Type **class-map type queuing class-gold**.
18. Type **match qos-group 3**.
19. Type **exit**.
20. Type **class-map type queuing class-silver**.
21. Type **match qos-group 4**.
22. Type **exit**.
23. Type **policy-map type qos system_qos_policy**.
24. Type **class class-gold**.
25. Type **set qos-group 3**.
26. Type **class class-silver**.
27. Type **set qos-group 4**.
28. Type **class class-fcoe**.
29. Type **set qos-group 1**.
30. Type **exit**.
31. Type **exit**.
32. Type **policy-map type queuing system_q_in_policy**.
33. Type **class**.
34. Type **class Type queuing class-fcoe**.
35. Type **bandwidth percent 20**.
36. Type **class type queuing class-gold**.

37. Type **bandwidth percent 33**.
38. Type **class type queuing class-silver**.
39. Type **bandwidth percent 2**9.
40. Type **class type queuing class-default**.
41. Type **bandwidth percent 18**.
42. Type **exit**.
43. Type **exit**.
44. Type **policy-map type queuing system_q_out_policy**.
45. Type **class type queuing class-fcoe**.
46. Type **bandwidth percent 20**.
47. Type **class type queuing class-gold**.
48. Type **bandwidth percent 3**3.
49. Type **class type queuing class-silver**.
50. Type **bandwidth percent 29**.
51. Type **class type queuing class-default**.
52. Type **bandwidth percent 18**.
53. Type **exit**.
54. Type **exit**.
55. Type **class-map type network-qos class-gold**.
56. Type **match qos-group 3**.
57. Type **exit**.
58. Type **class-map type network-qos class-silver**.
59. Type **match qos-group 4**.
60. Type **exit**.
61. Type **policy-map type network-qos system_nq_policy**.
62. Type **class type network-qos class-gold**.
63. Type **set cos 4**.
64. Type **mtu 9000**.
65. Type **class type network-qos class-fcoe**.
66. Type **pause no-drop**.
67. Type **mtu 2158**.
68. Type **class type network-qos class-silver**.
69. Type **set cos 2**.
70. Type **mtu 9000**.
71. Type **class type network-qos class-default**.
72. Type **mtu 9000**.
73. Type **exit**.
74. Type **system qos**.

75. Type **service-policy type qos input system_qos_policy**.
76. Type **service-policy type queuing input system_q_in_policy**.
77. Type **service-policy type queuing output system_q_out_policy**.
78. Type **service-policy type network-qos system_nq_policy**.
79. Type **exit**.
80. Type **copy run start**.

Configure FC Ports

The following steps provide the details for configuring the necessary FC ports on the Nexus devices.

Nexus A and Nexus B

1. Type **slot 1**.
2. Type **port 29-32 type fc**.

Note If you are using FCoE between the Nexus 5548 and storage, change this to: Type **port 31-32 type fc**.

3. Type **copy run start**.
4. Type **reload**.

   The Nexus switch will reboot. This will take several minutes.

Create the Necessary VLANs

The following steps provide the details for creating the necessary VLANs.

Nexus A and Nexus B

Following the switch reload, log in as user admin with the password you previously entered.

1. Type **config-t**.
2. Type **vlan <VM-MGMT VLAN ID>**.
3. Type **name VM-MGMT-VLAN**.
4. Type **exit**.
5. Type **vlan <Native VLAN ID>**.
6. Type **name Native-VLAN**.
7. Type **exit**.
8. Type **vlan <CSV VLAN ID>**.
9. Type **name CSV-VLAN**.
10. Type **exit**.
11. Type **vlan <iSCSI A VLAN ID>**.
12. Type **name iSCSI-A-VLAN**.
13. Type **exit**.

14. Type **vlan <iSCSI B VLAN ID>**.
15. Type **name iSCSI-B-VLAN**.
16. Type **exit**.
17. Type **vlan <Live Migration VLAN ID>**.
18. Type **name Live-Migration-VLAN**.
19. Type **exit**.
20. Type **vlan <App-Cluster VLAN ID>**.
21. Type **name App-Cluster-Comm-VLAN**.
22. Type **exit**.
23. Type **vlan <VM Data VLAN ID>**.
24. Type **name VM-Data-VLAN**.
25. Type **exit**.

Add Individual Port Descriptions for Troubleshooting

The following steps provide the details for adding individual port descriptions for troubleshooting activity and verification.

Cisco Nexus 5548 A

1. From the global configuration mode, type interface **Eth1/1**.
2. Type description ***<Controller A:e2a>***.
3. Type **exit**.
4. Type **interface Eth1/2**.
5. Type **description *<Controller B:e2a>***.
6. Type **exit**.
7. Type **interface Eth1/5**.
8. Type **description *<Nexus B:Eth1/5>***.
9. Type **exit**.
10. Type **interface Eth1/6**.
11. Type **description *<Nexus B:Eth1/6>***.
12. Type **exit**.
13. Type **interface Eth1/3**.
14. Type **description *<UCSM A:Eth1/19>***.
15. Type **exit**.
16. Type **interface Eth1/4**.
17. Type **description *<UCSM B:Eth1/19>***.
18. Type **exit**.

Cisco Nexus 5548 B

1. From the global configuration mode, type **interface Eth1/1**.
2. Type **description <*Controller A:e2b*>**.
3. Type **exit**.
4. Type **interface Eth1/2**.
5. Type **description <*Controller B:e2b*>**.
6. Type **exit**.
7. Type **interface Eth1/5**.
8. Type **description <*Nexus A:Eth1/5*>**.
9. Type **exit**.
10. Type **interface Eth1/6**.
11. Type **description <*Nexus A:Eth1/6*>**.
12. Type **exit**.
13. Type **interface Eth1/3**.
14. Type **description <*UCSM A:Eth1/20*>**.
15. Type **exit**.
16. Type **interface Eth1/4**.
17. Type **description <UCSM B:Eth1/20>**.
18. Type **exit**.

Create Necessary Port Channels

The following steps provide the details for creating the necessary port channels between devices.

Cisco Nexus 5548 A

1. From the global configuration mode, type **interface Po10**.
2. Type **description vPC peer-link**.
3. Type **exit**.
4. Type **interface Eth1/5-6**.
5. Type **channel-group 10 mode active**.
6. Type **no shutdown**.
7. Type **exit**.
8. Type **interface Po11**.
9. Type **description <*Controller A*>**.
10. Type **exit**.
11. Type **interface Eth1/1**.
12. Type **channel-group 11 mode active**.
13. Type **no shutdown**.
14. Type **exit**.

15. Type **interface Po12**.
16. Type **description <*Controller B*>**.
17. Type **exit**.
18. Type **interface Eth1/2**.
19. Type **channel-group 12 mode active**.
20. Type **no shutdown**.
21. Type **exit**.
22. Type **interface Po13**.
23. Type **description <*UCSM A*>**.
24. Type **exit**.
25. Type **interface Eth1/3**.
26. Type **channel-group 13 mode active**.
27. Type **no shutdown**.
28. Type **exit**.
29. Type **interface Po14**.
30. Type **description <*UCSM B*>**.
31. Type **exit**.
32. Type **interface Eth1/4**.
33. Type **channel-group 14 mode active**.
34. Type **no shutdown**.
35. Type **exit**.
36. Type **copy run start**.

Cisco Nexus 5548 B

1. From the global configuration mode, type **interface Po10**.
2. Type **description vPC peer-link**.
3. Type **exit**.
4. Type **interface Eth1/5-6**.
5. Type **channel-group 10 mode active**.
6. Type **no shutdown**.
7. Type **exit**.
8. Type **interface Po11**.
9. Type **description <*Controller A*>**.
10. Type **exit**.
11. Type **interface Eth1/1**.
12. Type **channel-group 11 mode active**.
13. Type **no shutdown**.
14. Type **exit**.

15. Type **interface Po12**.
16. Type **description <*Controller B*>**.
17. Type **exit**.
18. Type **interface Eth1/2**.
19. Type **channel-group 12 mode active**.
20. Type **no shutdown**.
21. Type **exit**.
22. Type **interface Po13**.
23. Type **description <*UCSM A*>**.
24. Type **exit**.
25. Type **interface Eth1/3**.
26. Type **channel-group 13 mode active**.
27. Type **no shutdown**.
28. Type **exit**.
29. Type **interface Po14**.
30. Type **description <*UCSM B*>**.
31. Type **exit**.
32. Type **interface Eth1/4**.
33. Type **channel-group 14 mode active**.
34. Type **no shutdown**.
35. Type **exit**.
36. Type **copy run start**.

Add Port Channel Configurations

The following steps provide the details for adding port channel configurations.

Cisco Nexus 5548 A

1. From the global configuration mode, type **interface Po10**.
2. Type **switchport mode trunk**.
3. Type **switchport trunk native vlan <Native VLAN ID>**.
4. Type s**witchport trunk allowed vlan <MGMT VLAN ID, CSV VLAN ID, iSCSI A VLAN ID, iSCSI B VLAN ID, Live Migration VLAN ID, VM Cluster Comm VLAN ID, VM Data VLAN ID>**.
5. Type **spanning-tree port type network**.
6. Type **no shutdown**.
7. Type **exit**.
8. Type **interface Po11**.
9. Type **switchport mode trunk**.

10. Type **switchport trunk native vlan <MGMT VLAN ID>**.
11. Type **switchport trunk allowed vlan <MGMT VLAN ID, iSCSI A VLAN ID, iSCSI B VLAN ID>**.
12. Type **spanning-tree port type edge trunk**.
13. Type **no shutdown**.
14. Type **exit**.
15. Type **interface Po12**.
16. Type **switchport mode trunk**.
17. Type **switchport trunk native vlan <MGMT VLAN ID>**.
18. Type **switchport trunk allowed vlan <MGMT VLAN ID, iSCSI A VLAN ID, iSCSI B VLAN ID >**.
19. Type **spanning-tree port type edge trunk**.
20. Type no **shutdown**.
21. Type **exit**.
22. Type **interface Po13**.
23. Type **switchport mode trunk**.
24. Type **switchport trunk native vlan <Native VLAN ID>**.
25. Type **switchport trunk allowed vlan <MGMT VLAN ID, CSV VLAN ID, iSCSI A VLAN ID, iSCSI B VLAN ID, Live Migration VLAN ID, VM Cluster Comm VLAN ID, VM Data VLAN ID>**.
26. Type **spanning-tree port type edge trunk**.
27. Type **no shutdown**.
28. Type **exit**.
29. Type **interface Po14**.
30. Type **switchport mode trunk**.
31. Type **switchport trunk native vlan <Native VLAN ID>**.
32. Type **switchport trunk allowed vlan <<MGMT VLAN ID, CSV VLAN ID, iSCSI A VLAN ID, iSCSI B VLAN ID, Live Migration VLAN ID, VM Cluster Comm VLAN ID, VM Data VLAN ID>**.
33. Type **spanning-tree port type edge trunk**.
34. Type **no shutdown**.
35. Type **exit**.
36. Type **copy run start**.

Cisco Nexus 5548 B

1. From the global configuration mode, type **interface Po10**.
2. Type **switchport mode trunk**.
3. Type **switchport trunk native vlan <Native VLAN ID>**.
4. Type **switchport trunk allowed vlan <MGMT VLAN ID, CSV VLAN ID, iSCSI A, iSCSI B VLAN ID, VLAN ID, Live Migration VLAN ID, VM Cluster Comm VLAN ID, VM Data VLAN ID>**.

5. Type **spanning-tree port type network**.
6. Type **no shutdown**.
7. Type **exit**.
8. Type **interface Po11**.
9. Type **switchport mode trunk**.
10. Type **switchport trunk native vlan <MGMT VLAN ID>**.
11. Type **switchport trunk allowed vlan <MGMT VLAN ID, iSCSI A VLAN ID, iSCSI B VLAN ID>**.
12. Type **spanning-tree port type edge trunk**.
13. Type **no shutdown**.
14. Type **exit**.
15. Type **interface Po12**.
16. Type **switchport mode trunk**.
17. Type **switchport trunk native vlan <MGMT VLAN ID>**.
18. Type **switchport trunk allowed vlan <MGMT VLAN ID, iSCSI A VLAN ID, iSCSI B VLAN ID>**.
19. Type **spanning-tree port type edge trunk**.
20. Type **no shutdown**.
21. Type **exit**.
22. Type **interface Po13**.
23. Type **switchport mode trunk**.
24. Type **switchport trunk native vlan <Native VLAN ID>**.
25. Type **switchport trunk allowed vlan <MGMT VLAN ID, CSV VLAN ID, iSCSI A VLAN ID, iSCSI B VLAN ID, Live Migration VLAN ID, VM Cluster Comm VLAN ID, VM Data VLAN ID>**.
26. Type **spanning-tree port type edge trunk**.
27. Type **no shutdown**.
28. Type **exit**.
29. Type **interface Po14**.
30. Type **switchport mode trunk**.
31. Type **switchport trunk native vlan <Native VLAN ID>**.
32. Type **switchport trunk allowed vlan <<MGMT VLAN ID, CSV VLAN ID, iSCSI A VLAN ID, iSCSI B VLAN ID, Live Migration VLAN ID, VM Cluster Comm VLAN ID, VM Data VLAN ID>**.
33. Type **spanning-tree port type edge trunk**.
34. Type **no shutdown**.
35. Type **exit**.
36. Type **copy run start**.

Configure Virtual Port Channels

The following steps provide the details for configuring virtual Port Channels (vPCs).

Cisco Nexus 5548 A

1. From the global configuration mode, type **vpc domain <*Nexus vPC domain ID*>**.
2. Type **role priority 10**.
3. Type **peer-keepalive destination <*Nexus B mgmt0 IP*> source <*Nexus A mgmt0 IP*>**.
4. Type **exit**.
5. Type **interface Po10**.
6. Type **vpc peer-link**.
7. Type **exit**.
8. Type **interface Po11**.
9. Type **vpc 11**.
10. Type **exit**.
11. Type **interface Po12**.
12. Type **vpc 12**.
13. Type **exit**.
14. Type **interface Po13**.
15. Type **vpc 13**.
16. Type **exit**.
17. Type **interface Po14**.
18. Type **vpc 14**.
19. Type **exit**.
20. Type **copy run start**.

Cisco Nexus 5548 B

1. From the global configuration mode, type **vpc domain <*Nexus vPC domain ID*>**.
2. Type **role priority 20**.
3. Type **peer-keepalive destination <*Nexus A mgmt0 IP*> source <*Nexus B mgmt0 IP*>**.
4. Type **exit**.
5. Type **interface Po10**.
6. Type **vpc peer-link**.
7. Type **exit**.
8. Type **interface Po11**.
9. Type **vpc 11**.
10. Type **exit**.
11. Type **interface Po12**.
12. Type **vpc 12**.

13. Type **exit**.
14. Type **interface Po13**.
15. Type **vpc 13**.
16. Type **exit**.
17. Type **interface Po14**.
18. Type **vpc 14**.
19. Type **exit**.
20. Type **copy run start**.

Link Into the Existing Network Infrastructure

Depending on the available network infrastructure, several methods and features can be used to uplink the FlexPod environment. If an existing Cisco Nexus environment is present, NetApp recommends using vPCs to uplink the Cisco Nexus 5548 switches included in the FlexPod environment into the infrastructure. The previously described procedures can be used to create an uplink vPC to the existing environment.

Save the Configuration

Nexus A and Nexus B

- Type **copy run star**t.

Cisco Unified Computing System Deployment Procedure

The following section provides a detailed procedure for configuring the Cisco Unified Computing System for use in a FlexPod environment. These steps should be followed precisely because a failure to do so could result in an improper configuration.

Perform Initial Setup of the Cisco UCS 6248 Fabric Interconnects

The following steps provide the details for initial setup of the Cisco UCS 6248 fabric Interconnects

Cisco UCS 6248 A

1. Connect to the console port on the first Cisco UCS 6248 fabric interconnect.
2. At the prompt, to enter the configuration method, enter **console** to continue.
3. If asked to either do 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.

Cisco UCS 6248 B

1. Connect to the console port on the second Cisco UCS 6248 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 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.

Log into Cisco UCS Manager

The following steps provide the details for logging into the Cisco UCS environment.

1. Open a Web browser and navigate to the Cisco UCS 6248 fabric interconnect cluster address.
2. Select 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 user name and enter the administrative password and click **Login** to log in to the Cisco UCS Manager software.

Add a 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.

Cisco UCS Manager

1. Select the Admin tab at the top of the left window.
2. Select **All > Communication Management**.

3. Right-click **Management IP Pool**.
4. Select **Create Block of IP Addresses**.
5. Enter the starting IP address of the block and number of IPs needed as well as the subnet and gateway information.
6. Click **OK** to create the IP block.
7. Click **OK** in the message box.

Synchronize Cisco UCS to NTP

The following steps provide the details for synchronizing the Cisco UCS environment to the NTP server.

Cisco UCS Manager

1. Select the **Admin** tab at the top of the left window.
2. Select **All > Timezone Management**.
3. Right-click **Timezone Management**.
4. In the right pane, select the appropriate timezone from the Timezone drop-down menu.
5. Click **Save Changes**.
6. Click **OK**.
7. Click **Add NTP Server**.
8. Input the NTP server IP and click **OK**.

Configure Unified Ports

The following steps provide the details for modifying an unconfigured Ethernet port into a FC uplink port ports in the Cisco UCS environment.

Note Modification of the unified ports leads to a reboot of the fabric interconnect in question. This reboot can take up to 10 minutes.

Cisco UCS Manager

1. Navigate to the **Equipment** tab in the left pane.
2. Select **Fabric Interconnect A**.
3. In the right pane, click the **General** tab.
4. Select **Configure Unified Ports**.
5. Select **Yes** to launch the wizard.
6. Use the slider tool and move one position to the left to configure the last two ports (31 and 32) as FC uplink ports.
7. Ports 31 and 32 now have the "B" indicator indicating their reconfiguration as FC uplink ports.
8. Click **Finish**.
9. Click **OK**.

10. The Cisco UCS Manager GUI will close as the primary fabric interconnect reboots.
11. After a successful reboot, open a Web browser and navigate to the Cisco UCS 6248 fabric interconnect cluster address.
12. When prompted, enter **admin** for the user name and enter the administrative password and click **Login** to log in to the Cisco UCS Manager software.
13. Navigate to the **Equipment** tab in the left pane.
14. Select **Fabric Interconnect B**.
15. In the right pane, click the **General** tab.
16. Select **Configure Unified Ports**.
17. Select **Yes** to launch the wizard.
18. Use the slider tool and move one position to the left to configure the last two ports (31 and 32) as FC uplink ports.
19. Ports 31 and 32 now have the "B" indicator indicating their reconfiguration as FC uplink ports.
20. Click **Finish**.
21. Click **OK**.

Edit the Chassis Discovery Policy

The following steps provide the details for modifying the chassis discovery policy as the base architecture includes two uplinks from each fabric extender installed in the Cisco UCS chassis.

Cisco UCS Manager

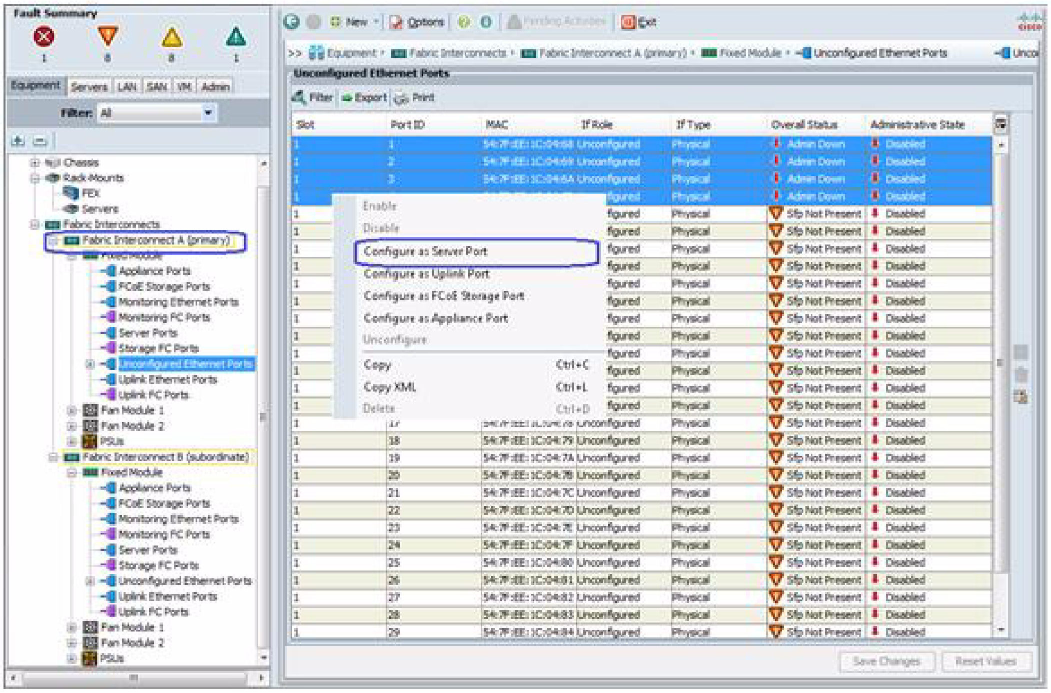
1. Navigate to the **Equipment** tab in the left pane.
2. In the right pane, click the **Policies** tab.
3. Under Global Policies, change the Chassis Discovery Policy to **2-link**.
4. Click **Save Changes**.

Enable Server and Uplink Ports

The following steps provide the details for enabling the fibre channel, server and uplinks ports.

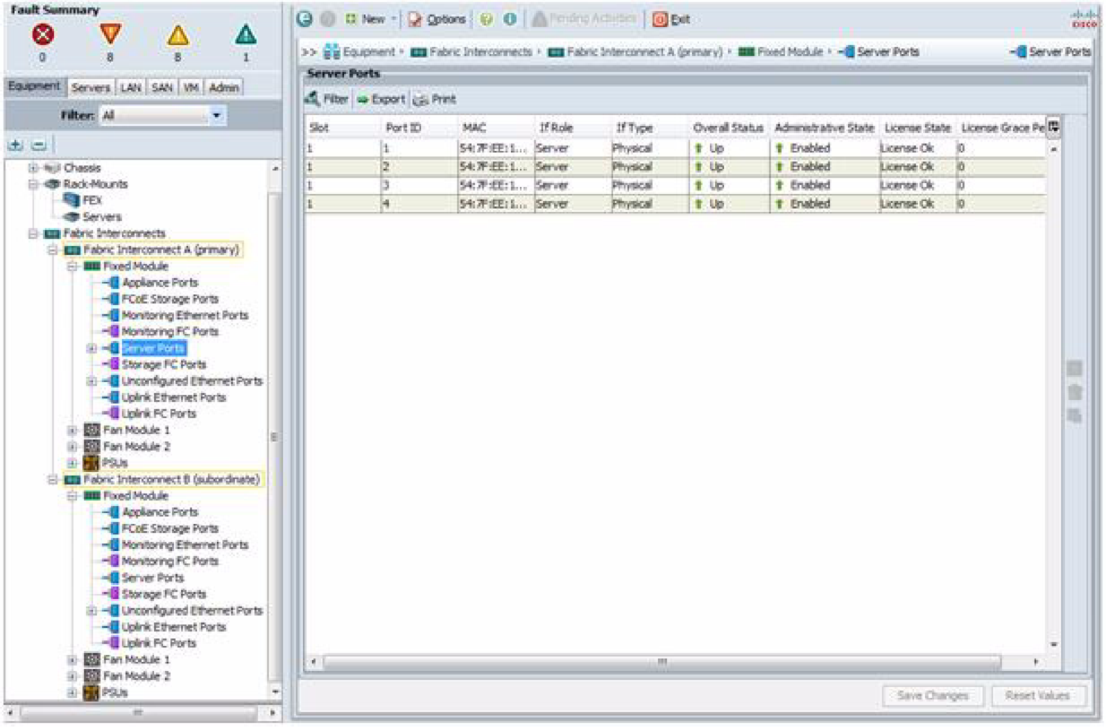
Cisco UCS Manager

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 the number of ports that are connected to the Cisco UCS chassis (2 per chassis), right-click them, and select **Configure as Server Port**.



Slot	Port ID	MAC	If Role	If Type	Overall Status	Administrative State
1	1	54:7F:EE:1C:04:68	Unconfigured	Physical	Admin Down	Disabled
1	2	54:7F:EE:1C:04:69	Unconfigured	Physical	Admin Down	Disabled
1	3	54:7F:EE:1C:04:6A	Unconfigured	Physical	Admin Down	Disabled
1			figured	Physical	Admin Down	Disabled
1			figured	Physical	Sfp Not Present	Disabled
1			figured	Physical	Sfp Not Present	Disabled
1			figured	Physical	Sfp Not Present	Disabled
1			figured	Physical	Sfp Not Present	Disabled
1			figured	Physical	Sfp Not Present	Disabled
1			figured	Physical	Sfp Not Present	Disabled
1			figured	Physical	Sfp Not Present	Disabled
1			figured	Physical	Sfp Not Present	Disabled
1			figured	Physical	Sfp Not Present	Disabled
1			figured	Physical	Sfp Not Present	Disabled
1			figured	Physical	Sfp Not Present	Disabled
1			figured	Physical	Sfp Not Present	Disabled
1	17	54:7F:EE:1C:04:78	Unconfigured	Physical	Sfp Not Present	Disabled
1	18	54:7F:EE:1C:04:79	Unconfigured	Physical	Sfp Not Present	Disabled
1	19	54:7F:EE:1C:04:7A	Unconfigured	Physical	Sfp Not Present	Disabled
1	20	54:7F:EE:1C:04:7B	Unconfigured	Physical	Sfp Not Present	Disabled
1	21	54:7F:EE:1C:04:7C	Unconfigured	Physical	Sfp Not Present	Disabled
1	22	54:7F:EE:1C:04:7D	Unconfigured	Physical	Sfp Not Present	Disabled
1	23	54:7F:EE:1C:04:7E	Unconfigured	Physical	Sfp Not Present	Disabled
1	24	54:7F:EE:1C:04:7F	Unconfigured	Physical	Sfp Not Present	Disabled
1	25	54:7F:EE:1C:04:80	Unconfigured	Physical	Sfp Not Present	Disabled
1	26	54:7F:EE:1C:04:81	Unconfigured	Physical	Sfp Not Present	Disabled
1	27	54:7F:EE:1C:04:82	Unconfigured	Physical	Sfp Not Present	Disabled
1	28	54:7F:EE:1C:04:83	Unconfigured	Physical	Sfp Not Present	Disabled
1	29	54:7F:EE:1C:04:84	Unconfigured	Physical	Sfp Not Present	Disabled

5. At the prompt, click **Yes**, then **OK** to continue.



Slot	Port ID	MAC	If Role	If Type	Overall Status	Administrative State	License State	License Grace Pe
1	1	54:7F:EE:1...	Server	Physical	Up	Enabled	License Ok	0
1	2	54:7F:EE:1...	Server	Physical	Up	Enabled	License Ok	0
1	3	54:7F:EE:1...	Server	Physical	Up	Enabled	License Ok	0
1	4	54:7F:EE:1...	Server	Physical	Up	Enabled	License Ok	0

6. Select the ports 19 and 20 that are connected to the Cisco Nexus 5548 switches; right-click them and select **Configure as Uplink Port**.

7. At the prompt click Yes, then **OK** to continue.

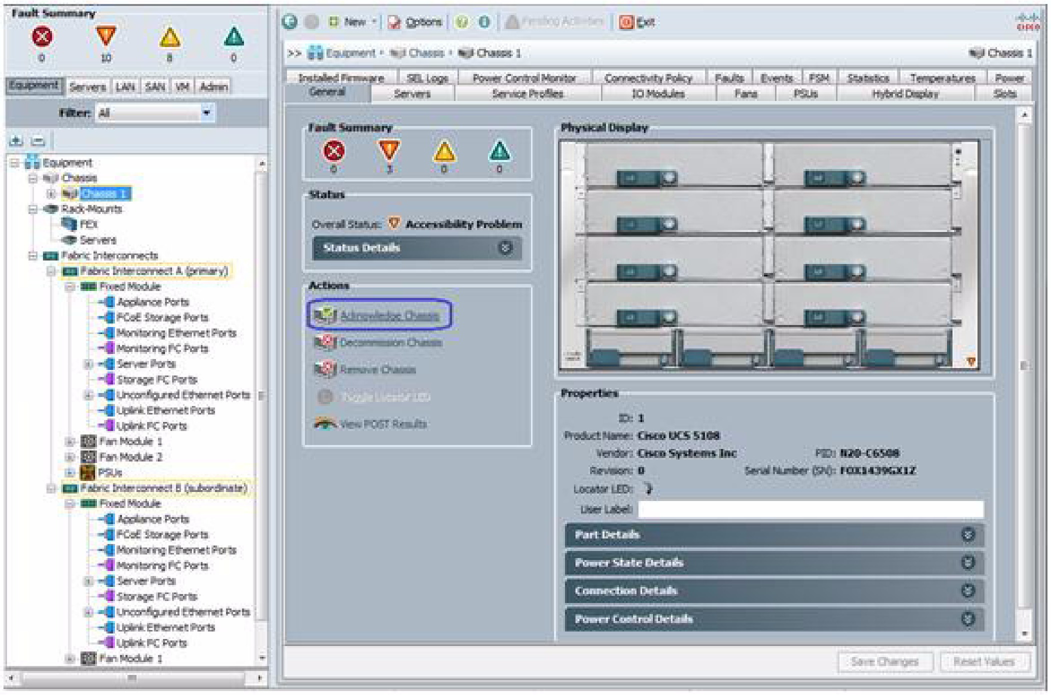
8. Select **Equipment > Fabric Interconnects > Fabric Interconnect B (subordinate) > Fixed Module**.
9. Expand the **Unconfigured Ethernet Ports** section.
10. Select the number of ports that are connected to the Cisco UCS chassis (2 per chassis), right-click them and select **Configure as Server Port**.
11. At the prompt click **Yes**, then **OK** to continue.
12. Select ports 19 and 20 that are connected to the Cisco Nexus 5548 switches, right-click them and select **Configure as Uplink Port**.
13. At the prompt click **Yes**, then **OK** to continue.

Acknowledge the Cisco UCS Chassis

The connected chassis needs to be acknowledged before it can be managed by Cisco UCS Manager.

Cisco UCS Manager

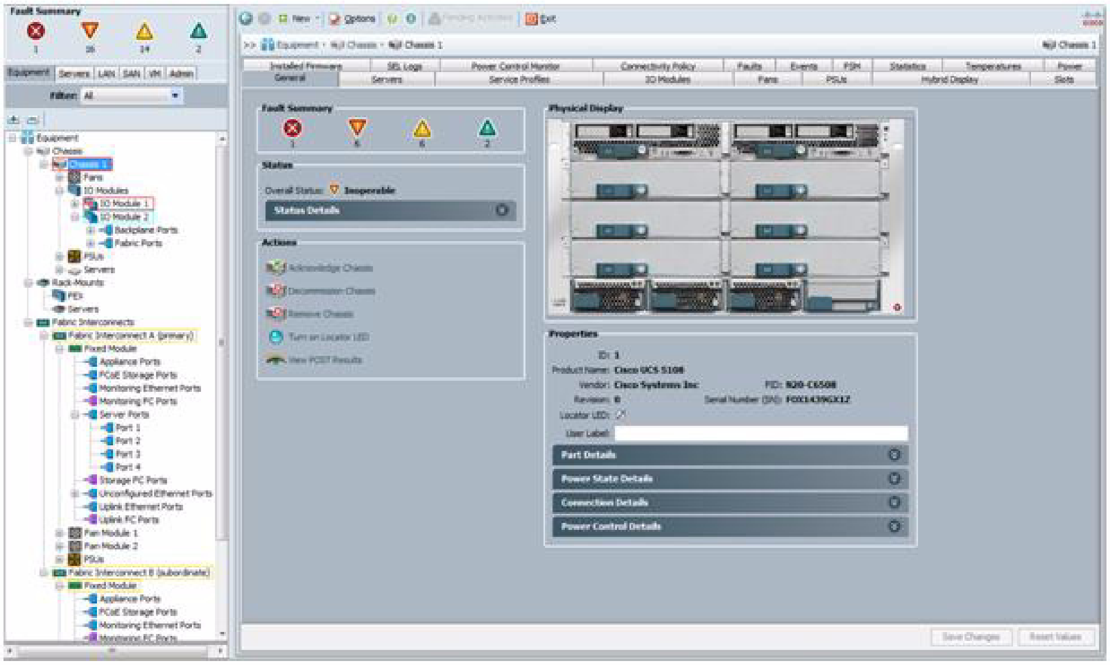
1. Select **Chassis 1** in the left pane.
2. Click **Acknowledge Chassis**.



Overall Status: Accessibility Problem

ID: 1
Product Name: Cisco UCS 5108
Vendor: Cisco Systems Inc
PID: N20-C6508
Revision: 0
Serial Number (SN): FOX1439GX1Z
Locator LED:
User Label:

Cisco UCS Manager acknowledges the chassis and the blades servers in it.



Overall Status: Inoperable

ID: 1
Product Name: Cisco UCS 5108
Vendor: Cisco Systems Inc
PID: N20-C6508
Revision: 0
Serial Number (SN): FOX1439GX12
Locator LED:
User Label:

Create the Uplink Port Channels to the Cisco Nexus 5548 Switches

The following steps provide the details to configure the necessary port channels for the Cisco UCS environment.

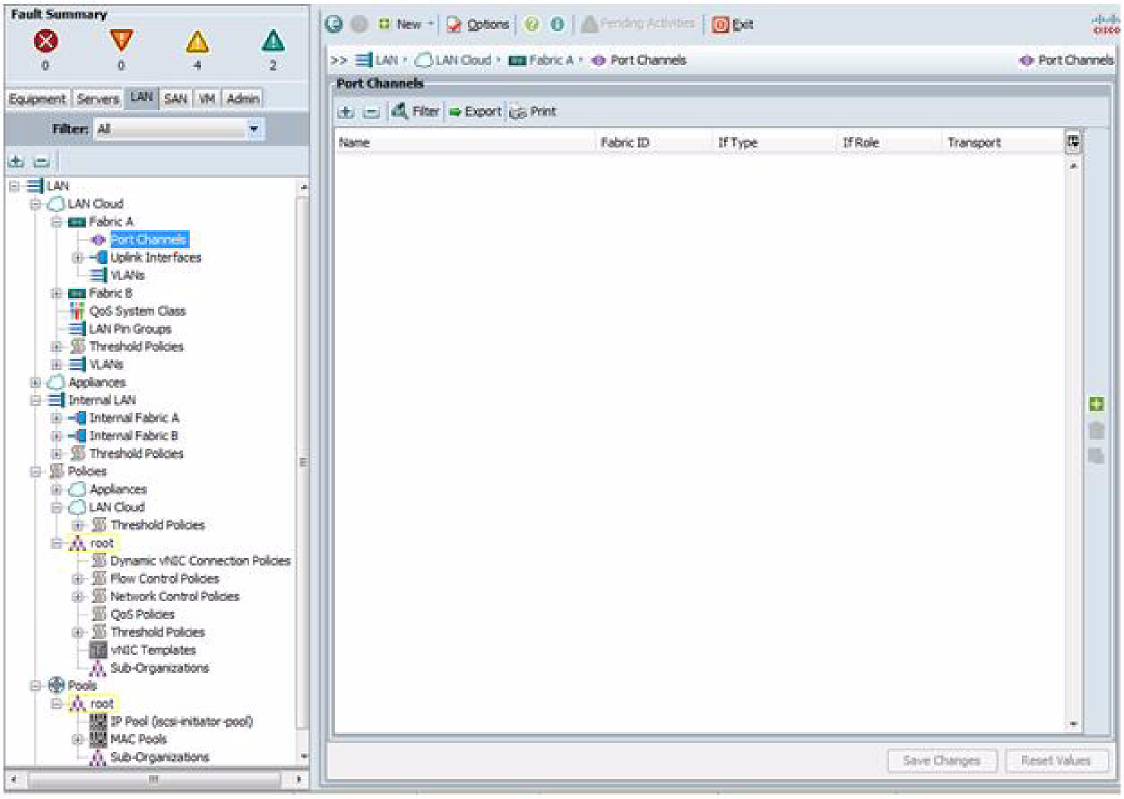
Cisco UCS Manager

1. Select the **LAN** tab located on the left of the window.

Note Two port channels are created, one from fabric A to both Cisco Nexus 5548 switches and one from fabric B to both Cisco Nexus 5548 switches.

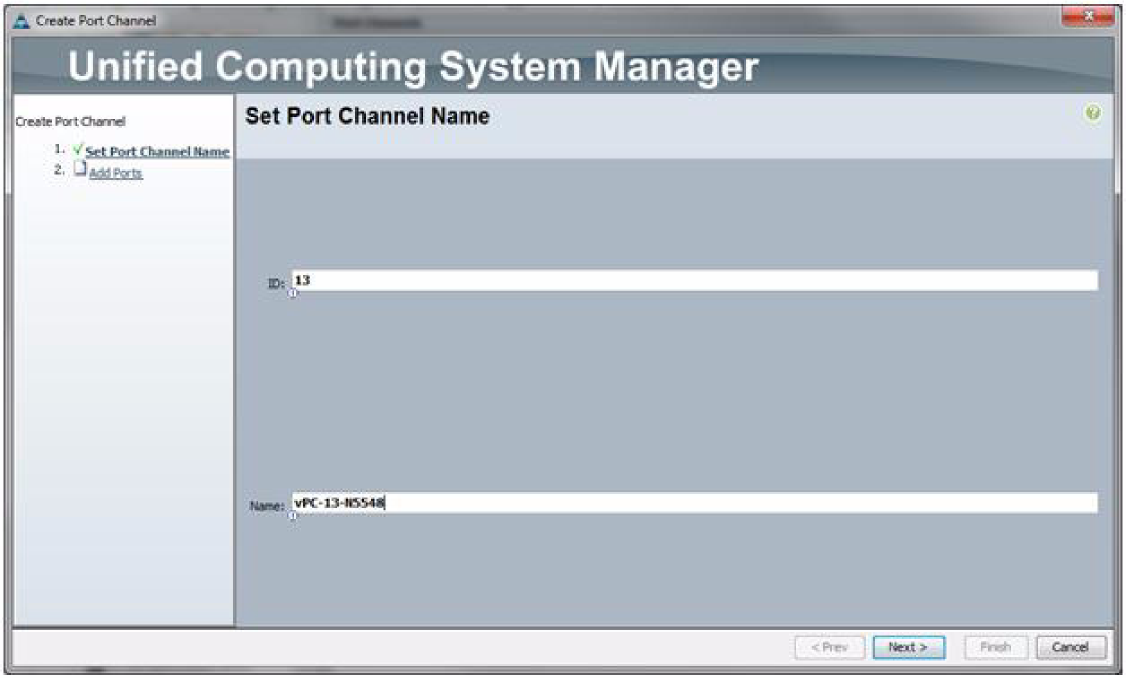
2. Under LAN Cloud, expand the **Fabric A** tree.

3. Right-click **Port Channels**.



4. Select **Create Port Channel**.
5. Enter **13** for the unique ID of the Port Channel.
6. Enter **vPC-13-N5548** for the name of the Port Channel.

7. Click **Next**.

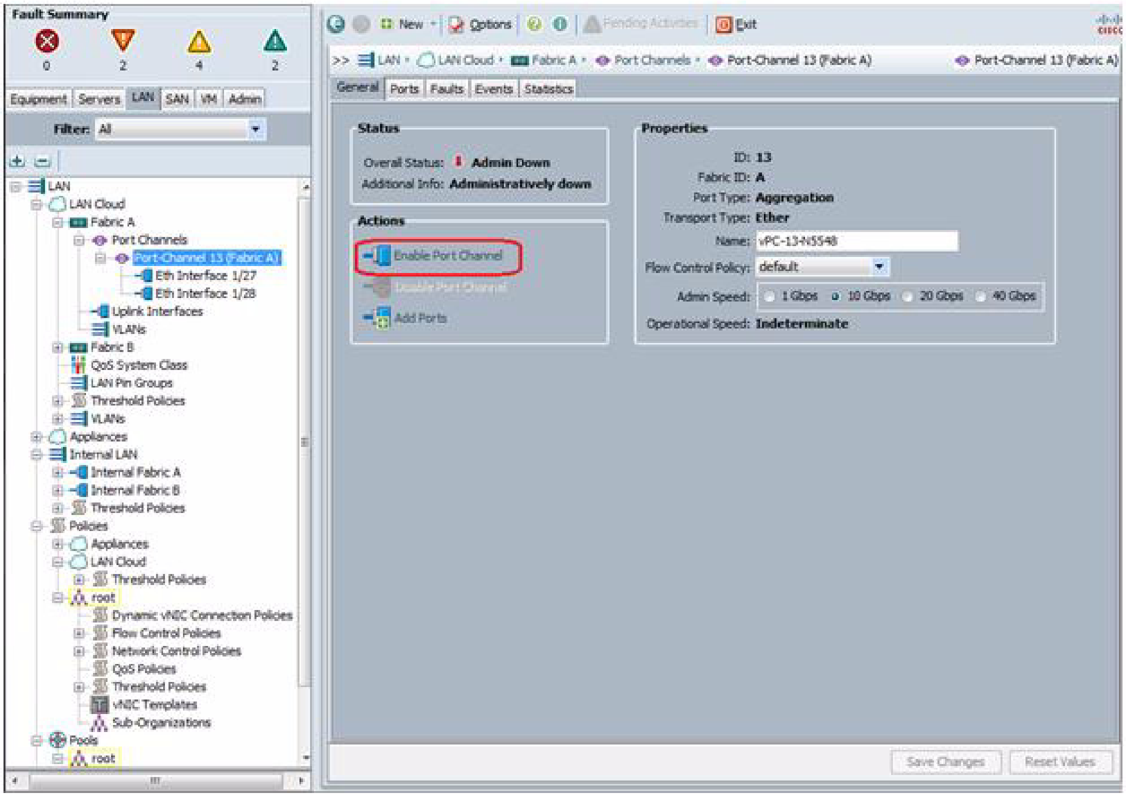


ID: 13

Name: vPC-13-N5548

8. Select the port with slot **ID 1** and **port 19** and also the port with slot **ID 1** and port **20** to be added to the Port Channel.
9. Click **>>** to add the ports to the Port Channel.
10. Click **Finish** to create the Port Channel.
11. Select the check box for **Show navigator for Port-Channel 13 (Fabric A)**.
12. Click **OK** to continue.
13. Under Actions, select **Enable Port Channel**.

14. In the pop-up box, click **Yes** then **OK** to enable.



Status

Overall Status: Admin Down

Additional Info: Administratively down

Properties

ID: 13

Fabric ID: A

Port Type: Aggregation

Transport Type: Ether

Name: vPC-13-N5548

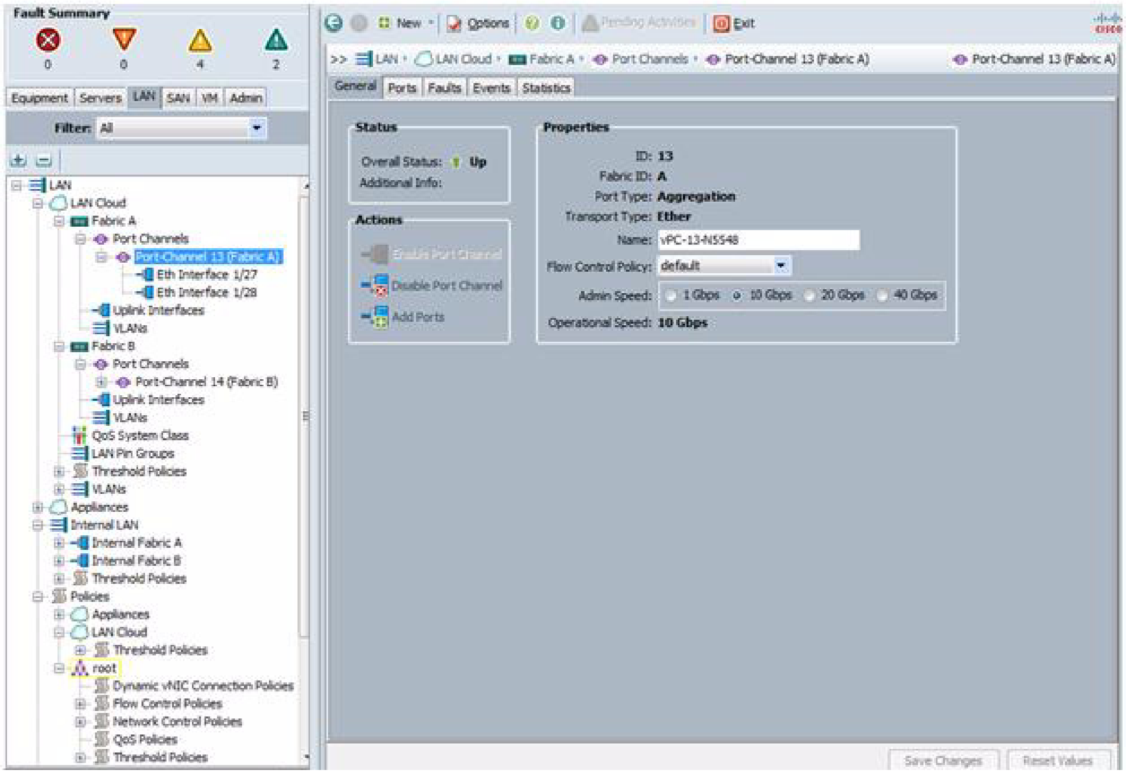
Flow Control Policy: default

Admin Speed: ○ 1 Gbps ● 10 Gbps ○ 20 Gbps ○ 40 Gbps

Operational Speed: Indeterminate

15. Wait until the overall status of the Port Channel is up.

16. Click **OK** to close the Navigator.



Status

Overall Status: Up

Additional Info:

Properties

ID: 13

Fabric ID: A

Port Type: Aggregation

Transport Type: Ether

Name: vPC-13-N5548

Flow Control Policy: default

Admin Speed: ○ 1 Gbps ● 10 Gbps ○ 20 Gbps ○ 40 Gbps

Operational Speed: 10 Gbps

17. Under LAN Cloud, expand the **Fabric B** tree.
18. Right-click **Port Channels**.
19. Select **Create Port Channel**.
20. Enter **14** for the unique ID of the PortChannel.
21. Enter **vPC-14-N5548** for the name of the PortChannel.
22. Click **Next**.
23. Select the port with slot **ID 1** and **port 19** and also the port with slot **ID 1** and **port 20** to be added to the Port Channel.
24. Click **>>** to add the ports to the Port Channel.
25. Click **Finish** to create the Port Channel.
26. Select the check box for **Show navigator for Port-Channel 14 (Fabric B)**.
27. Click **OK** to continue.
28. Under Actions, select **Enable Port Channel**.
29. In the pop-up box, click **Yes** then **OK** to enable.
30. Wait until the overall status of the Port Channel is up
31. Click **OK** to close the Navigator.

Create an Organization

The following steps provide the details for configuring an organization in the Cisco UCS environment. Organizations are used as a means to organize 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 included below.

Cisco UCS Manager

1. From the New… menu at the top of the window, select **Create Organization**.
2. Enter a name for the organization.
3. Enter a description for the organization (optional).
4. Click **OK**.
5. In the message box that displays, click **OK**.

Create a MAC Address Pool

The following steps provide the details for configuring the necessary MAC address pool for the Cisco UCS environment.

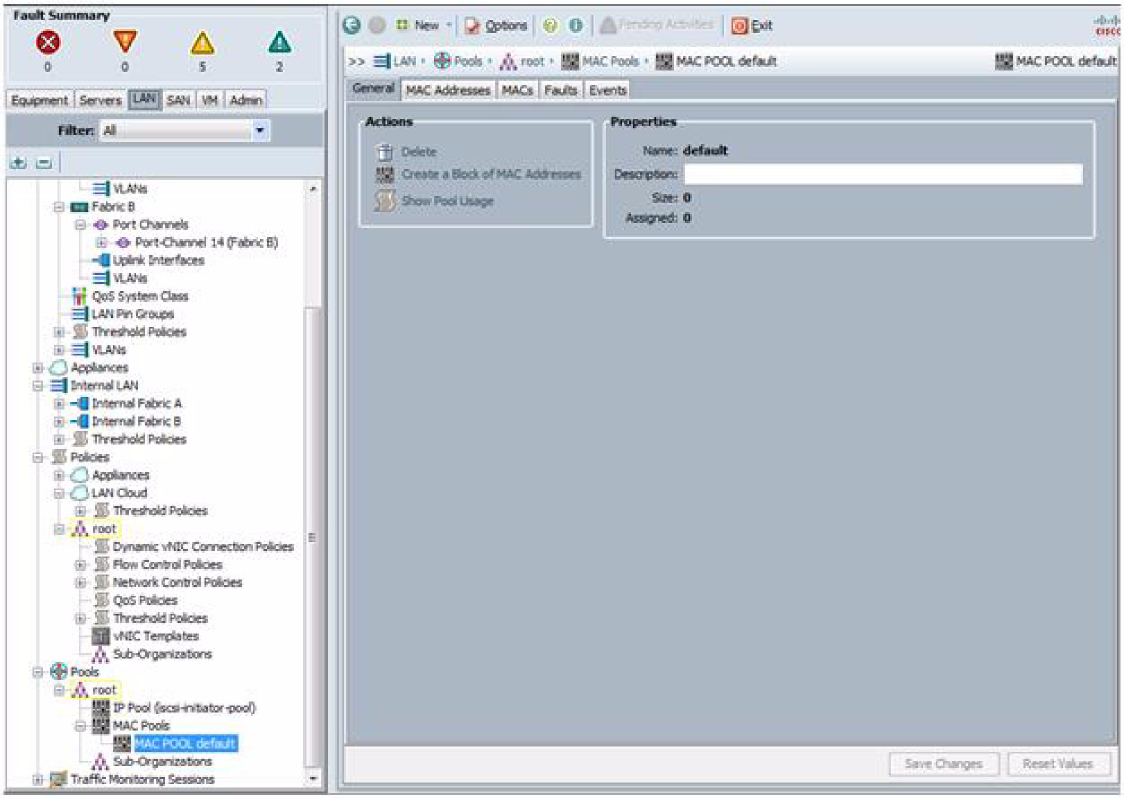
Cisco UCS Manager

1. Select the **LAN** tab located on the left of the window.
2. Select **Pools > root**.

Note One MAC address pool is created.

3. Right-click **MAC Pools** under the root organization.

4. Select **Create MAC Pool** to create the MAC address pool.



Name: **default**
Description:
Size: **0**
Assigned: **0**

5. Enter **MAC_Pool** for the name of the MAC pool.

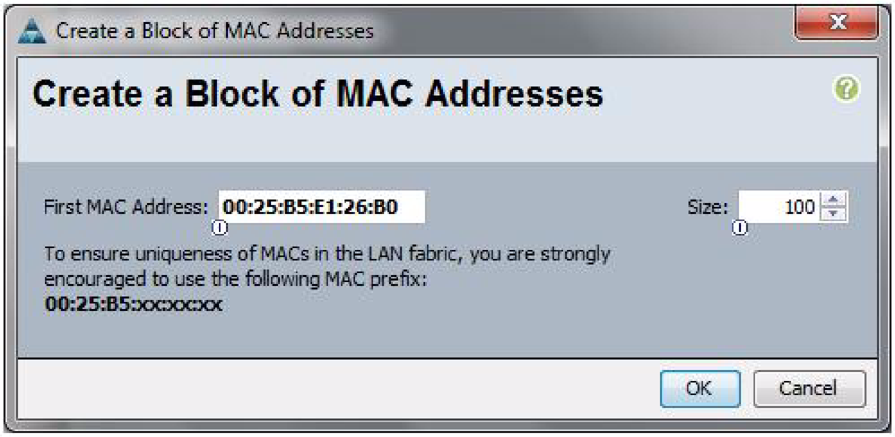
6. (Optional) Enter a description of the MAC pool.

7. Click **Next**.

8. Click **Add**.

9. Specify a starting MAC address.

10. Specify a size of the MAC address pool sufficient to support the available blade resources.



Create a Block of MAC Addresses

First MAC Address: **00:25:B5:E1:26:B0**

Size: 100

To ensure uniqueness of MACs in the LAN fabric, you are strongly encouraged to use the following MAC prefix:
00:25:B5:xx:xx:xx

11. Click **OK**.

12. Click **Finish**.

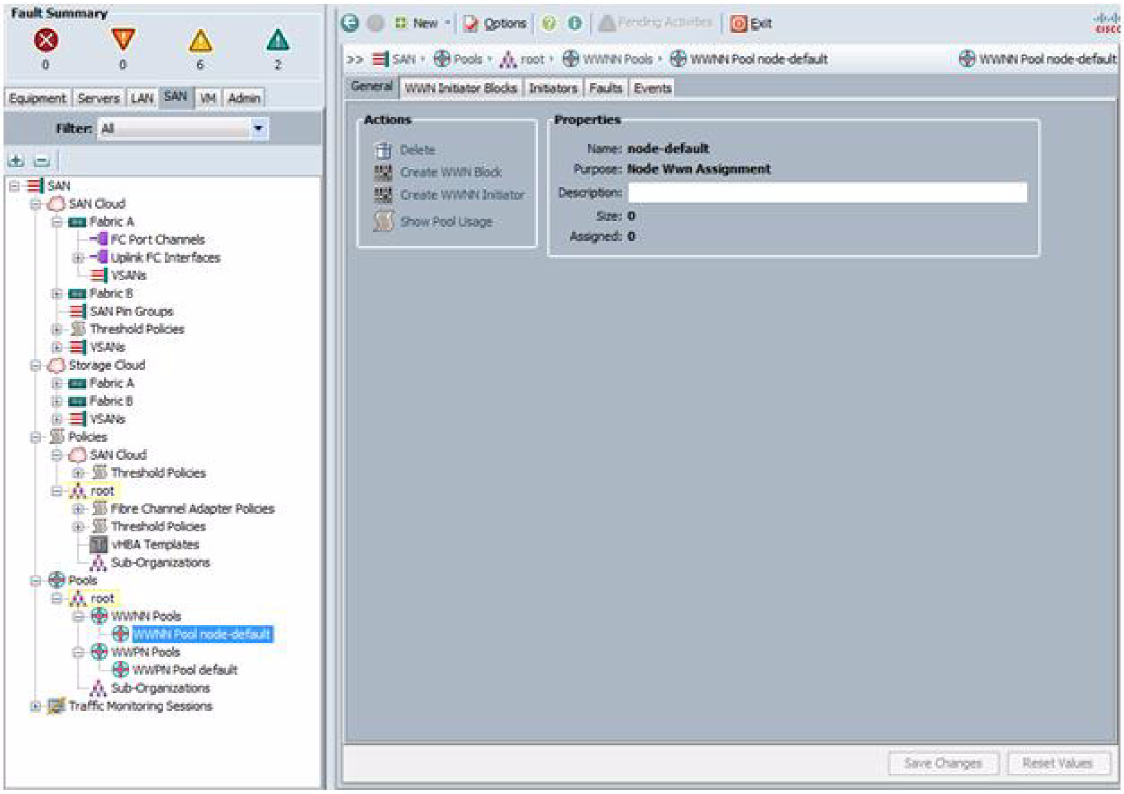
13. In the message box that displays, click **OK**.

Create WWNN Pools

The following steps provide the details for configuring the necessary WWNN pools for the Cisco UCS environment.

Cisco UCS Manager

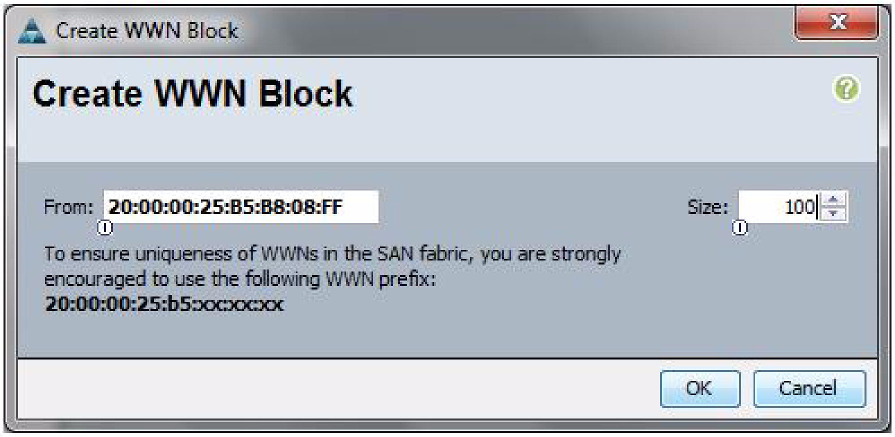
1. Select the SAN tab located at the top left of the window.
2. Select **Pools > root**.
3. Right-click **WWNN Pools**.
4. Select **Create WWNN Pool**.



Name: node-default
Purpose: Node Wwn Assignment
Description:
Size: 0
Assigned: 0

5. Enter **WWNN_Pool** for the name of the WWNN pool.
6. (Optional) Add a description for the WWNN pool.
7. Click **Next**.
8. Click **Add** to add a block of WWNN's.
9. Retain the default; modify if necessary.

10. Specify a size of the WWNN block sufficient to support the available blade resources.



From: 20:00:00:25:B5:B8:08:FF

Size: 100

To ensure uniqueness of WWNs in the SAN fabric, you are strongly encouraged to use the following WWN prefix:
20:00:00:25:b5:xx:xx:xx

11. Click **OK**.
12. Click **Finish** to proceed.
13. Click **OK** to finish.

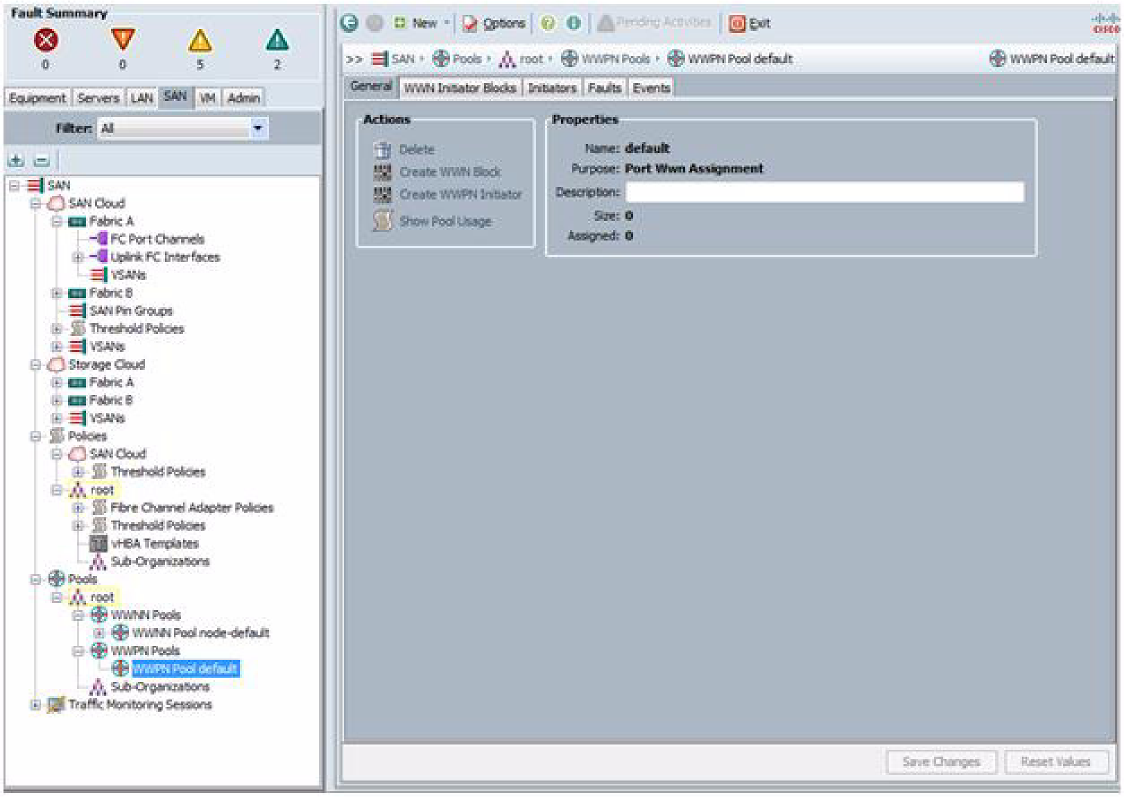
Create WWPN Pools

The following steps provide the details for configuring the necessary WWPN pools for the Cisco UCS environment.

Cisco UCS Manager

1. Select the **SAN** tab located at the top left of the window.
2. Select **Pools > root**.
3. Two WWPN pools are created; one for fabric A and one for fabric B.
4. Right-click **WWPN Pools**.

5. Select **Create WWPN Pool**.



Name: **default**
Purpose: **Port Wwn Assignment**
Description:
Size: **0**
Assigned: **0**

6. Enter **WWPN_Pool_A** for the name for the WWPN pool for fabric A.

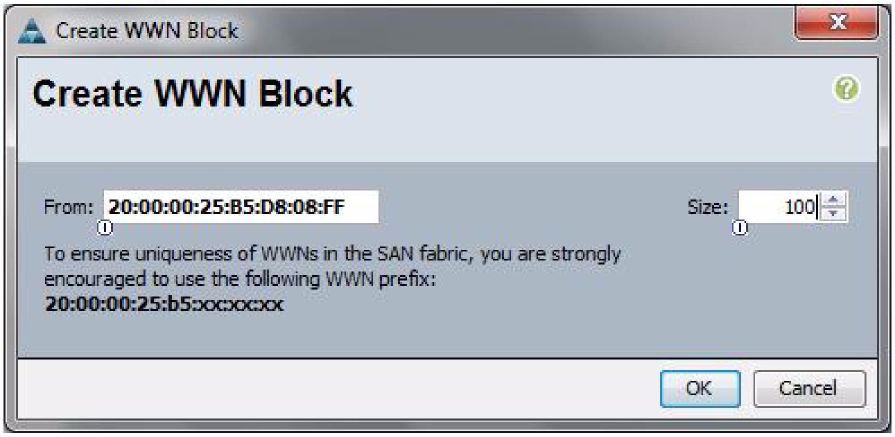
7. (Optional). Give the WWPN pool a description.

8. Click **Next**.

9. Click **Add** to add a block of WWPNs.

10. Enter the starting WWPN in the block for fabric A.

11. Specify a size of the WWPN block sufficient to support the available blade resources.



From: **20:00:00:25:B5:D8:08:FF**

Size: 100

To ensure uniqueness of WWNs in the SAN fabric, you are strongly encouraged to use the following WWN prefix:
20:00:00:25:b5:xx:xx:xx

12. Click **OK**.

13. Click **Finish** to create the WWPN pool.

14. Click **OK**.

15. Right-click **WWPN Pools**.
16. Select **Create WWPN Pool**.
17. Enter **WWPN_Pool_B** as the name for the WWPN pool for fabric B.
18. (Optional) Give the WWPN pool a description.
19. Click **Next**.
20. Click **Add** to add a block of WWPNs.
21. Enter the starting WWPN in the block for fabric B.
22. Specify a size of the WWPN block sufficient to support the available blade resources.
23. Click **OK**.
24. Click **Finish**.
25. Click **OK** to finish.

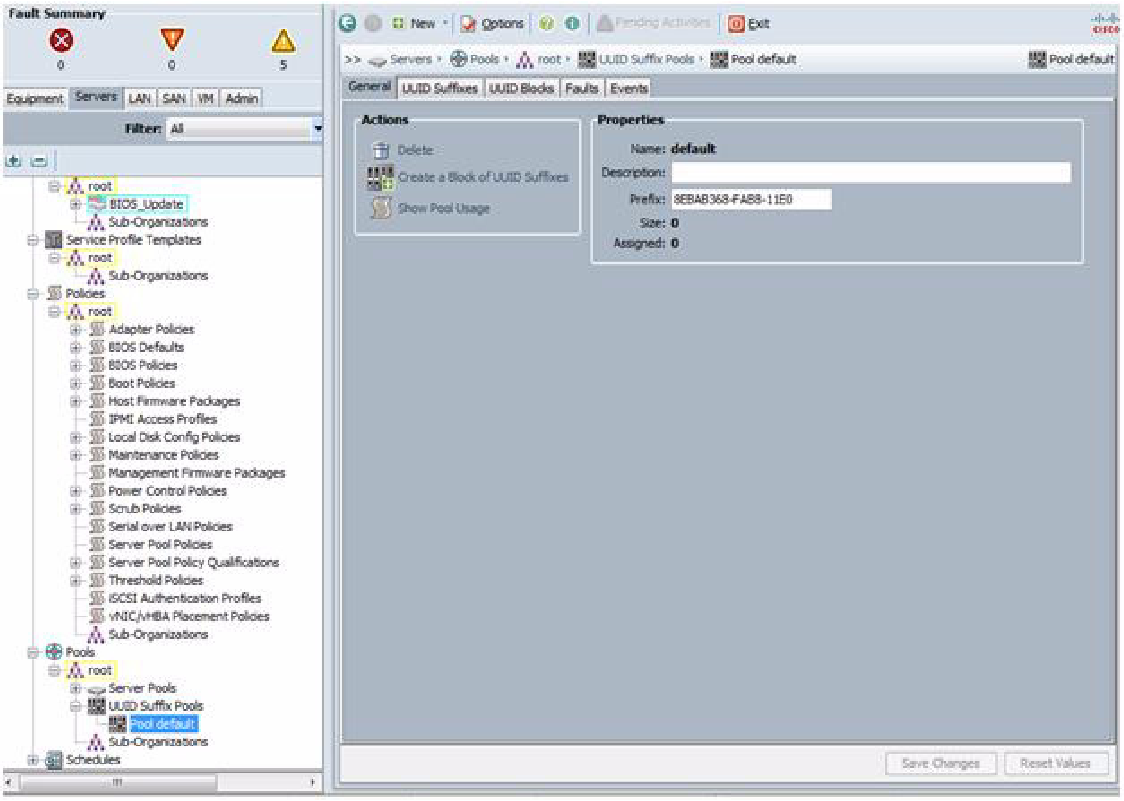
Create UUID Suffix Pools

The following steps provide the details for configuring the necessary UUID suffix pools for the Cisco UCS environment.

Cisco UCS Manager

1. Select the **Servers** tab located at the top left of the window.
2. Select **Pools > root**.
3. Right-click **UUID Suffix Pools**.

4. Select **Create UUID Suffix Pool**.



Name: **default**

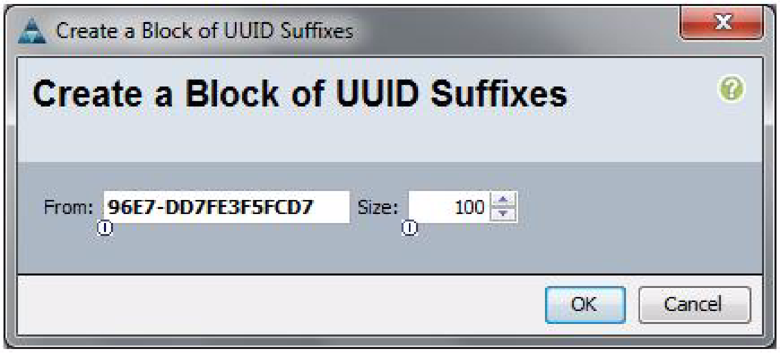
Description:

Prefix: 8EBAB368-FAB8-11E0

Size: **0**

Assigned: **0**

5. Name the UUID suffix pool **UUID_Pool**.
6. (Optional) Give the UUID suffix pool a description.
7. Retain the prefix at the derived option.
8. Click **Next**.
9. Click **Add** to add a block of UUID's.
10. Retain the default setting for the From field.
11. Specify a size of the UUID block sufficient to support the available blade resources.


Create a Block of UUID Suffixes
Create a Block of UUID Suffixes
OK
Cancel

From: 96E7-DD7FE3F5FCD7

Size: 100

12. Click **OK**.
13. Click **Finish** to proceed.
14. Click **OK** to finish.

Create Server Pools

The following steps provide the details to configure the necessary UUID suffix pools for the Cisco UCS environment.

Cisco UCS Manager

1. Select the **Servers** tab located at the top left of the window.
2. Select **Pools > root**.
3. Right-click **Server Pools**.
4. Select **Create Server Pool**.
5. Name the server pool **Infra_Pool**.
6. (Optional) Give the server pool a description.
7. Click **Next**.
8. Select two B200 servers to add\ to the Infra_Pool server pool. Click **>>** to add them to the pool.
9. Click **Finish**.
10. Select **OK** to finish.

Create VLANs

The following steps provide the details to configure the necessary VLANs for the Cisco UCS environment.

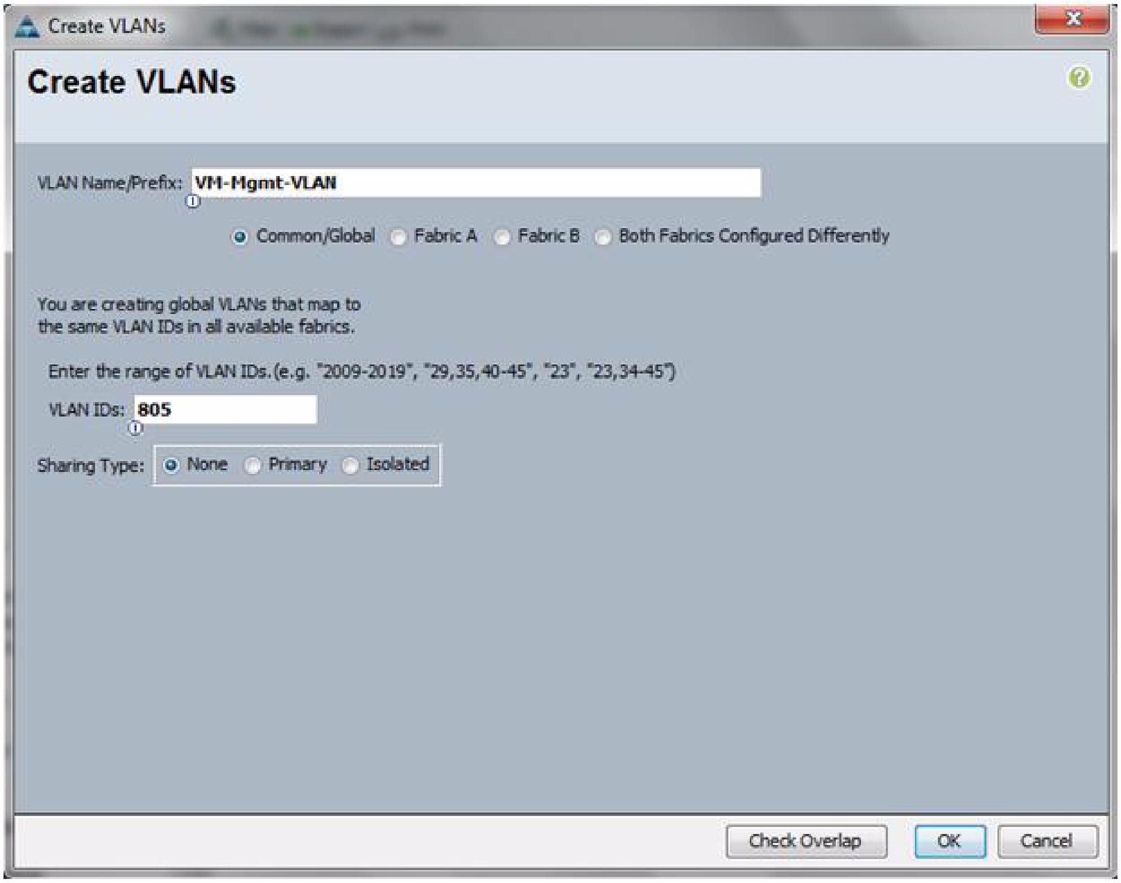
Cisco UCS Manager

1. Select the **LAN** tab located at the left of the window.

Note Eight VLANs are created.

2. Select **LAN Cloud**.
3. Right-click **VLANs**.
4. Select **Create VLANs**.
5. Enter **MGMT-VLAN** for the name of the VLAN to be used for management traffic.
6. Keep the Common/Global option selected for the scope of the VLAN.
7. Enter the VLAN ID for the management VLAN. Retain the sharing type as **none**.

8. Click **OK**.



VLAN Name/Prefix: VM-Mgmt-VLAN

● Common/Global ○ Fabric A ○ Fabric B ○ Both Fabrics Configured Differently

You are creating global VLANs that map to the same VLAN IDs in all available fabrics.

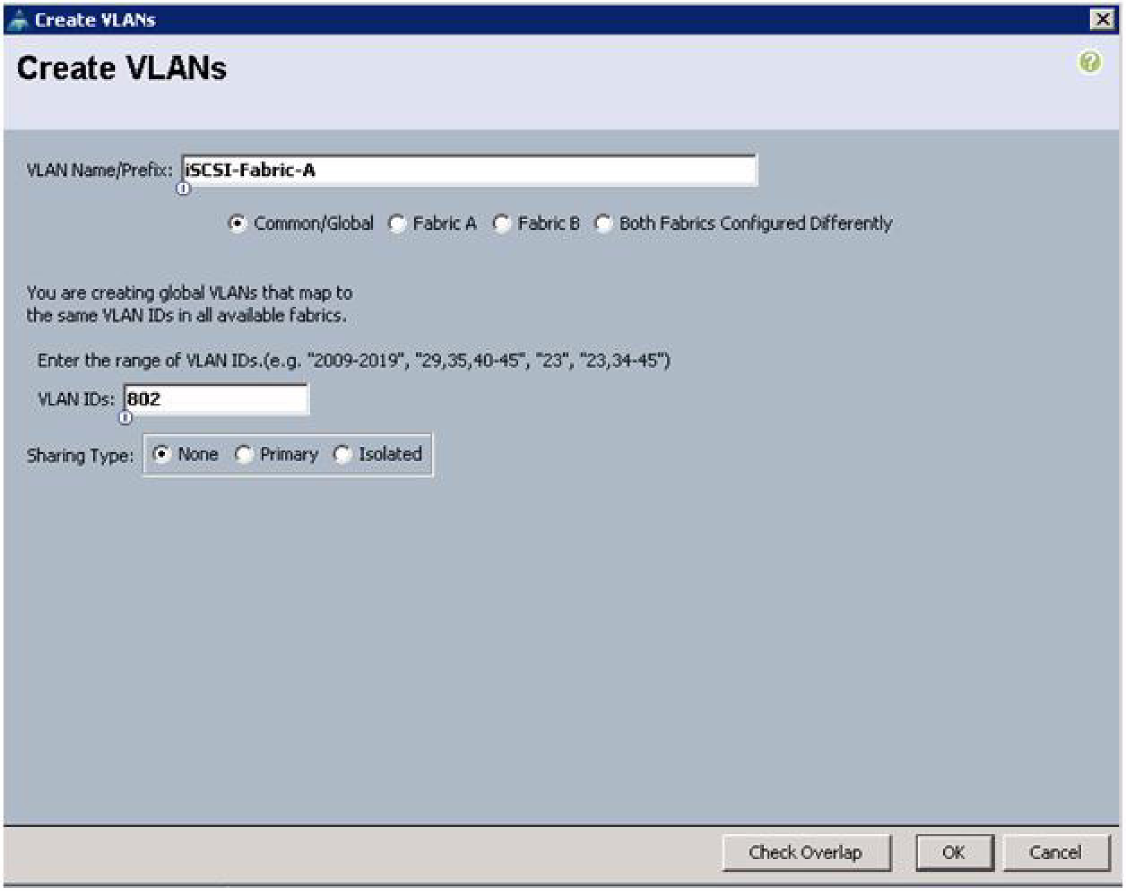
Enter the range of VLAN IDs.(e.g. "2009-2019", "29,35,40-45", "23", "23,34-45")

VLAN IDs: 805

Sharing Type: ● None ○ Primary ○ Isolated

9. Right-click **VLANs**.
10. Select **Create VLANs**.
11. Enter **CSV-VLAN** for the name of the VLAN for the CSV VLAN.
12. Retain the Common/Global option selected for the scope of the VLAN.
13. Enter the VLAN ID for the CSV VLAN.
14. Click **OK**.
15. Right-click **VLANs**.
16. Select **Create VLANs**.
17. Enter **iSCSI-VLAN-A** for the name of the VLAN for the first iSCSI VLAN.
18. Keep the Common/Global option selected for the scope of the VLAN.
19. Enter the VLAN ID for the first iSCSI VLAN .

20. Click **OK**.



VLAN Name/Prefix: iSCSI-Fabric-A

● Common/Global ○ Fabric A ○ Fabric B ○ Both Fabrics Configured Differently

You are creating global VLANs that map to the same VLAN IDs in all available fabrics.

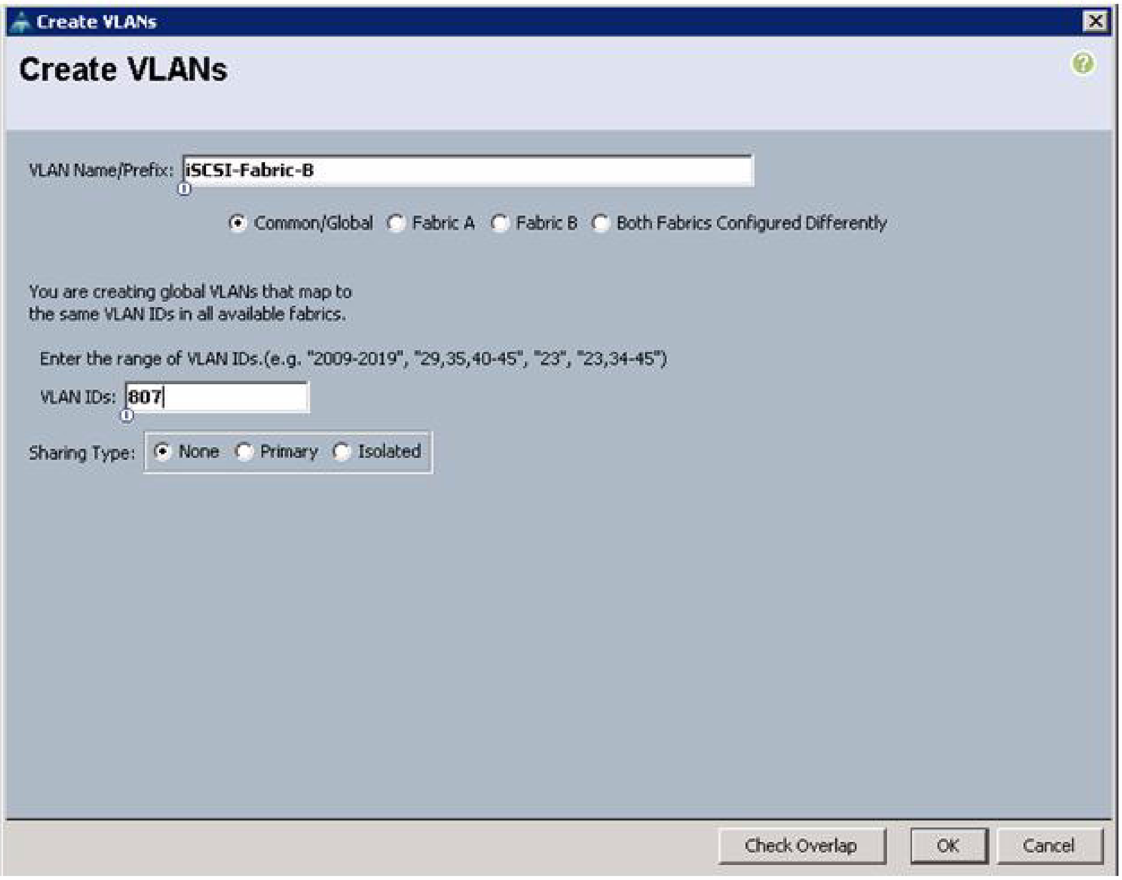
Enter the range of VLAN IDs.(e.g. "2009-2019", "29,35,40-45", "23", "23,34-45")

VLAN IDs: 802

Sharing Type: ● None ○ Primary ○ Isolated

21. Right-click **VLANs**.
22. Select **Create VLANs**.
23. Enter **iSCSI-VLAN-B** for the name of the VLAN for the second iSCSI VLAN.
24. Retain the Common/Global option selected for the scope of the VLAN.
25. Enter the VLAN ID for the second iSCSI VLAN.

26. Click **OK**.



Create VLANs

VLAN Name/Prefix: iSCSI-Fabric-B

● Common/Global ○ Fabric A ○ Fabric B ○ Both Fabrics Configured Differently

You are creating global VLANs that map to
the same VLAN IDs in all available fabrics.

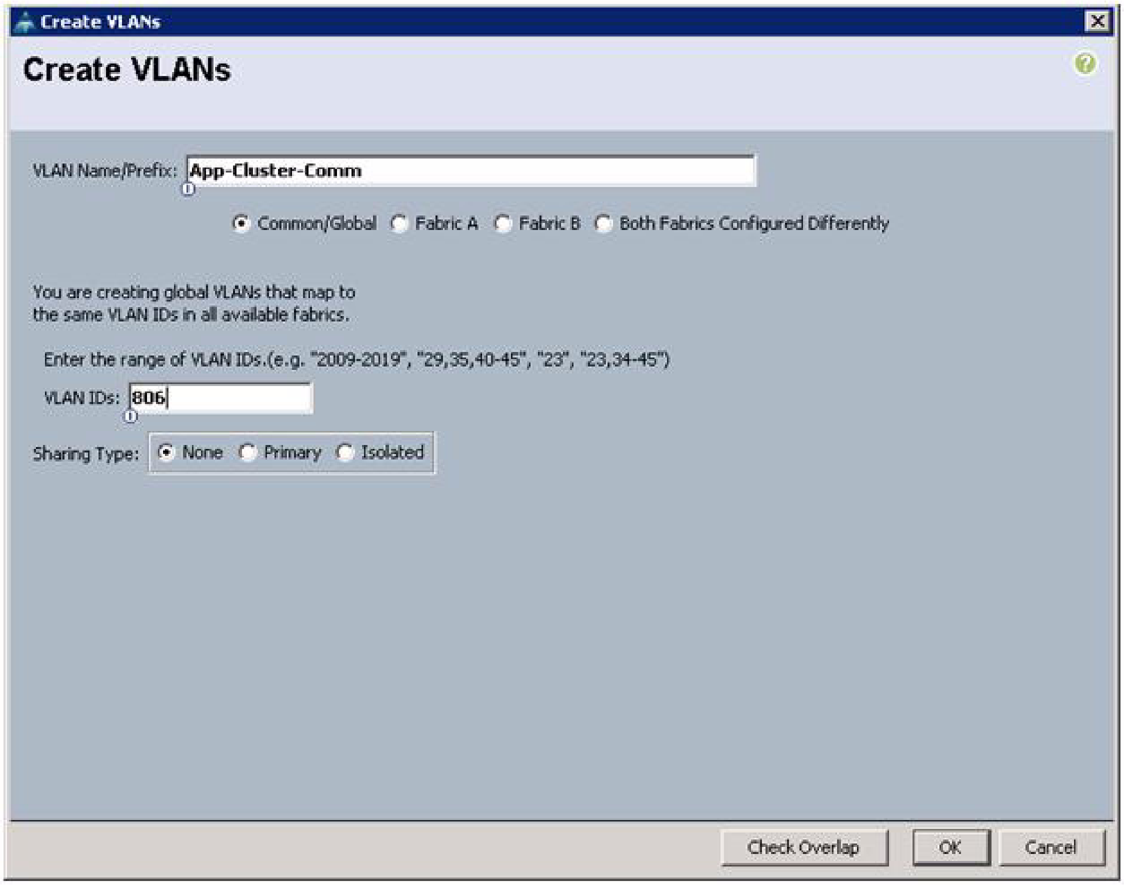
Enter the range of VLAN IDs.(e.g. "2009-2019", "29,35,40-45", "23", "23,34-45")

VLAN IDs: 807

Sharing Type: ● None ○ Primary ○ Isolated

27. Right-click **VLANs**.
28. Select **Create VLANs**.
29. Enter **Live Migration-VLAN** for the name of the VLAN for the live migration VLAN.
30. Retain the Common/Global option selected for the scope of the VLAN.
31. Enter the VLAN ID for the live migration VLAN.
32. Click **OK**, then **OK**.
33. Right-click **VLANs**.
34. Select **Create VLANs**.
35. Enter **App-Cluster-Comm-VLAN** for the name of the VLAN for the VM CLuster VLAN.
36. Retain the Common/Global option selected for the scope of the VLAN.
37. Enter the VLAN ID for the VM Cluster VLAN.

38. Click **OK**.



Create VLANs

VLAN Name/Prefix: App-Cluster-Comm

● Common/Global ○ Fabric A ○ Fabric B ○ Both Fabrics Configured Differently

You are creating global VLANs that map to the same VLAN IDs in all available fabrics.

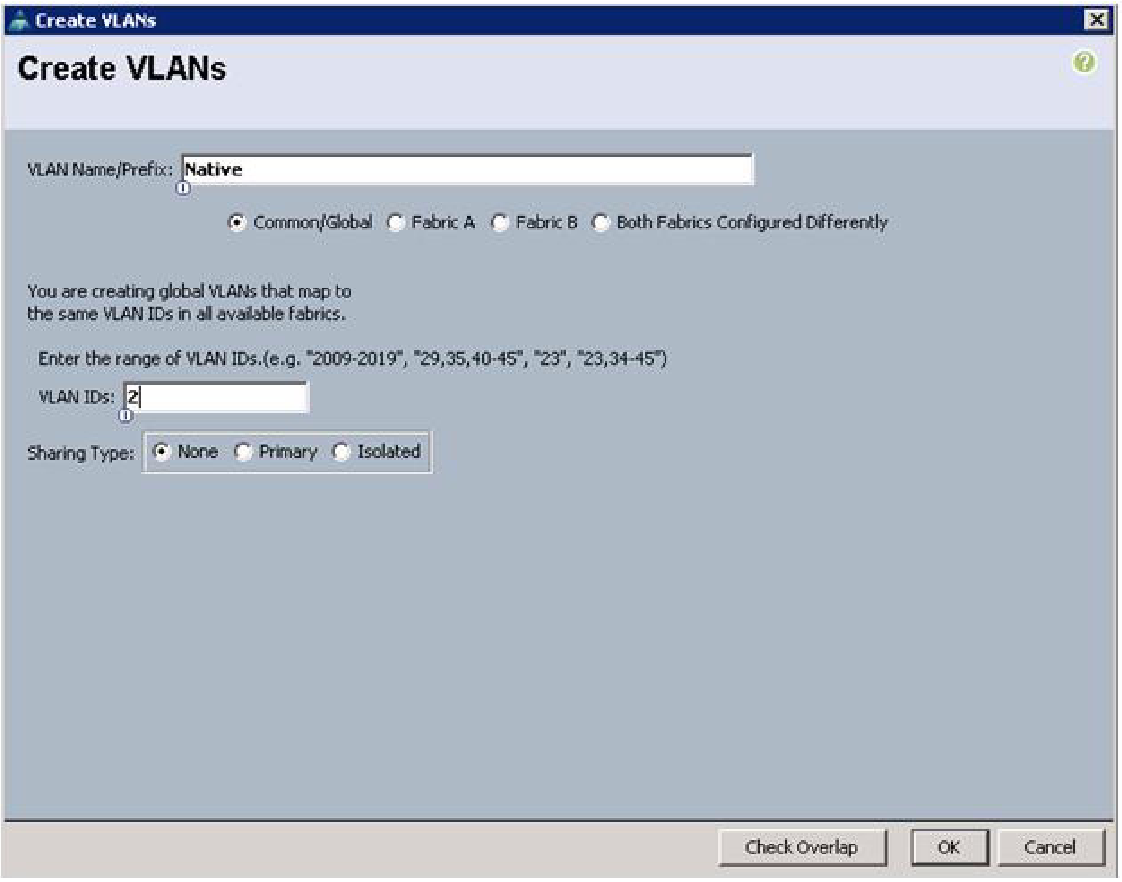
Enter the range of VLAN IDs.(e.g. "2009-2019", "29,35,40-45", "23", "23,34-45")

VLAN IDs: 806

Sharing Type: ● None ○ Primary ○ Isolated

39. Right-click **VLANs**.
40. Select **Create VLANs**.
41. Enter **VM-Data-VLAN** for the name of the VLAN for the VM data VLAN.
42. Retain the Common/Global option selected for the scope of the VLAN.
43. Enter the VLAN ID for the virtual machine data VLAN.
44. Click **OK**.
45. Right-click **VLANs**.
46. Select **Create VLANs**.
47. Enter **Native-VLAN** for the name of the VLAN for the Native VLAN.
48. Retain the Common/Global option selected for the scope of the VLAN.
49. Enter the VLAN ID for the Native VLAN.

50. Click **OK**.



Create VLANs

VLAN Name/Prefix: Native

● Common/Global ○ Fabric A ○ Fabric B ○ Both Fabrics Configured Differently

You are creating global VLANs that map to
the same VLAN IDs in all available fabrics.

Enter the range of VLAN IDs.(e.g. "2009-2019", "29,35,40-45", "23", "23,34-45")

VLAN IDs: 2

Sharing Type: ● None ○ Primary ○ Isolated

51. From the list of VLANs in the left pane, right-click the newly created Native-VLAN and select **Set as Native VLAN**.
52. Click **Yes**.
53. Click **OK**.

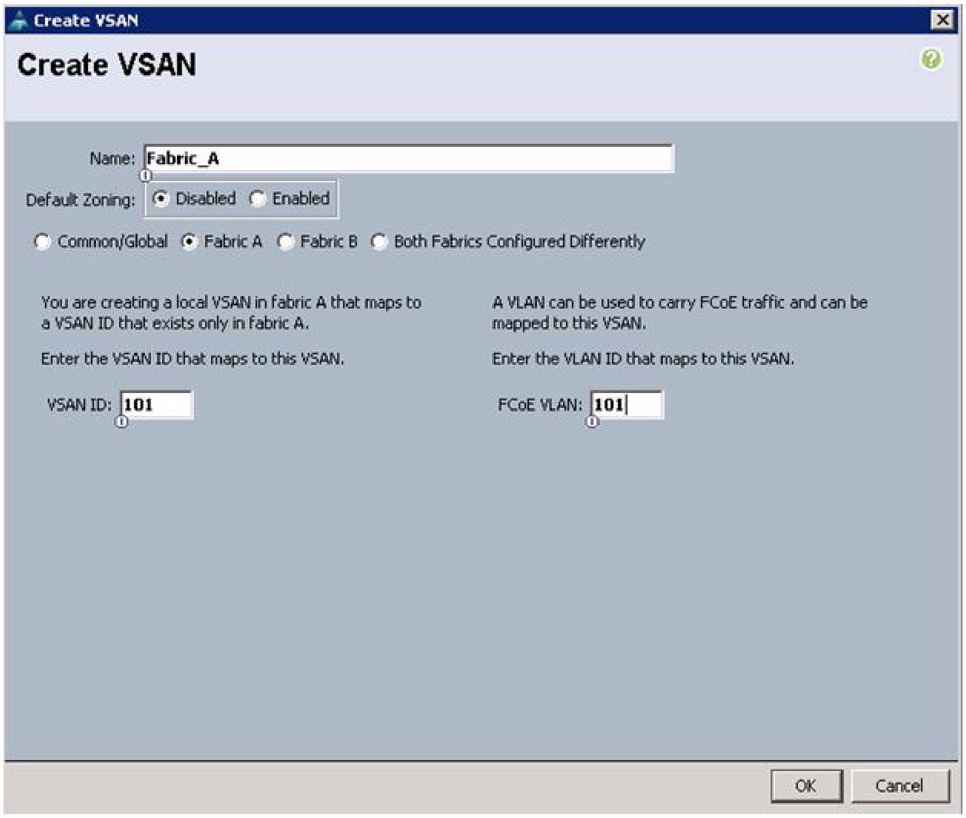
Create VSANs and SAN Port Channels

The following steps provide the details to configure the necessary VSANs and SAN Port Channels for the Cisco UCS environment. By default, VSAN 1 is used created and can be used. Alternate VSANs can be created as necessary.

Cisco UCS Manager

1. Select the **SAN** tab located at the top left of the window.
2. Expand the **SAN Cloud** tree.
3. Right-click **VSANs**.
4. Select **Create VSAN**.
5. Enter **VSAN_A** for the VSAN name for fabric A.
6. Retain the Disabled option selected for the Default Zoning.
7. Select **Fabric A**.

8. Enter the VSAN ID for fabric A.
9. Enter the FCoE VLAN ID for fabric A.
10. Click **OK**.
11. Click **OK** to create the VSAN.



Name: Fabric_A

Default Zoning: ● Disabled ○ Enabled

○ Common/Global ● Fabric A ○ Fabric B ○ Both Fabrics Configured Differently

You are creating a local VSAN in fabric A that maps to a VSAN ID that exists only in fabric A.

Enter the VSAN ID that maps to this VSAN.

VSAN ID: 101

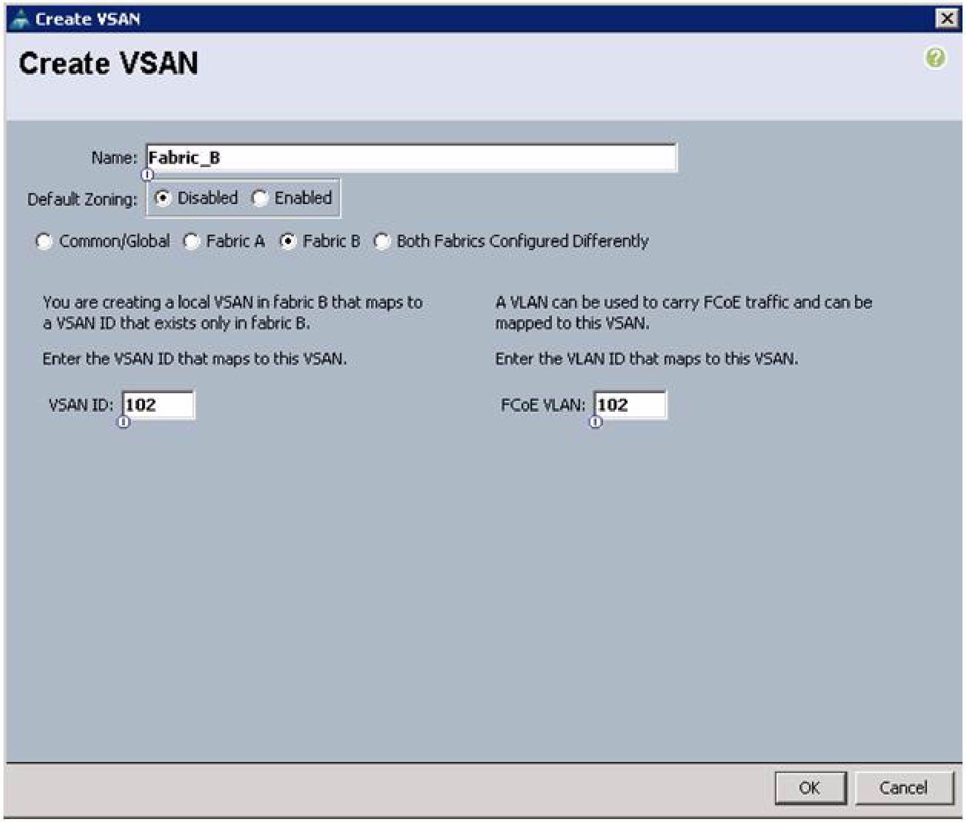
A VLAN can be used to carry FCoE traffic and can be mapped to this VSAN.

Enter the VLAN ID that maps to this VSAN.

FCoE VLAN: 101

12. Right-click **VSANs**.
13. Select **Create VSAN**.
14. Enter **VSAN_B** for the VSAN name for fabric B.
15. Retain the Disabled option selected for the Default Zoning.
16. Select **Fabric B**.
17. Enter the VSAN ID for fabric B.
18. Enter the FCoE VLAN ID for fabric B.
19. Click **OK**.

20. Click **OK** to create the VSAN.



Create VSAN

Name: Fabric_B

Default Zoning: ● Disabled ○ Enabled

○ Common/Global ○ Fabric A ● Fabric B ○ Both Fabrics Configured Differently

You are creating a local VSAN in fabric B that maps to a VSAN ID that exists only in fabric B.

Enter the VSAN ID that maps to this VSAN.

VSAN ID: 102

A VLAN can be used to carry FCoE traffic and can be mapped to this VSAN.

Enter the VLAN ID that maps to this VSAN.

FCoE VLAN: 102

21. Under SAN Cloud, expand the **Fabric A** tree.
22. Right-click **FC Port Channels**.
23. Select **Create Port Channel**.
24. Click **Yes** and enter **1** for the Port Channel ID and enter **SPo1** for the Port Channel name.
25. Click **Next**.
26. Select **ports 31** and **32**.
27. Click **>>** to add the ports to the Port Channel.
28. Click **Finish**.
29. Select the check box for **Show navigator for FC Port-Channel 1 (Fabric A)**.
30. Click **OK** to complete creating the Port Channel.
31. In the VSAN pull-down menu under Properties, select the vsan **VSAN_A** for fabric A.
32. Click **Apply**.
33. Click **OK**.
34. Under Actions, click **Enable Port Channel**.
35. Click **Yes** and then **OK** to enable the Port Channel.

    This action also enables the two FC ports in the PortChannel.
36. Click **OK** to close the Navigator.
37. Under SAN Cloud, expand the **Fabric B** tree.

38. Right-click **FC Port Channels**.
39. Select **Create Port Channel**.
40. Click **Yes** and enter **2** for the Port Channel ID and enter **SPo2** for the Port Channel name.
41. Click **Next**.
42. Select **ports 31** and **32** .
43. Click **>>** to add the ports to the Port Channel.
44. Click **Finish**.
45. Select check box for **Show navigator for FC Port-Channel 1 (Fabric B)**.
46. Click **OK** to complete creating the Port Channel.
47. In the VSAN pull-down menu under Properties, select **VSAN_B** for fabric B.
48. Click **Apply**.
49. Click **OK**.
50. Under Actions, click **Enable Port Channel**.
51. Click **Yes**.
52. Click **OK** to enable the Port Channel.

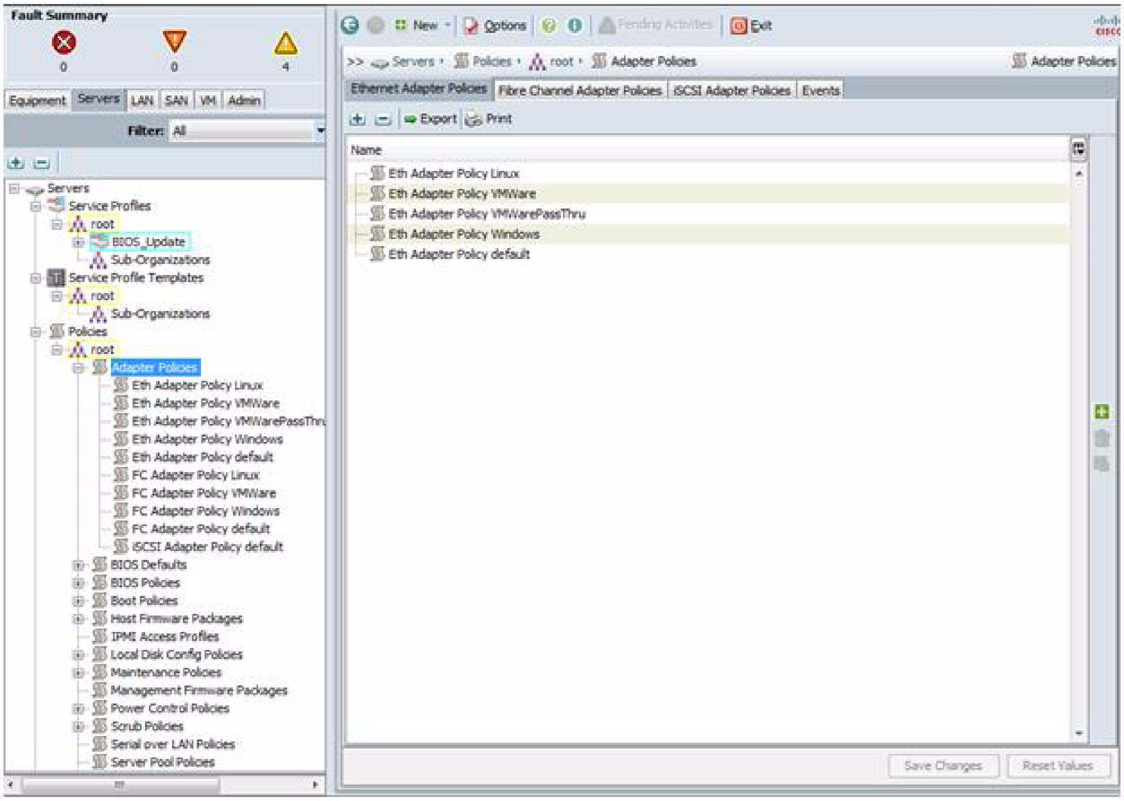
    This action also enables the two FC ports in the Port Channel.
53. Click **OK** to close the Navigator.

Create a FC Adapter Policy for NetApp Storage Arrays

The following steps provide the details to create a FC adapter policy for NetApp storage arrays.

1. Select the **SAN** tab located at the top of the left window.
2. Go to **SAN > Policies > root**.

3. Right-click **Fibre Channel Adapter Policies** and click **Create New Fibre Channel Adapter Policy**.



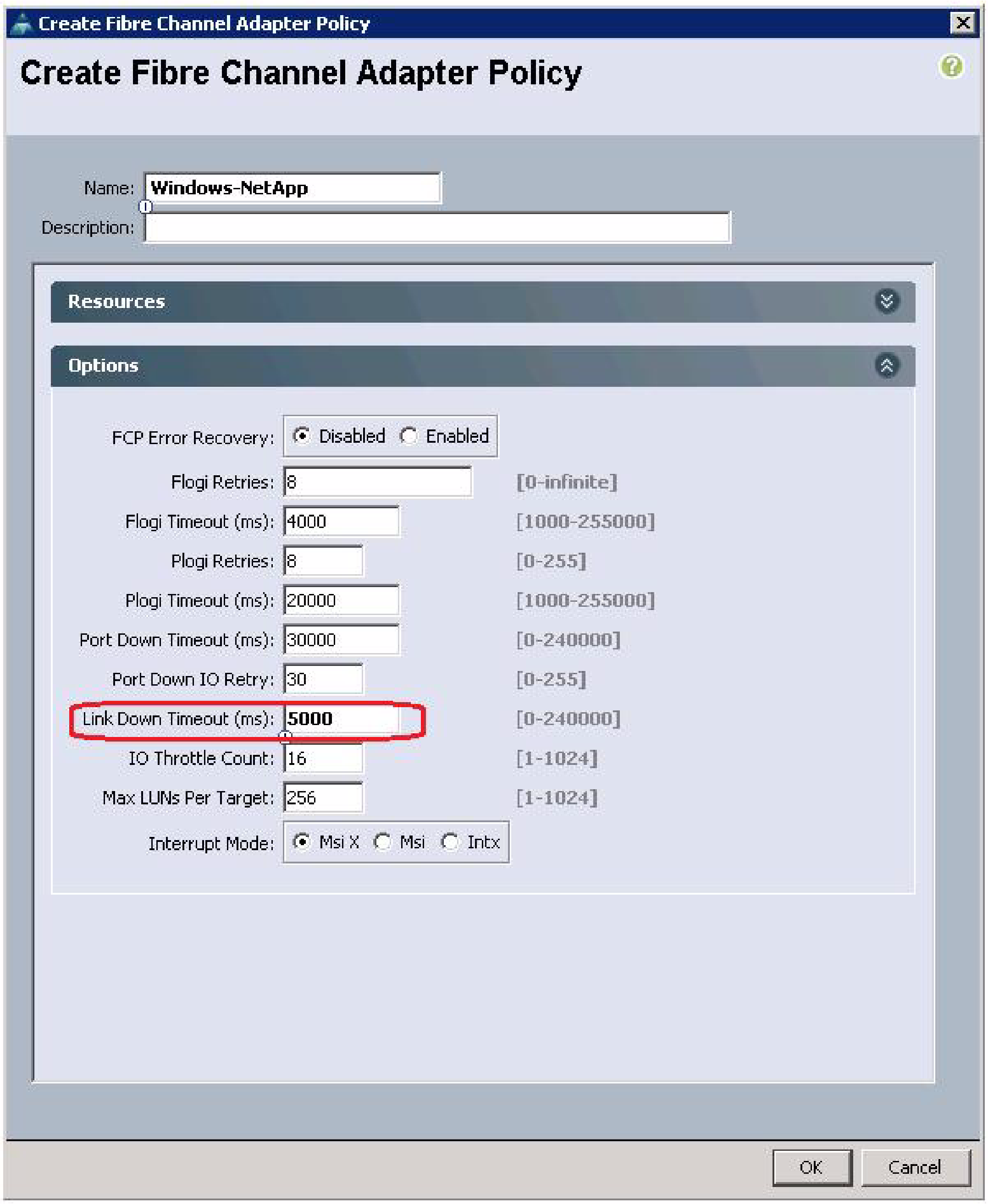
Name
Eth Adapter Policy Linux
Eth Adapter Policy VMWare
Eth Adapter Policy VMWarePassThru
Eth Adapter Policy Windows
Eth Adapter Policy default

4. Enter **Windows-NetApp** for the name of the Fibre Channel Adapter Policy.

5. Retain the default values the configurable items. Expand the Options drop-down list and set the Link Down Timeout (MS) option to **5000**.

6. Click **OK** to complete creating the FC adapter policy.

7. Click **OK**.



Create Fibre Channel Adapter Policy

Name: Windows-NetApp

Description:

Resources

Options

FCP Error Recovery: ● Disabled ○ Enabled

Flogi Retries: 8 [0-infinite]

Flogi Timeout (ms): 4000 [1000-255000]

Plogi Retries: 8 [0-255]

Plogi Timeout (ms): 20000 [1000-255000]

Port Down Timeout (ms): 30000 [0-240000]

Port Down IO Retry: 30 [0-255]

Link Down Timeout (ms): 5000 [0-240000]

IO Throttle Count: 16 [1-1024]

Max LUNs Per Target: 256 [1-1024]

Interrupt Mode: ● Msi X ○ Msi ○ Intx

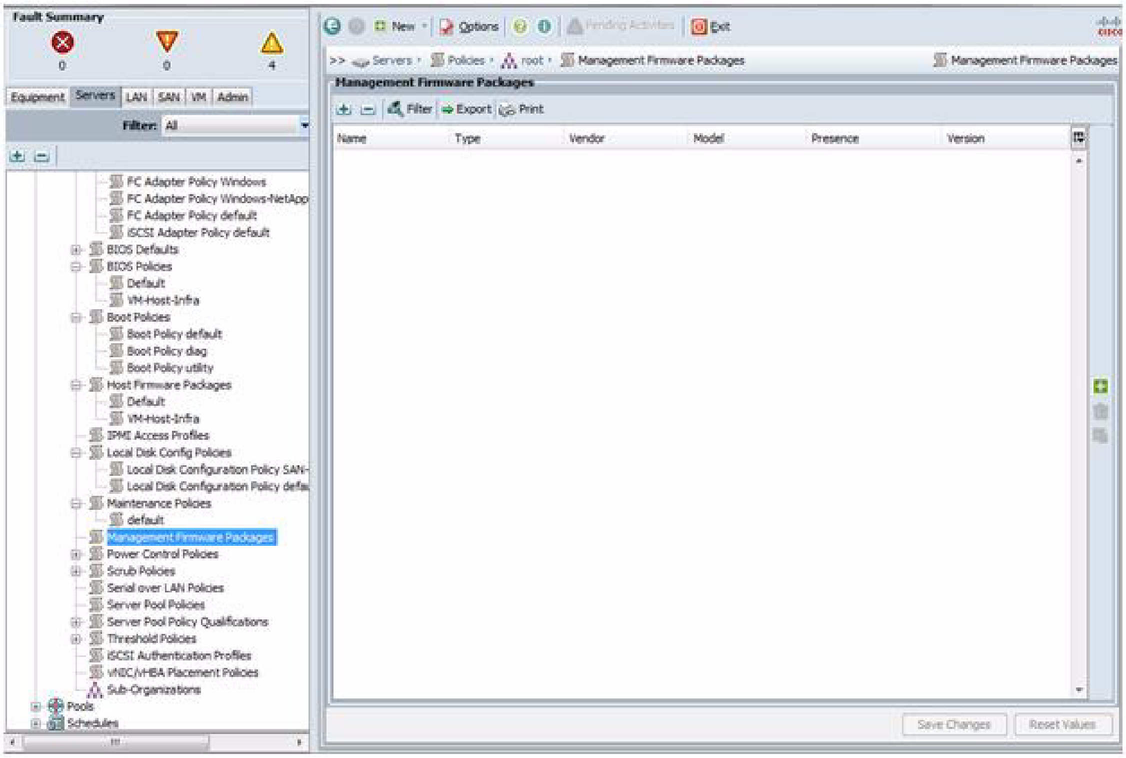
Create a Firmware Management Package

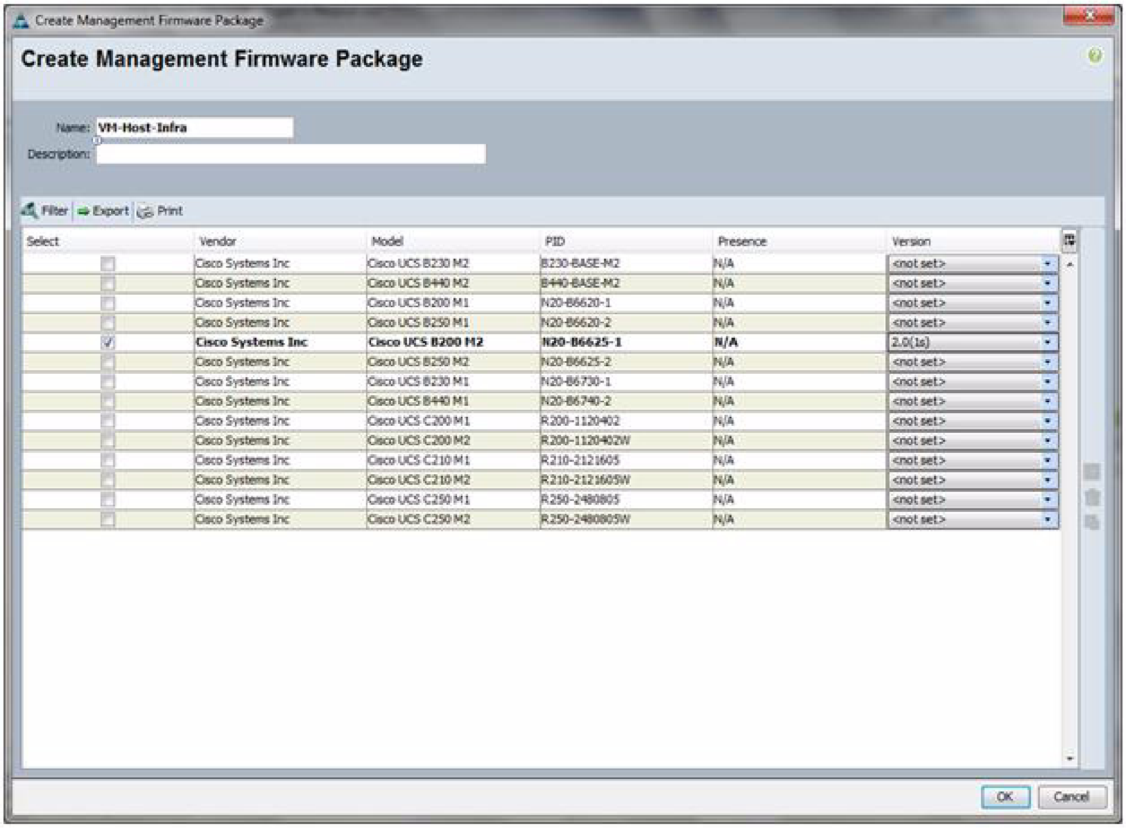
The following steps provide the details to create a firmware management policy for the Cisco UCS environment.

Cisco UCS Manager

1. Select the **Servers** tab located at the top left of the window.

2. Select **Policies > root**.
3. Right-click **Management Firmware Packages**.
4. Select **Create Management Firmware Package**.
5. Enter **VM-Host-Infra** for the management firmware package name.
6. Select the appropriate packages and versions of the Server Management Firmware for each server you have.
7. Click **OK** to complete creating the management firmware package.
8. Click **OK**.





Create Management Firmware Package

Name: VM-Host-Infra

Description:

Select	Vendor	Model	PID	Presence	Version
□	Cisco Systems Inc	Cisco UCS B230 M2	B230-BASE-M2	N/A	<not set>
□	Cisco Systems Inc	Cisco UCS B440 M2	B440-BASE-M2	N/A	<not set>
□	Cisco Systems Inc	Cisco UCS B200 M1	N20-B6620-1	N/A	<not set>
□	Cisco Systems Inc	Cisco UCS B250 M1	N20-B6620-2	N/A	<not set>
☑	**Cisco Systems Inc**	**Cisco UCS B200 M2**	**N20-B6625-1**	**N/A**	2.0(1s)
□	Cisco Systems Inc	Cisco UCS B250 M2	N20-B6625-2	N/A	<not set>
□	Cisco Systems Inc	Cisco UCS B230 M1	N20-B6730-1	N/A	<not set>
□	Cisco Systems Inc	Cisco UCS B440 M1	N20-B6740-2	N/A	<not set>
□	Cisco Systems Inc	Cisco UCS C200 M1	R200-1120402	N/A	<not set>
□	Cisco Systems Inc	Cisco UCS C200 M2	R200-1120402W	N/A	<not set>
□	Cisco Systems Inc	Cisco UCS C210 M1	R210-2121605	N/A	<not set>
□	Cisco Systems Inc	Cisco UCS C210 M2	R210-2121605W	N/A	<not set>
□	Cisco Systems Inc	Cisco UCS C250 M1	R250-2480805	N/A	<not set>
□	Cisco Systems Inc	Cisco UCS C250 M2	R250-2480805W	N/A	<not set>

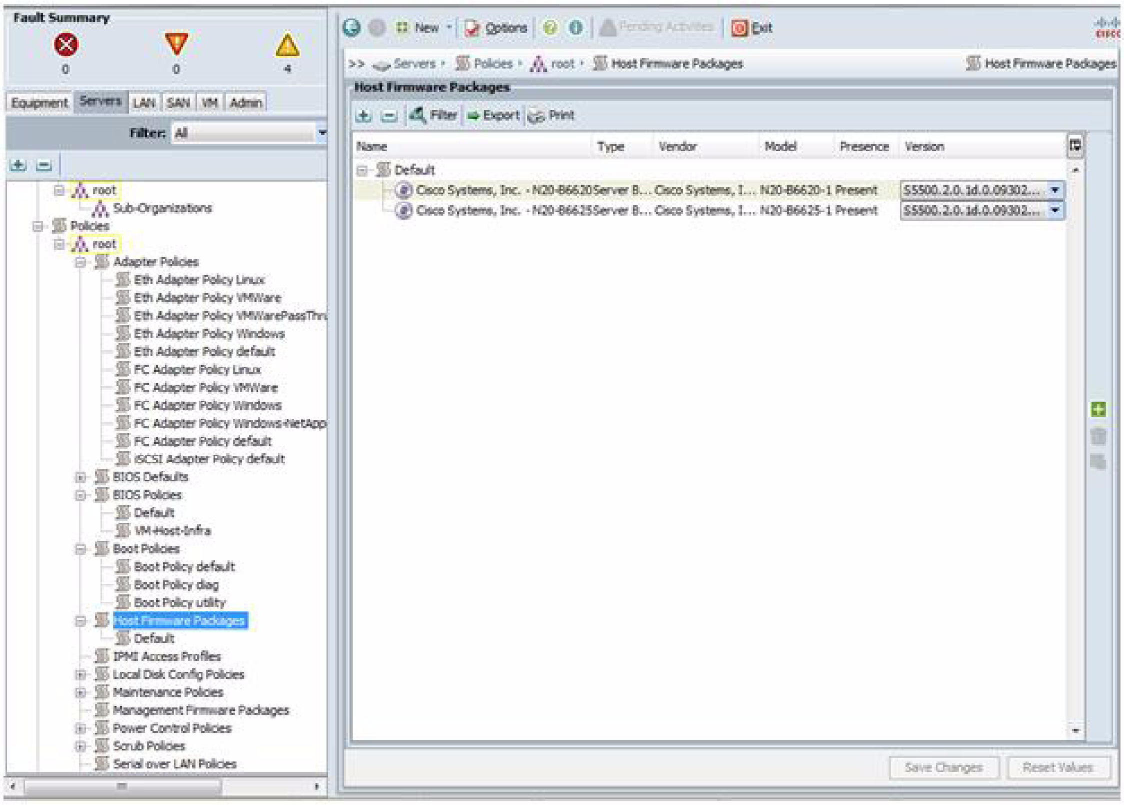
Create a Firmware Package Policy

The following steps provide the details to create a firmware management policy for a given server configuration in the Cisco UCS environment. Firmware management policies allow the administrator to select the corresponding packages for a given server configuration. These often include adapter, BIOS, board controller, FC adapters, HBA option ROM, and storage controller properties.

Cisco UCS Manager

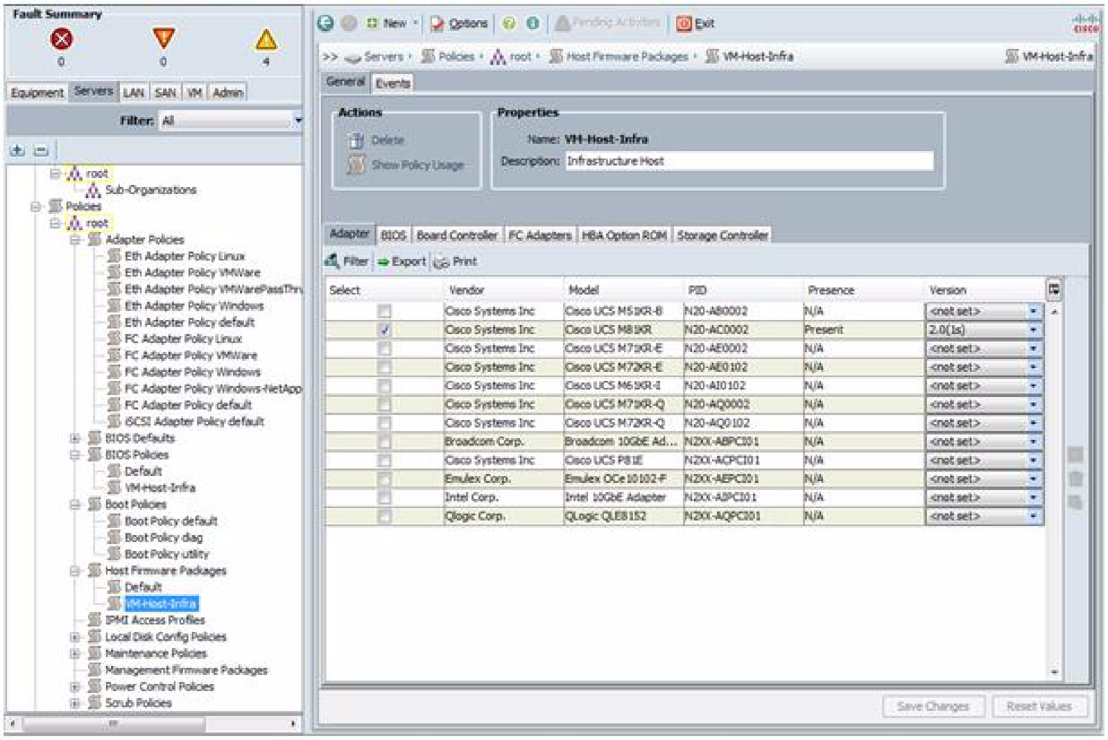
1. Select the **Servers** tab located at the top left of the window.
2. Select **Policies > root**.
3. Right-click **Host Firmware Packages**.
4. Select **Create Host Firmware Package**.
5. Enter the name of the host firmware package for the corresponding server configuration.
6. Navigate the tabs of the Create Host Firmware Package Navigator and select the appropriate packages and versions for the server configuration.
7. Click **OK** to complete creating the host firmware package.

8. Click **OK**.



Host Firmware Packages

Name	Type	Vendor	Model	Presence	Version
Default					
Cisco Systems, Inc. - N20-B6620	Server B...	Cisco Systems, I...	N20-B6620-1	Present	S5500.2.0.1d.0.09302...
Cisco Systems, Inc. - N20-B6625	Server B...	Cisco Systems, I...	N20-B6625-1	Present	S5500.2.0.1d.0.09302...

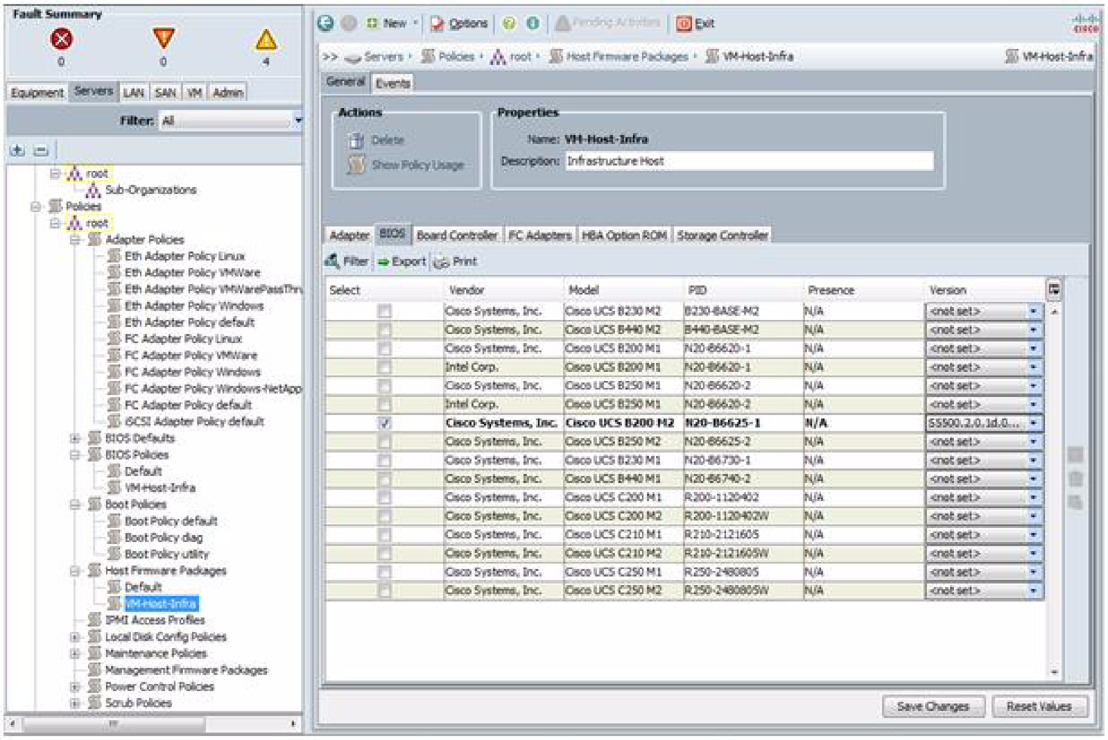


Properties

Name: **VM-Host-Infra**

Description: Infrastructure Host

Select	Vendor	Model	PID	Presence	Version
□	Cisco Systems Inc	Cisco UCS M51KR-B	N20-AB0002	N/A	<not set>
☑	Cisco Systems Inc	Cisco UCS M81KR	N20-AC0002	Present	2.0(1s)
□	Cisco Systems Inc	Cisco UCS M71KR-E	N20-AE0002	N/A	<not set>
□	Cisco Systems Inc	Cisco UCS M72KR-E	N20-AE0102	N/A	<not set>
□	Cisco Systems Inc	Cisco UCS M61KR-I	N20-AI0102	N/A	<not set>
□	Cisco Systems Inc	Cisco UCS M71KR-Q	N20-AQ0002	N/A	<not set>
□	Cisco Systems Inc	Cisco UCS M72KR-Q	N20-AQ0102	N/A	<not set>
□	Broadcom Corp.	Broadcom 10GbE Ad...	N2XX-ABPCI01	N/A	<not set>
□	Cisco Systems Inc	Cisco UCS P81E	N2XX-ACPCI01	N/A	<not set>
□	Emulex Corp.	Emulex OCe10102-F	N2XX-AEPCI01	N/A	<not set>
□	Intel Corp.	Intel 10GbE Adapter	N2XX-AIPCI01	N/A	<not set>
□	Qlogic Corp.	QLogic QLE8152	N2XX-AQPCI01	N/A	<not set>



Name: VM-Host-Infra

Description: Infrastructure Host

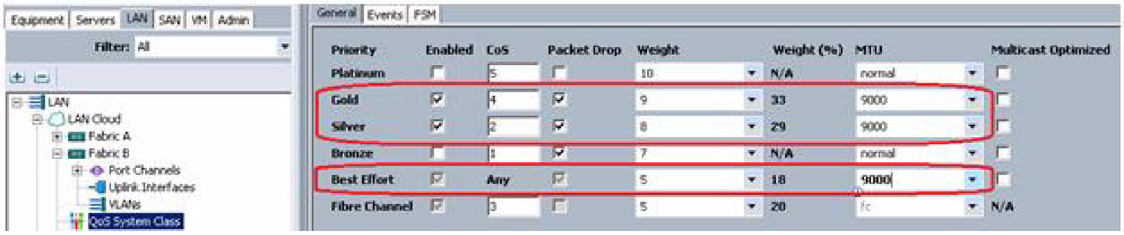
Select	Vendor	Model	PID	Presence	Version
□	Cisco Systems, Inc.	Cisco UCS B230 M2	B230-BASE-M2	N/A	<not set>
□	Cisco Systems, Inc.	Cisco UCS B440 M2	B440-BASE-M2	N/A	<not set>
□	Cisco Systems, Inc.	Cisco UCS B200 M1	N20-B6620-1	N/A	<not set>
□	Intel Corp.	Cisco UCS B200 M1	N20-B6620-1	N/A	<not set>
□	Cisco Systems, Inc.	Cisco UCS B250 M1	N20-B6620-2	N/A	<not set>
□	Intel Corp.	Cisco UCS B250 M1	N20-B6620-2	N/A	<not set>
☑	**Cisco Systems, Inc.**	**Cisco UCS B200 M2**	**N20-B6625-1**	**N/A**	S5500.2.0.1d.0...
□	Cisco Systems, Inc.	Cisco UCS B250 M2	N20-B6625-2	N/A	<not set>
□	Cisco Systems, Inc.	Cisco UCS B230 M1	N20-B6730-1	N/A	<not set>
□	Cisco Systems, Inc.	Cisco UCS B440 M1	N20-B6740-2	N/A	<not set>
□	Cisco Systems, Inc.	Cisco UCS C200 M1	R200-1120402	N/A	<not set>
□	Cisco Systems, Inc.	Cisco UCS C200 M2	R200-1120402W	N/A	<not set>
□	Cisco Systems, Inc.	Cisco UCS C210 M1	R210-2121605	N/A	<not set>
□	Cisco Systems, Inc.	Cisco UCS C210 M2	R210-2121605W	N/A	<not set>
□	Cisco Systems, Inc.	Cisco UCS C250 M1	R250-2480805	N/A	<not set>
□	Cisco Systems, Inc.	Cisco UCS C250 M2	R250-2480805W	N/A	<not set>

Set Jumbo Frames and Enable Quality of Service in Cisco UCS Fabric

The following steps provide the details for setting jumbo frames and enabling the quality of server in the Cisco UCS Fabric.

Cisco UCS Manager

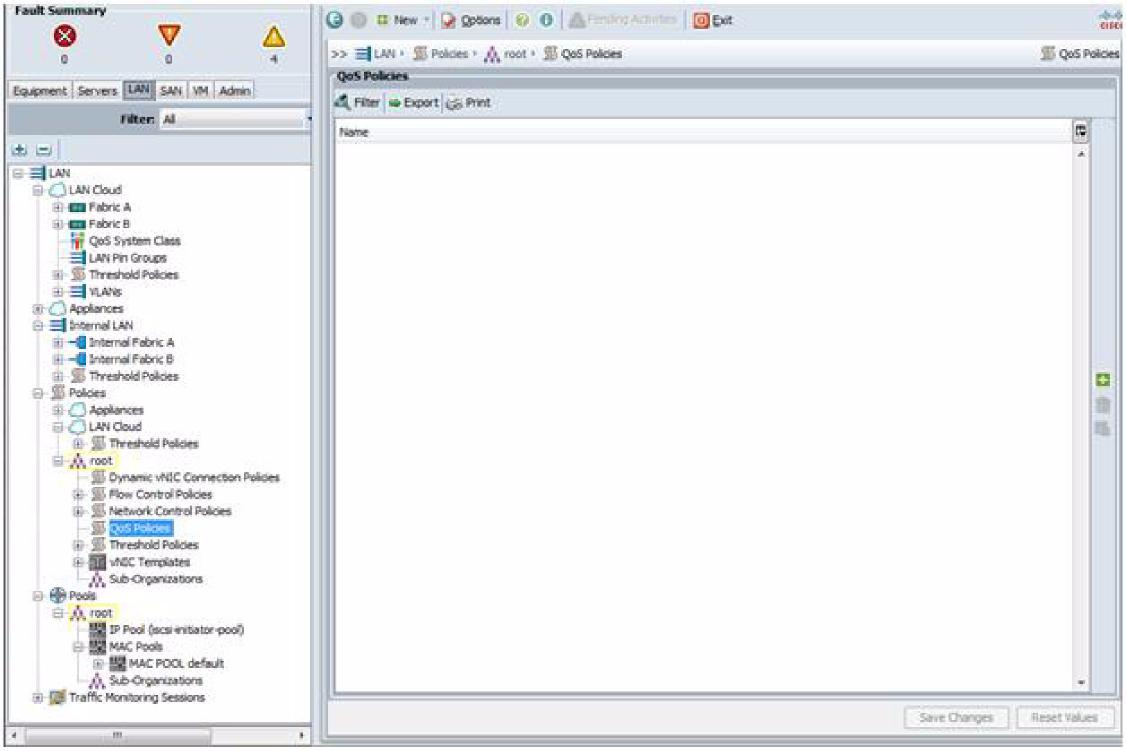
1. Select the **LAN** tab located at the top left of the window.
2. Go to **LAN Cloud > QoS System Class**.
3. In the right pane, click the **General** tab.
4. On the Gold and Silver Priority, and Best Efforts row, enter **9000** in the MTU boxes.
5. Click **Save Changes**.
6. Click **OK** to continue.



Priority	Enabled	CoS	Packet Drop	Weight	Weight (%)	MTU	Multicast Optimized
Platinum	□	5	□	10	N/A	normal	□
Gold	☑	4	☑	9	33	9000	□
Silver	☑	2	☑	8	29	9000	□
Bronze	□	1	☑	7	N/A	normal	□
Best Effort	☑	Any	☑	5	18	9000	□
Fibre Channel	☑	3	□	5	20	fc	N/A

7. Select the **LAN** tab located at the left of the window.

8. Go to **LAN > Policies > Root >**.



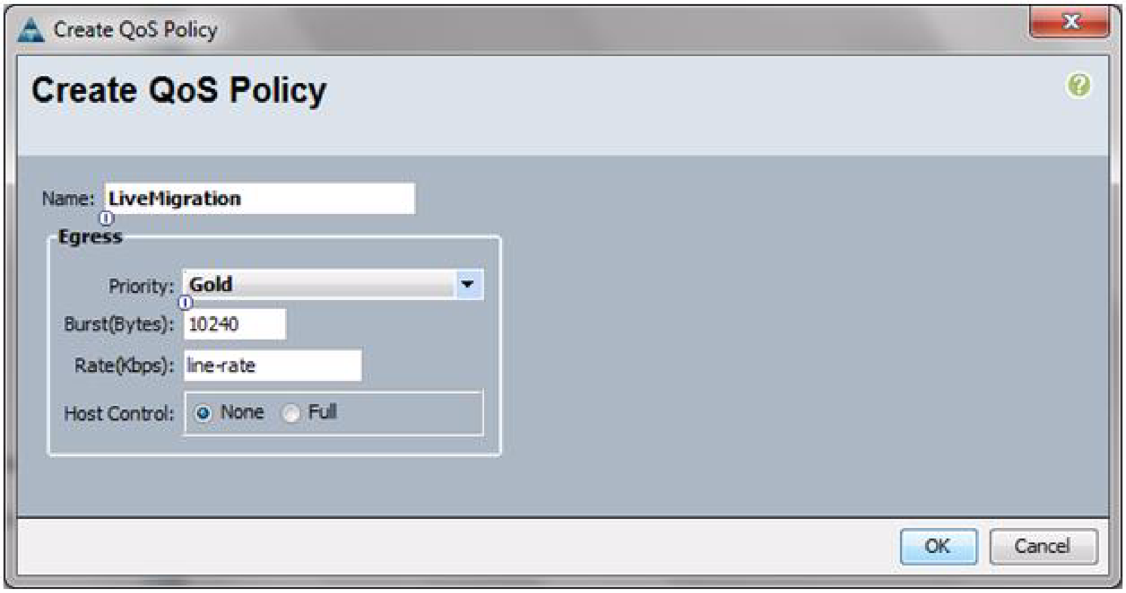
9. Right-click **QoS Policies**.

10. Select **Create QoS Policy**.

11. Enter **LiveMigration** for the QoS Policy name.

12. Change the Priority to **Gold**. Retain Burst(Bytes) set to 10240. Retain Rate(Kbps) set to line-rate. Retain Host Control set to None.

13. Click **OK**.


Create QoS Policy

Name: LiveMigration

Egress

Priority: Gold

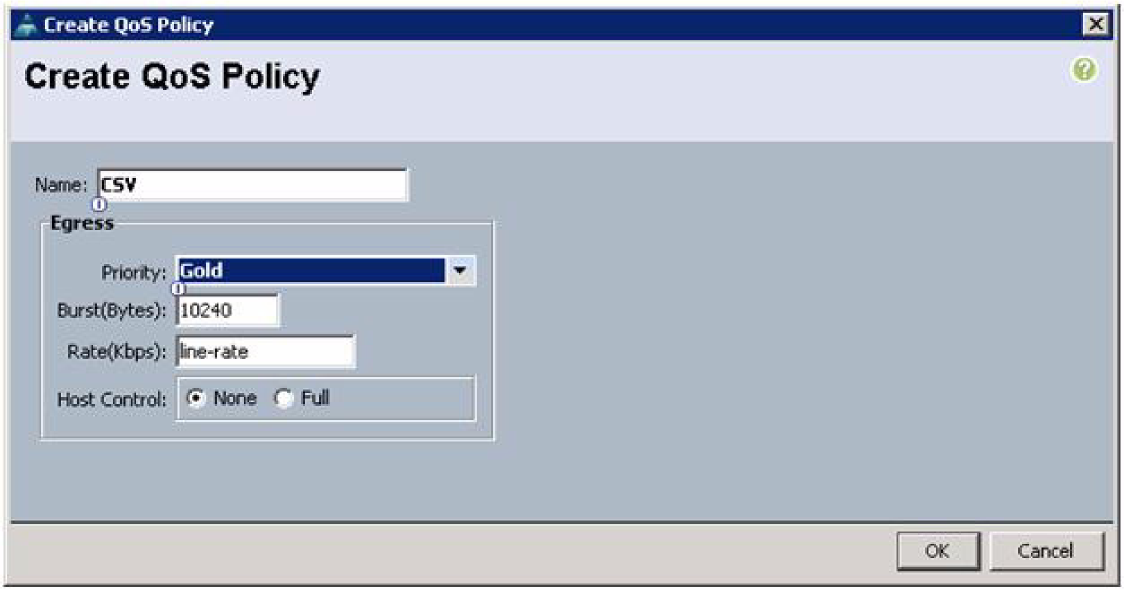
Burst(Bytes): 10240

Rate(Kbps): line-rate

Host Control: ● None ○ Full

14. Right-click **QoS Policies**.

15. Select **Create QoS Policy**.
16. Enter **CSV** for the QoS Policy name.
17. Change the Priority to **Gold**. Retain Burst(Bytes) set to 10240. Retan Rate(Kbps) set to line-rate. Retain Host Control set to None.
18. Click **OK**.



Create QoS Policy

Name: CSV

Egress

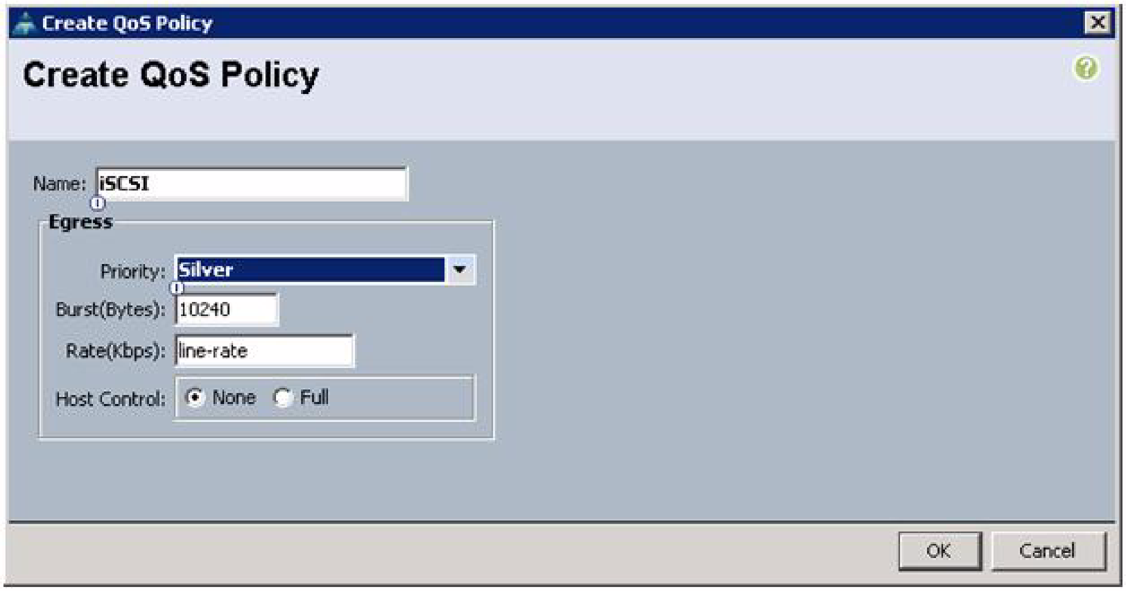
Priority: Gold

Burst(Bytes): 10240

Rate(Kbps): line-rate

Host Control: ● None ○ Full

19. Right-click **QoS Policies**.
20. Select **Create QoS Policy**.
21. Enter **iSCSI** for the QoS Policy name.
22. Change the Priority to **Silver**. Retain Burst(Bytes) set to 10240. Retain Rate(Kbps) set to line-rate. Retain Host Control set to None.
23. Click **OK**.



Create QoS Policy

Name: iSCSI

Egress

Priority: Silver

Burst(Bytes): 10240

Rate(Kbps): line-rate

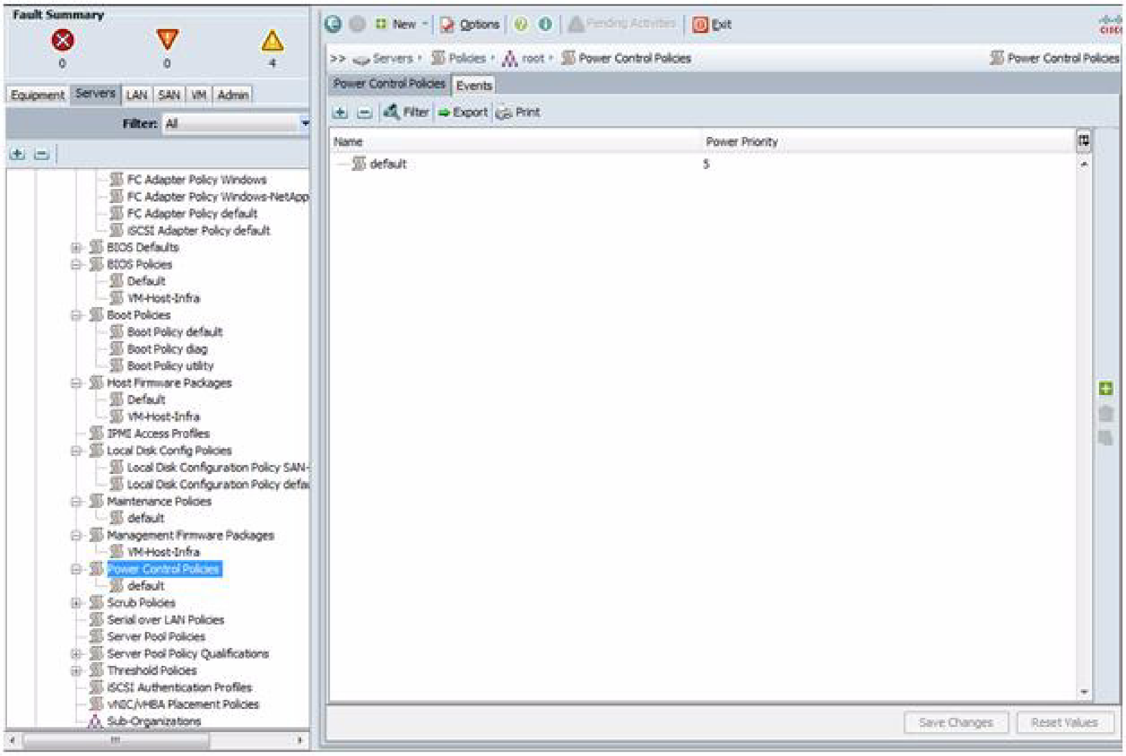
Host Control: ● None ○ Full

Create a Power Control Policy

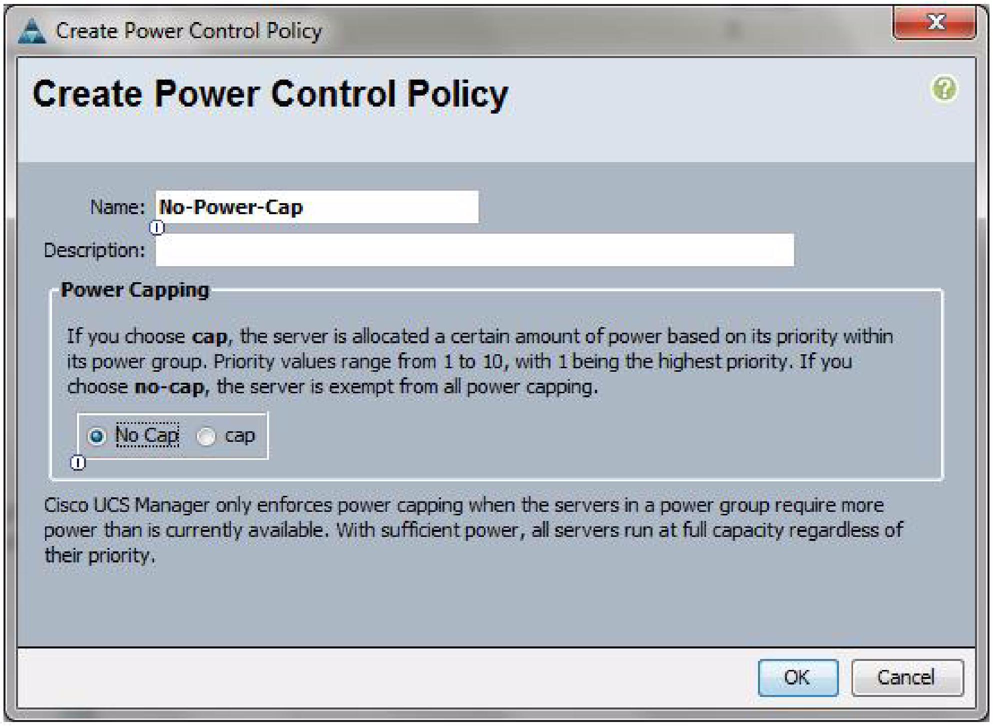
The following steps provide the details to create a Power Control Policy for the Cisco UCS environment.

Cisco UCS Manager

1. Select the **Servers** tab located at the top left of the window.
2. Go to **Policies > root**.
3. Right-click **Power Controller Policies**.
4. Select **Create Power Control Policy**.
5. Enter **No-Power-Cap** for the power control policy name.
6. Change the Power Capping to **No Cap**.
7. Click **OK** to complete creating the host firmware package.
8. Click **OK**.



Name	Power Priority
default	5



Create Power Control Policy

Name: No-Power-Cap

Description:

Power Capping

If you choose **cap**, the server is allocated a certain amount of power based on its priority within its power group. Priority values range from 1 to 10, with 1 being the highest priority. If you choose **no-cap**, the server is exempt from all power capping.

● No Cap ○ cap

Cisco UCS Manager only enforces power capping when the servers in a power group require more power than is currently available. With sufficient power, all servers run at full capacity regardless of their priority.

Create a Local Disk Configuration Policy

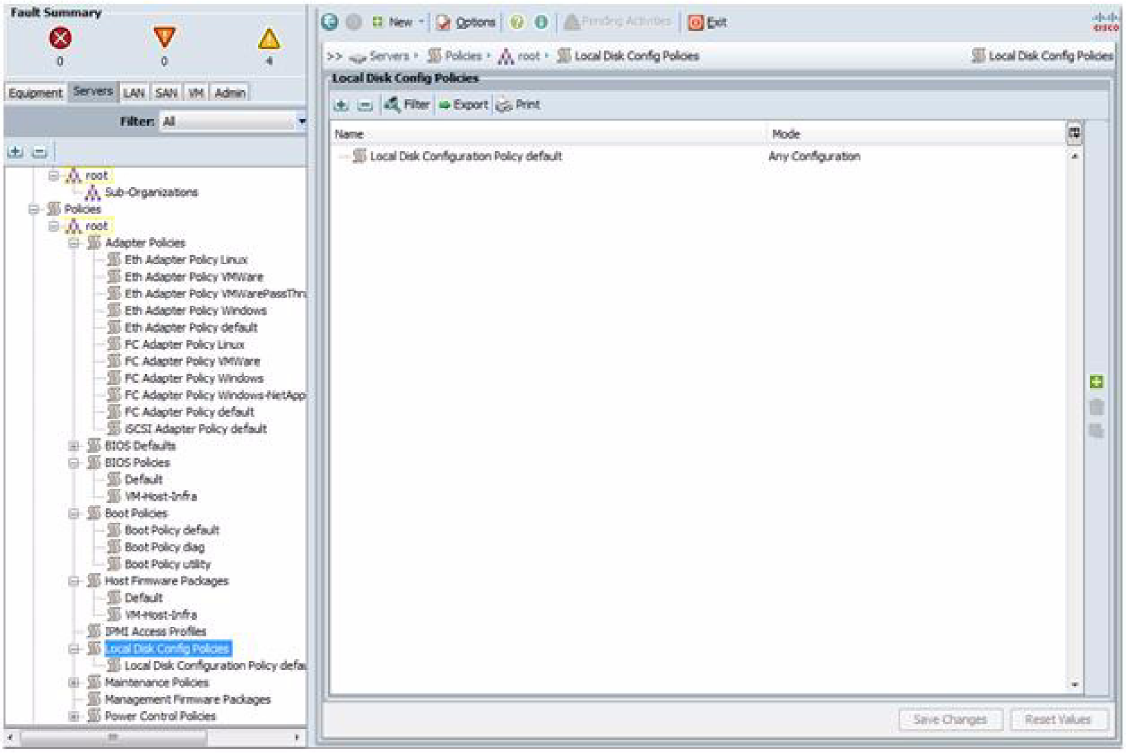
The following steps provide the details to create a local disk configuration for the Cisco UCS environment, which is necessary if the servers in question do not have a local disk.

Note This policy should not be used on blades that contain local disks.

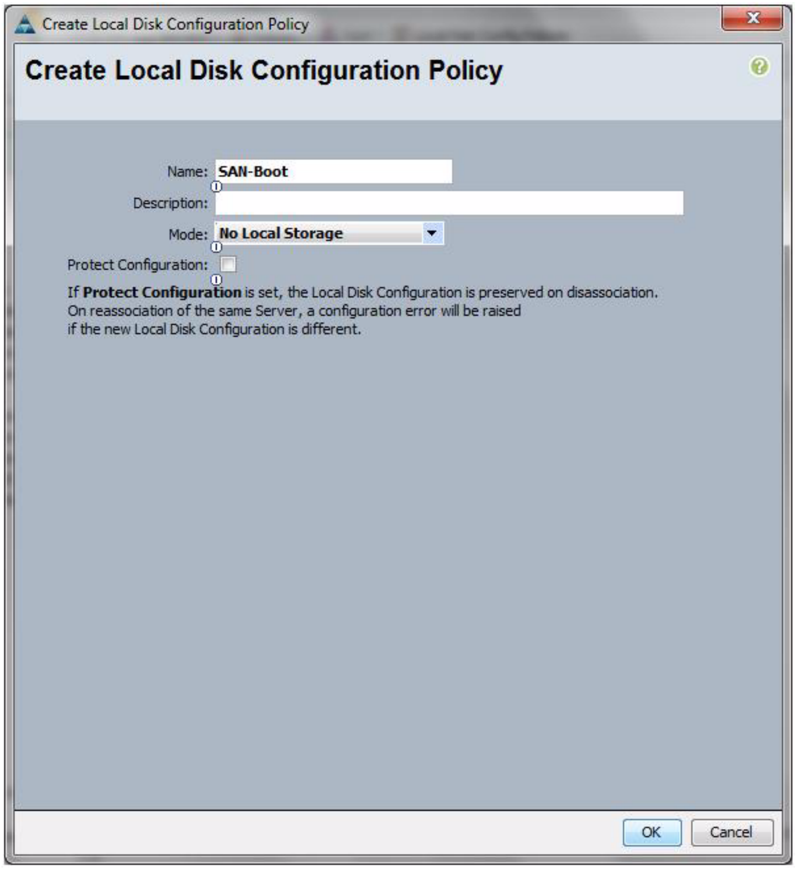
Cisco UCS Manager

1. Select the **Servers** tab located on the left of the window.
2. Go to **Policies > root**.
3. Right-click **Local Disk Config Policies**.
4. Select **Create Local Disk Configuration Policy**.
5. Enter **SAN Boot** for the local disk configuration policy name.
6. Change the Mode to **No Local Storage**. Uncheck the **Protect Configuration** box.
7. Click **OK** to complete creating the host firmware package.

8. Click **OK**.



Name	Mode
Local Disk Configuration Policy default	Any Configuration



Create Local Disk Configuration Policy

Name: SAN-Boot

Description:

Mode: No Local Storage

Protect Configuration: □

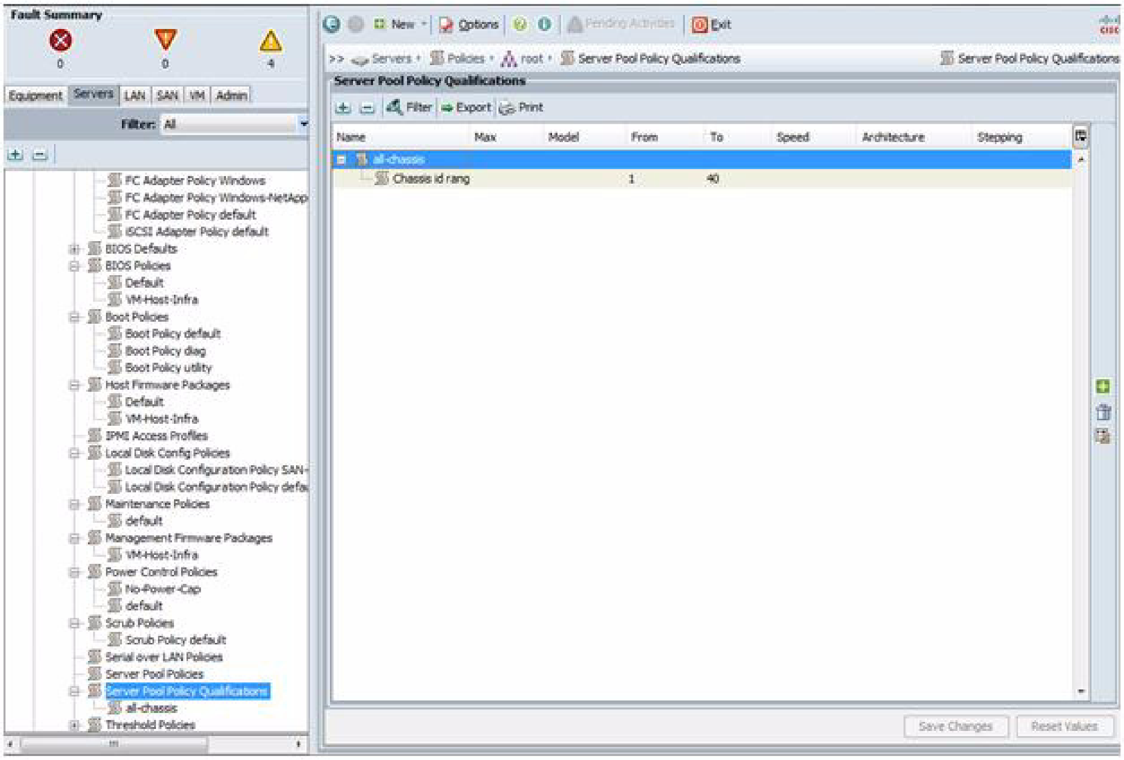
If **Protect Configuration** is set, the Local Disk Configuration is preserved on disassociation.
On reassociation of the same Server, a configuration error will be raised
if the new Local Disk Configuration is different.

Create a Server Pool Qualification Policy

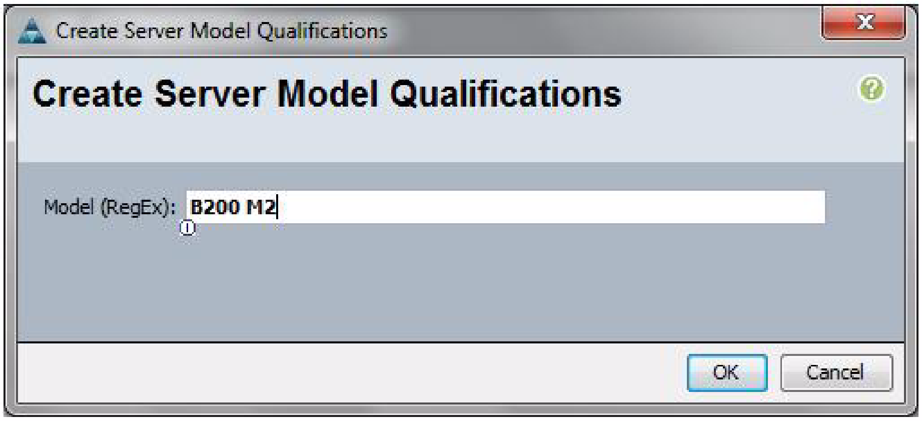
The following steps provide the details to create a server pool qualification policy for the Cisco UCS environment.

Cisco UCS Manager

1. Select the **Servers** tab located on the left of the window.
2. Go to **Policies > root**.
3. Right-click **Server Pool Qualification Policies**.
4. Select **Create Server Pool Policy Qualification**.
5. Select **Server Model Qualifications**.
6. Enter **B200 M2** as the Model(RegEx).
7. Click **OK** to complete creating the host firmware package.
8. Click **OK**.



Name	Max	Model	From	To	Speed	Architecture	Stepping
all-chassis							
Chassis id rang			1	40			



Create Server Model Qualifications
Create Server Model Qualifications
OK
Cancel

Model (RegEx): B200 M2

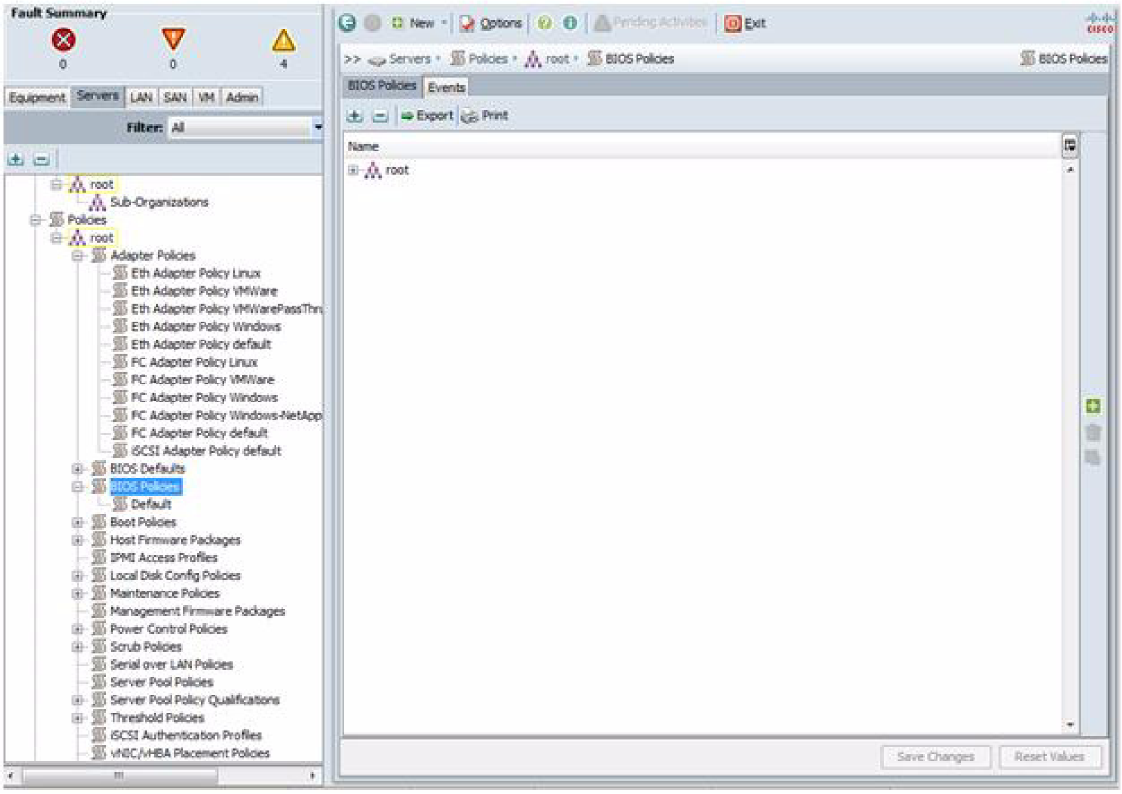
Create a Server BIOS Policy

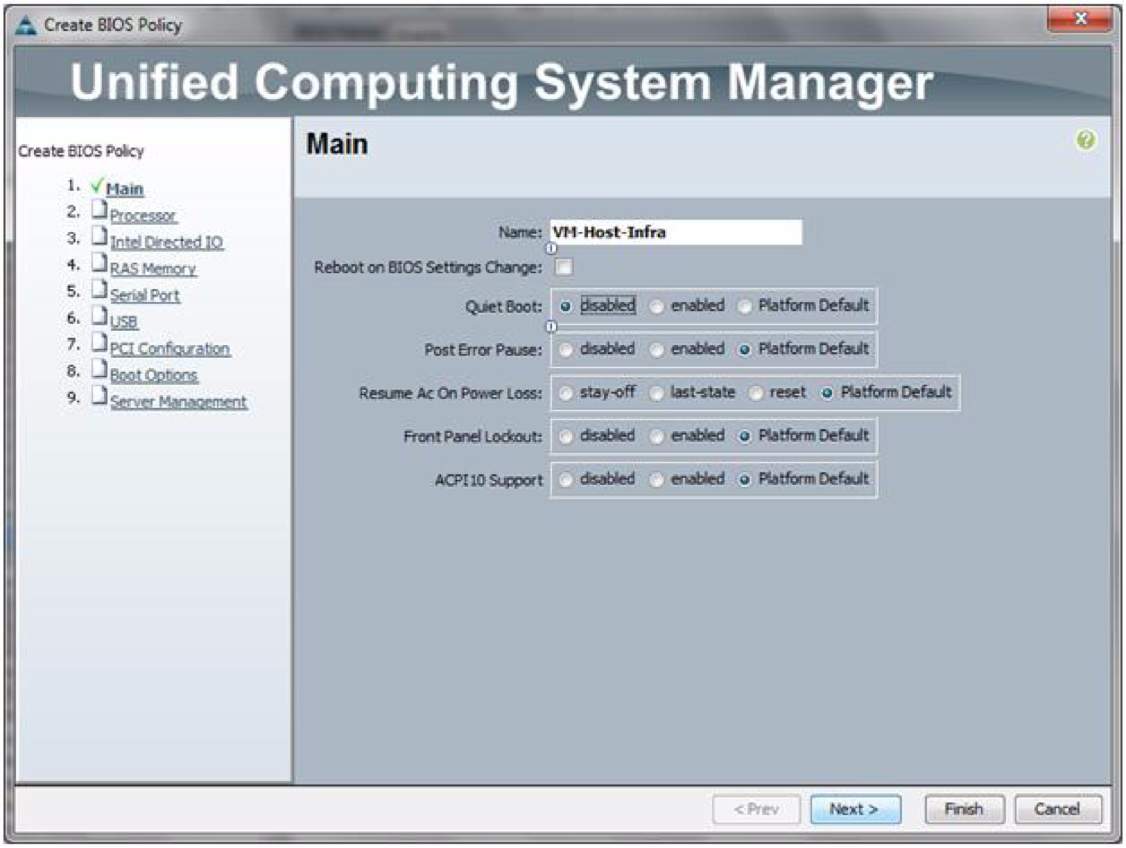
The following steps provide the details to create a server BIOS policy for the Cisco UCS environment.

Cisco UCS Manager

1. Select the **Servers** tab located on the left of the window.
2. Go to **Policies > root**.
3. Right-click **BIOS Policies**.
4. Select **Create BIOS Policy**.
5. Enter **VM-Host-Infra** for the BIOS policy name.
6. Change the Quiet Boot property to **Disabled**.
7. Click **Finish** to complete creating the BIOS policy.

8. Click **OK**.


Fault Summary
0
0
4
Equipment
Servers
LAN
SAN
VM
Admin
Filter: All
root
Sub-Organizations
Policies
root
Adapter Policies
Eth Adapter Policy Linux
Eth Adapter Policy VMWare
Eth Adapter Policy VMWarePassThru
Eth Adapter Policy Windows
Eth Adapter Policy default
FC Adapter Policy Linux
FC Adapter Policy VMWare
FC Adapter Policy Windows
FC Adapter Policy Windows-NetApp
FC Adapter Policy default
iSCSI Adapter Policy default
BIOS Defaults
BIOS Policies
Default
Boot Policies
Host Firmware Packages
IPMI Access Profiles
Local Disk Config Policies
Maintenance Policies
Management Firmware Packages
Power Control Policies
Scrub Policies
Serial over LAN Policies
Server Pool Policies
Server Pool Policy Qualifications
Threshold Policies
iSCSI Authentication Profiles
vNIC/vHBA Placement Policies
New
Options
Pending Activities
Exit
>> Servers › Policies › root › BIOS Policies
BIOS Policies
BIOS Policies
Events
Export
Print
Name
root
Save Changes
Reset Values



Name: VM-Host-Infra

Reboot on BIOS Settings Change: □

Quiet Boot: ● disabled ○ enabled ○ Platform Default

Post Error Pause: ○ disabled ○ enabled ● Platform Default

Resume Ac On Power Loss: ○ stay-off ○ last-state ○ reset ● Platform Default

Front Panel Lockout: ○ disabled ○ enabled ● Platform Default

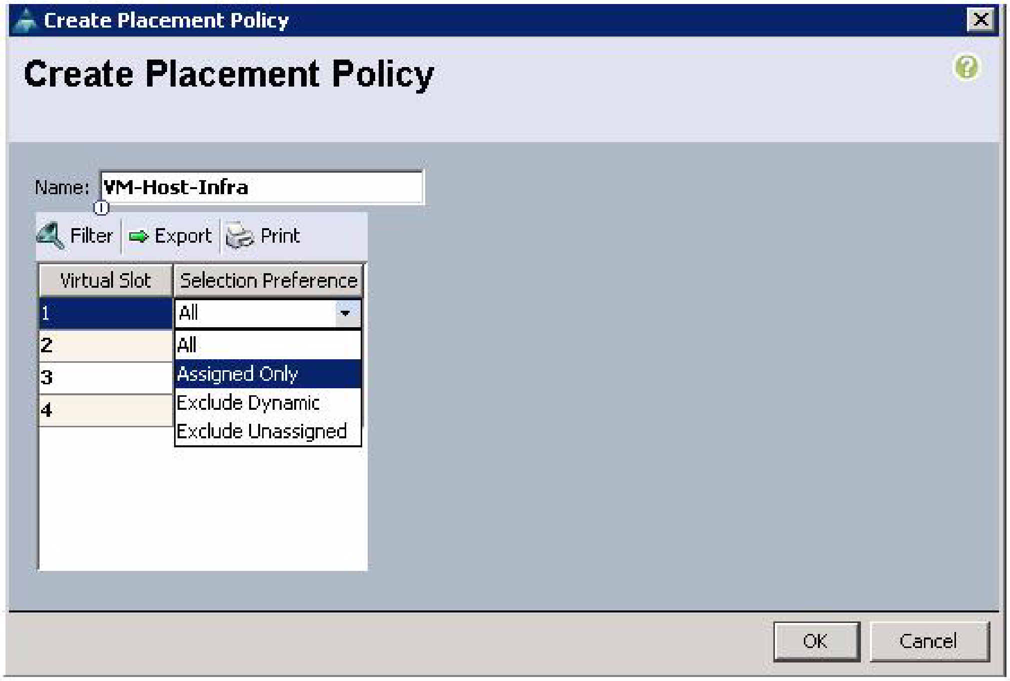
ACPI10 Support ○ disabled ○ enabled ● Platform Default

Create a vNIC/HBA Placement Policy for Virtual Machine Infrastructure Hosts

Cisco UCS Manager

1. Right-click **vNIC/HBA Placement policy** and select **Create**.
2. Enter the name **VM-Host-Infra**.
3. Click **1** and select **Assign Only**.

4. Click **OK**.



Create Placement Policy

Name: VM-Host-Infra

Virtual Slot	Selection Preference
1	All
2	
3	
4	

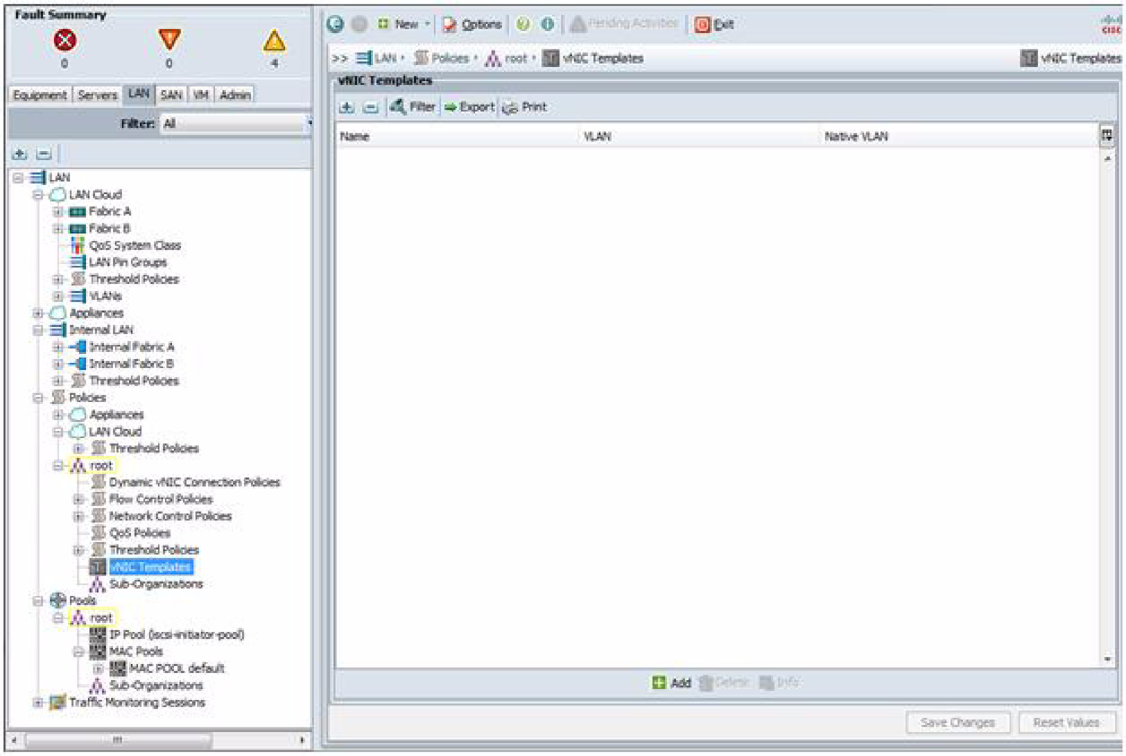
Create a vNIC Template

The following steps provide the details to create multiple vNIC templates for the Cisco UCS environment.

Cisco UCS Manager

1. Select the **LAN** tab located on the left of the window.
2. Go to **Policies > root**.

3. Right-click **vNIC Templates**.



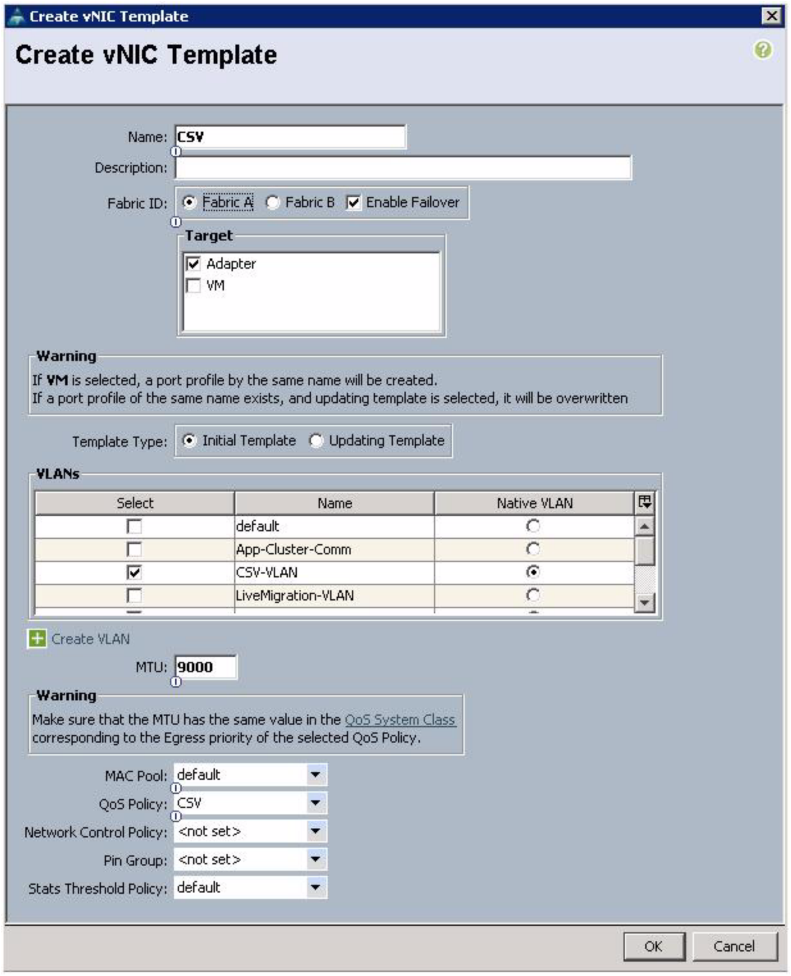
4. Select **Create vNIC Template**.

5. Enter **CSV** for the vNIC template name.

6. Retain Fabric A checked. Check the **Enable Failover** box. Under target, deselect the **VM** box. Select **Updating Template** as the Template Type. Under VLANs, select **CSV VLAN** and set it as **Native VLAN**. Under MTU, enter **9000**. Under MAC Pool, select **Default**. Under QOS Policy, select **CSV**.

7. Click **OK** to complete creating the vNIC template.

8. Click **OK**.



Create vNIC Template

Name: CSV

Description:

Fabric ID: ● Fabric A ○ Fabric B ☑ Enable Failover

Target

☑ Adapter
☐ VM

Warning
If **VM** is selected, a port profile by the same name will be created.
If a port profile of the same name exists, and updating template is selected, it will be overwritten

Template Type: ● Initial Template ○ Updating Template

VLANs

Select	Name	Native VLAN
☐	default	○
☐	App-Cluster-Comm	○
☑	CSV-VLAN	●
☐	LiveMigration-VLAN	○

MTU: 9000

Warning
Make sure that the MTU has the same value in the QoS System Class corresponding to the Egress priority of the selected QoS Policy.

MAC Pool: default

QoS Policy: CSV

Network Control Policy: <not set>

Pin Group: <not set>

Stats Threshold Policy: default

9. Select the **LAN** tab located on the left of the window.

10. Go to **Policies > root**.

11. Right-click **vNIC Templates**.

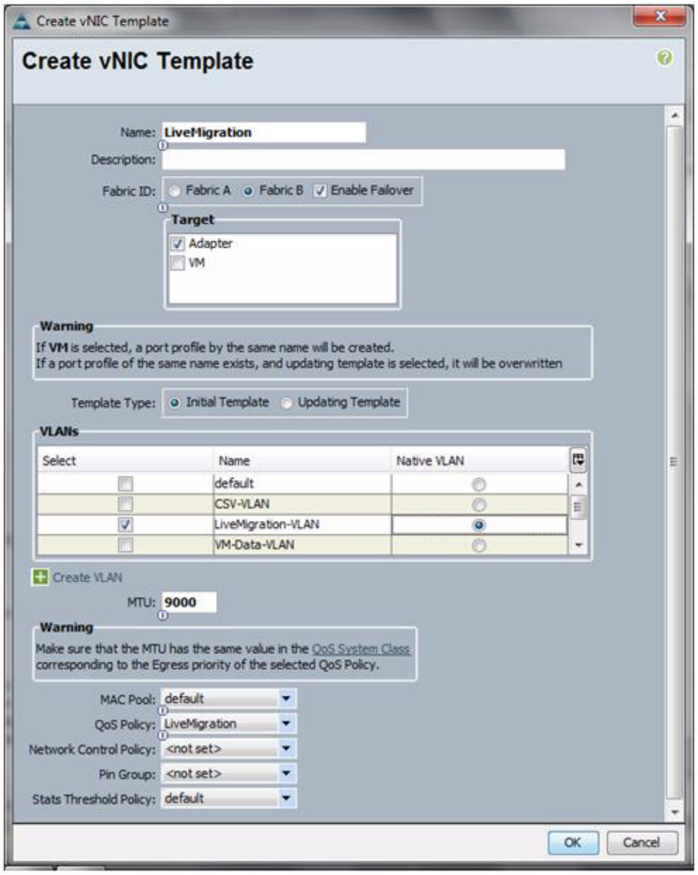
12. Select **Create vNIC Template**.

13. Enter **LiveMigration** for the vNIC template name.

14. Check **Fabric B**. Check the **Enable Failover** box. Under target, deselect the **VM** box. Select **Updating Template** as the Template Type. Under VLANs, select **Live-Migration-VLAN** and set it as **Native VLAN**. Under MTU, enter **9000**. Under MAC Pool, select **Default**. Under QoS Policy, select **Live-Migration**.

15. Click **OK** to complete creating the vNIC template.

16. Click **OK**.



Create vNIC Template

Name: LiveMigration

Description:

Fabric ID: ○ Fabric A ● Fabric B ☑ Enable Failover

Target

☑ Adapter

□ VM

Warning

If **VM** is selected, a port profile by the same name will be created.
If a port profile of the same name exists, and updating template is selected, it will be overwritten

Template Type: ● Initial Template ○ Updating Template

VLANs

Select	Name	Native VLAN
□	default	○
□	CSV-VLAN	○
☑	LiveMigration-VLAN	●
□	VM-Data-VLAN	○

Create VLAN

MTU: 9000

Warning

Make sure that the MTU has the same value in the QoS System Class corresponding to the Egress priority of the selected QoS Policy.

MAC Pool: default

QoS Policy: LiveMigration

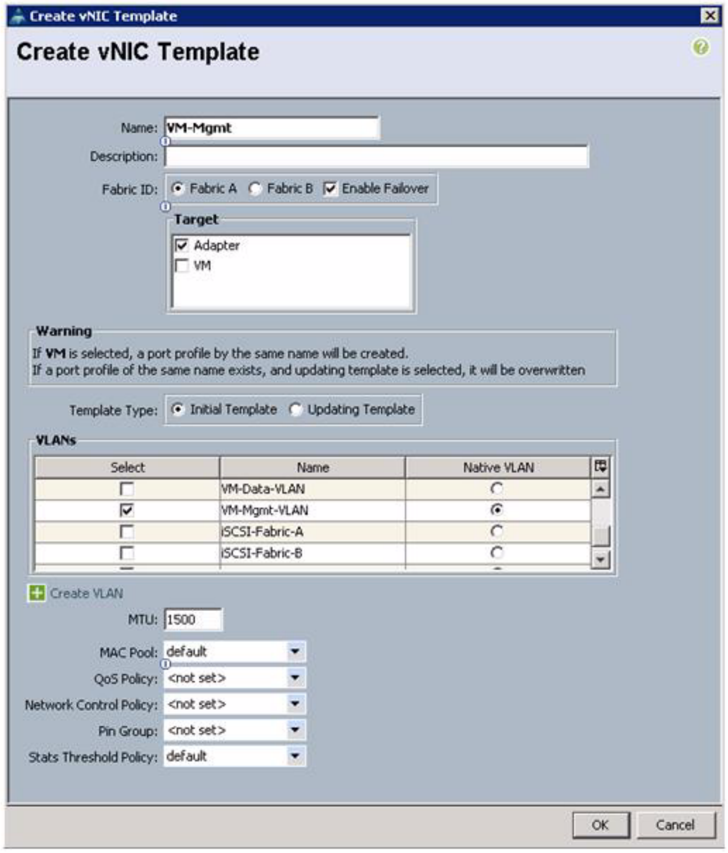
Network Control Policy: <not set>

Pin Group: <not set>

Stats Threshold Policy: default

17. Select the **LAN** tab located on the left of the window.
18. Go to **Policies > root**.
19. Right-click **vNIC Templates**.
20. Select **Create vNIC Template**.
21. Enter **VM-MGMT** for the vNIC template name.
22. Check **Fabric A**. Check the **Enable Failover** box. Under target, deselect the **VM** box. Select **Updating Template** as the Template Type. Under VLANs, select **MGMT-VLAN**. Set it as **Native VLAN**. Under MAC Pool, select **MAC_Pool**.
23. Click **OK** to complete creating the vNIC template.

24. Click **OK**.



Create vNIC Template

Name: VM-Mgmt

Description:

Fabric ID: ● Fabric A ○ Fabric B ☑ Enable Failover

Target

☑ Adapter

□ VM

Warning

If **VM** is selected, a port profile by the same name will be created.
If a port profile of the same name exists, and updating template is selected, it will be overwritten

Template Type: ● Initial Template ○ Updating Template

VLANs

Select	Name	Native VLAN
□	VM-Data-VLAN	○
☑	VM-Mgmt-VLAN	●
□	iSCSI-Fabric-A	○
□	iSCSI-Fabric-B	○

MTU: 1500

MAC Pool: default

QoS Policy: <not set>

Network Control Policy: <not set>

Pin Group: <not set>

Stats Threshold Policy: default

25. Select the **LAN** tab located on the left of the window.

26. Go to **Policies > root**.

27. Right-click **vNIC Templates**.

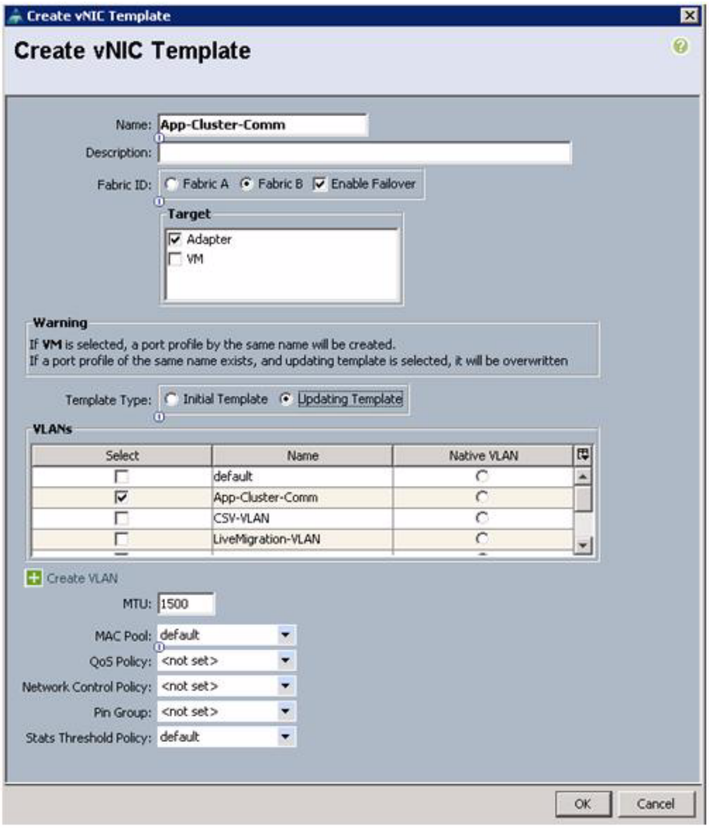
28. Select **Create vNIC Template**.

29. Enter **App-Cluster-Comm** for the vNIC template name.

30. Check **Fabric B**. Check the **Enable Failover** box. Under target, deselect the **VM** box. Select **Updating Template** as the Template Type. Under VLANs, select **App-Cluster-Comm**. Do not set a Native VLAN. Under MTU, enter **1500**. Under MAC Pool, select **Default**.

31. Click **OK** to complete creating the vNIC template.

32. Click **OK**.



Create vNIC Template

Name: App-Cluster-Comm

Description:

Fabric ID: ○ Fabric A ● Fabric B ☑ Enable Failover

Target

☑ Adapter

☐ VM

Warning

If **VM** is selected, a port profile by the same name will be created.
If a port profile of the same name exists, and updating template is selected, it will be overwritten

Template Type: ○ Initial Template ● Updating Template

VLANs

Select	Name	Native VLAN
☐	default	○
☑	App-Cluster-Comm	○
☐	CSV-VLAN	○
☐	LiveMigration-VLAN	○

MTU: 1500

MAC Pool: default

QoS Policy: <not set>

Network Control Policy: <not set>

Pin Group: <not set>

Stats Threshold Policy: default

33. Select the **LAN** tab located on the left of the window.

34. Go to **Policies > root**.

35. Right-click **vNIC Templates**.

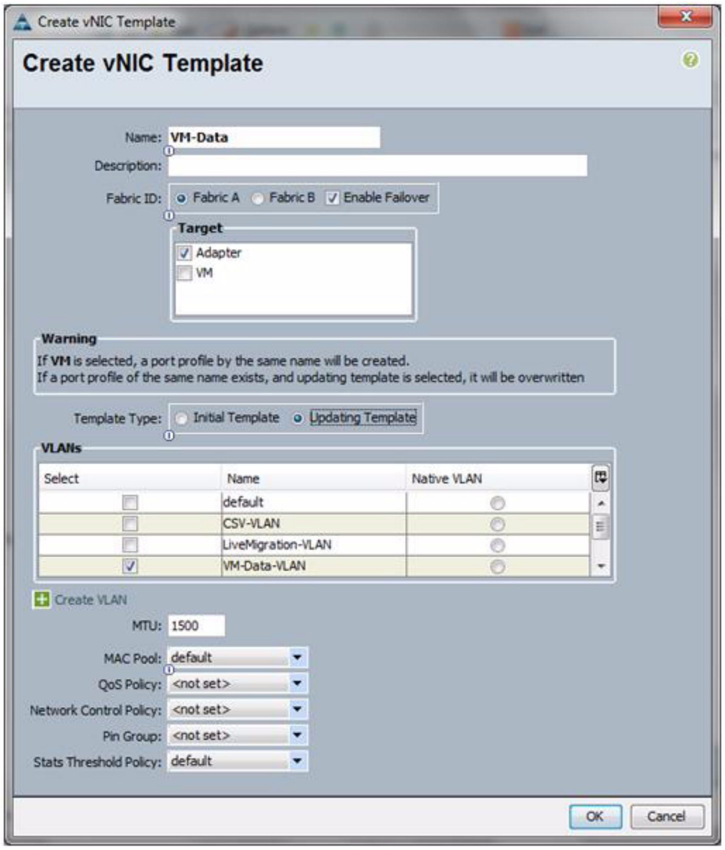
36. Select **Create vNIC Template**.

37. Enter **VM-Data** as the vNIC template name.

38. Check **Fabric A**. Check the **Enable Failover** box. Under target, deselect the **VM** box. Select **Updating Template** as the Template Type. Under VLANs, select **VM**. Do not set a Native VLAN. Under MAC Pool, select **Default**.

39. Click **OK** to complete creating the vNIC template.

40. Click **OK**.



Create vNIC Template

Name: VM-Data

Description:

Fabric ID: ● Fabric A ○ Fabric B ☑ Enable Failover

Target

☑ Adapter

☐ VM

Warning

If VM is selected, a port profile by the same name will be created.
If a port profile of the same name exists, and updating template is selected, it will be overwritten

Template Type: ○ Initial Template ● Updating Template

VLANs

Select	Name	Native VLAN
☐	default	○
☐	CSV-VLAN	○
☐	LiveMigration-VLAN	○
☑	VM-Data-VLAN	○

Create VLAN

MTU: 1500

MAC Pool: default

QoS Policy: <not set>

Network Control Policy: <not set>

Pin Group: <not set>

Stats Threshold Policy: default

41. Select the **LAN** tab located on the left of the window.

42. Go to **Policies > root**.

43. Right-click **vNIC Templates**.

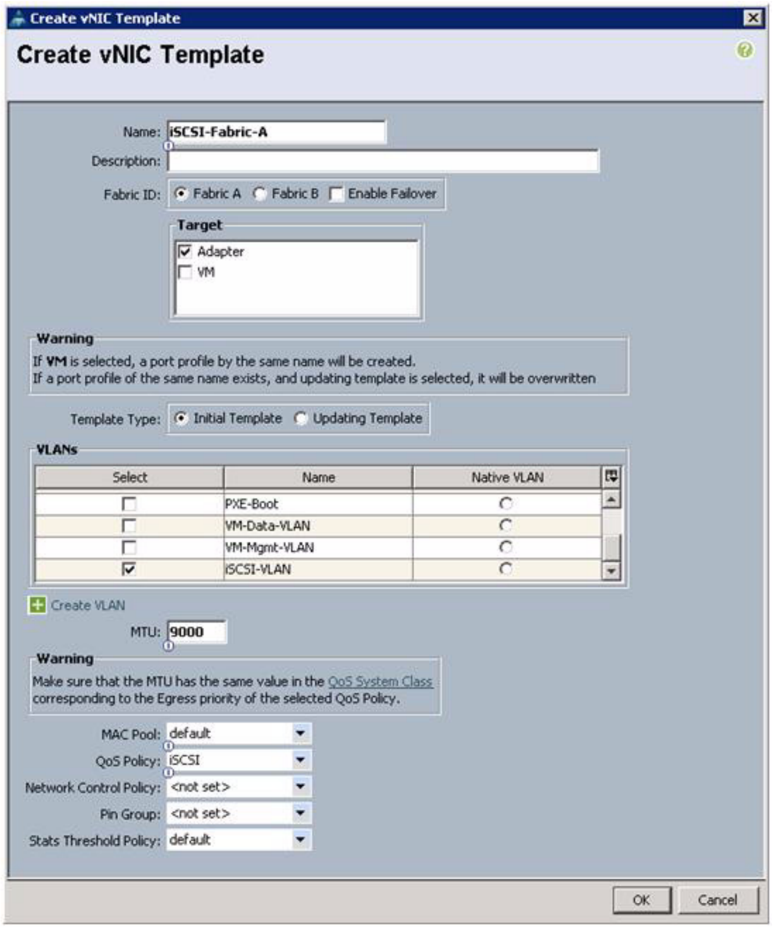
44. Select **Create vNIC Template**.

45. Enter **iSCSI-A** for the vNIC template name.

46. Check **Fabric A**. Uncheck the **Enable Failover** box. Under target, deselect the **VM** box. Select **Updating Template** as the Template Type. Under VLANs, select **iSCSI-VLAN-A**. Do not set a Native VLAN. Under MTU, enter **9000**. Under MAC Pool, select **MAC_Pool**. Under QoS Policy, select **iSCSI**.

47. Click **OK** to complete creating the vNIC template.

48. Click **OK**.



Create vNIC Template

Name: iSCSI-Fabric-A

Description:

Fabric ID: ● Fabric A ○ Fabric B □ Enable Failover

Target

☑ Adapter

□ VM

Warning

If **VM** is selected, a port profile by the same name will be created.
If a port profile of the same name exists, and updating template is selected, it will be overwritten

Template Type: ● Initial Template ○ Updating Template

VLANs

Select	Name	Native VLAN
□	PXE-Boot	○
□	VM-Data-VLAN	○
□	VM-Mgmt-VLAN	○
☑	iSCSI-VLAN	○

Create VLAN

MTU: 9000

Warning

Make sure that the MTU has the same value in the QoS System Class corresponding to the Egress priority of the selected QoS Policy.

MAC Pool: default

QoS Policy: iSCSI

Network Control Policy: <not set>

Pin Group: <not set>

Stats Threshold Policy: default

49. Select the **LAN** tab located on the left of the window.

50. Go to **Policies > root**.

51. Right-click **vNIC Templates**.

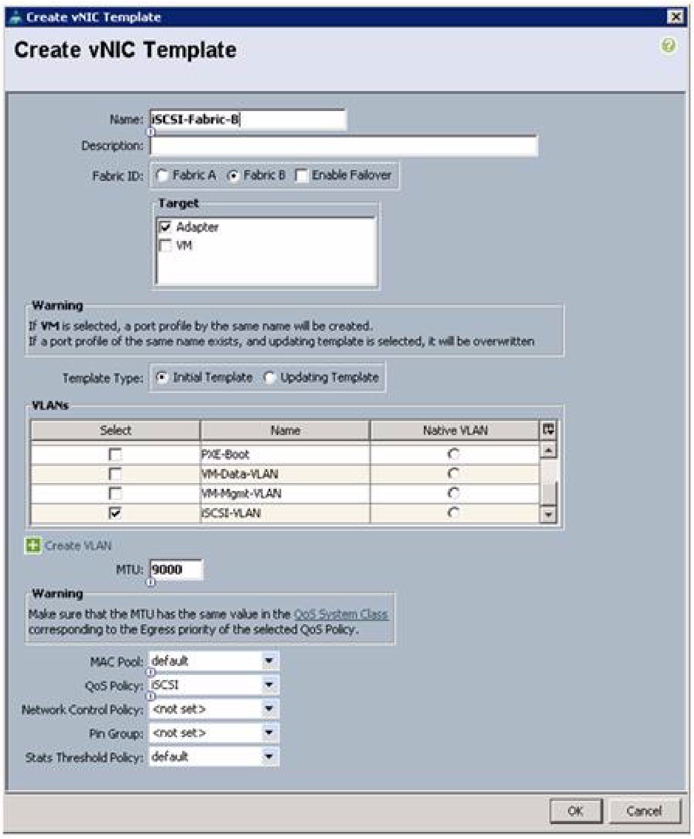
52. Select **Create vNIC Template**.

53. Enter **iSCSI-B** for the vNIC template name.

54. Check **Fabric B**. Uncheck the **Enable Failover** box. Under target, deselect the **VM** box. Select **Updating Template** as the Template Type. Under VLANs, select **iSCSI-VLAN-B**. Do not set a Native VLAN. Under MTU, enter **9000**. Under MAC Pool, select **MAC_Pool**. Under QoS Policy, select **iSCSI**.

55. Click **OK** to complete creating the vNIC template.

56. Click **OK**.



Create vNIC Template

Name: iSCSI-Fabric-B

Description:

Fabric ID: ○ Fabric A ● Fabric B □ Enable Failover

Target

☑ Adapter

□ VM

Warning

If **VM** is selected, a port profile by the same name will be created.
If a port profile of the same name exists, and updating template is selected, it will be overwritten

Template Type: ● Initial Template ○ Updating Template

VLANs

Select	Name	Native VLAN
□	PXE-Boot	○
□	VM-Data-VLAN	○
□	VM-Mgmt-VLAN	○
☑	iSCSI-VLAN	○

Create VLAN

MTU: 9000

Warning

Make sure that the MTU has the same value in the QoS System Class corresponding to the Egress priority of the selected QoS Policy.

MAC Pool: default

QoS Policy: iSCSI

Network Control Policy: <not set>

Pin Group: <not set>

Stats Threshold Policy: default

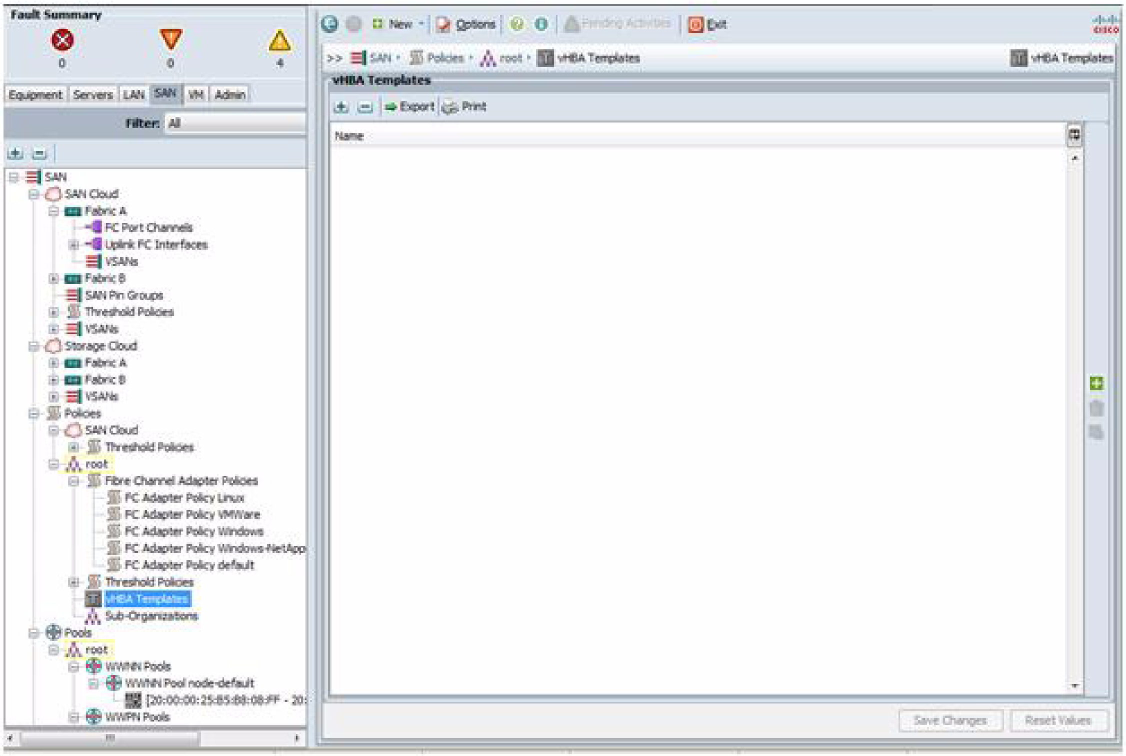
Create vHBA Templates for Fabric A and B

The following steps provide the details to create multiple vHBA templates for the Cisco UCS environment.

Cisco UCS Manager

1. Select the **VSAN** tab located on the left of the window.
2. Go to **Policies > root**.

3. Right-click **vHBA Templates**.



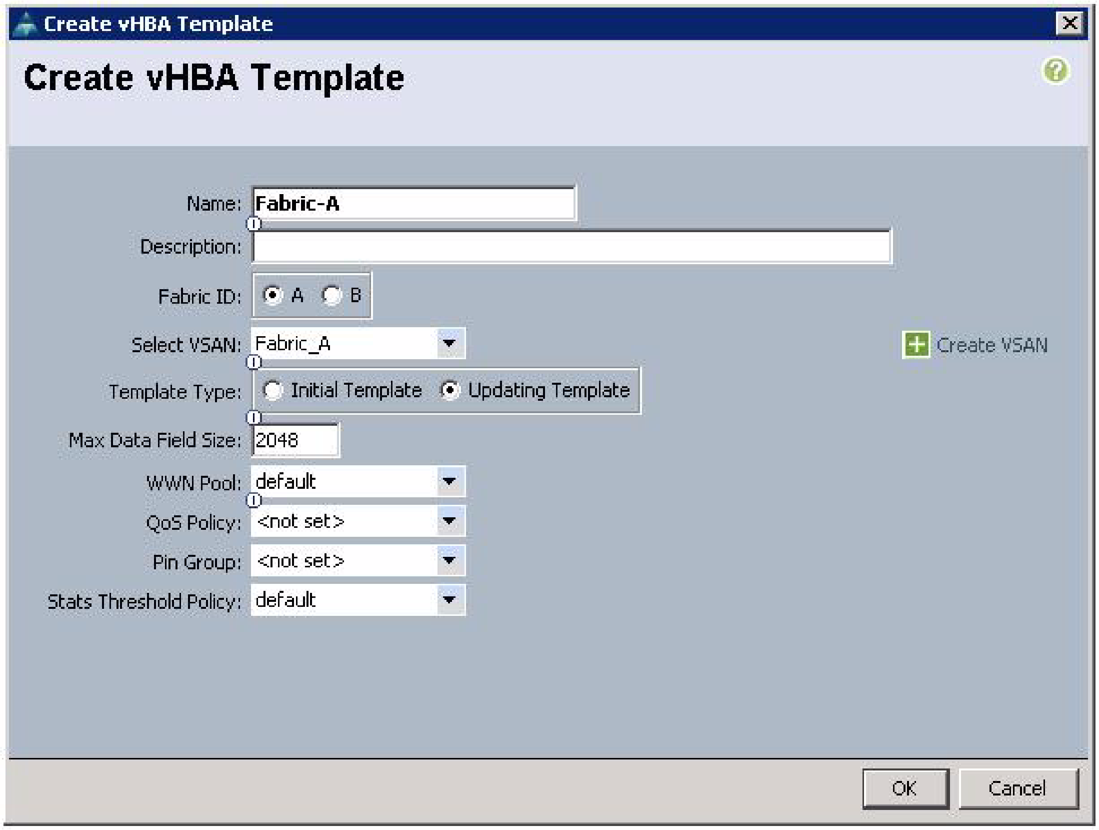
4. Select **Create vNIC Template**.

5. Enter **VHBA-Template-A** for the vHBA template name.

6. Select **Fabric A**. Under Select VSAN, select **VSAN_A**. Under WWN Pool, select **WWPN_Pool**.

7. Click **OK** to complete creating the vHBA template.

8. Click **OK**.



Create vHBA Template

Name: Fabric-A

Description:

Fabric ID: ● A ○ B

Select VSAN: Fabric_A

Template Type: ○ Initial Template ● Updating Template

Max Data Field Size: 2048

WWN Pool: default

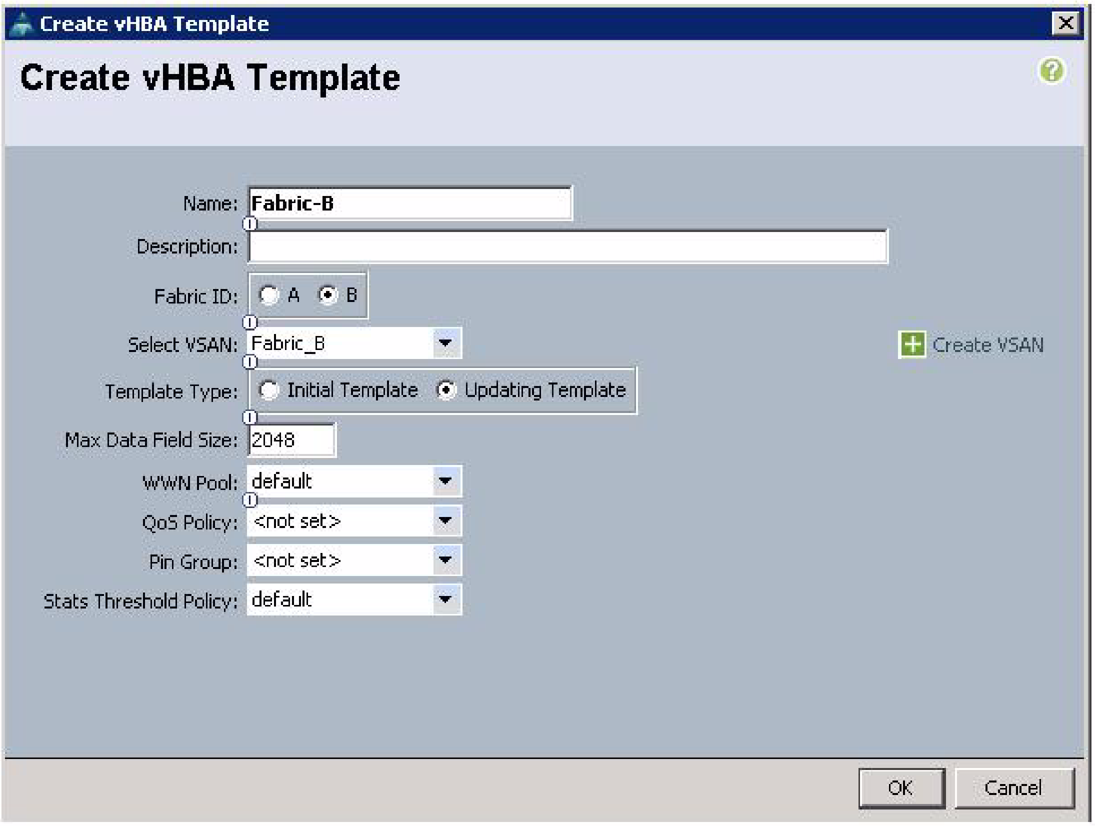
QoS Policy: <not set>

Pin Group: <not set>

Stats Threshold Policy: default

9. Select the **VSAN** tab located on the left of the window.
10. Go to **Policies > root**.
11. Right-click **vHBA Templates**.
12. Select **Create vHBA Template**.
13. Enter **VHBA-Template-B** for the vHBA template name.
14. Select **Fabric B**. Under Select VSAN,select **VSAN_B**. Under WWN Pool, select **WWPN_Pool**.
15. Click **OK** to complete creating the vHBA template.

16. Click **OK**.



Create vHBA Template

Name: Fabric-B

Description:

Fabric ID: ○ A ● B

Select VSAN: Fabric_B

Template Type: ○ Initial Template ● Updating Template

Max Data Field Size: 2048

WWN Pool: default

QoS Policy: <not set>

Pin Group: <not set>

Stats Threshold Policy: default

Create Boot Policies

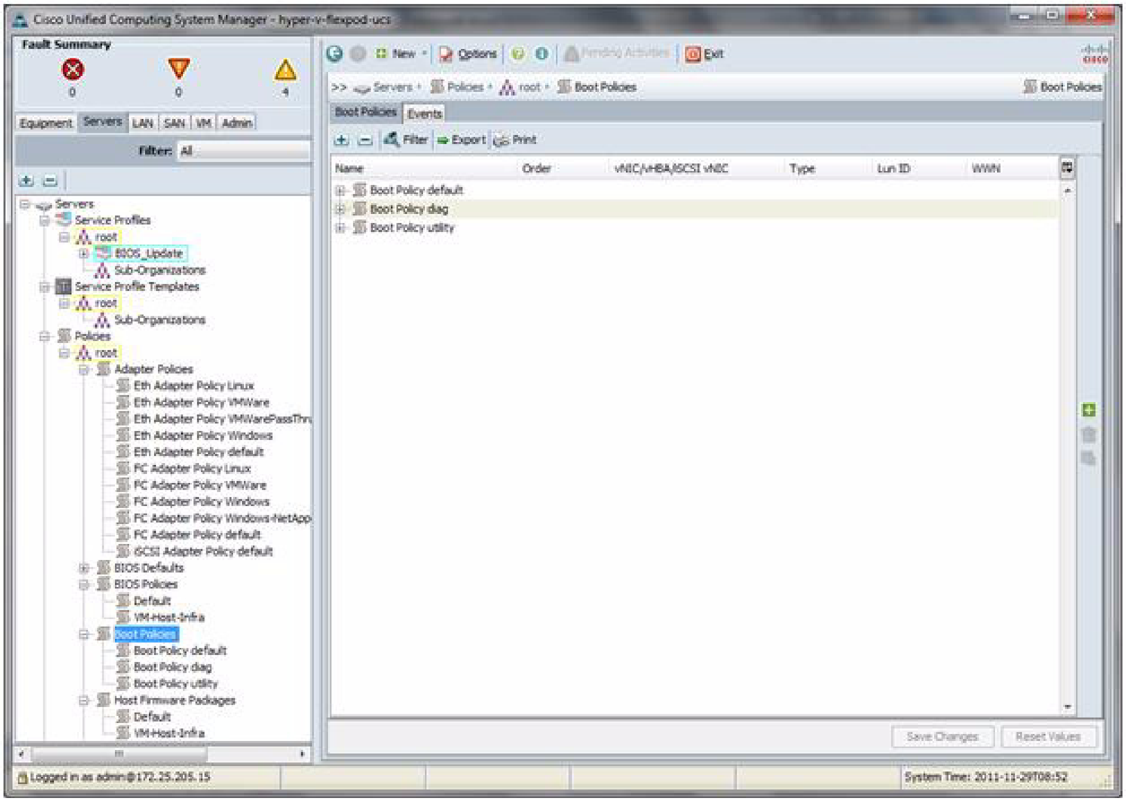
The following steps provide the details to create boot policies for the Cisco UCS environment. These directions apply to an environment in which each storage controller 0c port is connected to fabric A and each storage controller 0d port is connected to fabric B. In these steps, 2 boot policies will be configured. The first policy will configure the primary target to be controller A port 0c and the second boot policy primary target will be controller B port 0d.

Note If you are using FCoE between the Nexus 5548 and the NetApp Storage systems substitute port 2a for port 0c and port 2b for port 0d in this procedure

Cisco UCS Manager

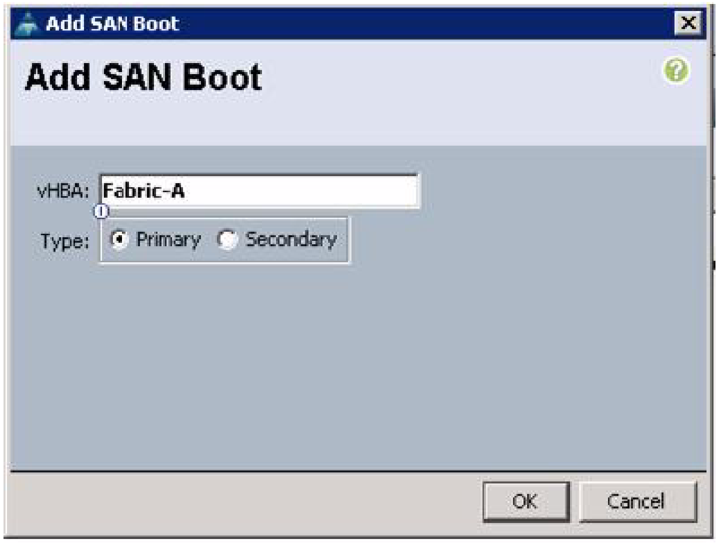
1. Select the **Servers** tab located at the top left of the window.
2. Go to **Policies > root**.

3. Right-click **Boot Policies**.



4. Select **Create Boot Policy**.
5. Name the boot policy **Boot-Fabric-A**.
6. (Optional) Give the boot policy a description.
7. Retain Reboot on Boot Order Change and Enforce vNIC/vHBA Name unchecked.
8. Expand the Local Devices drop-down menu and select **Add CD-ROM**.
9. Expand the vHBAs drop-down menu and select **Add SAN Boot**.
10. Enter **Fabric-A** in the vHBA field in the Add SAN Boot window.
11. Make sure that **Primary** is selected as the type.

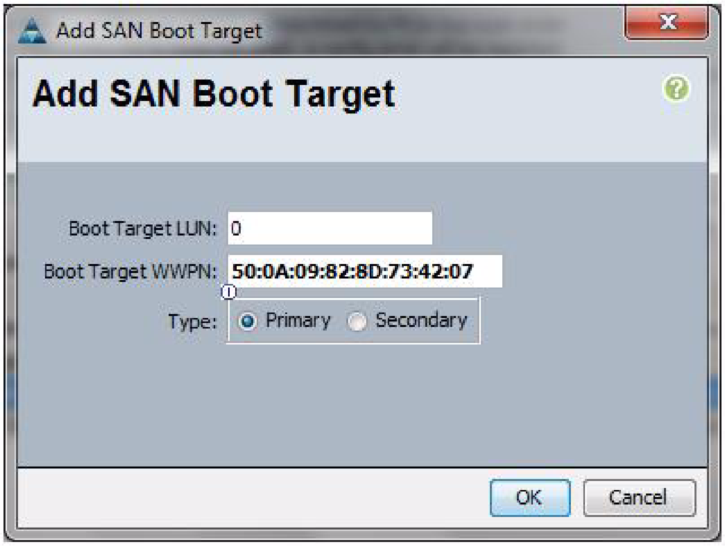
12. Click **OK** to add the SAN boot initiator.



vHBA: Fabric-A

Type: ● Primary ○ Secondary

13. Under the vHBA drop-down menu, select **Add SAN Boot Target**. Retain the value for Boot Target LUN as **0**.
14. Enter the WWPN for the primary FC adapter interface 0c of controller A. To obtain this information, log in to controller A and run the fcp show adapters command.
15. Be sure to use the FC port name for 0c and not the FC node name.
16. Retain the type as **Primary**.
17. Click **OK** to add the SAN boot target.



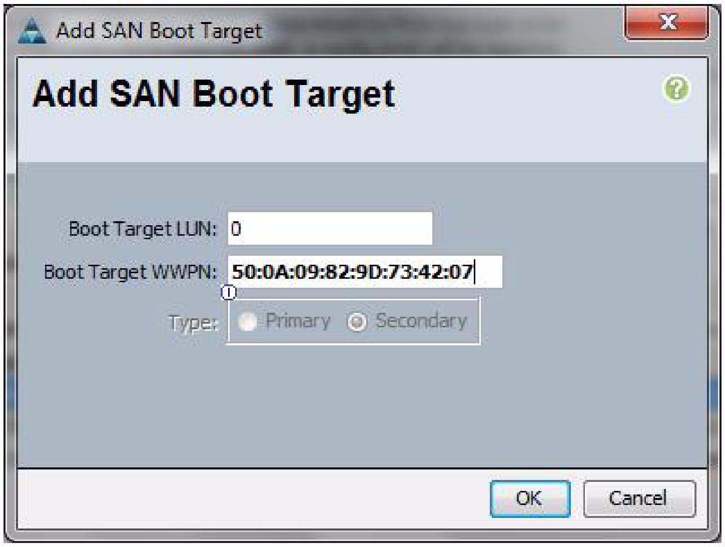
Boot Target LUN: 0

Boot Target WWPN: 50:0A:09:82:8D:73:42:07

Type: ● Primary ○ Secondary

18. Under the vHBA drop-down menu, select **Add SAN Boot Target**. Retain the value for Boot Target LUN as **0**.
19. Enter the WWPN for the primary FC adapter interface 0c of controller B. To obtain this information, log in to the controller B and run the fcp show adapters command.
20. Be sure to use the FC port name for port 0c and not the FC node name.

21. Click **OK** to add the SAN boot target.



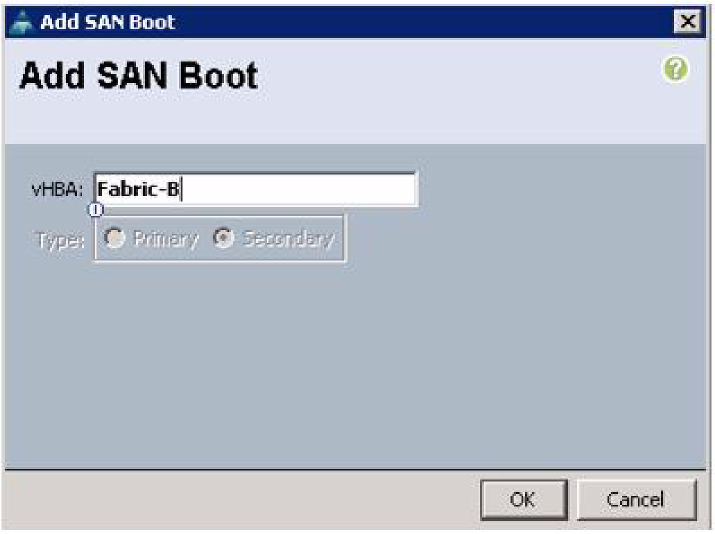
Add SAN Boot Target

Boot Target LUN: 0

Boot Target WWPN: 50:0A:09:82:9D:73:42:07

Type: ○ Primary ● Secondary

22. Select **Add SAN Boot** under the vHBA drop-down menu.
23. Enter **Fabric-B** in the vHBA field in the Add SAN Boot.
24. The type should automatically be set to Secondary and it will be grayed out.
25. Click **OK** to add the SAN boot target.



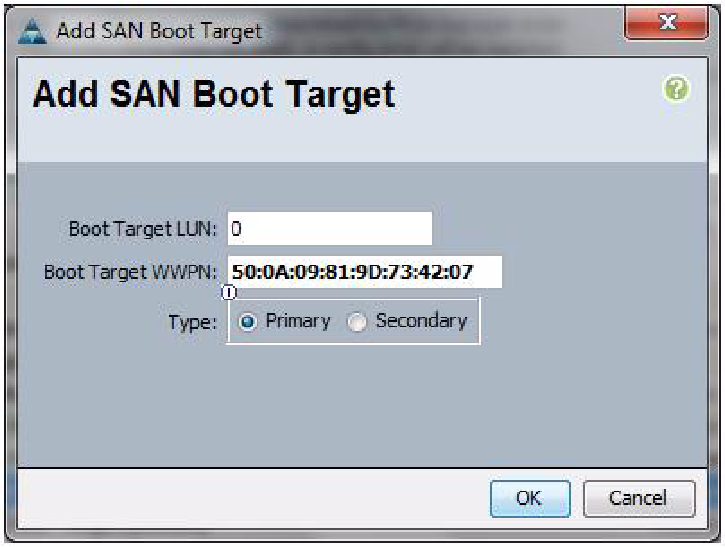
Add SAN Boot

vHBA: Fabric-B

Type: ○ Primary ● Secondary

26. Select **Add SAN Boot Target** under the vHBA drop-down menu.
27. The Add SAN Boot Target window displays. Retain the value for Boot Target LUN as **0**.
28. Enter the WWPN for the primary FC adapter interface 0d of the controller B. To obtain this information, log in to controller B and run the fcp show adapters command.
29. Be sure to use the FC port name for port 0d and not the FC node name.
30. Retain the type as **Primary**.

31. Click **OK** to add the SAN boot target.



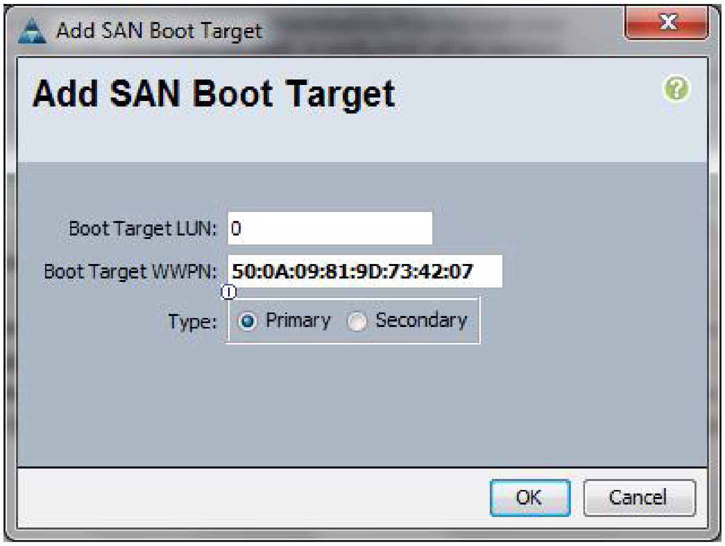
Add SAN Boot Target

Boot Target LUN: 0

Boot Target WWPN: 50:0A:09:81:9D:73:42:07

Type: ● Primary ○ Secondary

32. Under the vHBA drop-down menu, select **Add SAN Boot Target**. Retain the value for Boot Target LUN as **0**.
33. Enter the WWPN for the primary FC adapter interface 0d of controller A. To obtain this information, log in to controller A and run the fcp show adapters command.
34. Be sure to use the FC port name for port 0d and not the FC node name.
35. Click **OK** to add the SAN boot target.



Add SAN Boot Target

Boot Target LUN: 0

Boot Target WWPN: 50:0A:09:81:9D:73:42:07

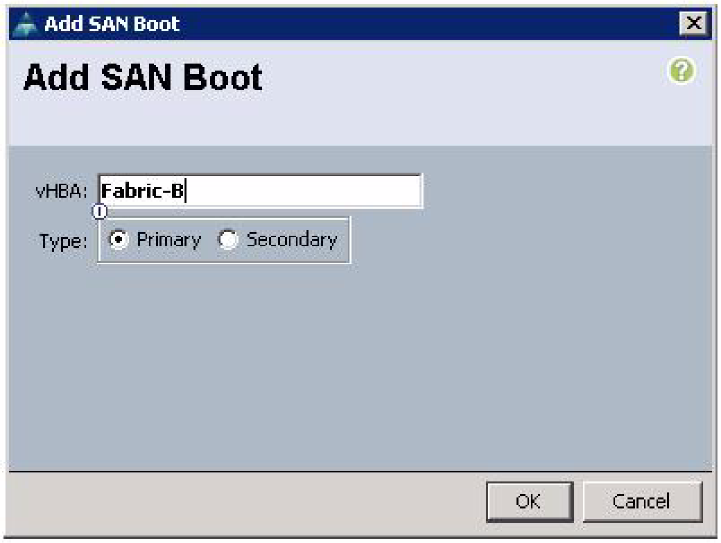
Type: ● Primary ○ Secondary

Creating Boot Policy for Fabric -B

Cisco UCS Manager

1. Right-click **Boot Policies**.
2. Select **Create Boot Policy**.
3. Name the boot policy **Boot-Fabric-B**.

4. (Optional) Give the boot policy a description.
5. Retain **Reboot on Boot Order Change** and **Enforce vNIC/vHBA Name**.
6. Expand the Local Devices drop-down menu and select **Add CD-ROM**.
7. Click the vHBA drop-down menu and select **Add SAN Boot**.
8. Enter **Fabric-B** in the vHBA field in the Add SAN Boot window.
9. Make sure that **Primary** is selected as the type.
10. Click **OK** to add the SAN boot target.

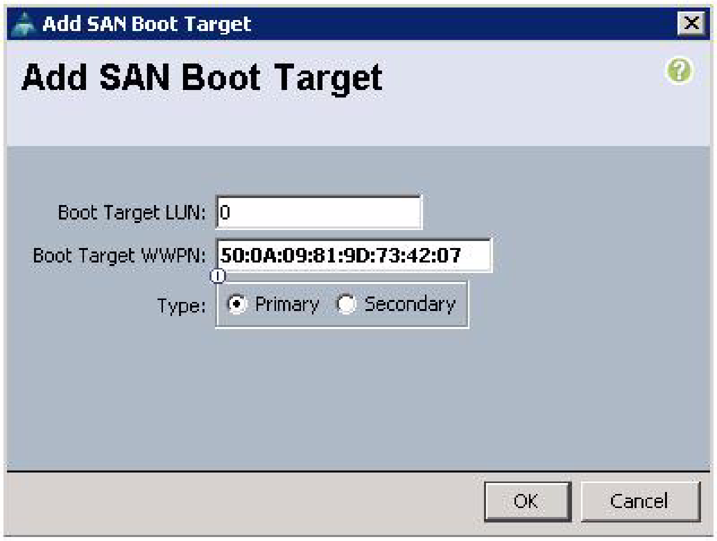


Add SAN Boot

vHBA: Fabric-B

Type: ● Primary ○ Secondary

11. Under the vHBA drop-down menu, select **Add SAN Boot Target**. Retain the value for Boot Target LUN as **0**.
12. Enter the WWPN for the primary FC adapter interface 0d of controller B. To obtain this information, log in to controller B and run the fcp show adapters command.
13. Be sure to use the FC port name for port 0d and not the FC node name.
14. Retain the type as **Primary**.
15. Click **OK** to add the SAN boot target.



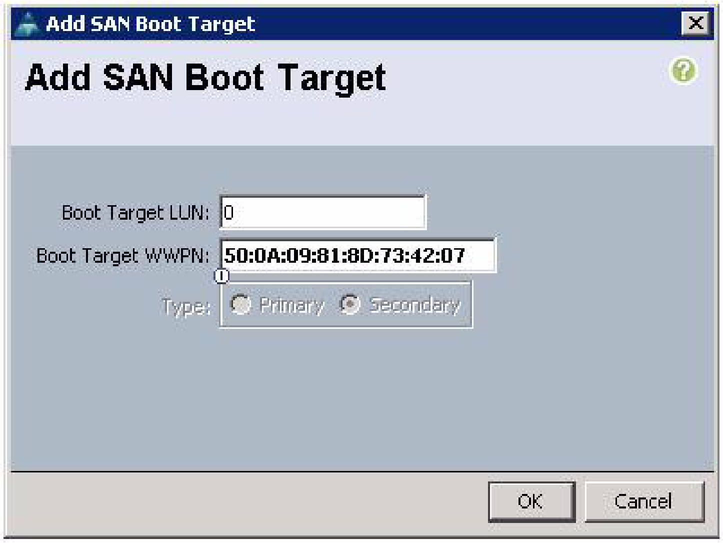
Add SAN Boot Target

Boot Target LUN: 0

Boot Target WWPN: 50:0A:09:81:9D:73:42:07

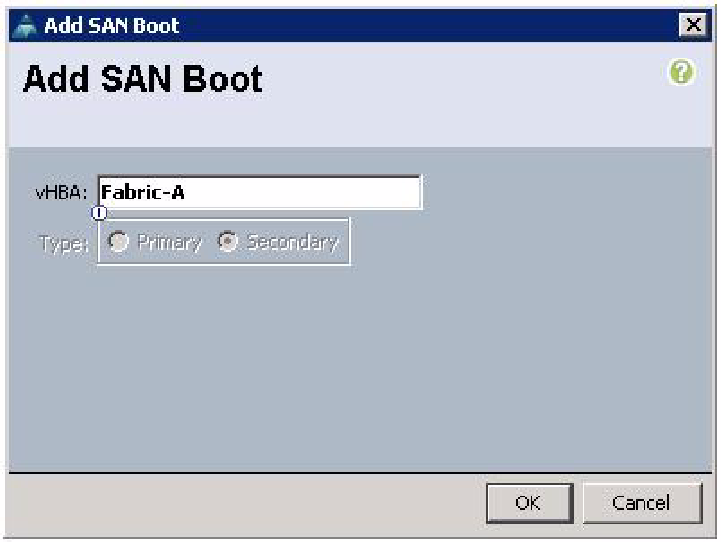
Type: ● Primary ○ Secondary

16. Under the vHBA drop-down menu, select **Add SAN Boot Target**. Retain the value for Boot Target LUN as **0**.
17. Enter the WWPN for the primary FC adapter interface 0d of controller A. To obtain this information, log in to controller A and run the fcp show adapters command.
18. Be sure to use the FC port name for port 0d and not the FC node name.
19. Click **OK** to add the SAN boot target.


Add SAN Boot Target

Boot Target LUN: 0
Boot Target WWPN: 50:0A:09:81:8D:73:42:07
Type: ○ Primary ● Secondary

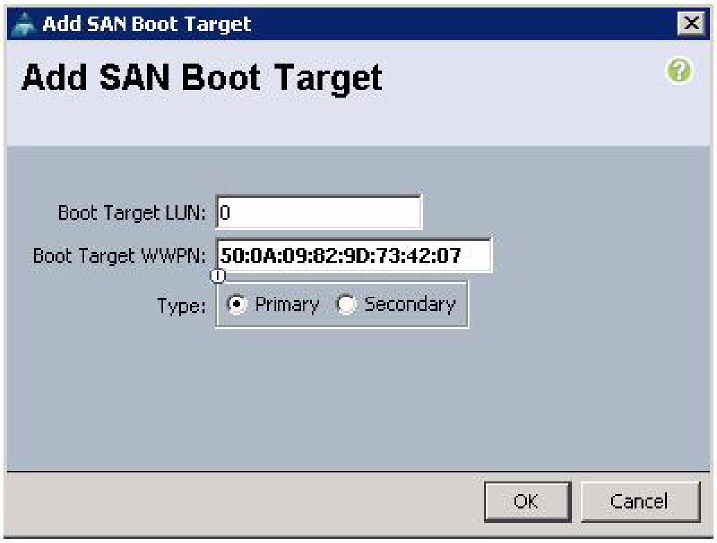
20. Select **Add SAN Boot** under the vHBA drop-down menu.
21. Enter **Fabric-A** in the vHBA field in the Add SAN Boot window.
22. The type should automatically be set to **Secondary** and it will be grayed out.
23. Click **OK** to add the SAN boot target.


Add SAN Boot

vHBA: Fabric-A
Type: ○ Primary ● Secondary

24. Select **Add SAN Boot Target** under the vHBA drop-down menu.
25. The Add SAN Boot Target window displays. Retain the value for Boot Target LUN as **0**.
26. Enter the WWPN for the primary FC adapter interface 0c of controller A. To obtain this information, log in to controller A and run the fcp show adapters command.

27. Be sure to use the FC port name for port 0c and not the FC node name.
28. Retain the type as **Primary**.
29. Click **OK** to add the SAN boot target.



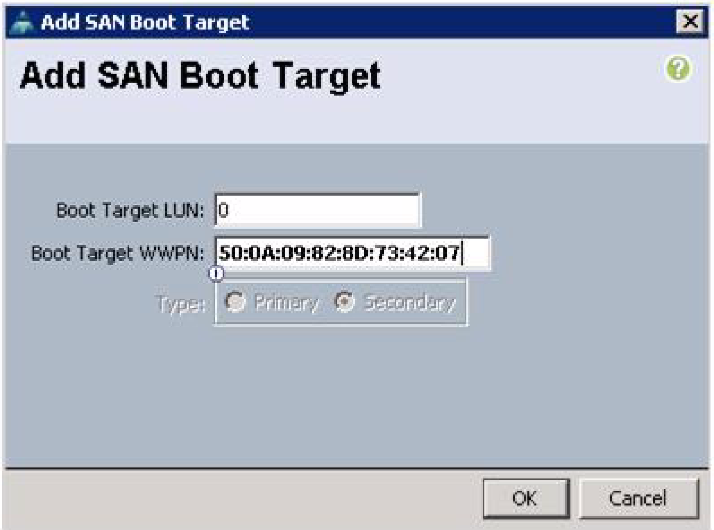
Add SAN Boot Target

Boot Target LUN: 0

Boot Target WWPN: 50:0A:09:82:9D:73:42:07

Type: ● Primary ○ Secondary

30. Under the vHBA drop-down menu, select **Add SAN Boot Target**. Retain the value for Boot Target LUN as **0**.
31. Enter the WWPN for the primary FC adapter interface 0c of controller B. To obtain this information, log in to controller B and run the fcp show adapters command.
32. Be sure to use the FC port name for port 0c and not the FC node name.
33. Click **OK** to add the SAN boot target.



Add SAN Boot Target

Boot Target LUN: 0

Boot Target WWPN: 50:0A:09:82:8D:73:42:07

Type: ○ Primary ● Secondary

34. Click **OK** to create the boot policy in the Create Boot Policy pop-up window.

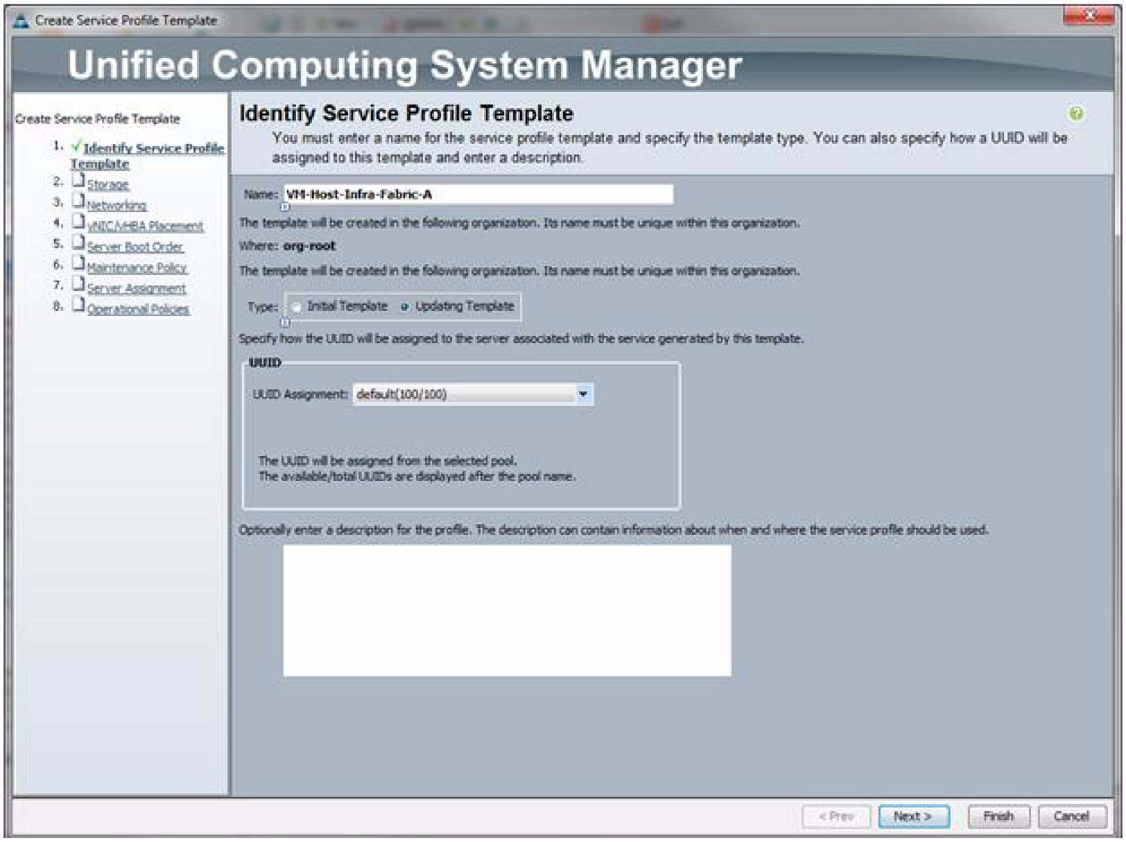
Create the Service Profile Templates

This section details the creation of two service profile templates: one for fabric A and one for fabric B.

Cisco UCS Manager

1. Select the Servers tab at the top left of the window.
2. Go to Service Profile Templates > root.
3. Right-click root.
4. Select Create Service Profile Template.

   The Create Service Profile Template window displays.
5. The following steps detail configuration information for the Identify the Service Profile Template Section:
   a. Name the service profile template **VM-Host-Infra-Fabric-A**. This service profile template is configured to boot from controller A port 0c.
   b. Select **Updating Template**.
   c. In the UUID section, select **UUID_Pool**.
   d. Click **Next**.



Identify Service Profile Template

You must enter a name for the service profile template and specify the template type. You can also specify how a UUID will be assigned to this template and enter a description.

Name: VM-Host-Infra-Fabric-A

The template will be created in the following organization. Its name must be unique within this organization.

Where: **org-root**

The template will be created in the following organization. Its name must be unique within this organization.

Type: ○ Initial Template ● Updating Template

Specify how the UUID will be assigned to the server associated with the service generated by this template.

UUID

UUID Assignment: default(100/100)

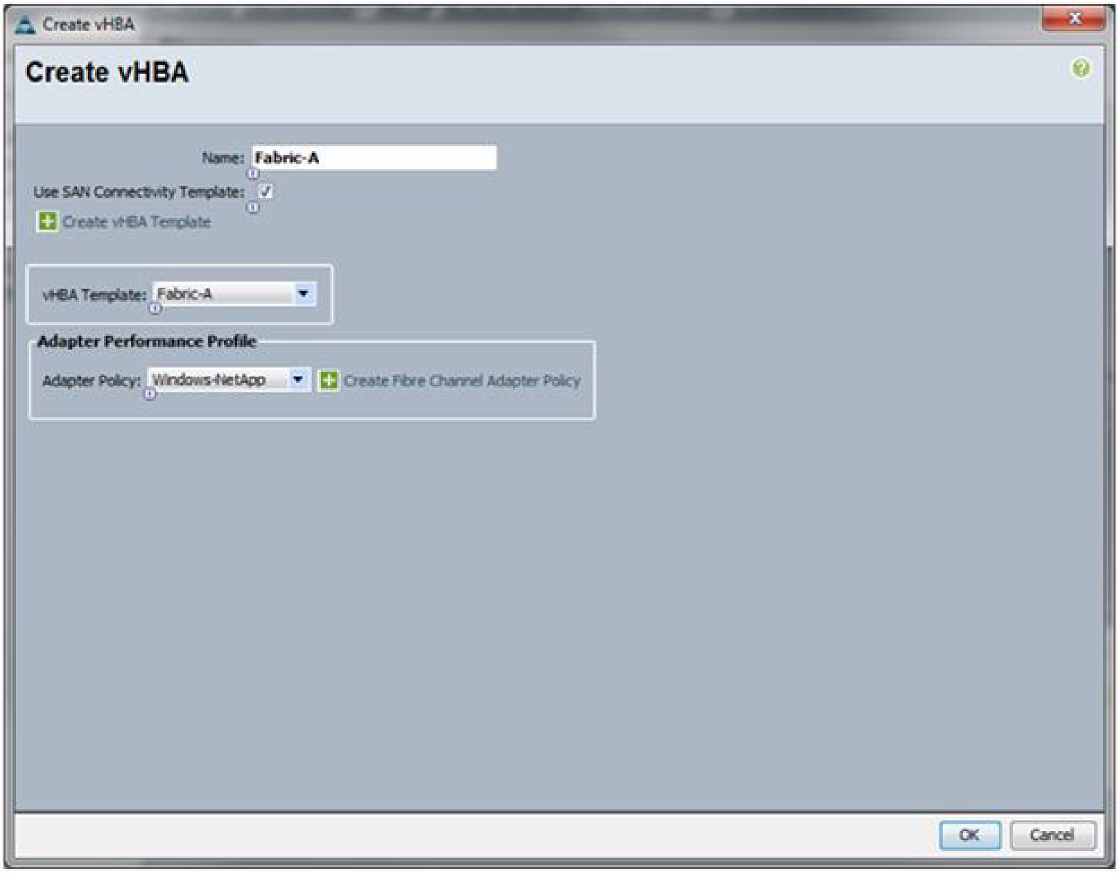
The UUID will be assigned from the selected pool.
The available/total UUIDs are displayed after the pool name.

Optionally enter a description for the profile. The description can contain information about when and where the service profile should be used.

Storage section

1. Select **Default** for the Local Storage field.
2. Select the appropriate local storage policy if the server in question does not have local disk.
3. Select **SAN-Boot** for the local disk configuration policy.
4. Select the **Expert** option for the SAN connectivity field.
5. In the WWNN Assignment field, select **WWNN_Pool**.

6. Click the **Add** button at the bottom of the window to add vHBAs to the template.
7. The Create vHBA window displays. Name the vHBA **Fabric-A**.
8. Check the box for **Use SAN Connectivity Template**.
9. Select **Fabric-A** in the vHBA Template field.
10. Select **Windows-NetApp** in the Adapter Policy field.
11. Click **OK** to add the vHBA to the template.


Create vHBA
Create vHBA
Create vHBA Template
Adapter Performance Profile
Create Fibre Channel Adapter Policy
OK
Cancel

Name: Fabric-A

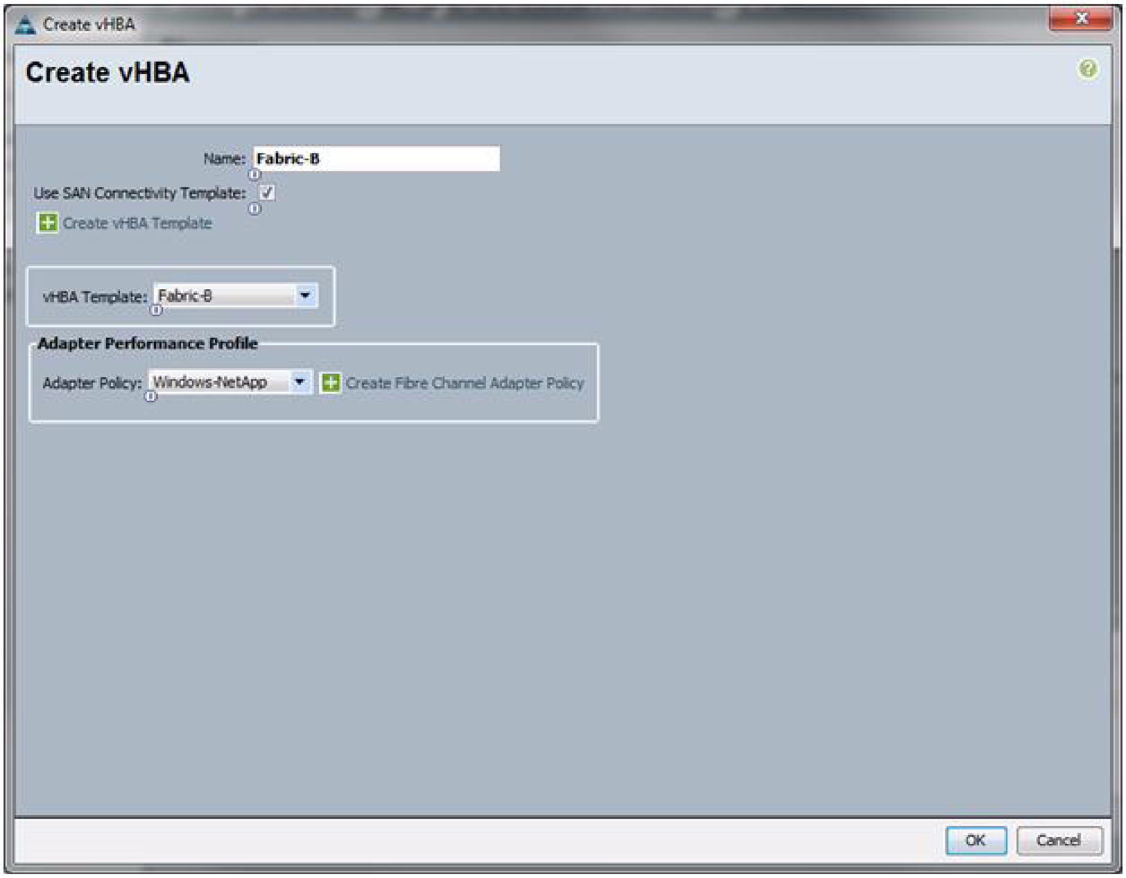
Use SAN Connectivity Template: ✓

vHBA Template: Fabric-A

Adapter Policy: Windows-NetApp

12. Click the **Add** button at the bottom of the window to add vHBAs to the template.
13. The Create vHBA window displays. Name the **vHBA Fabric-B**.
14. Check the box for **Use SAN Connectivity Template**.
15. Select **Fabric-B** in the vHBA Template field.
16. Select **Windows-NetApp** in the Adapter Policy field.

17. Click **OK** to add the vHBA to the template.



Create vHBA

Name: Fabric-B

Use SAN Connectivity Template: ☑

Create vHBA Template

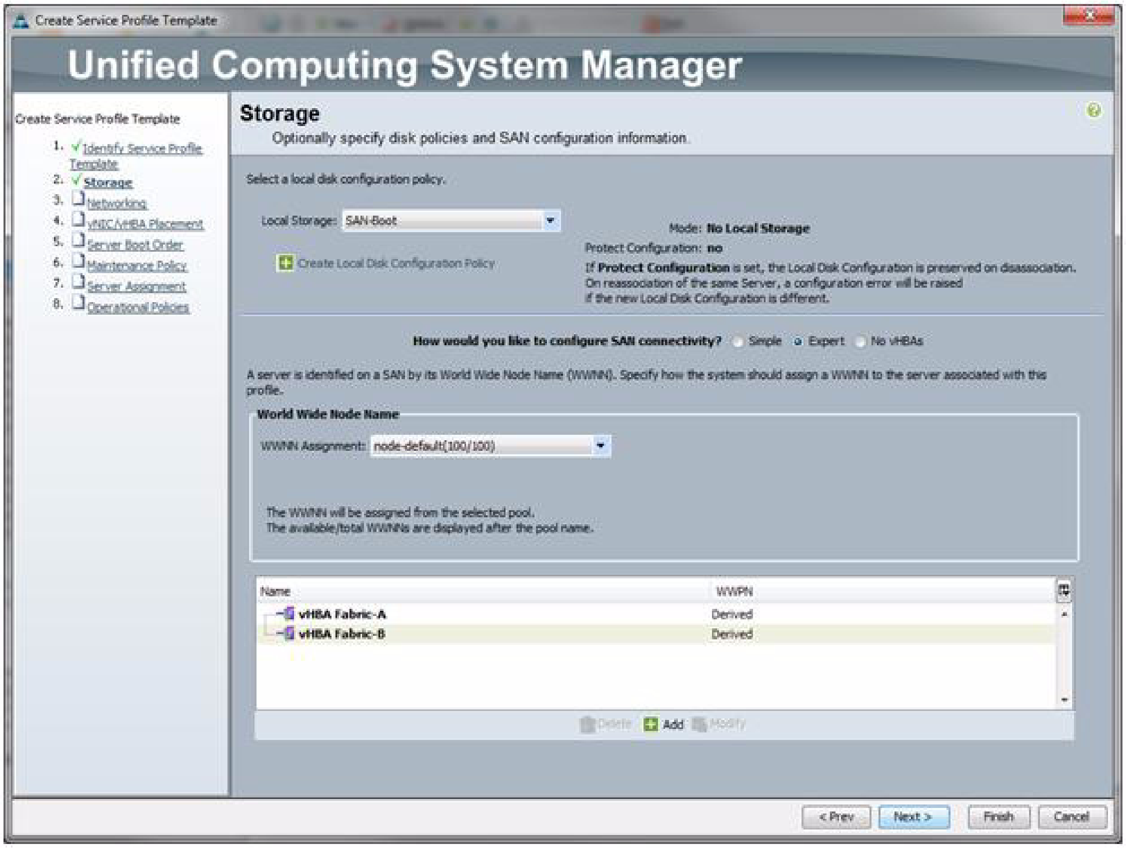
vHBA Template: Fabric-B

Adapter Performance Profile

Adapter Policy: Windows-NetApp

Create Fibre Channel Adapter Policy

18. Verify. Review the table to make sure that both of the vHBAs were created.



Create Service Profile Template
Unified Computing System Manager
Create Service Profile Template
1. ✓ Identify Service Profile Template
2. ✓ Storage
3. Networking
4. vNIC/vHBA Placement
5. Server Boot Order
6. Maintenance Policy
7. Server Assignment
8. Operational Policies

Storage

Optionally specify disk policies and SAN configuration information.

Select a local disk configuration policy.

Local Storage: SAN-Boot

Create Local Disk Configuration Policy

Mode: **No Local Storage**

Protect Configuration: **no**

If **Protect Configuration** is set, the Local Disk Configuration is preserved on disassociation. On reassociation of the same Server, a configuration error will be raised if the new Local Disk Configuration is different.

How would you like to configure SAN connectivity? ○ Simple ● Expert ○ No vHBAs

A server is identified on a SAN by its World Wide Node Name (WWNN). Specify how the system should assign a WWNN to the server associated with this profile.

World Wide Node Name

WWNN Assignment: node-default(100/100)

The WWNN will be assigned from the selected pool.
The available/total WWNNs are displayed after the pool name.

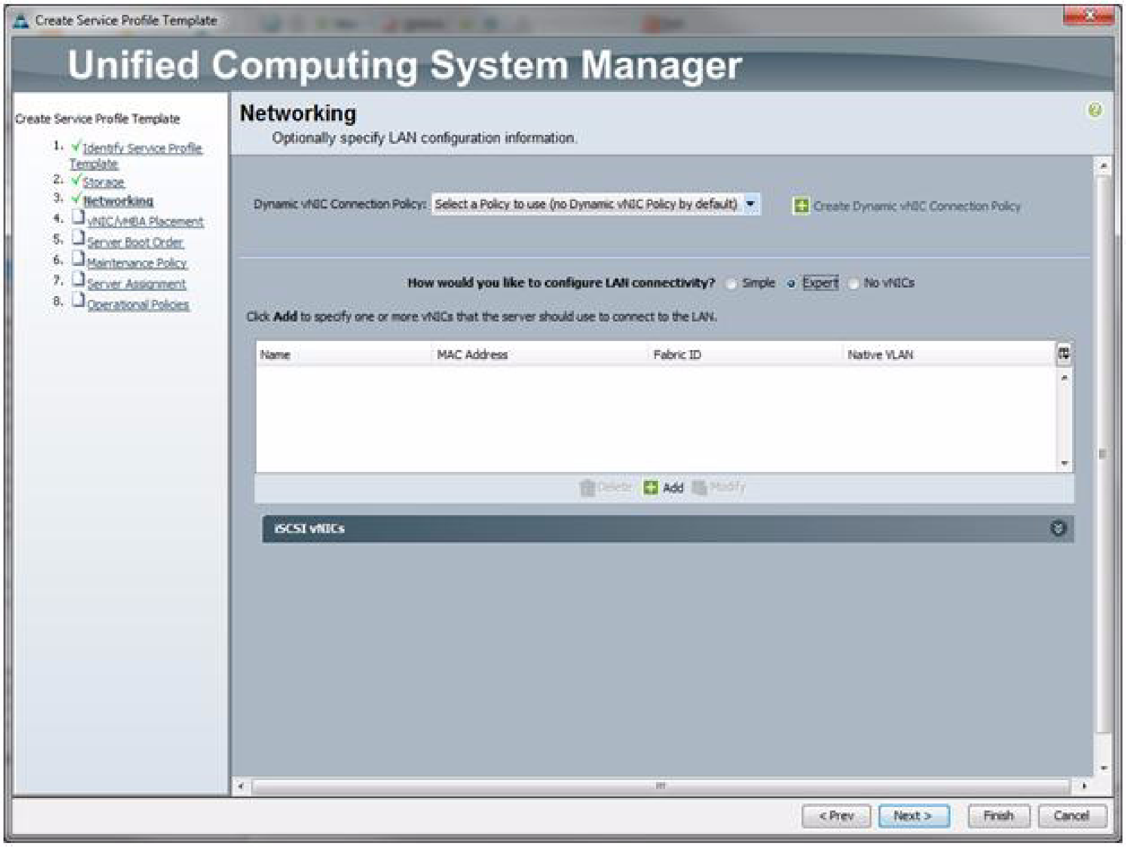
Name	WWPN
vHBA Fabric-A	Derived
vHBA Fabric-B	Derived

19. Click **Next**.

Networking Section

1. Retain the **Dynamic vNIC Connection Policy** field as the default.

2. Select **Expert** for the LAN connectivity option.



Networking

Optionally specify LAN configuration information.

Dynamic vNIC Connection Policy: Select a Policy to use (no Dynamic vNIC Policy by default)

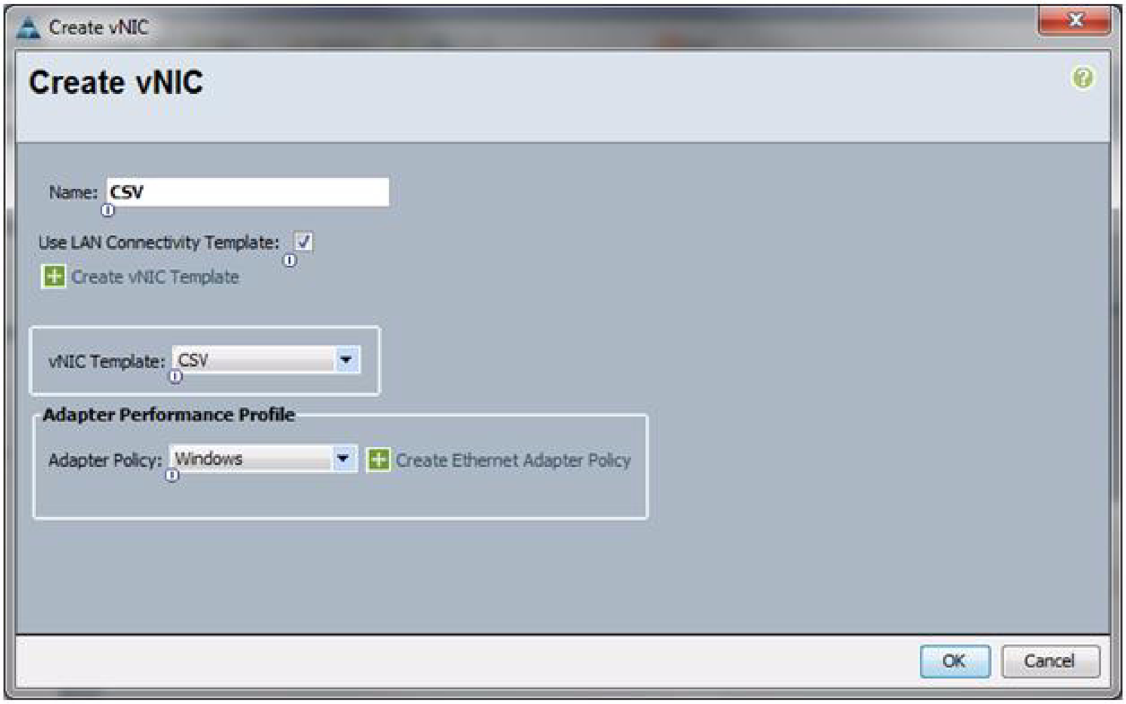
How would you like to configure LAN connectivity? ○ Simple ● Expert ○ No vNICs

Click **Add** to specify one or more vNICs that the server should use to connect to the LAN.

Name	MAC Address	Fabric ID	Native VLAN

3. Click **Add** to add a vNIC to the template.
4. The Create vNIC window displays. Name the **vNIC CSV**.
5. Check the **Use LAN Connectivity Template** checkbox.
6. Select **CSV** for the vNIC Template field.
7. Select **Windows** in the Adapter Policy field.

8. Click **OK** to add the vNIC to the template.



Name: CSV

Use LAN Connectivity Template: ☑

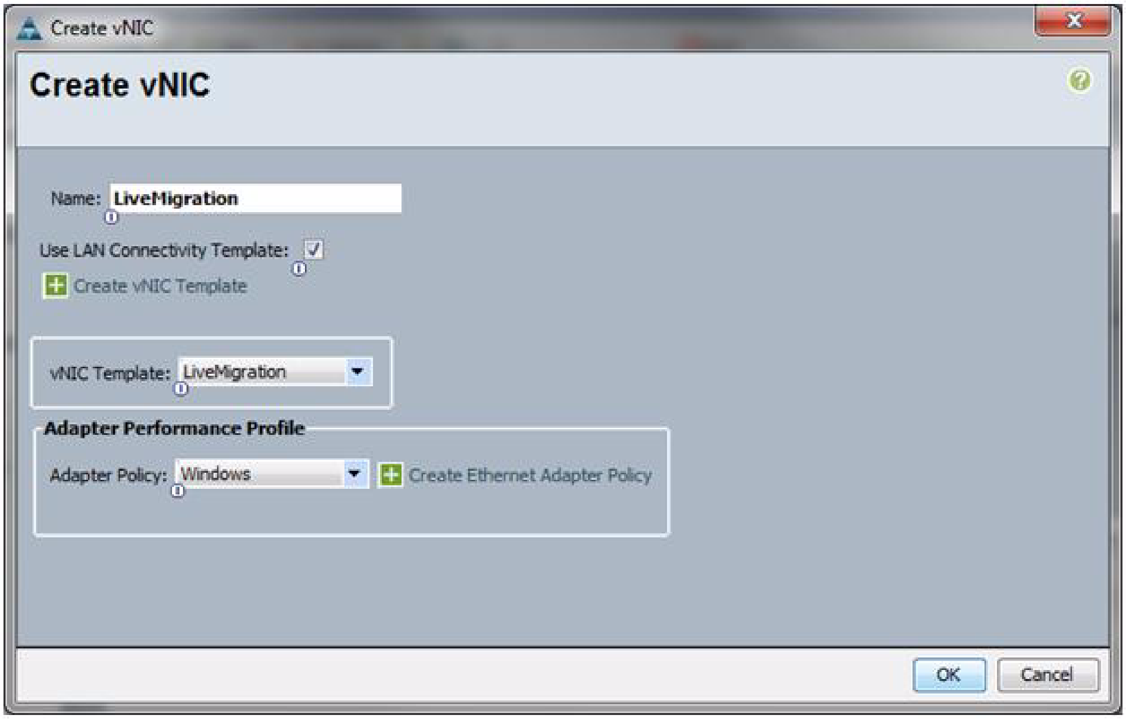
vNIC Template: CSV

Adapter Performance Profile

Adapter Policy: Windows

9. From the Cisco UCS Manager screen, click **Add** to add a vNIC to the template.
10. The Create vNIC window displays. Name the vNIC **LiveMigration**.
11. Check the **Use LAN Connectivity Template** checkbox.
12. Select **LiveMigration** for the vNIC Template field.
13. Select **Windows** in the Adapter Policy field.

14. Click **OK** to add the vNIC to the template.



Create vNIC

Name: LiveMigration

Use LAN Connectivity Template: ☑

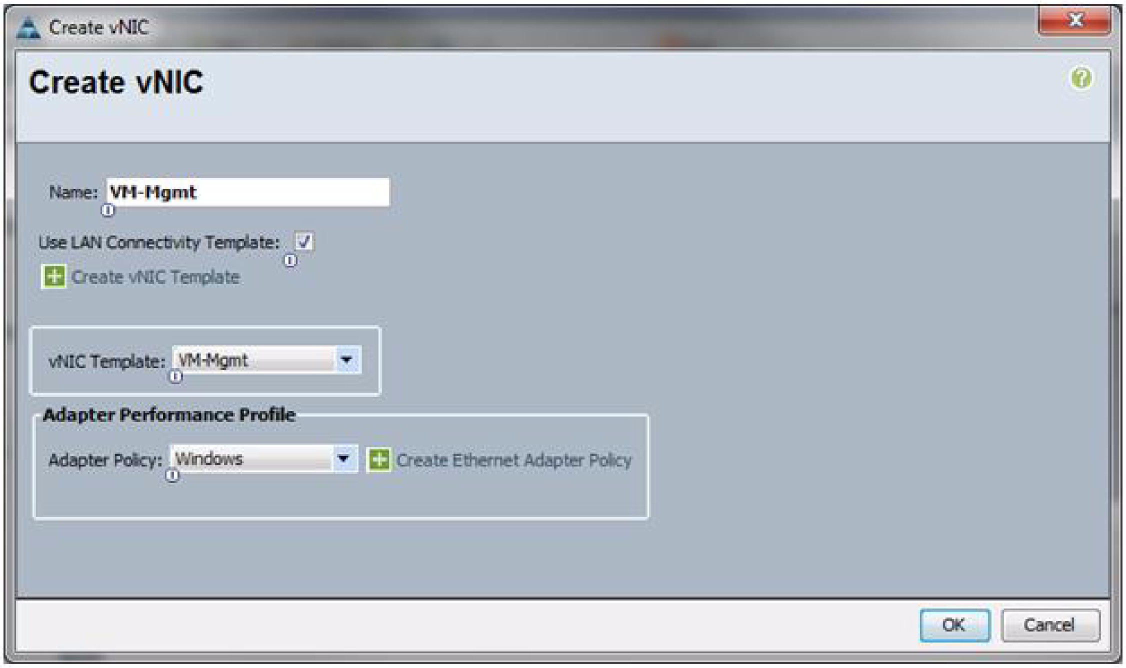
Adapter Performance Profile

vNIC Template: LiveMigration

Adapter Policy: Windows

15. From the Cisco UCS Manager screen, click **Add** to add a vNIC to the template.
16. The Create vNIC window displays. Name the vNIC **VM-MGMT**.
17. Check the **Use LAN Connectivity Template** checkbox.
18. Select **VM-MGMT** for the vNIC Template field.
19. Select **Windows** in the Adapter Policy field.

20. Click **OK** to add the vNIC to the template.



Create vNIC

Name: VM-Mgmt

Use LAN Connectivity Template: ☑

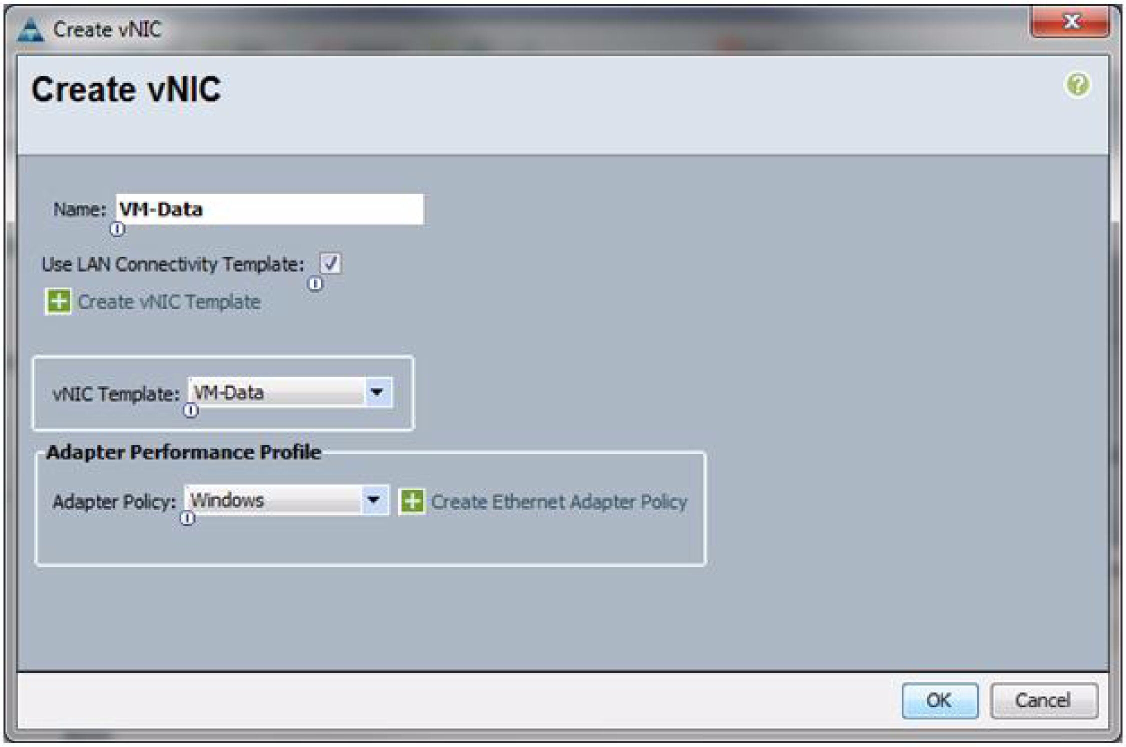
vNIC Template: VM-Mgmt

Adapter Performance Profile

Adapter Policy: Windows

21. From the Cisco UCS Manager screen, click **Add** to add a vNIC to the template.
22. The Create vNIC window displays. Name the vNIC **App-Cluster-Comm**.
23. Check the **Use LAN Connectivity Template** checkbox.
24. Select **App-Cluster-Comm** for the vNIC Template field.
25. Select **Windows** in the Adapter Policy field.
26. Click **OK** to add the vNIC to the template.
27. Click **Add** to add a vNIC to the template.
28. The Create vNIC window displays. Name the vNIC **VM-Data**.
29. Check the **Use LAN Connectivity Template** checkbox.
30. Select **VM-Data** for the vNIC Template field.
31. Select **Windows** in the Adapter Policy field.

32. Click **OK** to add the vNIC to the template.



Name: VM-Data

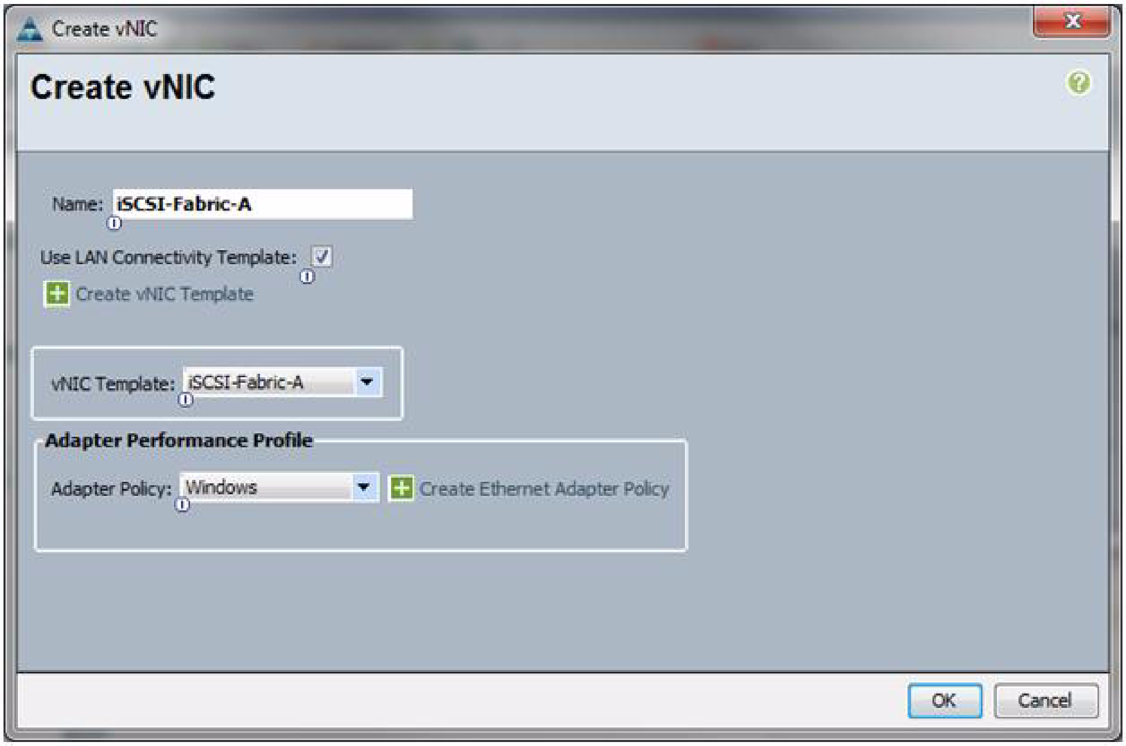
Use LAN Connectivity Template: ☑

vNIC Template: VM-Data

Adapter Policy: Windows

33. From the Cisco UCS Manager screen, click **Add** to add a vNIC to the template.
34. The Create vNIC window displays. Name the vNIC **iSCSI-Fabric-A**.
35. Check the **Use LAN Connectivity Template** checkbox.
36. Select **iSCSI-Fabric-A** for the vNIC Template field.
37. Select **Windows** in the Adapter Policy field.

38. Click **OK** to add the vNIC to the template.



Create vNIC

Name: iSCSI-Fabric-A

Use LAN Connectivity Template: ☑

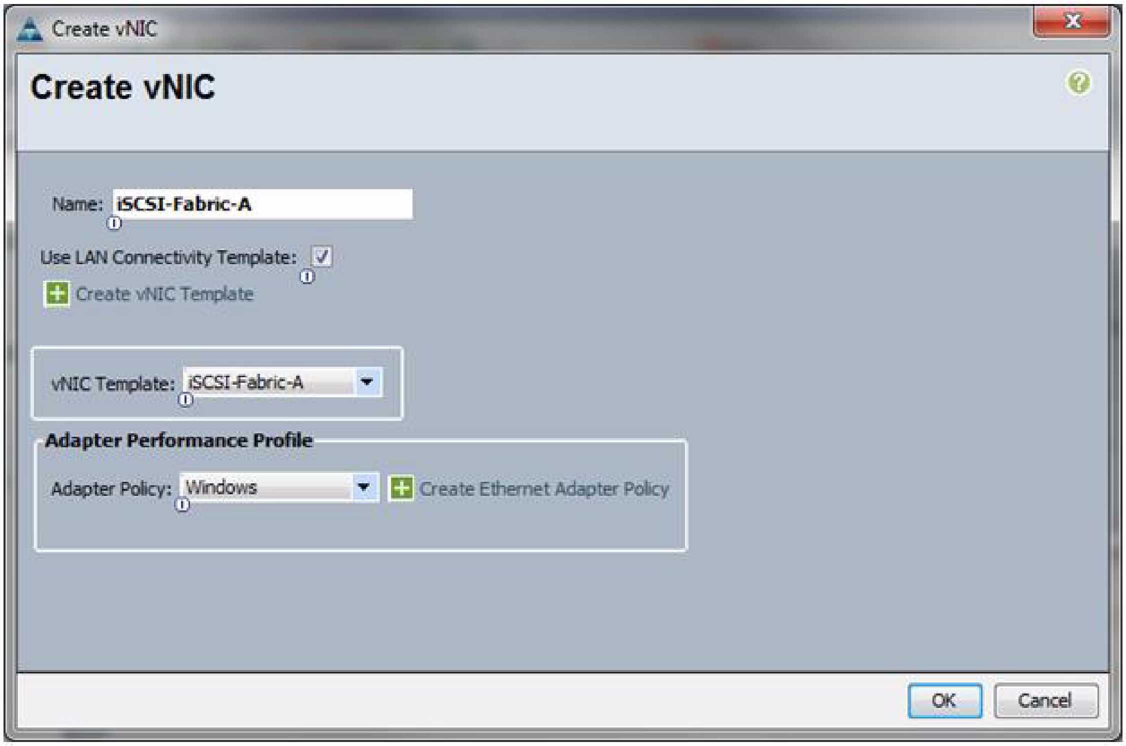
vNIC Template: iSCSI-Fabric-A

Adapter Performance Profile

Adapter Policy: Windows

39. From the Cisco UCS Manager screen, click **Add** to add a vNIC to the template.
40. The Create vNIC window displays. Name the vNIC **iSCSI-Fabric-A**.
41. Check the **Use LAN Connectivity Template** checkbox.
42. Select **iSCSI-Fabric-A** for the vNIC Template field.
43. Select **Windows** in the Adapter Policy field.

44. Click **OK** to add the vNIC to the template.



Create vNIC

Name: iSCSI-Fabric-A

Use LAN Connectivity Template: ☑

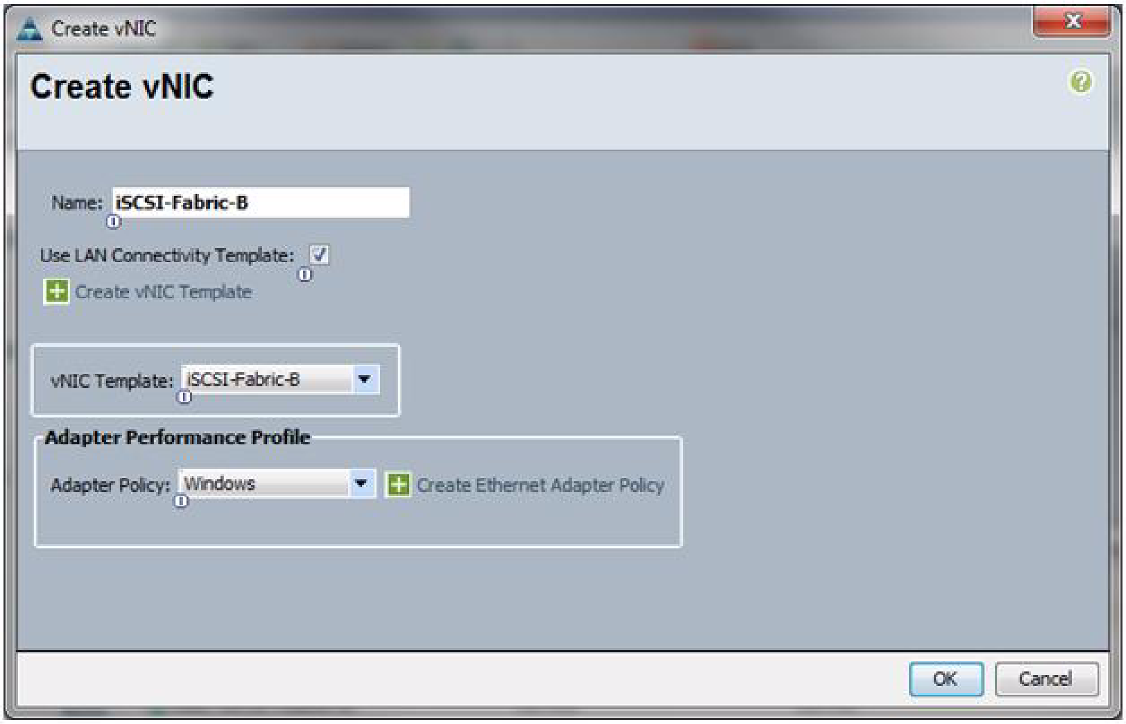
vNIC Template: iSCSI-Fabric-A

Adapter Performance Profile

Adapter Policy: Windows

45. From the Cisco UCS Manager screen, click **Add** to add a vNIC to the template.
46. The Create vNIC window displays. Name the vNIC **iSCSI-Fabric-B**.
47. Check the **Use LAN Connectivity Template** checkbox.
48. Select **iSCSI-Fabric-B** for the vNIC Template field.
49. Select **Windows** in the Adapter Policy field.

50. Click **OK** to add the vNIC to the template.



Create vNIC

Name: iSCSI-Fabric-B

Use LAN Connectivity Template: ☑

Create vNIC Template

vNIC Template: iSCSI-Fabric-B

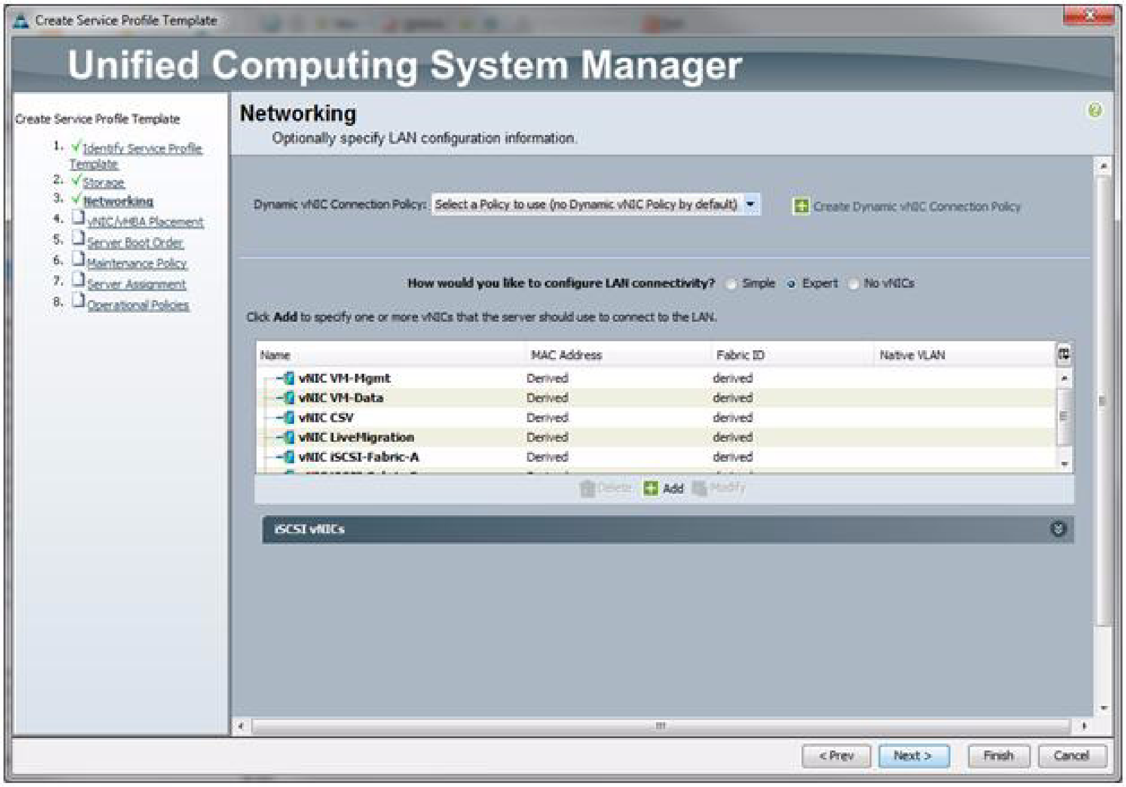
Adapter Performance Profile

Adapter Policy: Windows

Create Ethernet Adapter Policy

OK Cancel

51. Verify. Review the table to make sure that all of the vNICs were created.



Create Service Profile Template

Unified Computing System Manager

Create Service Profile Template

1. ✓ Identify Service Profile Template
2. ✓ Storage
3. ✓ Networking
4. □ vNIC/vHBA Placement
5. □ Server Boot Order
6. □ Maintenance Policy
7. □ Server Assignment
8. □ Operational Policies

Networking

Optionally specify LAN configuration information.

Dynamic vNIC Connection Policy: Select a Policy to use (no Dynamic vNIC Policy by default)

Create Dynamic vNIC Connection Policy

How would you like to configure LAN connectivity? ○ Simple ● Expert ○ No vNICs

Click **Add** to specify one or more vNICs that the server should use to connect to the LAN.

Name	MAC Address	Fabric ID	Native VLAN
vNIC VM-Mgmt	Derived	derived	
vNIC VM-Data	Derived	derived	
vNIC CSV	Derived	derived	
vNIC LiveMigration	Derived	derived	
vNIC iSCSI-Fabric-A	Derived	derived	

Delete Add Modify

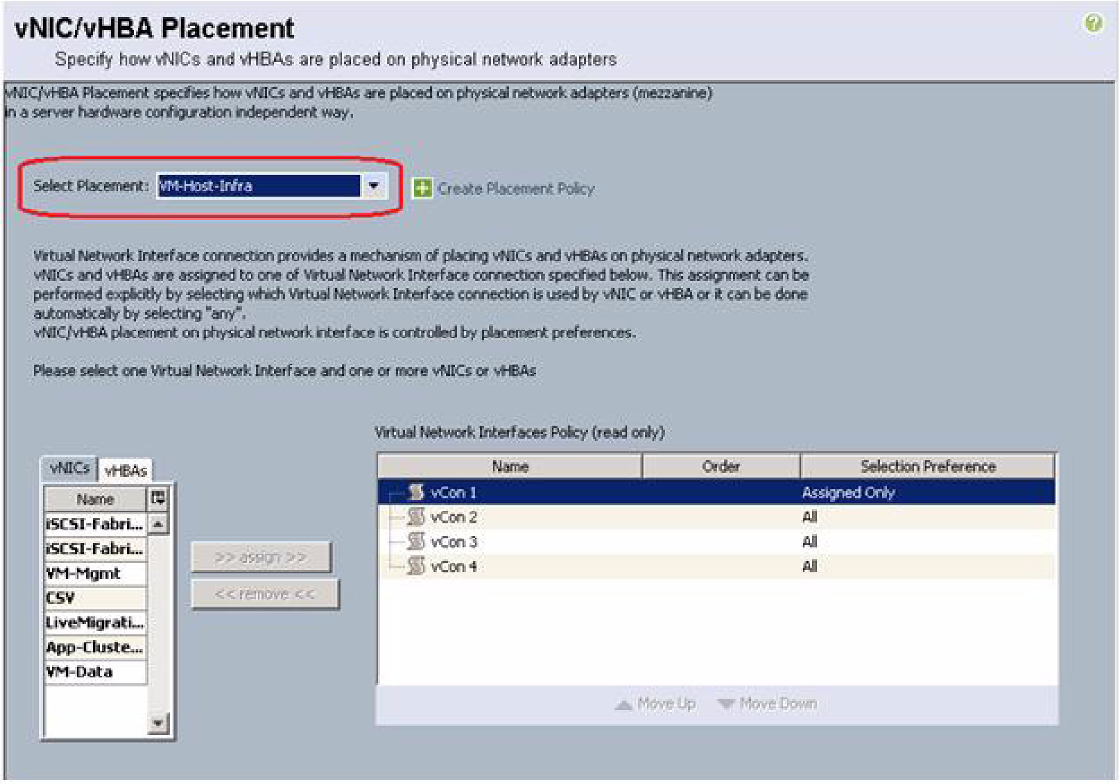
iSCSI vNICs

< Prev Next > Finish Cancel

52. Click **Next**.

vNIC/vHBA Placement Section

1. Select the **VM-Host-Infra Placement Policy** in the Select Placement field.



vNIC/vHBA Placement

Specify how vNICs and vHBAs are placed on physical network adapters

vNIC/vHBA Placement specifies how vNICs and vHBAs are placed on physical network adapters (mezzanine) in a server hardware configuration independent way.

Select Placement: VM-Host-Infra

Virtual Network Interface connection provides a mechanism of placing vNICs and vHBAs on physical network adapters. vNICs and vHBAs are assigned to one of Virtual Network Interface connection specified below. This assignment can be performed explicitly by selecting which Virtual Network Interface connection is used by vNIC or vHBA or it can be done automatically by selecting "any".
vNIC/vHBA placement on physical network interface is controlled by placement preferences.

Please select one Virtual Network Interface and one or more vNICs or vHBAs

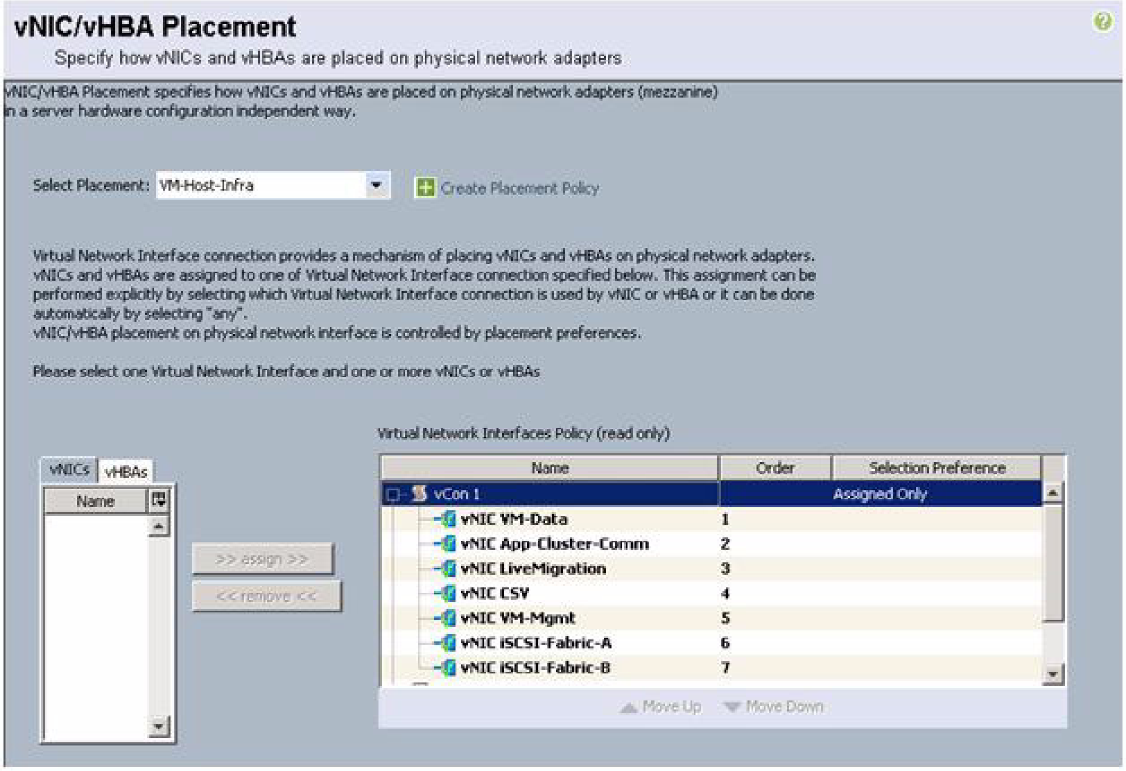
Name
iSCSI-Fabri...
iSCSI-Fabri...
VM-Mgmt
CSV
LiveMigrati...
App-Cluste...
VM-Data

Virtual Network Interfaces Policy (read only)

Name	Order	Selection Preference
vCon 1		Assigned Only
vCon 2		All
vCon 3		All
vCon 4		All

2. Select vCon1 assign the vNICs in the following order:
   a. VM-Data
   b. App-Cluster-Comm
   c. LiveMigration
   d. CSV
   e. VM-Mgmt
   f. iSCSI-Fabric-A

g. iSCSI-Fabric-B



vNIC/vHBA Placement

Specify how vNICs and vHBAs are placed on physical network adapters

vNIC/vHBA Placement specifies how vNICs and vHBAs are placed on physical network adapters (mezzanine) in a server hardware configuration independent way.

Select Placement: VM-Host-Infra

Virtual Network Interface connection provides a mechanism of placing vNICs and vHBAs on physical network adapters. vNICs and vHBAs are assigned to one of Virtual Network Interface connection specified below. This assignment can be performed explicitly by selecting which Virtual Network Interface connection is used by vNIC or vHBA or it can be done automatically by selecting "any".
vNIC/vHBA placement on physical network interface is controlled by placement preferences.

Please select one Virtual Network Interface and one or more vNICs or vHBAs

Virtual Network Interfaces Policy (read only)

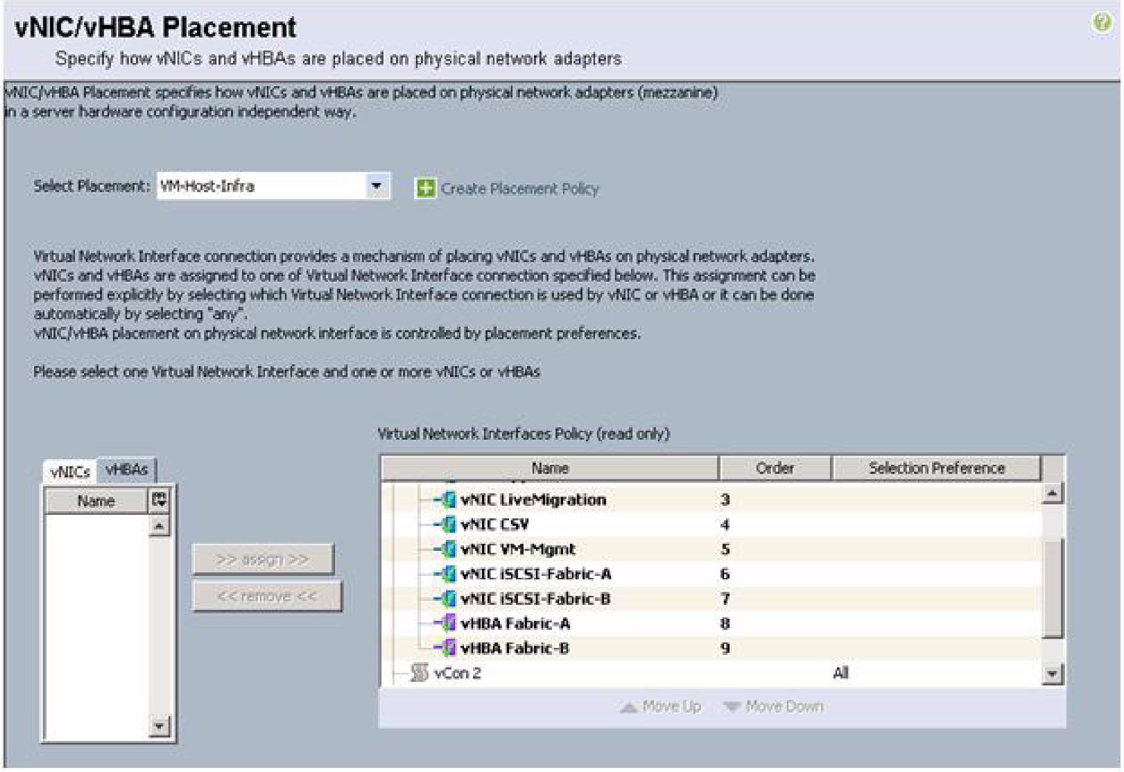
Name	Order	Selection Preference
vCon 1		Assigned Only
vNIC VM-Data	1	
vNIC App-Cluster-Comm	2	
vNIC LiveMigration	3	
vNIC CSV	4	
vNIC VM-Mgmt	5	
vNIC iSCSI-Fabric-A	6	
vNIC iSCSI-Fabric-B	7	

3. Click the **vHBA** tab and add the vHBAs in the following order:

   a. Fabric-A

   b. Fabric-B

4. Verify. Review the table to make sure that all of the vHBAs and vNICs were created. The order of the vNICs and vHBAs is not important.



vNIC/vHBA Placement

Specify how vNICs and vHBAs are placed on physical network adapters

vNIC/vHBA Placement specifies how vNICs and vHBAs are placed on physical network adapters (mezzanine) in a server hardware configuration independent way.

Select Placement: VM-Host-Infra

Virtual Network Interface connection provides a mechanism of placing vNICs and vHBAs on physical network adapters. vNICs and vHBAs are assigned to one of Virtual Network Interface connection specified below. This assignment can be performed explicitly by selecting which Virtual Network Interface connection is used by vNIC or vHBA or it can be done automatically by selecting "any".
vNIC/vHBA placement on physical network interface is controlled by placement preferences.

Please select one Virtual Network Interface and one or more vNICs or vHBAs

Virtual Network Interfaces Policy (read only)

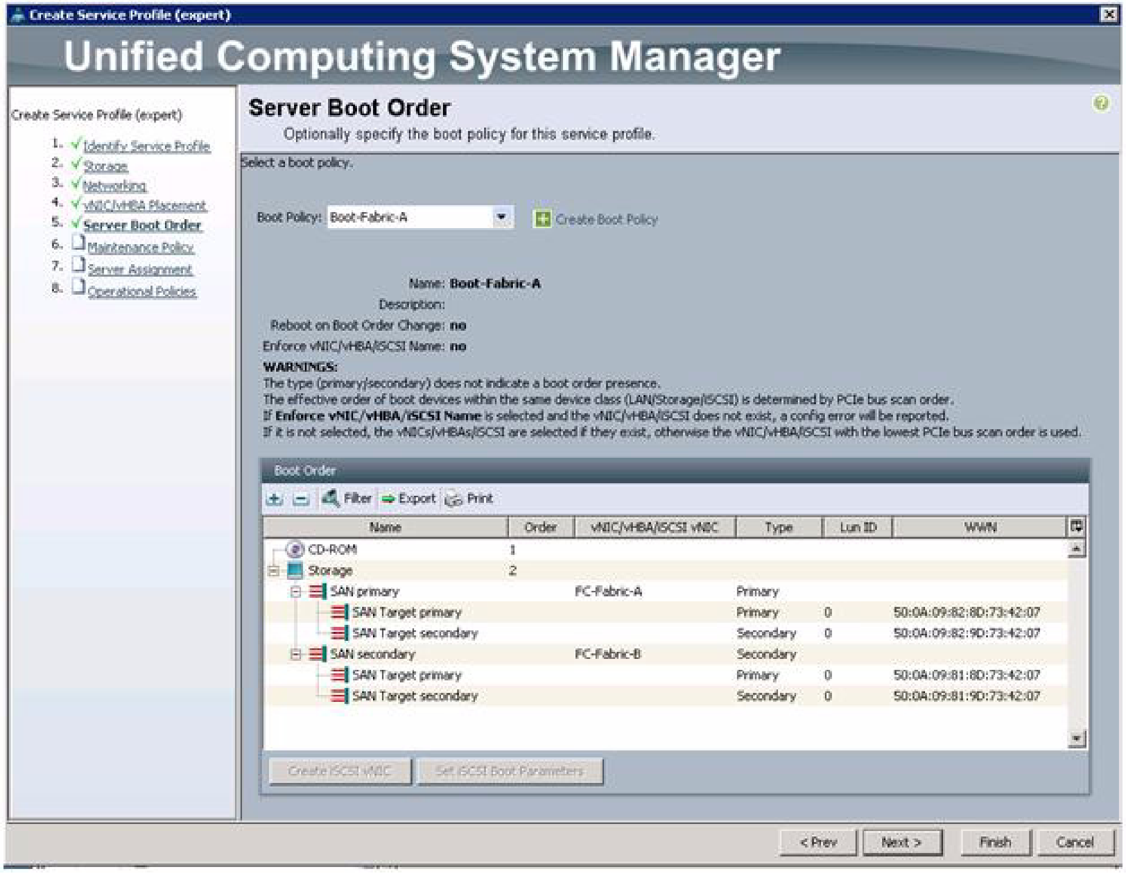
Name	Order	Selection Preference
vNIC LiveMigration	3	
vNIC CSV	4	
vNIC VM-Mgmt	5	
vNIC iSCSI-Fabric-A	6	
vNIC iSCSI-Fabric-B	7	
vHBA Fabric-A	8	
vHBA Fabric-B	9	
vCon 2		All

5. Click **Next** to continue to the next section.

Server Boot Order Section

1. Select **Boot Fabric-A** in the Boot Policy field.
2. Verify. Review the table to make sure that all of the boot devices were created and identified. Verify that the boot devices are in the correct boot sequence.

3. Click **Next** to continue to the next section.



Server Boot Order

Optionally specify the boot policy for this service profile.

Select a boot policy.

Boot Policy: Boot-Fabric-A

Name: **Boot-Fabric-A**
Description:
Reboot on Boot Order Change: **no**
Enforce vNIC/vHBA/iSCSI Name: **no**

WARNINGS:
The type (primary/secondary) does not indicate a boot order presence.
The effective order of boot devices within the same device class (LAN/Storage/iSCSI) is determined by PCIe bus scan order.
If **Enforce vNIC/vHBA/iSCSI Name** is selected and the vNIC/vHBA/iSCSI does not exist, a config error will be reported.
If it is not selected, the vNICs/vHBAs/iSCSI are selected if they exist, otherwise the vNIC/vHBA/iSCSI with the lowest PCIe bus scan order is used.

Boot Order

Name	Order	vNIC/vHBA/iSCSI vNIC	Type	Lun ID	WWN
CD-ROM	1				
Storage	2				
SAN primary		FC-Fabric-A	Primary		
SAN Target primary			Primary	0	50:0A:09:82:8D:73:42:07
SAN Target secondary			Secondary	0	50:0A:09:82:9D:73:42:07
SAN secondary		FC-Fabric-B	Secondary		
SAN Target primary			Primary	0	50:0A:09:81:8D:73:42:07
SAN Target secondary			Secondary	0	50:0A:09:81:9D:73:42:07

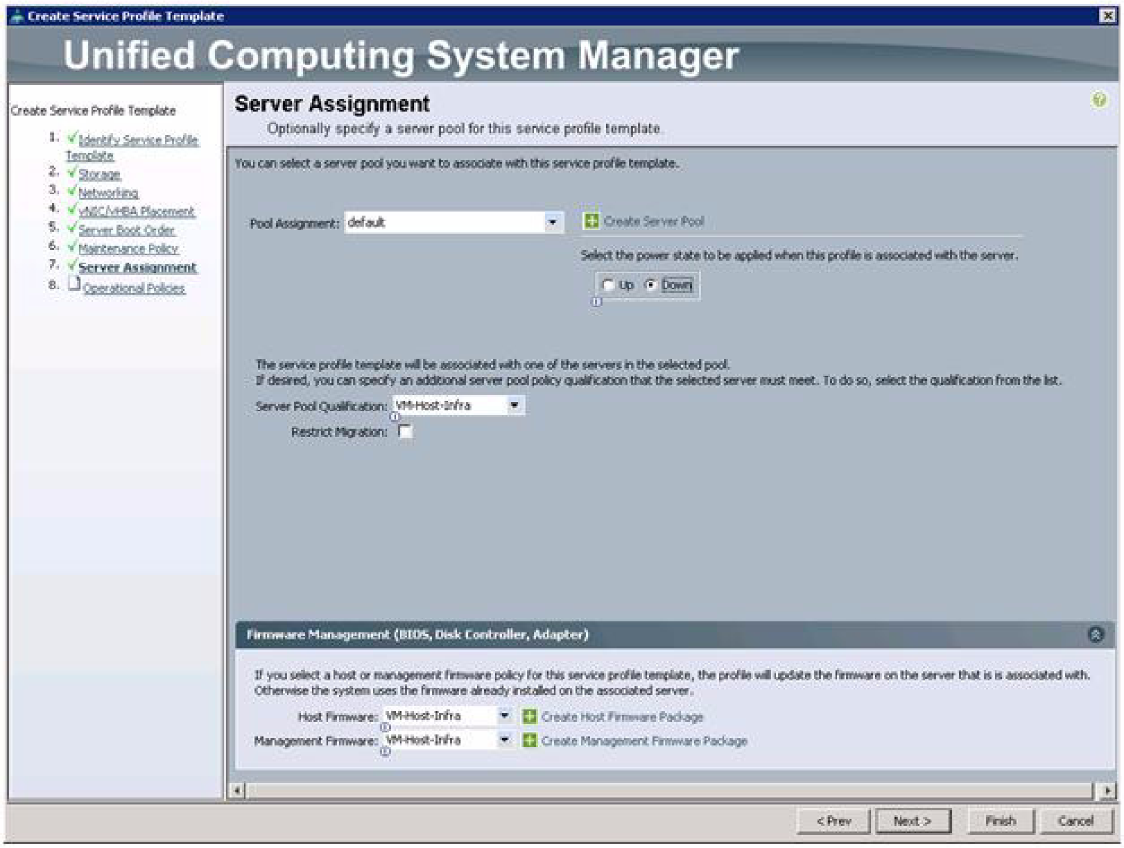
Maintenance Policy Section

1. Retain the default of no policy used by default.
2. Click **Next** to continue to the next section.

Server Assignment Section

1. Select **Default** in the Pool Assignment field.
2. Select **VM-Host-Infra** for the Server Pool Qualification field.
3. Select **Up** for the power state.
4. Select **VM-Host-Infra** in the Host Firmware field.
5. Select **VM-Host-Infra** in the Management Firmware field.

6. Click **Next** to continue to the next section.



Create Service Profile Template
Unified Computing System Manager
Create Service Profile Template
1. Identify Service Profile Template
2. Storage
3. Networking
4. vNIC/vHBA Placement
5. Server Boot Order
6. Maintenance Policy
7. Server Assignment
8. Operational Policies
Create Server Pool
Create Host Firmware Package
Create Management Firmware Package
< Prev
Next >
Finish
Cancel

Server Assignment

Optionally specify a server pool for this service profile template.

You can select a server pool you want to associate with this service profile template.

Pool Assignment: default

Select the power state to be applied when this profile is associated with the server.

○ Up ● Down

The service profile template will be associated with one of the servers in the selected pool.
If desired, you can specify an additional server pool policy qualification that the selected server must meet. To do so, select the qualification from the list.

Server Pool Qualification: VM-Host-Infra

Restrict Migration: □

Firmware Management (BIOS, Disk Controller, Adapter)

If you select a host or management firmware policy for this service profile template, the profile will update the firmware on the server that is is associated with.
Otherwise the system uses the firmware already installed on the associated server.

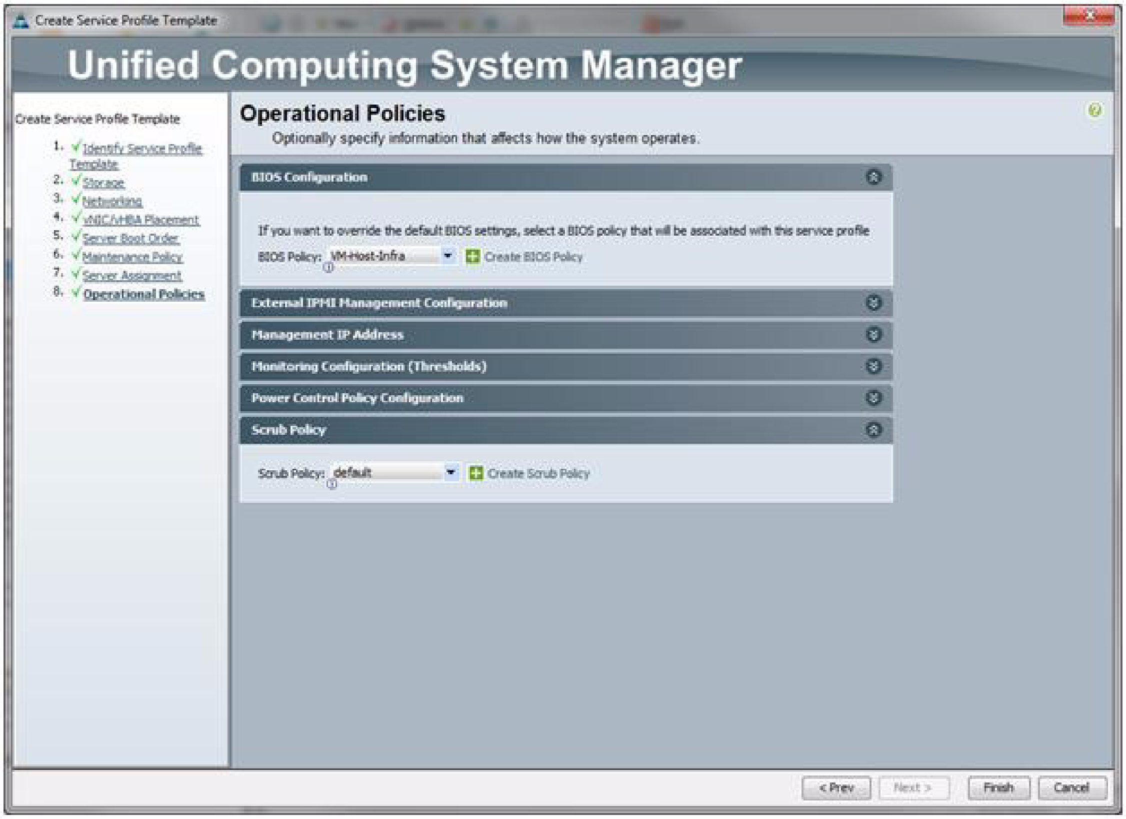
Host Firmware: VM-Host-Infra

Management Firmware: VM-Host-Infra

Operational Policies Section

1. Select **VM-Host-Infra** in the BIOS Policy field.
2. Expand **Power Control Policy Configuration**.
3. Select **No-Power-Cap** in the Power Control Policy field.
4. Click **Finish** to create the Service Profile template.

5. Click **OK**.



Create Service Profile Template
Unified Computing System Manager
Create Service Profile Template
1. ✓ Identify Service Profile Template
2. ✓ Storage
3. ✓ Networking
4. ✓ vNIC/vHBA Placement
5. ✓ Server Boot Order
6. ✓ Maintenance Policy
7. ✓ Server Assignment
8. ✓ Operational Policies
BIOS Configuration
External IPMI Management Configuration
Management IP Address
Monitoring Configuration (Thresholds)
Power Control Policy Configuration
Scrub Policy
Create BIOS Policy
Create Scrub Policy
< Prev
Next >
Finish
Cancel

Operational Policies

Optionally specify information that affects how the system operates.

If you want to override the default BIOS settings, select a BIOS policy that will be associated with this service profile

BIOS Policy: VM-Host-Infra

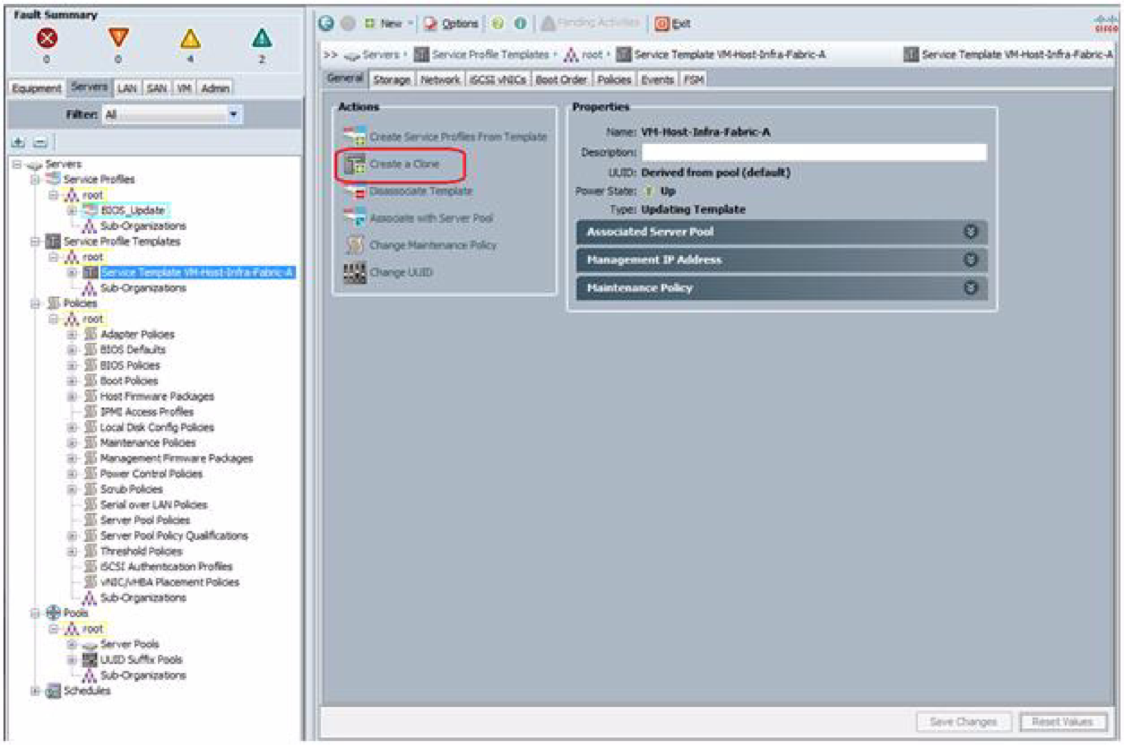
Scrub Policy: default

6. Select the **Servers** tab located at the top left of the window.

7. Go to **Service Profile Templates > root**.

8. Select the previously created **VM-Host-Infra-Fabric-A** template

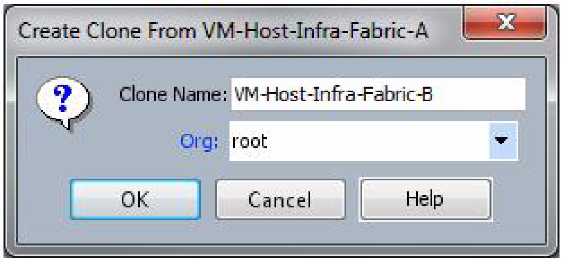
9. Click **Create a Clone**.



Name: VM-Host-Infra-Fabric-A
Description:
UUID: Derived from pool (default)
Power State: Up
Type: Updating Template

10. Enter **VM-Host-Infra-Fabric-B** in the Clone Name field

11. Click **OK**.



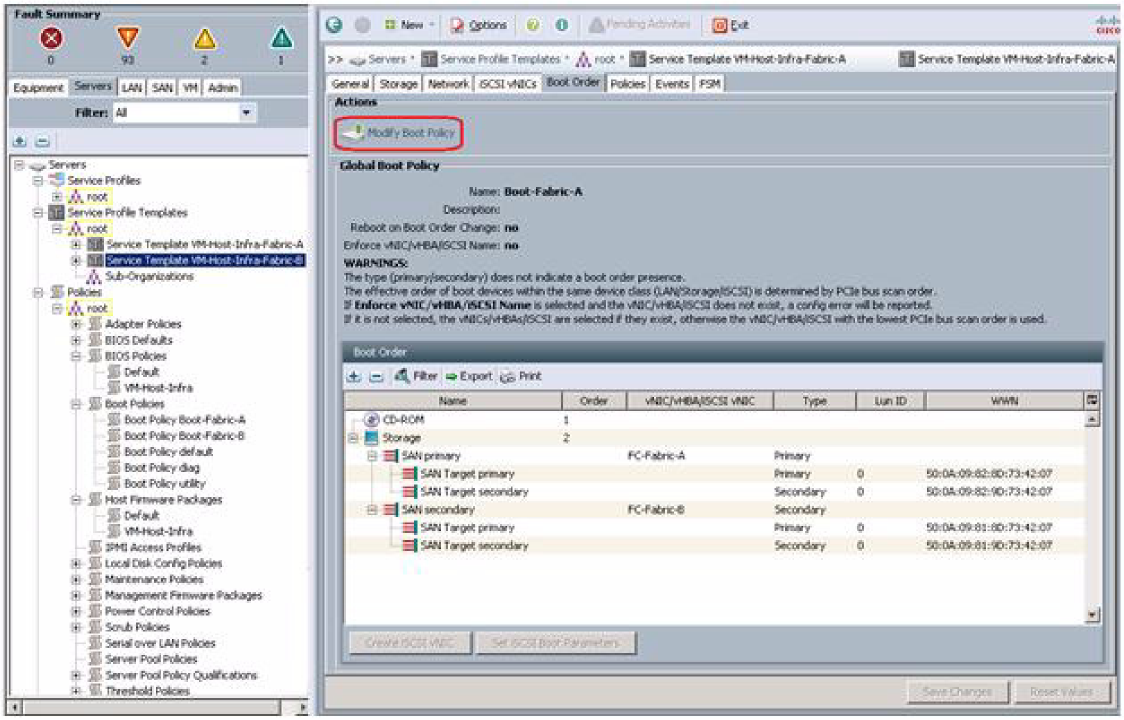
Create Clone From VM-Host-Infra-Fabric-A

Clone Name: VM-Host-Infra-Fabric-B

Org: root

12. Select the newly created service profile template and select the **Boot Order** tab.

13. Click **Modify Boot Policy**.



Global Boot Policy

Name: **Boot-Fabric-A**
Description:
Reboot on Boot Order Change: **no**
Enforce vNIC/vHBA/iSCSI Name: **no**

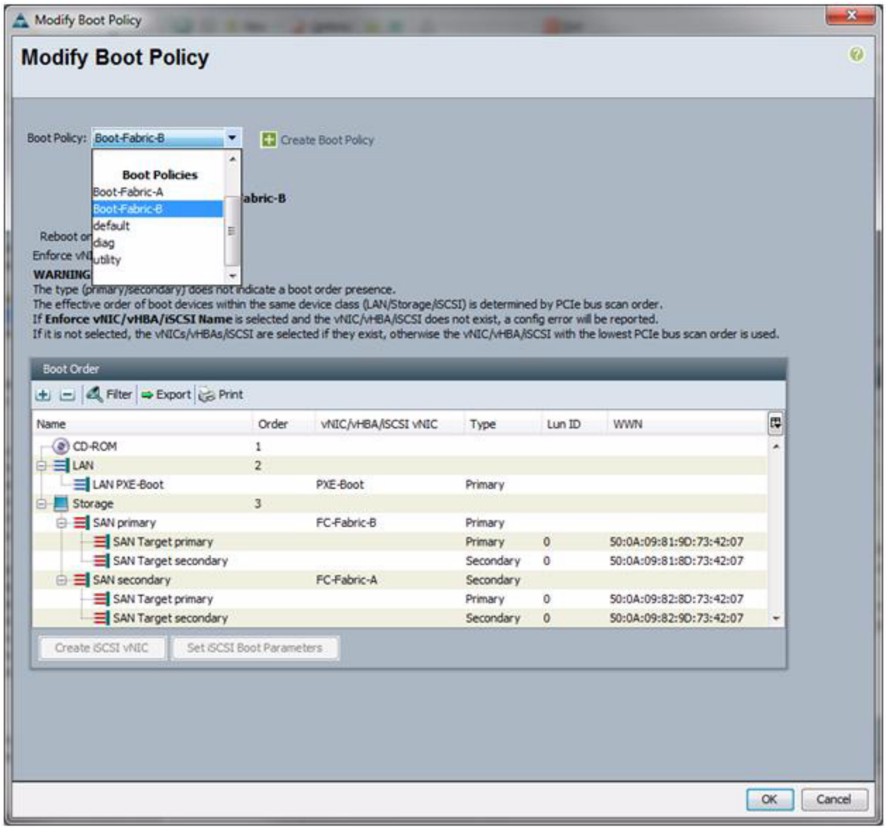
WARNINGS:
The type (primary/secondary) does not indicate a boot order presence.
The effective order of boot devices within the same device class (LAN/Storage/iSCSI) is determined by PCIe bus scan order.
If **Enforce vNIC/vHBA/iSCSI Name** is selected and the vNIC/vHBA/iSCSI does not exist, a config error will be reported.
If it is not selected, the vNICs/vHBAs/iSCSI are selected if they exist, otherwise the vNIC/vHBA/iSCSI with the lowest PCIe bus scan order is used.

Boot Order

Name	Order	vNIC/vHBA/iSCSI vNIC	Type	Lun ID	WWN
CD-ROM	1				
Storage	2				
SAN primary		FC-Fabric-A	Primary		
SAN Target primary			Primary	0	50:0A:09:82:8D:73:42:07
SAN Target secondary			Secondary	0	50:0A:09:82:9D:73:42:07
SAN secondary		FC-Fabric-B	Secondary		
SAN Target primary			Primary	0	50:0A:09:81:8D:73:42:07
SAN Target secondary			Secondary	0	50:0A:09:81:9D:73:42:07

14. Select **Boot-Fabric-B Boot Policy**.

15. Click **OK**.



Modify Boot Policy

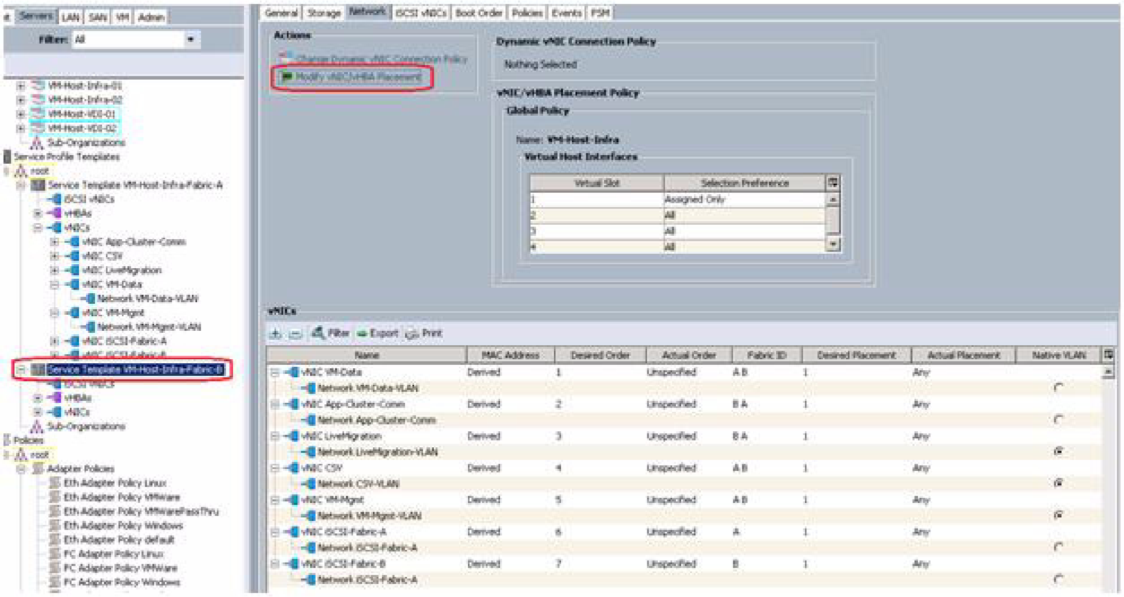
Boot Policy: Boot-Fabric-B

WARNING
The type (primary/secondary) does not indicate a boot order presence.
The effective order of boot devices within the same device class (LAN/Storage/iSCSI) is determined by PCIe bus scan order.
If **Enforce vNIC/vHBA/iSCSI Name** is selected and the vNIC/vHBA/iSCSI does not exist, a config error will be reported.
If it is not selected, the vNICs/vHBAs/iSCSI are selected if they exist, otherwise the vNIC/vHBA/iSCSI with the lowest PCIe bus scan order is used.

Boot Order

Name	Order	vNIC/vHBA/iSCSI vNIC	Type	Lun ID	WWN
CD-ROM	1				
LAN	2				
LAN PXE-Boot		PXE-Boot	Primary		
Storage	3				
SAN primary		FC-Fabric-B	Primary		
SAN Target primary			Primary	0	50:0A:09:81:9D:73:42:07
SAN Target secondary			Secondary	0	50:0A:09:81:8D:73:42:07
SAN secondary		FC-Fabric-A	Secondary		
SAN Target primary			Primary	0	50:0A:09:82:8D:73:42:07
SAN Target secondary			Secondary	0	50:0A:09:82:9D:73:42:07

16. Select the **Network** tab and click **Modify vNIC/HBA Placement Policy**.



Dynamic vNIC Connection Policy

Nothing Selected

vNIC/vHBA Placement Policy

Global Policy

Name: **VM-Host-Infra**

Virtual Host Interfaces

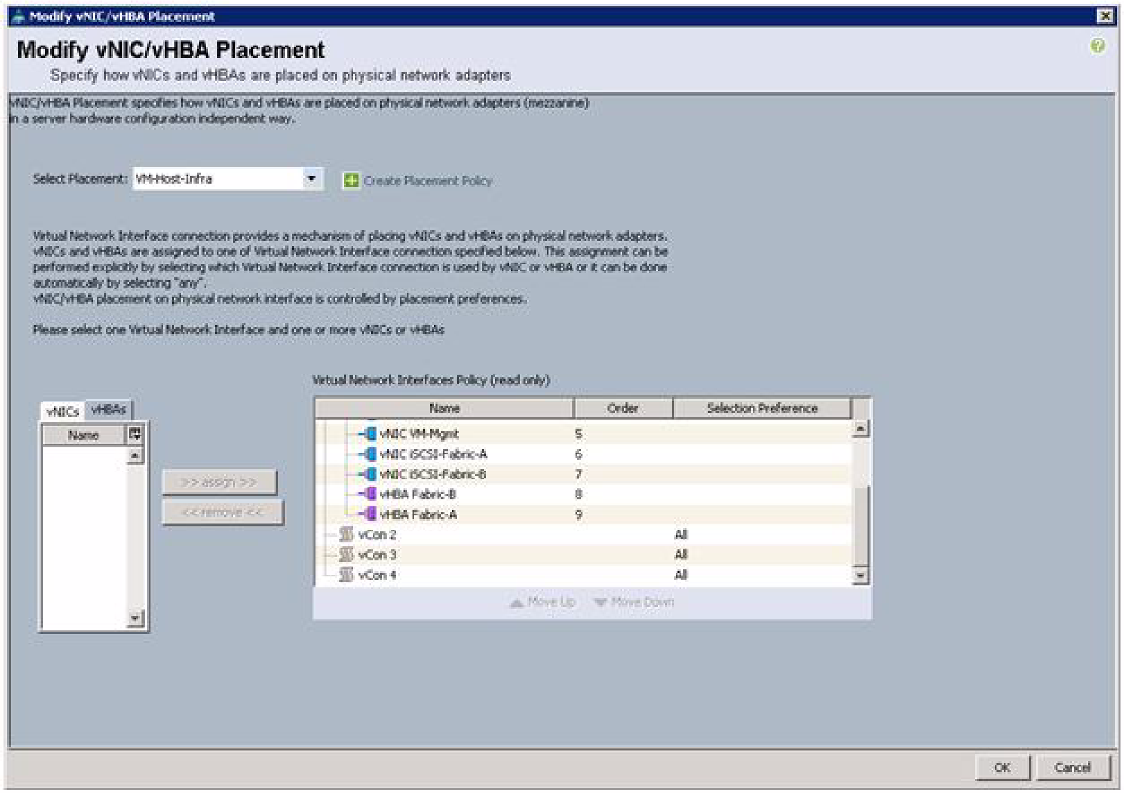
Virtual Slot	Selection Preference
1	Assigned Only
2	All
3	All
4	All

vNICs

Name	MAC Address	Desired Order	Actual Order	Fabric ID	Desired Placement	Actual Placement	Native VLAN
vNIC VM-Data	Derived	1	Unspecified	A B	1	Any	
Network VM-Data-VLAN							○
vNIC App-Cluster-Comm	Derived	2	Unspecified	B A	1	Any	
Network App-Cluster-Comm							○
vNIC LiveMigration	Derived	3	Unspecified	B A	1	Any	
Network LiveMigration-VLAN							●
vNIC CSV	Derived	4	Unspecified	A B	1	Any	
Network CSV-VLAN							●
vNIC VM-Mgmt	Derived	5	Unspecified	A B	1	Any	
Network VM-Mgmt-VLAN							●
vNIC iSCSI-Fabric-A	Derived	6	Unspecified	A	1	Any	
Network iSCSI-Fabric-A							○
vNIC iSCSI-Fabric-B	Derived	7	Unspecified	B	1	Any	
Network iSCSI-Fabric-A							○

17. Move **vHBA Fabric-B** ahead of **vHBA Fabric-A** in the placement order.

18. Click **OK**.



Modify vNIC/vHBA Placement

Specify how vNICs and vHBAs are placed on physical network adapters

vNIC/vHBA Placement specifies how vNICs and vHBAs are placed on physical network adapters (mezzanine) in a server hardware configuration independent way.

Select Placement: VM-Host-Infra

Virtual Network Interface connection provides a mechanism of placing vNICs and vHBAs on physical network adapters. vNICs and vHBAs are assigned to one of Virtual Network Interface connection specified below. This assignment can be performed explicitly by selecting which Virtual Network Interface connection is used by vNIC or vHBA or it can be done automatically by selecting "any".
vNIC/vHBA placement on physical network interface is controlled by placement preferences.

Please select one Virtual Network Interface and one or more vNICs or vHBAs

Virtual Network Interfaces Policy (read only)

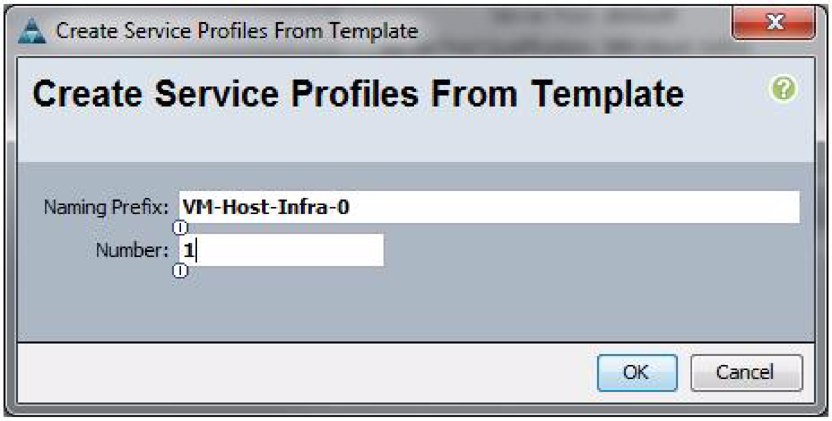
Name	Order	Selection Preference
vNIC VM-Mgmt	5	
vNIC iSCSI-Fabric-A	6	
vNIC iSCSI-Fabric-B	7	
vHBA Fabric-B	8	
vHBA Fabric-A	9	
vCon 2		All
vCon 3		All
vCon 4		All

Create Service Profiles From a Template

The following steps provide the details to create a service profile from a template.

Cisco UCS Manager

1. Select the **Servers** tab located at the top left of the window.
2. Select **Service Profile Templates VM-Host-Infra-Fabric-A**.
3. Right-click and select **Create Service Profile From Template**.
4. Enter **VM-Host-Infra-0** for the service profile prefix.
5. Enter **1** for the number of service profiles to create.
6. Click **OK** to create the service profile.



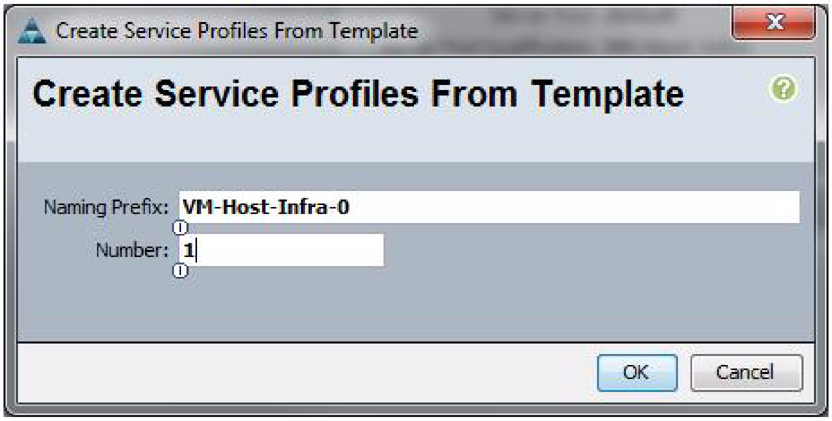
Create Service Profiles From Template

Create Service Profiles From Template

Naming Prefix: VM-Host-Infra-0

Number: 1

7. Click **OK**.
8. Select **Service Profile Templates VM-Host-Infra-Fabric-B**.
9. Right-click and select **Create Service Profile From Template**.
10. Enter **VM-Host-Infra-0** for the service profile prefix.
11. Enter **1** for the number of service profiles to create.
12. Click **OK** to create the service profile.



Create Service Profiles From Template

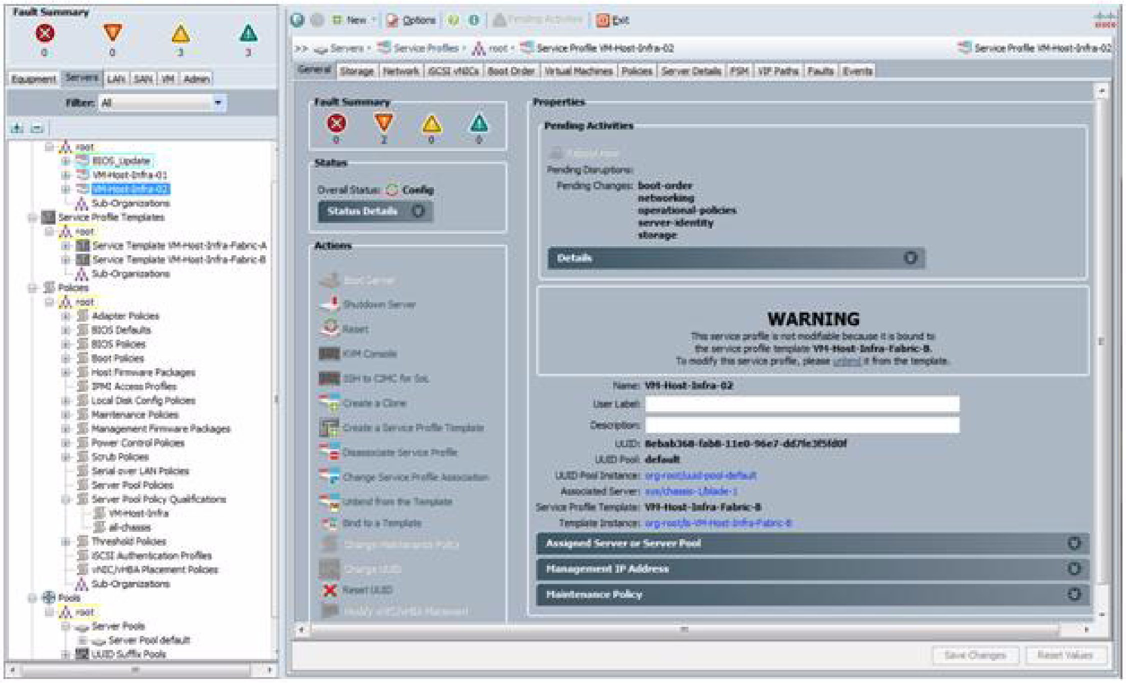
Create Service Profiles From Template

Naming Prefix: VM-Host-Infra-0

Number: 1

13. Click **OK**.

14. Verify that Service Profiles VM-Host-Infra-01 and VM-Host-Infra-02 are created. The service profiles will be automatically associated with the servers in their assigned server pools.



Pending Disruptions:
Pending Changes: boot-order
networking
operational-policies
server-identity
storage

WARNING
This service profile is not modifiable because it is bound to the service profile template VM-Host-Infra-Fabric-B.
To modify this service profile, please unbind it from the template.

Name: VM-Host-Infra-02
User Label:
Description:
UUID: 8ebab368-fab8-11e0-96e7-dd7fe3f5fd0f
UUID Pool: default
UUID Pool Instance: org-root/uuid-pool-default
Associated Server: sys/chassis-1/blade-1
Service Profile Template: VM-Host-Infra-Fabric-B
Template Instance: org-root/ls-VM-Host-Infra-Fabric-B

Add More Server Blades to the FlexPod Unit

Add server pools, service profile templates, and service profiles in the respective organizations to add more servers to the FlexPod unit. All other pools and policies are at the root level and can be shared among the organizations.

Gather the Necessary Information

After the Cisco UCS service profiles have been created (in the previous steps), the infrastructure blades in the environment each have a unique configuration. To proceed with the FlexPod deployment, specific information must be gathered from each Cisco UCS blade and from the NetApp controllers. Insert the required information in the tables below.

Table 13 NetApp Controller Information

NetApp Controller	FC Port	FC Portname
Controller A	0c	
	0d	
Controller B	0c	
	0d	

Note On each NetApp controller use show fcp adapters to gather the information above. If using FCoE between storage and the Cisco Nexus 5548s, substitute 2a for 0c and 2b for 0d.

Table 14 Cisco UCS Service Profile Name Information

Cisco UCS Service Profile Name	Fabric-A WWPN	Fabric-B WWPN
VM-Host-Infra-01		
VM-Host-Infra-02		

Note To gather the information in the table above, launch the Cisco UCS Manager GUI, and in the left pane select the Servers tab. From there, expand Servers > Service Profiles > root > . Click each service profile and then click the Storage tab on the right. While doing so, record the WWPN information in the right display window for both vHBA_A and vHBA_B for each service profile in the table above.

Cisco Nexus 5548 Deployment Procedure: Part 2

This section provides the details to complete the configuration of the Nexus infrastructure for the FlexPod environment.

Create VSANs, Assign FC Ports, Turn on FC Ports

The following steps provide the details to configure VSANs, assigning FC ports and enabling FC ports.

Note This procedure sets up Fibre Channel connections between the Cisco Nexus 5548s and the NetApp storage systems. If you want to use FCoE connections between the Cisco Nexus 5548s and the NetApp storage systems using the NetApp Unified Target Adapter (UTA) use the Alternate Cisco Nexus 5548 Deployment Procedure: Part 2 for FCoE.

Cisco Nexus 5548 A

1. From the global configuration mode, type **interface san-port-channel 1**.
2. Type **channel mode active**.
3. Type **exit**.
4. Type **vsan database**.
5. Type **vsan <VSAN A ID> name Fabric_A**.
6. Type **vsan <VSAN A ID> interface fc1/29-32**.
7. Type **vsan <VSAN A ID> interface san-port-channel 1**.
8. Type **exit**.
9. Type **interface fc1/31-32**.
10. Type **channel-group 1 force**.
11. Type **no shutdown**.
12. Type **exit**.
13. Type **interface fc1/29-30**.
14. Type **no shutdown**.
15. Type **exit**.
16. Type **show int san-port-channel 1 to confirm connectivity**.

17. Type **interface fc1/29**.
18. Type **switchport description <Controller A:0c>**.
19. Type **exit**.
20. Type **interface fc1/30**.
21. Type **switchport description <Controller B:0c>**.
22. Type **exit**.
23. Type **interface fc1/31**.
24. Type **switchport description <UCSM A:fc1/31>**.
25. Type **exit**.
26. Type **interface fc1/32**.
27. Type **switchport description <UCSM A:fc1/32>**.
28. Type **exit**.

Cisco Nexus 5548 B

1. From the global configuration mode, type **interface san-port-channel 2**.
2. Type **channel mode active**.
3. Type **exit**.
4. Type **vsan database**.
5. Type **vsan <VSAN B ID> name Fabric_B**.
6. Type **vsan <VSAN B ID> interface fc1/29-32**.
7. Type **vsan <VSAN B ID> interface san-port-channel 2**.
8. Type **exit**.
9. Type **interface fc1/31-32**.
10. Type **channel-group 2 force**.
11. Type **no shutdown**.
12. Type **exit**.
13. Type **interface fc1/29-30**.
14. Type **no shutdown**.
15. Type **exit**.
16. Type **show int san-port-channel 2 to confirm connectivity**.
17. Type **interface fc1/29**.
18. Type **switchport description <Controller A:0d>**.
19. Type **exit**.
20. Type **interface fc1/30**.
21. Type **switchport description <Controller B:0d>**.
22. Type **exit**.
23. Type **interface fc1/31**.
24. Type **switchport description <UCSM B:fc1/31>**.

25. Type **exit**.
26. Type **interface fc1/32**.
27. Type **switchport description <UCSM B:fc1/32>**.
28. Type **exit**.

Create Device Aliases and Create Zones

The following steps provide the details to configure device aliases and zones for the primary boot path. Instructions are given for all target ports, however, the redundant path is enabled following operating system installation.

Cisco Nexus 5548 A

1. From the global configuration mode, type **device-alias database**.
2. Type **device-alias name VM-Host-Infra-01_A pwwn <Fabric-A WWPN>**.
3. Type **device-alias name VM-Host-Infra-02_A pwwn <Fabric-A WWPN>**.
4. Type **device-alias name controller_A_0c pwwn <Controller A 0c WWPN>**.
5. Type **device-alias name controller_B_0c pwwn <Controller B 0c WWPN>**.
6. Get this information from the table in section Gather the Necessary Information.
7. After all of the necessary device-alias are created, type **exit**.
8. Type **device-alias commit**.
9. Create the zone for each service profile.
10. Type zone name **VM-Host-Infra-01_A vsan <Fabric A VSAN ID>**.
11. Type **member device-alias VM-Host-Infra-01_A**.
12. Type **member device-alias controller_A_0c**.
13. Type **exit**.
14. After the zone for the primary path of the first Cisco UCS service profiles has been created, create a zoneset to organize and manage them.
15. Create the zoneset and add the necessary members.
16. Type **zoneset name flexpod vsan <Fabric A VSAN ID>**.
17. Type **member VM-Host-Infra-01_A**.
18. Type **exit**.
19. Activate the zoneset.
20. Type **zoneset activate name flexpod vsan < Fabric A VSAN ID>**.
21. Type **exit**.
22. Type **copy run start**.

Cisco Nexus 5548 B

1. From the global configuration mode, type **device-alias database**.
2. Type **device-alias name VM-Host-Infra-01_B pwwn <Fabric-B WWPN>**.
3. Type **device-alias name VM-Host-Infra-02_B _B pwwn <Fabric-B WWPN>**.
4. Type **device-alias name controller_A_0d pwwn <Controller A 0d WWPN>**.

5. Type **device-alias name controller_B_0d pwwn <Controller B 0d WWPN>**.
6. Get this information from the tables in the section Gather the Necessary Information.
7. After all of the necessary device-alias are created, type **exit**.
8. Type **device-alias commit**.
9. Create the zones for each service profile.
10. Type **zone name VM-Host-Infra-02_B vsan <Fabric B VSAN ID>**.
11. Type **member device-alias VM-Host-Infra-02_B _B**.
12. Type **member device-alias controller_B_0d**.
13. Type **exit**.
14. After all of the zones for the Cisco UCS service profiles have been created, create a zoneset to organize and manage them.
15. Create the zoneset and add the necessary members.
16. Type **zoneset name flexpod vsan <Fabric B VSAN ID>**.
17. Type **member VM-Host-Infra-02_B**.
18. Type **exit**.
19. Activate the zoneset.
20. Type **zoneset activate name flexpod vsan <Fabric B VSAN ID>**.
21. Type **exit**.
22. Type **copy run start**.

NetApp FAS3240A Deployment Procedure: Part 2

The following sections provide detailed procedures for configuring the interface groups (or igroups), creating LUNs for the service profiles on the storage controllers, and mapping those LUNs to the igroups to be accessible to the service profiles.

Create iGroups

The following steps provide the details to configure the necessary iGroups on the storage controller that enable the mapping of a given host to its storage resources.

Controller A

For the first service profile to boot from controller A, do the following to create igroups for each vHBA:

1. Run the command: `igroup create -f -t hyper_v VM-Host-Infra-01 <Fabric-A WWPN> <Fabric-B WWPN>.`
2. Run the command: `igroup set VM-Host-Infra-01 alua yes.`

Controller B

For the first service profile to boot from controller B do the following to create igroups for each vHBA:

1. Run the command: `igroup create -f -t hyper_v VM-Host-Infra-02` *`<Fabric-A WWPN> <Fabric-B WWPN>`*`.`
2. Run the command: `igroup set VM-Host-Infra-02 alua yes.`

Create LUNs

The following step provides the detail to configure the necessary LUNs on the storage controller for deployment of the SAN booted Windows 2008 R2 SP1 operating system. This LUN, when prepared, will be used as the base for cloning multiple installations.

Controller A

For the first service profile to boot off of controller A do the following to create the LUN for the OS installation:

Run the command: `lun create -s 120g -t hyper_v -o noreserve /vol/win_boot_A/hyper-v-host.`

Map LUNs to iGroup

This step provides the detail for mapping the necessary LUN on the storage controller to the created iGroups.

Controller A

For the first service profile to boot from controller A map the LUN for the OS installation:

Run the command: `lun map /vol/win_boot_A/hyper-v-host VM-Host-Infra-01.`

Prepare the Host for Windows Server 2008 R2 SP1 Installation

The following steps provide the details necessary to prepare the host for the installation of Windows Server 2008 R2.

Note In order for the Windows Installer to recognize the Fiber Channel SAN boot disk for each server, the Cisco UCS fnic driver must be loaded into the windows installer during installation. Please download the latest Unified Computing System (UCS) Drivers from www.cisco.com under Cisco UCS B-Series Blade Server Software and place the iso on the same machine with the Windows Server 2008 R2 SP1 DVD iso.

Cisco UCS Manager

1. In the KVM window, select the **Virtual Media** tab.
2. Click the **Add Image…** button in the window that displays.
3. Browse to the Windows Server 2008 R2 SP1 iso image file.
4. Click **Open** to add the image to the list of virtual media.
5. Click the checkbox for **Mapped** next to the entry corresponding to the image you just added.
6. In the KVM window, select the **KVM** tab to monitor during boot.
7. In the KVM window, select the **Boot Server** button in the upper left corner.
8. Click **OK**.
9. Click **OK**.

Install Windows Server 2008 R2

The following steps provide the details necessary for the installation of Windows Server 2008 R2.

Cisco UCS Manager

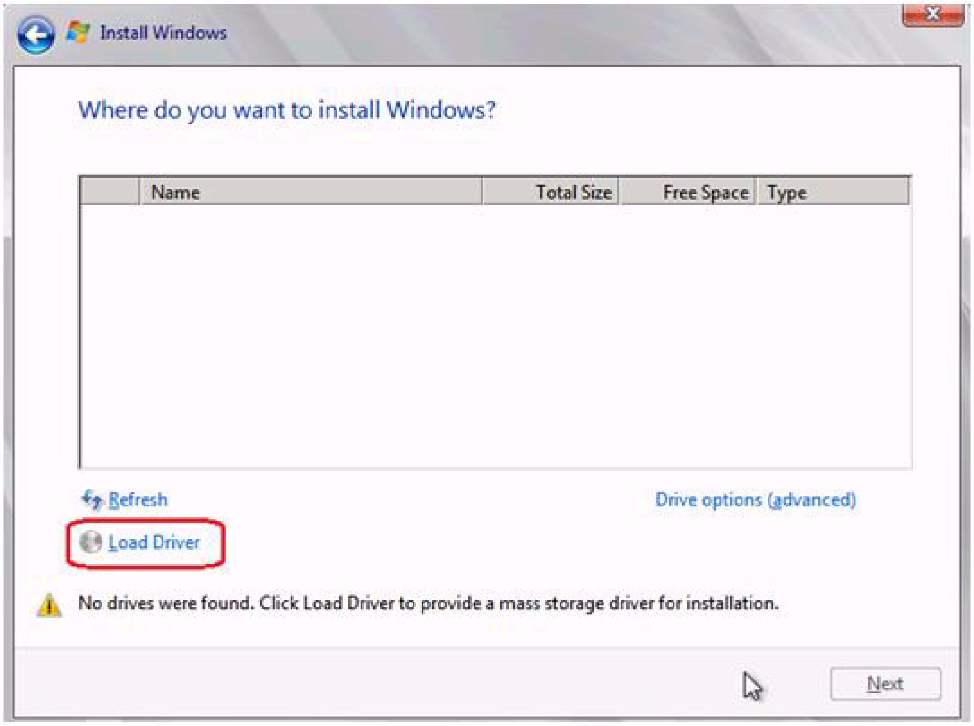
1. In the KVM window, select the **Boot Server** button in the upper left corner.
2. Click **OK**.
3. Click **OK**.
4. Reboot the blade using the **Boot Server** button at the top of the KVM window.

Note It does not matter whether you use a soft or hard reboot, because the blades do not have an OS.

5. On reboot, the machine detects the presence of the Windows Server 2008 R2 SP1 install media.
6. Select **Next** from the Install Windows window that displays and proceed to install Windows Server 2008 R2 SP1 DataCenter Edition Full Installation.

Note During installation the Cisco VIC FCoE Storport Miniport driver will need to be loaded.

7. When the screen displays to select the installation disk, select **Load Driver**.



Install Windows

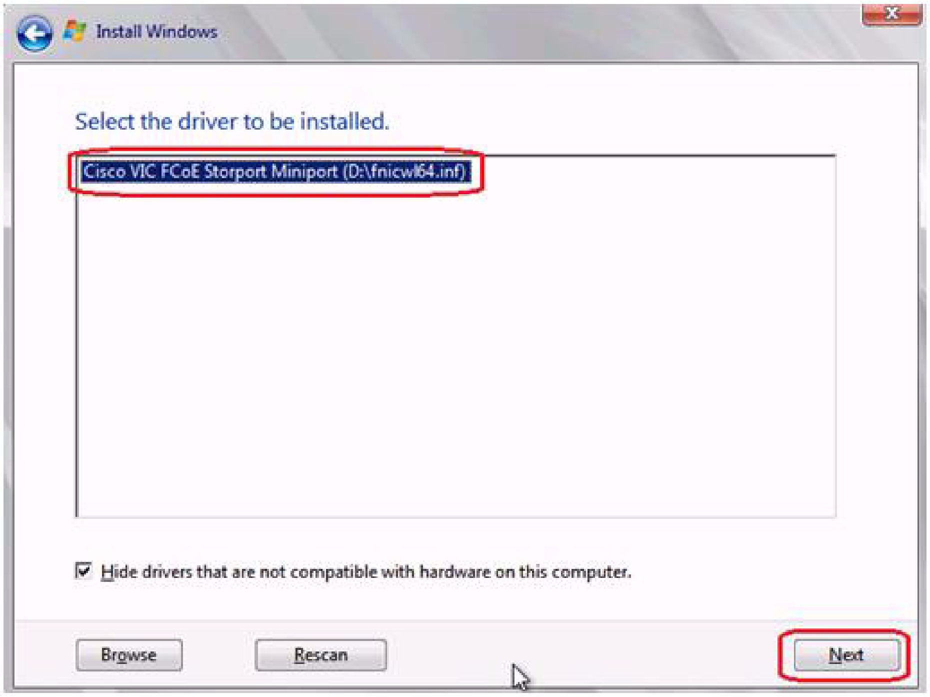
Where do you want to install Windows?

Name	Total Size	Free Space	Type

No drives were found. Click Load Driver to provide a mass storage driver for installation.

8. In order to load the appropriate driver, unmap the Windows Installer DVD in the Virtual Media tab.
9. Browse to and map the Cisco Drivers iso downloaded earlier.
10. Browse to the \Windows\Storage\Cisco\M81KR\W2K8R2\x64 folder on the mounted iso.

11. The Cisco VIC FCoE Storeport driver will be selected. Click **Next** to load the driver.



Select the driver to be installed.

Cisco VIC FCoE Storport Miniport (D:\fnicwl64.inf)

☑ Hide drivers that are not compatible with hardware on this computer.

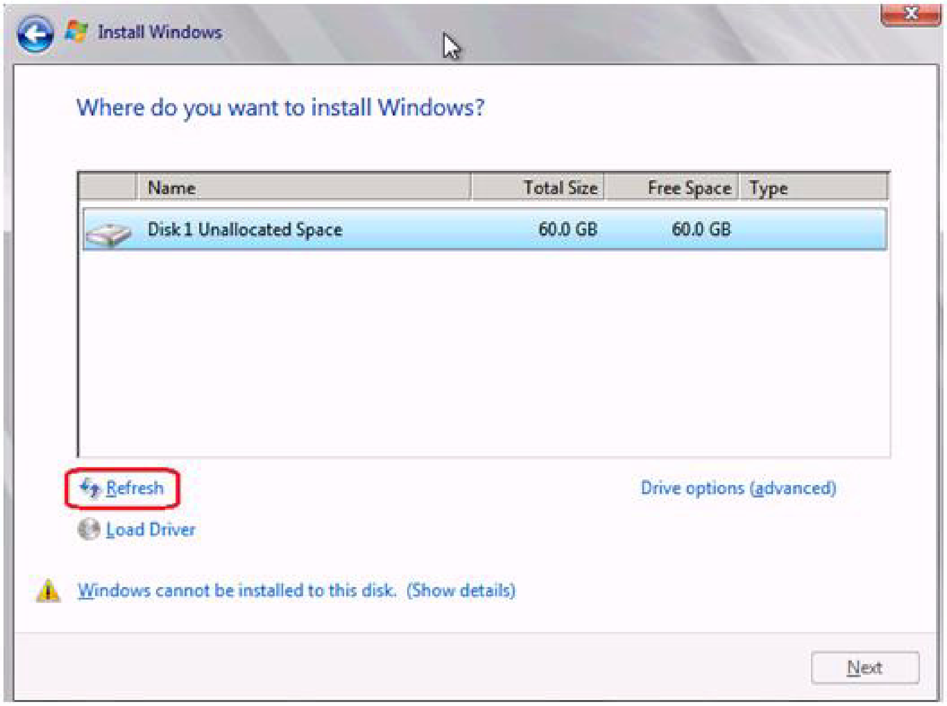
12. Switch to the Virtual Media tab.

13. Uncheck the check box for the currently mapped ISO image for Mapped next to the entry corresponding to the image you just added.

14. Remap the Windows Installer DVD by checking the **Mapped** box next to the ISO image.

15. Switch back to the **KVM** tab.

16. The boot LUN will now be visible as a selectable storage device for the Windows installation. Click the **Refresh** button to allow the installer to recognize the Windows Installer DVD.



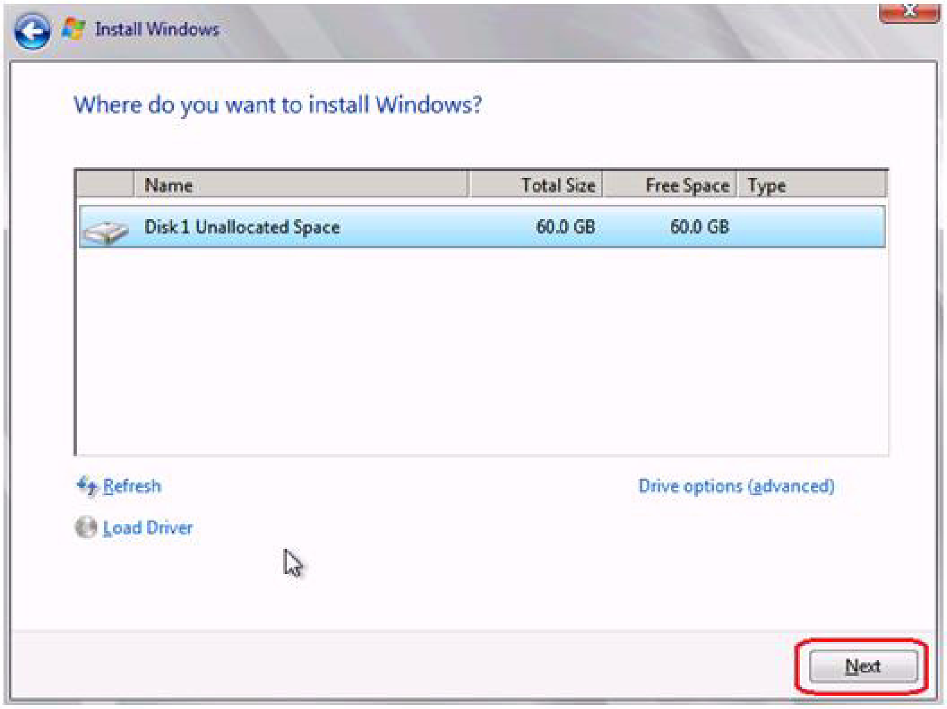
Install Windows

Where do you want to install Windows?

Name	Total Size	Free Space	Type
Disk 1 Unallocated Space	60.0 GB	60.0 GB	

Windows cannot be installed to this disk. (Show details)

17. Click **Next** to continue with the installation. Do a standard installation of Windows Server 2008 R2 SP1 DataCenter Edition.



Install Windows

Where do you want to install Windows?

Name	Total Size	Free Space	Type
Disk 1 Unallocated Space	60.0 GB	60.0 GB	

Note Detailed steps for the installation of Windows Server 2008 R2 SP1DataCenter Edition are not provided. Please reference Microsoft documentation in for this information.

18. Following completion of the installation of Windows 2008 R2, which may require several server reboots, log into the server with an administrative account.
19. In the KVM window, select the **Virtual Media** tab.
20. Click the **Add Image…** button in the window that displays.
21. Browse to the **Cisco Drivers iso image file**.
22. Click **Open** to add the image to the list of virtual media.
23. Click the checkbox for **Mapped** next to the entry corresponding to the image you just added.
24. Within the KVM console of the host, browse to the **Device Manager**. This can be accomplished by right-clicking **My Computer** and selecting **Properties** and selecting **Device Manager**.
25. Select the first Ethernet Controller in the Other Devices category.
26. Right-click and select **Update Driver Software**.
27. Click **Browse my computer** for driver software and browse to the **\Windows\Network\Cisco\M81KR\W2K8R2\x64** folder on the virtual CD drive.
28. Click **Next**.
29. Click **Close** to complete the driver installation.
30. At the top of the Device Manager window, click **Action > Scan for Hardware Changes** to install the Cisco driver to the remaining Ethernet interfaces.
31. Click the **X** at the top right corner to close the Device Manager window.

Note At this point, if you have a DHCP server installed on your Management Network, the Management Network Interface should come up with an IP address. If you do not have DHCP, use the later procedure “Configure Network Interfaces and Rename Server” to determine which Network Interface is on the Management VLAN and configure it with a static IP with connection to the outside world.

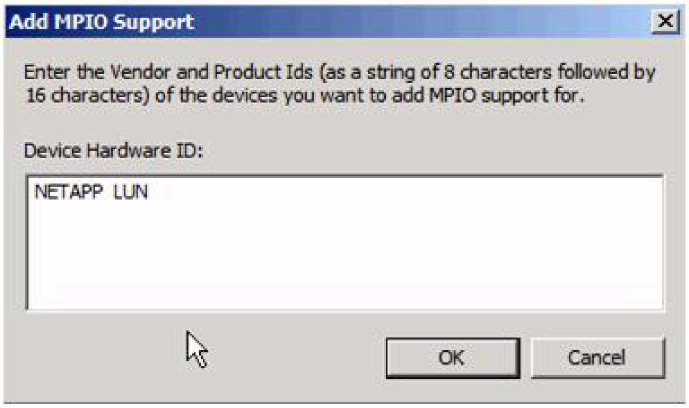
32. Right-click **My Computer** and select **Manage**.

    The Server Manager window displays.
33. Right-click **Features**.
34. Install the following features:
    - .NET Framework 3.5.1 Features. (WCF Activation is not required)
    - Multipath I/O
35. Return to Server Manager and right-click **Roles**.
36. Select **Add Role**.
37. Select the **Hyper-V** role and click **Next** to complete the installation wizard.
38. Chose the option not to reboot the server. The server will be rebooted after the next step.

Configure MPIO

1. Click **Start**, select **Administrative Tools**, and click **MPIO**.

2. Click **Add** and enter **NETAPP LUN**. (There are two spaces between NETAPP and LUN).



Enter the Vendor and Product Ids (as a string of 8 characters followed by 16 characters) of the devices you want to add MPIO support for.

Device Hardware ID:

NETAPP LUN

3. A reboot is required. Click **OK** to reboot the server.
4. After the server reboots, login again with administrator rights and open the MPIO configuration utility again.
5. Verify the **NETAPP LUN** entry is in the list.
6. Open the Device Manger by clicking **Start > Run**, and typing **devmgmt.msc**.
7. Expand the **Disk Drives node** and verify that you entered the NETAPP LUN Multi-Path Disk Device. Additional SAN paths for redundancy.

Create Zones for Redundant Paths

The following steps provide details for configuring zones for the redundant boot path for each service profile.

Note If FCoE is being used between the Nexus 5548s and Storage, use the Alternate Create Zones for Redundant Paths section in the Appendix.

Cisco Nexus 5548 A

1. From the global configuration mode, create the zones for the redundant path for each service profile.
2. Type **zone name VM-Host-Infra-01_A vsan <Fabric A VSAN ID>**.
3. Type **member device-alias controller_B_0c**.
4. Type **exit**.
5. Type **zone name VM-Host-Infra-02_A vsan <Fabric A VSAN ID>**.
6. Type **member device-alias VM-Host-Infra02_A**.
7. Type **member device-alias controller_B_0c**.
8. Type **member device-alias controller_A_0c**.
9. Type **exit**.
10. Modify the zoneset and add the necessary members.
11. Type **zoneset name flexpod vsan <Fabric A VSAN ID>**.
12. Type **member VM-Host-Infra-02_A**.

13. Type **exit**.
14. Activate the zoneset.
15. Type **zoneset activate name flexpod vsan <Fabric A VSAN ID>**.
16. Type **exit**.
17. Type **copy run start**.

Cisco Nexus 5548 B

1. From the global configuration mode, create the zones for the redundant path for each service profile.
2. Type **zone name VM-Host-Infra-01_B vsan <Fabric B VSAN ID>**.
3. Type **member device-alias alias VM-Host-Infra-01_B**.
4. Type **member device-alias controller_A_0d**.
5. Type **member device-alias controller_B_0d**.
6. Type **exit**.
7. Type **zone name VM-Host-Infra-02_B vsan <Fabric B VSAN ID>**.
8. Type **member device-alias controller_A_0d**.
9. Type **exit**.
10. Modify the zoneset and add the necessary members.
11. Type **zoneset name flexpod vsan <Fabric B VSAN ID>**.
12. Type **member VM-Host-Infra-01_B**.
13. Type **exit**.
14. Activate the zoneset.
15. Type **zoneset activate name flexpod vsan <Fabric B VSAN ID>**.
16. Type **exit**.
17. Type **copy run start**.

Verify MultiPath I/O Connections (Both Hyper-V Hosts)

For Both Cisco UCS Hosts

1. Open the Device Manger by clicking **Start > Run** and type **devmgmt.msc**.
2. Expand the Disk Drives node and verify that you have multiple NETAPP LUN Multi-Path Disk Device.

Clone the Windows Server 2008 R2 SP1 Installation

During these steps, you will be guided through the creation of a golden Windows image, which once created is used for rapid cloning of the Windows 2008 R2 SP1 installation. At this point, the boot LUN for the first server can be cloned and prepared using Microsoft Sysprep to be used for host VM-Host-Infra-02 and future servers.

Cloning is a NetApp feature that enables the rapid provisioning of resources while requiring very little storage at the time of creation. If an alternative method for installing Windows is being used, such as Windows Deployment Services, then cloning the boot LUN is not necessary.

Cisco UCS Manager

1. Within the KVM console of the host, confirm that all Windows updates have been installed. Windows Update will display a status message indicating that Windows is up to date.
2. Select **Start > Logoff > Shut down** to power down the host.

NetApp Controller A

1. Clone the first boot LUN; type **clone start /vol/win_boot_A/hyper-v-host /vol/win_boot_A/hyper-v-template**. Wait for the clone operation to complete.
2. Unmap the first boot LUN; type **lun unmap /vol/win_boot_A/hyper-v-host VM-Host-Infra-01**.
3. Map the cloned LUN; type **lun map /vol/win_boot_A/hyper-v-template VM-Host-Infra-01 0**.

Cisco UCS Manager

1. Within the KVM console of the host, boot the server and log in with an administrator account.
2. Click **Restart Later** if prompted to restart the server.
3. Launch **C:\Windows\system32\sysprep\sysprep.exe**. Select the **Generalize** button and the **Shutdown** option. The server will prepare and then shutdown.

NetApp Controller A

1. Clone the Hyper-V golden template LUN; type **clone start /vol/win_boot_A/hyper-v-template /vol/win_boot_A/VM-Host-Infra-01**. Wait for the clone operation to complete.
2. Unmap the Hyper-V golden template LUN; type **lun unmap /vol/win_boot_A/hyper-v-template VM-Host-Infra-01**.
3. Map the cloned LUN; type **lun map /vol/win_boot_A/VM-Host-Infra-01 VM-Host-Infra-01 0**.
4. Make sure that ndmpd is enabled on both NetApp controllers; type **ndmpd** on both controllers.
5. Copy the Hyper-V golden template LUN from NetApp Controller A to NetApp Controller B; type **ndmpcopy -da <ControllerB username>:<password> /vol/win_boot_A/hyper-v-template <ControllerB IP>:/vol/win_boot_B/**. You now have a copy of the golden Hyper-V LUN on each storage controller and a LUN of the host image that can be updated and Sysprepped in the future on Controller A.

NetApp Controller B

1. Online the just-copied LUN; type **lun online /vol/win_boot_B/hyper-v-template**.
2. Clone the Hyper-V golden template LUN; type **clone start /vol/win_boot_B/hyper-v-template /vol/win_boot_B/VM-Host-Infra-02**. Wait for the clone operation to complete.
3. Map the cloned LUN; type **lun map /vol/win_boot_B/VM-Host-Infra-02 VM-Host-Infra-02 0**.

VM-Host-Infra-01 and VM-Host-Infra-02

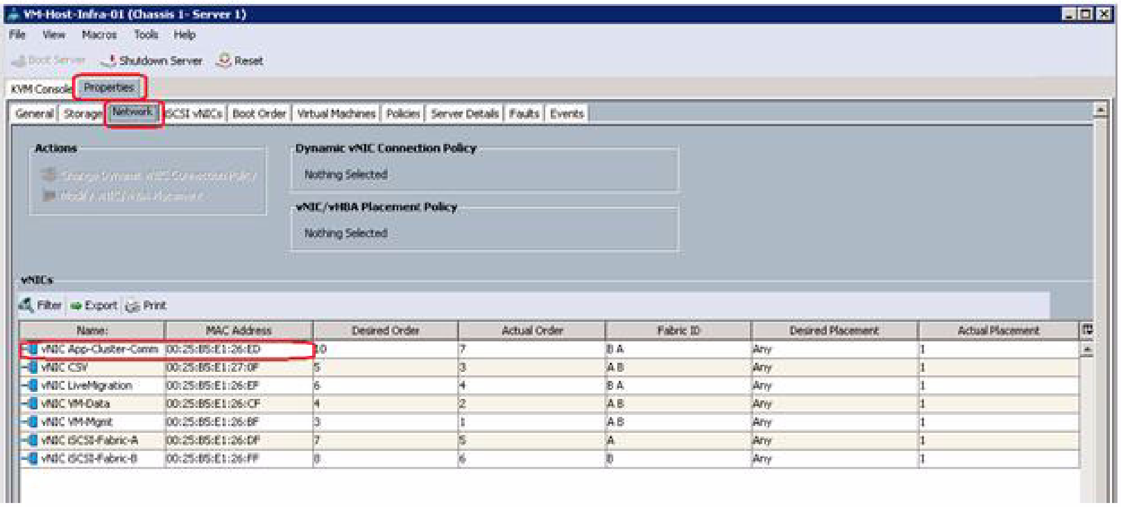
1. Using the Cisco UCS KVM Console, boot up both hosts.
2. Complete the Windows Setup.

Configure Network Interfaces, Rename Servers, and Install Microsoft Windows Updates on Both Hyper-V Hosts

This section provides the details for naming the Windows network interfaces according to the VLANs in which they reside for VM-Host-Infra-01. This is achieved by matching the MAC addresses assigned in the service profile with the network interfaces presented in the operating system. Also, during this section, the server is renamed as well as Windows Updates performed. Repeat these steps for VM-Host-Infra-02.

Cisco UCS Manager

1. In the KVM window, select the **Properties** tab.
2. Select the **Network** tab. The corresponding vNICs are displayed along with their MAC addresses.



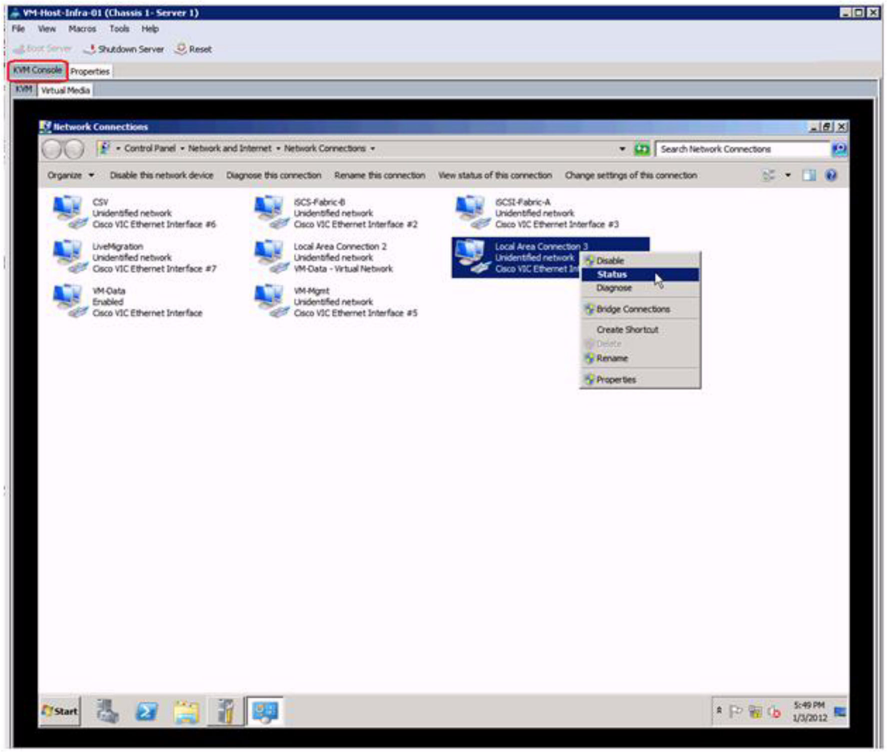
Dynamic vNIC Connection Policy: Nothing Selected

vNIC/vHBA Placement Policy: Nothing Selected

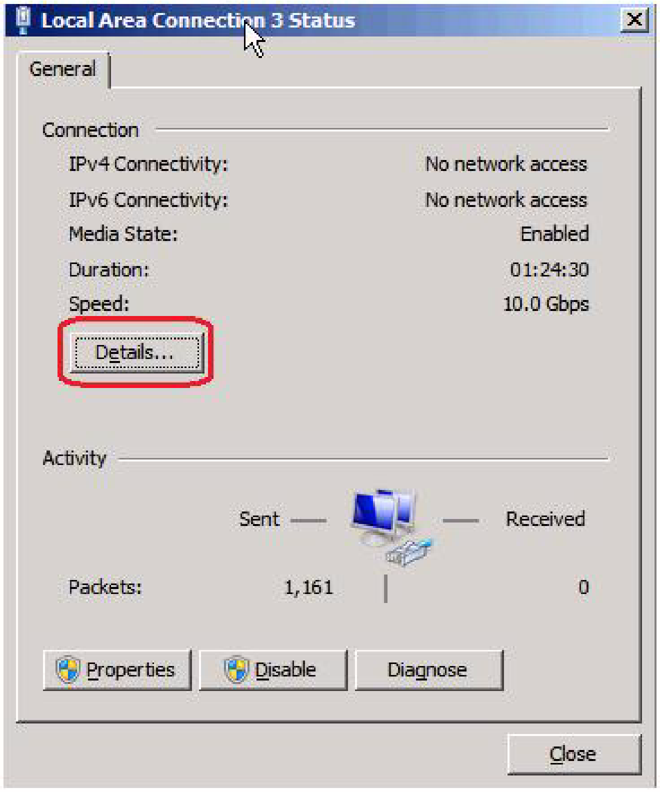
Name:	MAC Address	Desired Order	Actual Order	Fabric ID	Desired Placement	Actual Placement
vNIC App-Cluster-Comm	00:25:B5:E1:26:ED	10	7	B A	Any	1
vNIC CSV	00:25:B5:E1:27:0F	5	3	A B	Any	1
vNIC LiveMigration	00:25:B5:E1:26:EF	6	4	B A	Any	1
vNIC VM-Data	00:25:B5:E1:26:CF	4	2	A B	Any	1
vNIC VM-Mgmt	00:25:B5:E1:26:BF	3	1	A B	Any	1
vNIC iSCSI-Fabric-A	00:25:B5:E1:26:DF	7	5	A	Any	1
vNIC iSCSI-Fabric-B	00:25:B5:E1:26:FF	8	6	B	Any	1

3. Within the KVM console of the host, browse to the **Network Connections** window, This can be accomplished by selecting **Start** and right-clicking **Network**. In the Network and Sharing Center that displays, select **Change Adapter Settings**.
4. Right-click the first network adapter.

5. Select **Status**.


VM-Host-Infra-01 (Chassis 1- Server 1)
File View Macros Tools Help
Boot Server Shutdown Server Reset
KVM Console Properties
KVM Virtual Media
Network Connections
Control Panel ▸ Network and Internet ▸ Network Connections
Search Network Connections
Organize Disable this network device Diagnose this connection Rename this connection View status of this connection Change settings of this connection
CSV
Unidentified network
Cisco VIC Ethernet Interface #6
iSCS-Fabric-B
Unidentified network
Cisco VIC Ethernet Interface #2
iSCSI-Fabric-A
Unidentified network
Cisco VIC Ethernet Interface #3
LiveMigration
Unidentified network
Cisco VIC Ethernet Interface #7
Local Area Connection 2
Unidentified network
VM-Data - Virtual Network
Local Area Connection 3
Unidentified network
Cisco VIC Ethernet In
VM-Data
Enabled
Cisco VIC Ethernet Interface
VM-Mgmt
Unidentified network
Cisco VIC Ethernet Interface #5
Disable
Status
Diagnose
Bridge Connections
Create Shortcut
Delete
Rename
Properties
Start
5:49 PM
1/3/2012

6. In the Status window that appears, select the **Details** button.



Connection

IPv4 Connectivity: No network access

IPv6 Connectivity: No network access

Media State: Enabled

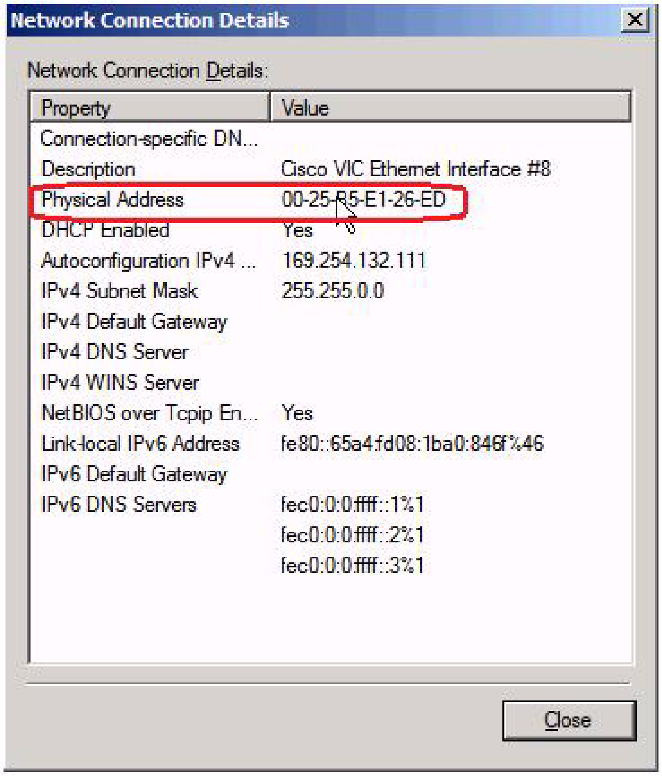
Duration: 01:24:30

Speed: 10.0 Gbps

Packets: 1,161 0

7. In the Network Connection Details window, note the Physical Address, which is the MAC address for the vNIC.

Note Cross-reference this address with the MAC addresses for the provisioned vNICs as detailed in step 2 of this section.



Network Connection Details

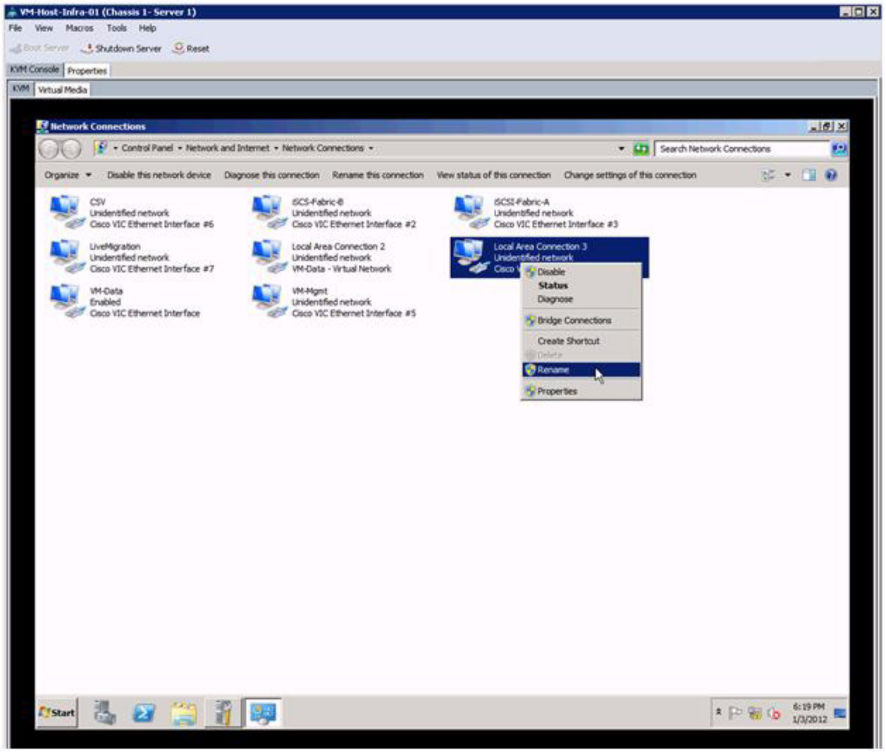
Network Connection Details:

Property	Value
Connection-specific DN...	
Description	Cisco VIC Ethernet Interface #8
Physical Address	00-25-B5-E1-26-ED
DHCP Enabled	Yes
Autoconfiguration IPv4 ...	169.254.132.111
IPv4 Subnet Mask	255.255.0.0
IPv4 Default Gateway	
IPv4 DNS Server	
IPv4 WINS Server	
NetBIOS over Tcpip En...	Yes
Link-local IPv6 Address	fe80::65a4:fd08:1ba0:846f%46
IPv6 Default Gateway	
IPv6 DNS Servers	fec0:0:0:ffff::1%1 fec0:0:0:ffff::2%1 fec0:0:0:ffff::3%1

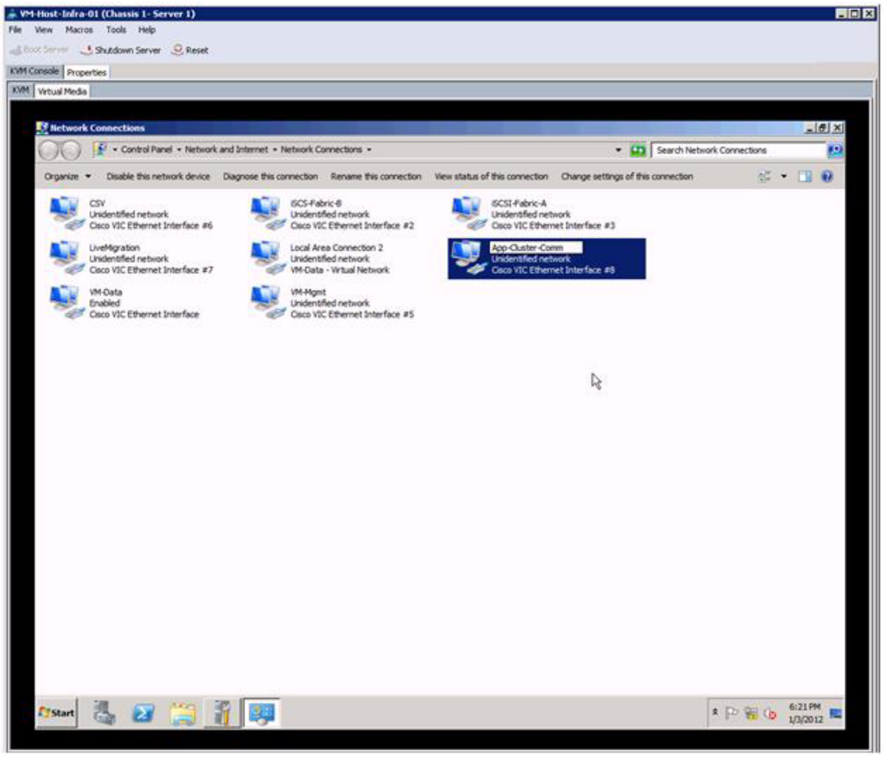
8. Click **Close**.

9. In the Network Connection window, right-click the interface whose MAC address was just determined.

10. Select **Rename**.


VM-Host-Infra-01 (Chassis 1- Server 1)
File View Macros Tools Help
Boot Server Shutdown Server Reset
KVM Console Properties
KVM Virtual Media
Network Connections
Control Panel ▸ Network and Internet ▸ Network Connections ▸
Search Network Connections
Organize ▾ Disable this network device Diagnose this connection Rename this connection View status of this connection Change settings of this connection
CSV
Unidentified network
Cisco VIC Ethernet Interface #6
iSCS-Fabric-B
Unidentified network
Cisco VIC Ethernet Interface #2
iSCSI-Fabric-A
Unidentified network
Cisco VIC Ethernet Interface #3
LiveMigration
Unidentified network
Cisco VIC Ethernet Interface #7
Local Area Connection 2
Unidentified network
VM-Data - Virtual Network
Local Area Connection 3
Unidentified network
Cisco V
VM-Data
Enabled
Cisco VIC Ethernet Interface
VM-Mgmt
Unidentified network
Cisco VIC Ethernet Interface #5
Disable
Status
Diagnose
Bridge Connections
Create Shortcut
Delete
Rename
Properties
Start
6:19 PM
1/3/2012

11. Name the interface the same as the corresponding vNIC within the service profile provisioned within Cisco UCS Manager.


VM-Host-Infra-01 (Chassis 1- Server 1)
File View Macros Tools Help
Boot Server Shutdown Server Reset
KVM Console Properties
KVM Virtual Media
Network Connections
Control Panel ▸ Network and Internet ▸ Network Connections ▸
Search Network Connections
Organize ▾ Disable this network device Diagnose this connection Rename this connection View status of this connection Change settings of this connection
CSV
Unidentified network
Cisco VIC Ethernet Interface #6
iSCS-Fabric-B
Unidentified network
Cisco VIC Ethernet Interface #2
iSCSI-Fabric-A
Unidentified network
Cisco VIC Ethernet Interface #3
LiveMigration
Unidentified network
Cisco VIC Ethernet Interface #7
Local Area Connection 2
Unidentified network
VM-Data - Virtual Network
App-Cluster-Comm
Unidentified network
Cisco VIC Ethernet Interface #8
VM-Data
Enabled
Cisco VIC Ethernet Interface
VM-Mgmt
Unidentified network
Cisco VIC Ethernet Interface #5
Start
6:21 PM
1/3/2012

12. Repeat this process for all network interfaces.

13. Configure the binding order.

14. In the Network Connection window, press the **ALT** key and hold for a few seconds until the Menu Bar displays.

15. Click **Advanced > Advanced Settings…**

16. Under the Connections section of the Advanced Settings window, use the arrows to modify the binding order. The recommended binding order is:

    a. VM-Data

    b. App-Cluster-Comm

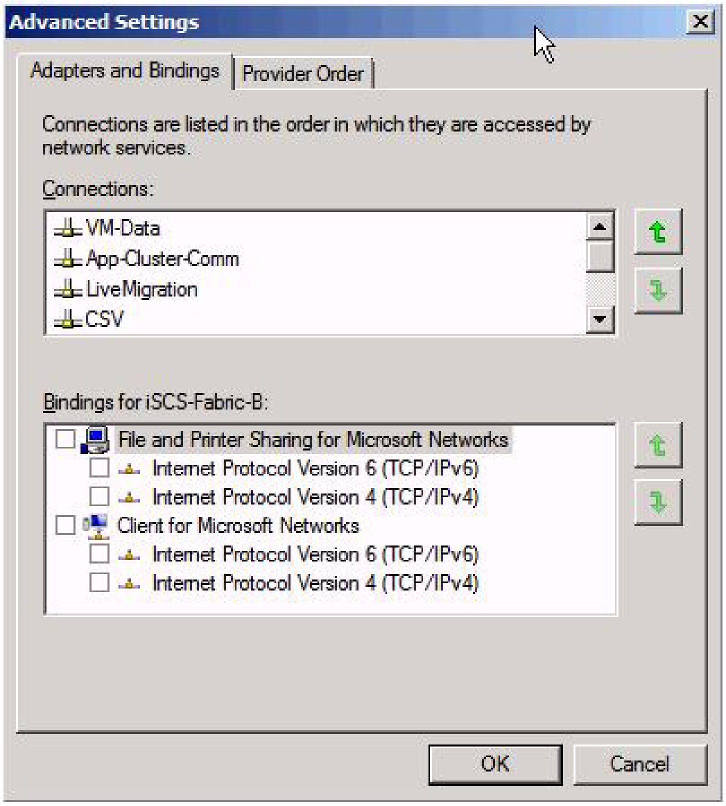
    c. Live Migration

    d. CSV

    e. VM-Mgmt

    f. iSCSI -Fabric-A

    g. iSCSI-Fabric-B



Connections are listed in the order in which they are accessed by network services.

Connections:

- VM-Data
- App-Cluster-Comm
- LiveMigration
- CSV

Bindings for iSCS-Fabric-B:

- □ File and Printer Sharing for Microsoft Networks
  - □ Internet Protocol Version 6 (TCP/IPv6)
  - □ Internet Protocol Version 4 (TCP/IPv4)
- □ Client for Microsoft Networks
  - □ Internet Protocol Version 6 (TCP/IPv6)
  - □ Internet Protocol Version 4 (TCP/IPv4)

17. Click **OK** to set the binding order.

18. In the Network Connection window, right-click the individual interfaces (excluding VM-Data and App-Comm-Cluster) and select **Properties** to navigate to the interface properties, enabling IP address assignment.

19. Assign IP addresses to all interfaces except the VM-Data and App-Comm-Cluster interfaces.

20. Click the **X** located at the top right corner to close the Network Connections window.

21. Within the KVM console of the host, browse to the **System** window. This can be accomplished by right-clicking **My Computer** and selecting **Properties**.
22. In the System window, select **Change Settings**.
23. In the System Properties window, select **Change**.
24. Assign the Server Hostname and Workgroup.
25. Click **OK**.
26. A restart is required. Click **OK**.
27. After the reboot, log-in to the server with an administrator account.
28. Within the KVM console of the host, browse to the **System** window. This can be accomplished by right-clicking **My Computer** and selecting **Properties**.
29. Install all Windows Updates on the server by selecting the **Windows Update** link in the lower left-hand corner.

Install the Failover Cluster Feature

Cisco UCS Hosts VM-Host-Infra-01 and Host VM-Host-Infra-02

1. In Server Manager, right-click **Features** and select **Add Features**.
2. Check **Failover Cluster** and click **Next**.
3. Click **Install**.

Install NetApp MultiPath IO Tools on Both Hyper-V Hosts

Cisco UCS Hosts VM-Host-Infra-01 and Host VM-Host-Infra-02

1. Using the UCS KVM console, download NetApp SnapDrive for Windows version 6.4 64-bit from the Support (formerly NOW®) Web site.Install Microsoft Hotfixes KB2494016, KB2520235 and KB2531907.
2. Using the SnapDrive version 6.4 Installation and Administration Guide as a reference, install SnapDrive for Windows version 6.4. Note that the SnapDrive6.4 installer program should be run as administrator. Also, during installation HTTPS credentials must be entered for storage systems and do not use Protection Manager Integration.
3. Download the Data ONTAP DSM 3.5 for Windows MPIO software under MultiPath I/O for Windows on the NetApp Support site.
4. Using the Data ONTAP DSM 3.5 for Windows MPIO Installation and Administration Guide as a reference, install Data ONTAP DSM 3.5 for Windows MPIO. Choose **Yes** to install the Hyper-V Guest Utilities. At the end of the DSM Installation, click **Yes** to Reboot Now.

Verify Multipath I/O Connections

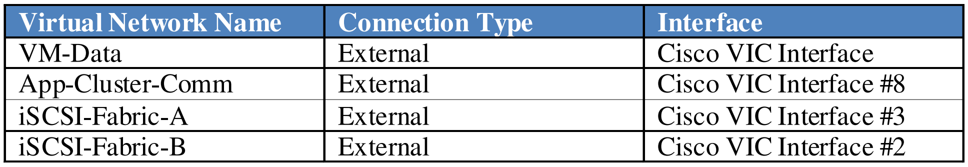
Cisco UCS Hosts VM-Host-Infra-01 and VM-Host-Infra-02

1. Using the Cisco UCS KVM console, boot and log into the server. A reboot will be required for the multipath software drivers to install.

2. In Windows Server Manager, under Storage, navigate to **Data ONTAP® DSM Manager**, **Virtual Disks**, **Disk 1**, and verify four available paths to the disk.

Creating Microsoft Hyper-V Virtual Network Switches

Create the following Virtual Network Switches on both infrastructure hosts.

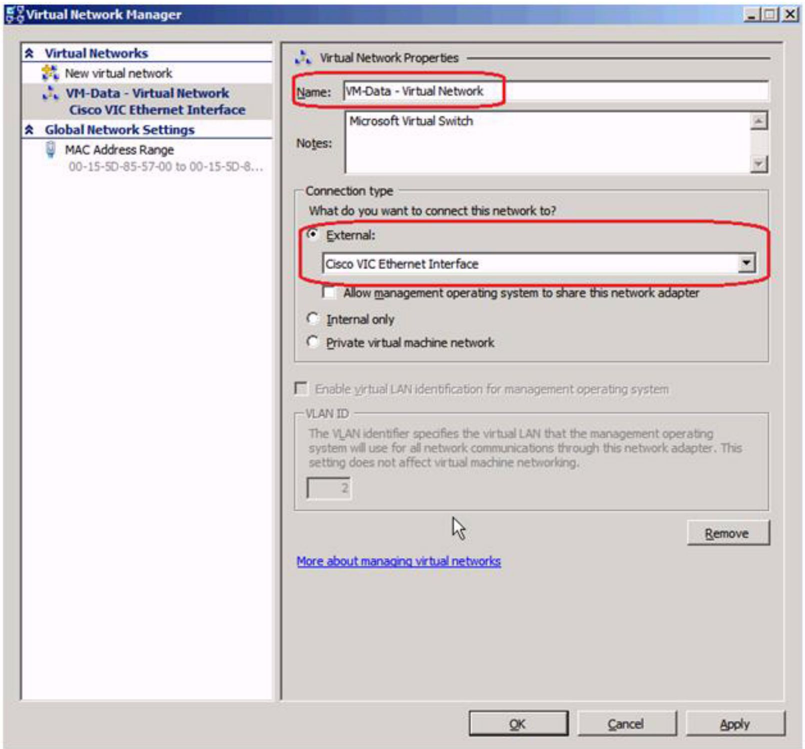


Virtual Network Name	Connection Type	Interface
VM-Data	External	Cisco VIC Interface
App-Cluster-Comm	External	Cisco VIC Interface #8
iSCSI-Fabric-A	External	Cisco VIC Interface #3
iSCSI-Fabric-B	External	Cisco VIC Interface #2

Note Interface numbers may vary.

1. Open **Hyper-V Manager**.
2. Select the **Hyper-V** server and click **Virtual Network Manager**.
3. Select **External** and click **Add**.
4. Provide a name that matches the network name used in the Network Interface Configuration section.
5. Select **External** connection type and the matching interface for each network adapter.
6. Click **Apply**.
7. Click **New Virtual Network** .
8. Select **External**.
9. Click **Add**.
10. Repeat steps 4 through 9 for all Virtual Machine Networks.

VM-Date Hyper-V Network Switch


Virtual Network Manager
Virtual Networks
New virtual network
VM-Data - Virtual Network
Cisco VIC Ethernet Interface
Global Network Settings
MAC Address Range
00-15-5D-85-57-00 to 00-15-5D-8...
Virtual Network Properties
Remove
More about managing virtual networks
OK
Cancel
Apply

Name: VM-Data - Virtual Network

Notes: Microsoft Virtual Switch

Connection type

What do you want to connect this network to?

● External:

Cisco VIC Ethernet Interface

□ Allow management operating system to share this network adapter

○ Internal only

○ Private virtual machine network

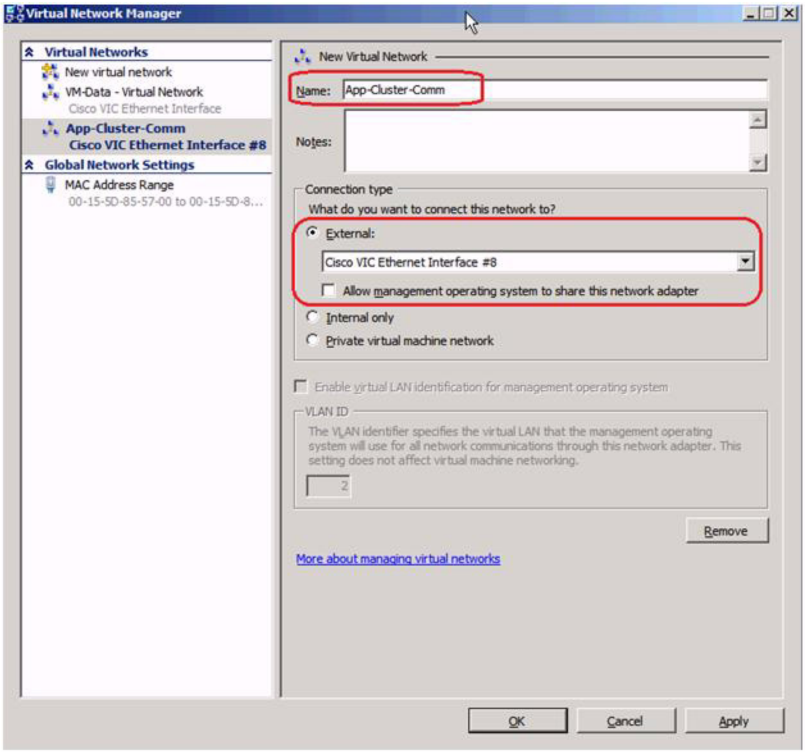
□ Enable virtual LAN identification for management operating system

VLAN ID

The VLAN identifier specifies the virtual LAN that the management operating system will use for all network communications through this network adapter. This setting does not affect virtual machine networking.

2

App-Cluster-Comm


Virtual Network Manager
Virtual Networks
New virtual network
VM-Data - Virtual Network
Cisco VIC Ethernet Interface
App-Cluster-Comm
Cisco VIC Ethernet Interface #8
Global Network Settings
MAC Address Range
00-15-5D-85-57-00 to 00-15-5D-8...
New Virtual Network
Remove
More about managing virtual networks
OK
Cancel
Apply

Name: App-Cluster-Comm

Notes:

Connection type

What do you want to connect this network to?

● External:

Cisco VIC Ethernet Interface #8

□ Allow management operating system to share this network adapter

○ Internal only

○ Private virtual machine network

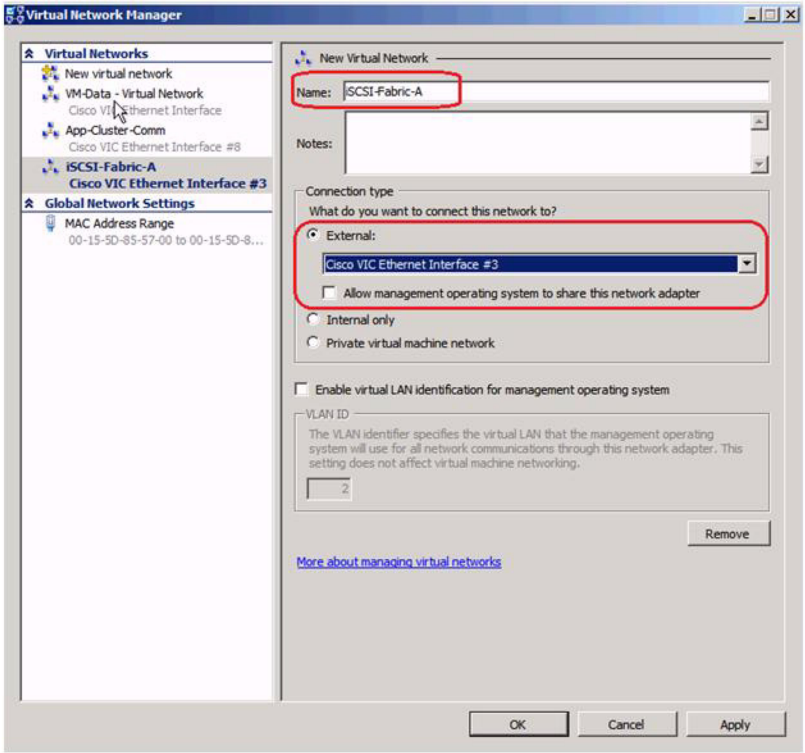
□ Enable virtual LAN identification for management operating system

VLAN ID

The VLAN identifier specifies the virtual LAN that the management operating system will use for all network communications through this network adapter. This setting does not affect virtual machine networking.

2

iSCSI-Fabric-A



Virtual Network Manager

Virtual Networks
- New virtual network
- VM-Data - Virtual Network
  Cisco VIC Ethernet Interface
- App-Cluster-Comm
  Cisco VIC Ethernet Interface #8
- **iSCSI-Fabric-A**
  Cisco VIC Ethernet Interface #3

Global Network Settings
- MAC Address Range
  00-15-5D-85-57-00 to 00-15-5D-8...

New Virtual Network

Name: iSCSI-Fabric-A

Notes:

Connection type

What do you want to connect this network to?

● External:

Cisco VIC Ethernet Interface #3

□ Allow management operating system to share this network adapter

○ Internal only

○ Private virtual machine network

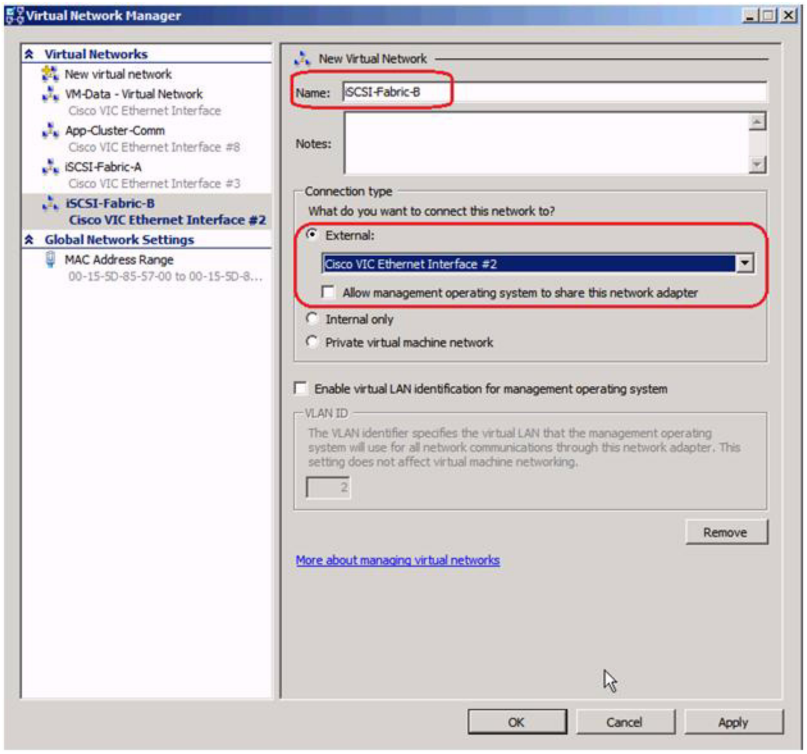
□ Enable virtual LAN identification for management operating system

VLAN ID

The VLAN identifier specifies the virtual LAN that the management operating system will use for all network communications through this network adapter. This setting does not affect virtual machine networking.

2

iSCSI-Fabric-B



Virtual Network Manager

Virtual Networks
- New virtual network
- VM-Data - Virtual Network
  Cisco VIC Ethernet Interface
- App-Cluster-Comm
  Cisco VIC Ethernet Interface #8
- iSCSI-Fabric-A
  Cisco VIC Ethernet Interface #3
- **iSCSI-Fabric-B**
  Cisco VIC Ethernet Interface #2

Global Network Settings
- MAC Address Range
  00-15-5D-85-57-00 to 00-15-5D-8...

New Virtual Network

Name: iSCSI-Fabric-B

Notes:

Connection type

What do you want to connect this network to?

● External:

Cisco VIC Ethernet Interface #2

□ Allow management operating system to share this network adapter

○ Internal only

○ Private virtual machine network

□ Enable virtual LAN identification for management operating system

VLAN ID

The VLAN identifier specifies the virtual LAN that the management operating system will use for all network communications through this network adapter. This setting does not affect virtual machine networking.

2

Create LUNs for Host-Based Virtual Machines and SnapManager for Hyper-V (Both Hyper-V Hosts)

In this procedure, SnapDrive will be used to create LUNs to hold both host-based virtual machines and the NetApp SnapManager for Hyper-V SnapInfo directory.

1. From the Cisco UCS KVM console, log in to the host **VM-Host-Infra-01** as an Administrator.
2. Open Windows Explorer and create a folder named **C:\VHD**.
3. Open **SnapDrive**.
4. Select **Disks** and click **Create** Disk.
5. In the Welcome screen, click Next.
6. Enter the **IP/FQDN** for the Controller A and click **Add**.
7. When enumeration has completed, select the target volume (VHD_A) where you intend to add the LUN.
8. Add a LUN Name, LUN Description and click **Next**.
9. Select **Dedicated** and click **Next**.
10. Select **Use a Volume Mount Point** and enter **C:\VHD** in the box.
11. Set the LUN Size to **500 GB**, click **Next**.
12. Select **All Fiber Channel Initiators** to map the new LUN.
13. Click **Next**, then Select **Automatic** and click **Next**.
14. Click **Finish**.
15. Repeat on host VM-Host-Infra-02 on Controller_B with volume VHD_B.

Domain Controller Virtual Machine (optional)

Most environments will already have an active directory infrastructure and will not require additional domain controllers to be deployed for the Hyper-V FlexPod. The optional domain controllers can be omitted from the configuration in this case or used as a resource domain. The domain controller virtual machines will not be clustered because redundancy is provided by deploying multiple domain controllers running in virtual machines on different servers. Since these virtual machines reside on Hyper-V hosts that run Windows Failover cluster, but are not clustered themselves, Hyper-V Manager should be used to manage them instead of Virtual Machine Manager.

Note The domain controller network interfaces must be accessible by the all virtual machines and the virtual machines hosts. For the configuration presented in this document, the IP subnet on VLAN VM-Mgmt must have a layer 3 route to the IP subnet on VLAN VM-Data.

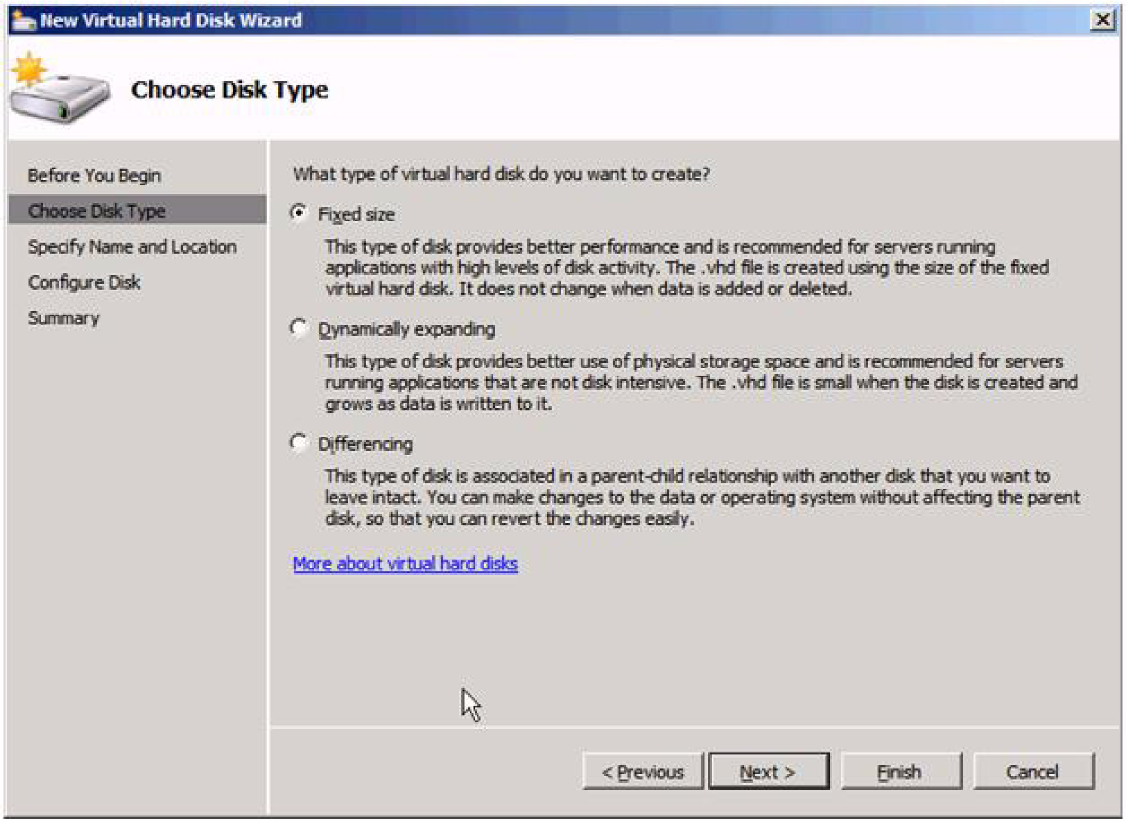
Create VHD for Domain Controller Virtual Machine (Optional)

Create the following VHD storage resources that will be used by the virtual machines running system center roles:

Table 15 VHD Storage Resources

VM Host	VM Name	Name	Location	Size	Type
Infra-VM-Host-01	Infra-DC-01	Infra-DC-01.vhd	C:\VHD\Infra-DC-01	60 GB	Fixed
Infra-VM-Host-02	Infra-DC-02	Infra-DC-02.vhd	C:\VHD\Infra-DC-02	60 GB	Fixed

1. Open the **Hyper-V Manager** and select the **Hyper-V server** in the left pane.
2. Click **New** in the right action pane and select **Hard Disk**.



What type of virtual hard disk do you want to create?

● Fixed size

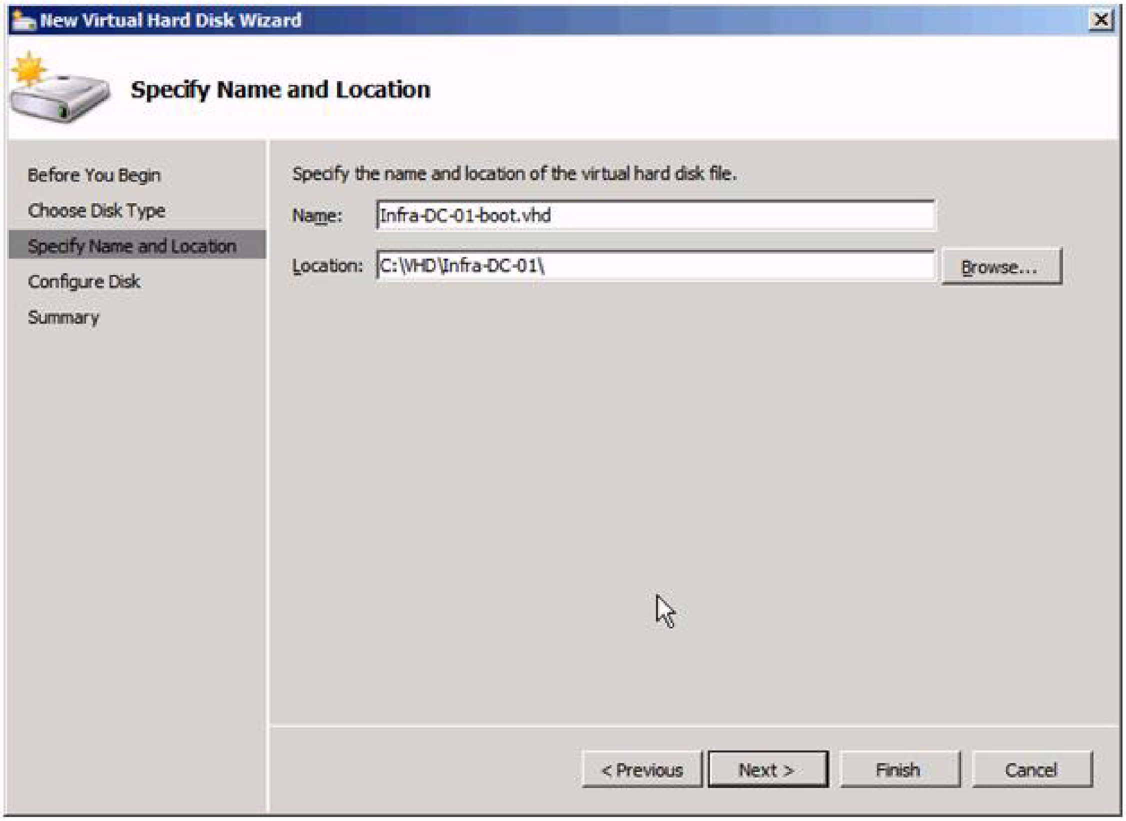
This type of disk provides better performance and is recommended for servers running applications with high levels of disk activity. The .vhd file is created using the size of the fixed virtual hard disk. It does not change when data is added or deleted.

○ Dynamically expanding

This type of disk provides better use of physical storage space and is recommended for servers running applications that are not disk intensive. The .vhd file is small when the disk is created and grows as data is written to it.

○ Differencing

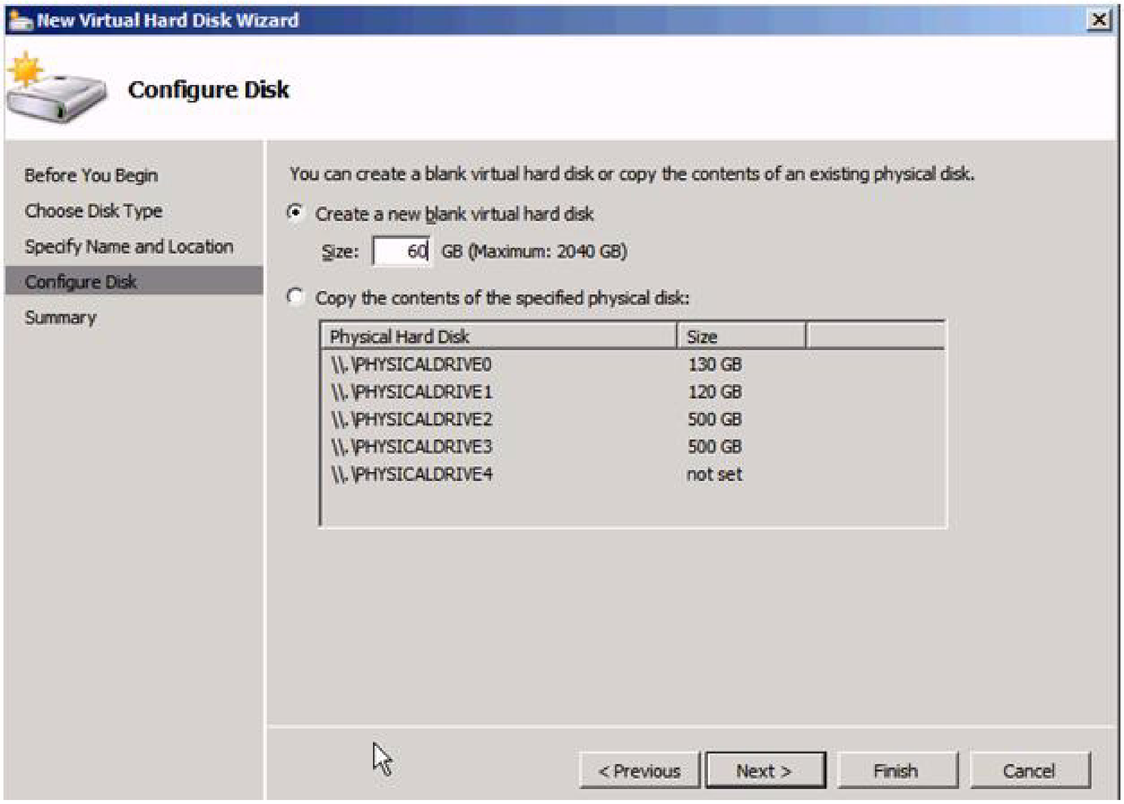
This type of disk is associated in a parent-child relationship with another disk that you want to leave intact. You can make changes to the data or operating system without affecting the parent disk, so that you can revert the changes easily.



Specify the name and location of the virtual hard disk file.

Name: Infra-DC-01-boot.vhd

Location: C:\VHD\Infra-DC-01\



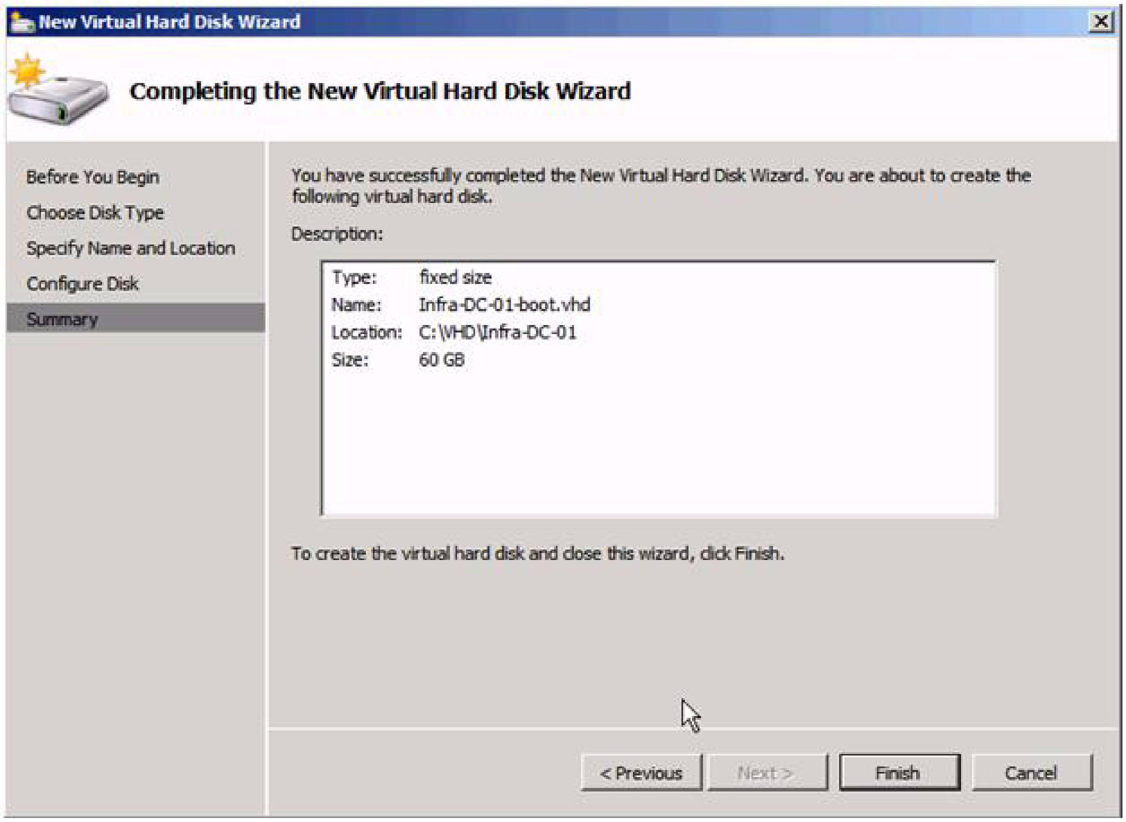
You can create a blank virtual hard disk or copy the contents of an existing physical disk.

● Create a new blank virtual hard disk

Size: 60 GB (Maximum: 2040 GB)

○ Copy the contents of the specified physical disk:

Physical Hard Disk	Size
\\.\PHYSICALDRIVE0	130 GB
\\.\PHYSICALDRIVE1	120 GB
\\.\PHYSICALDRIVE2	500 GB
\\.\PHYSICALDRIVE3	500 GB
\\.\PHYSICALDRIVE4	not set


New Virtual Hard Disk Wizard
Completing the New Virtual Hard Disk Wizard
Before You Begin
Choose Disk Type
Specify Name and Location
Configure Disk
Summary
< Previous
Next >
Finish
Cancel

You have successfully completed the New Virtual Hard Disk Wizard. You are about to create the following virtual hard disk.

Description:

Type: fixed size
Name: Infra-DC-01-boot.vhd
Location: C:\VHD\Infra-DC-01
Size: 60 GB

To create the virtual hard disk and close this wizard, click Finish.

Create a Domain Controller Virtual Machine

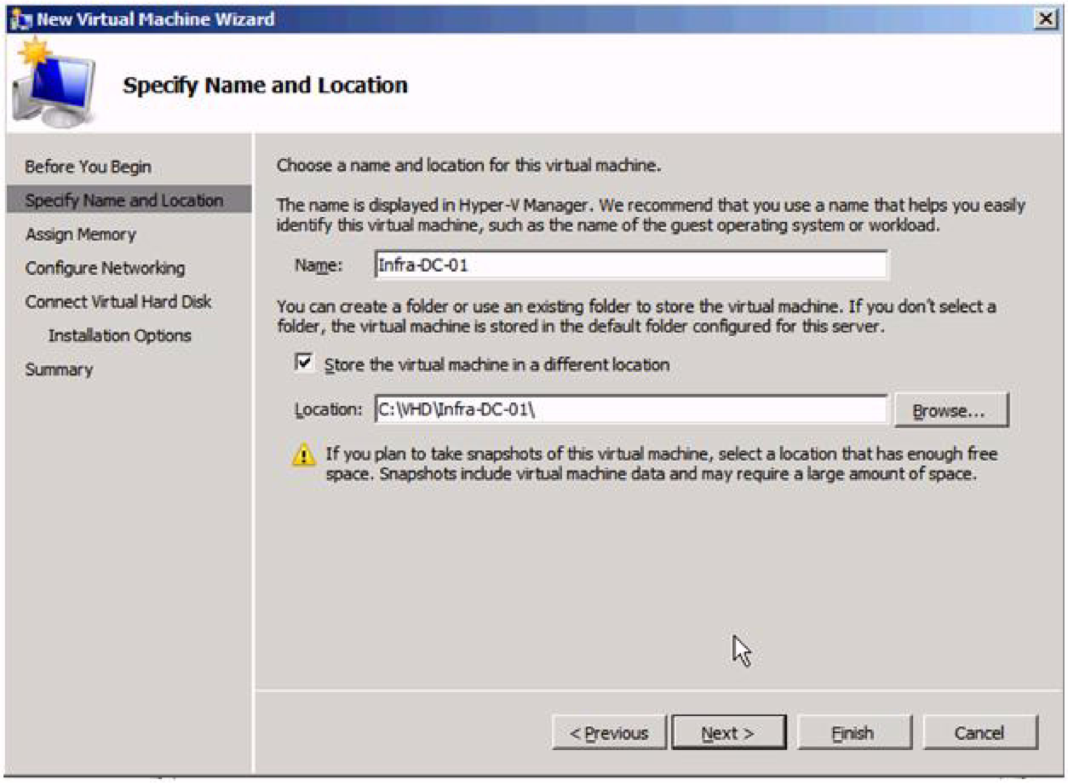
Create the following virtual machines that will be used by the domain controller roles.

Table 16 Virtual Machine Domains

VM Host	VM Name	Hard Disk	Network	Memory	VLAN ID
Infra-VM-Host-01	Infra-DC-01	C:\VHD\Infra-DC-01.vhd	VM-Data – Virtual Network	8 GB	804
Infra-VM-Host-02	Infra-DC-02	C:\VHD\Infra-DC-02.vhd	VM-Data – Virtual Network	8 GB	804

1. Open **Hyper-V Manager** and select the **Hyper-V** server in the left pane.
2. Click **New** in the right action pane and select **Virtual Machine**.
3. Provide the name. Check the box for storing the virtual machine in a different location and provide the path. Click **Next**.
4. Enter the memory size and click **Next**.
5. Select the Network connection **VM-Data-Virtual Network**. Click **Next**.
6. Select the option to use an existing virtual hard disk and specify the path to the VHD created in the previous section. Click **Next**.
7. Select the option to install the operating system later and click **Finish**.

8. Repeat steps 1 through 7 for each virtual machine.



Choose a name and location for this virtual machine.

The name is displayed in Hyper-V Manager. We recommend that you use a name that helps you easily identify this virtual machine, such as the name of the guest operating system or workload.

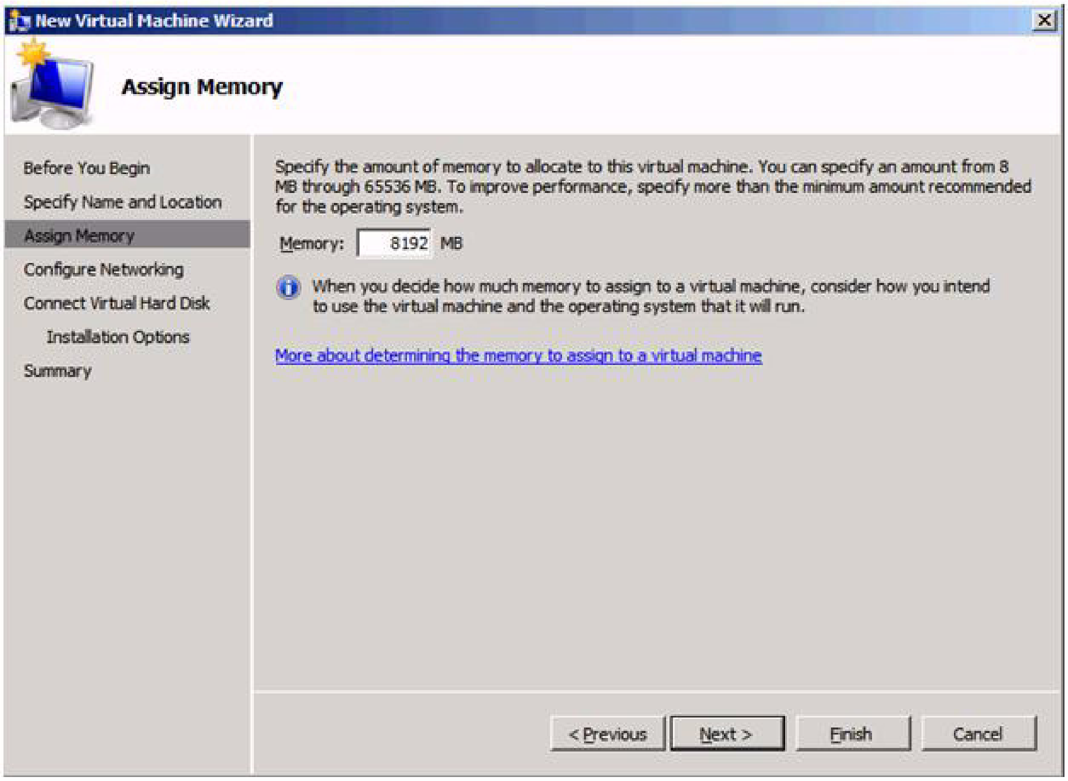
Name: Infra-DC-01

You can create a folder or use an existing folder to store the virtual machine. If you don't select a folder, the virtual machine is stored in the default folder configured for this server.

☑ Store the virtual machine in a different location

Location: C:\VHD\Infra-DC-01\ Browse...

If you plan to take snapshots of this virtual machine, select a location that has enough free space. Snapshots include virtual machine data and may require a large amount of space.

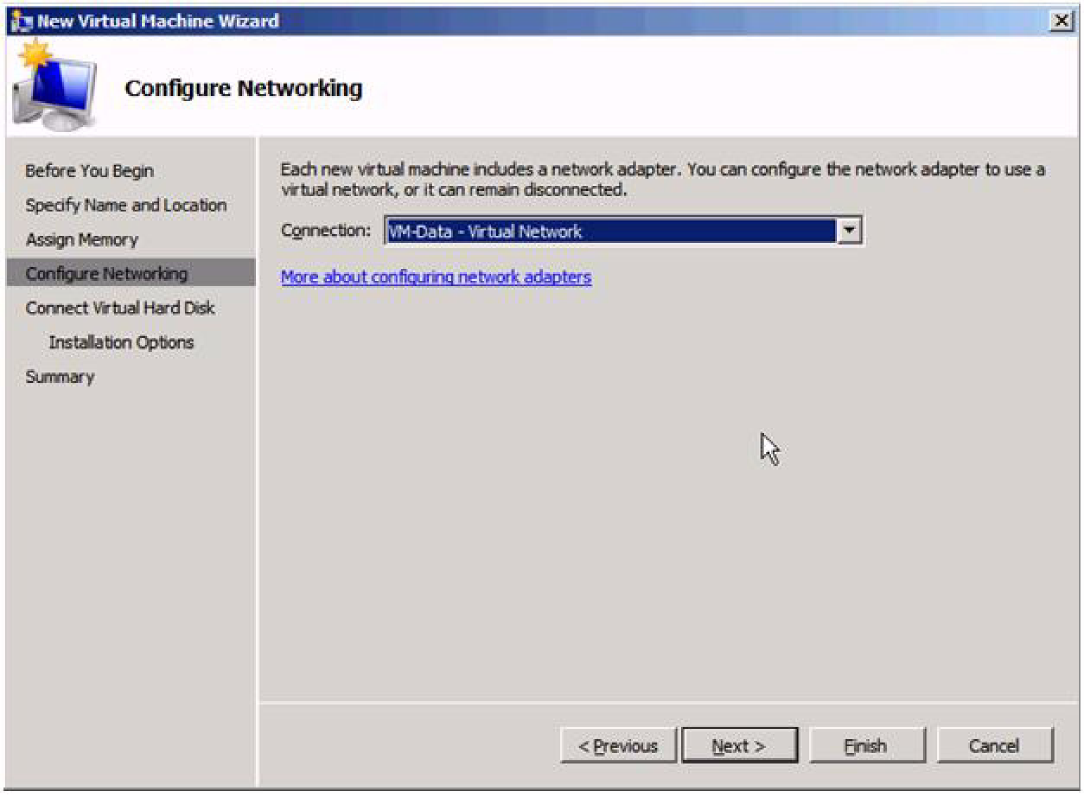


Specify the amount of memory to allocate to this virtual machine. You can specify an amount from 8 MB through 65536 MB. To improve performance, specify more than the minimum amount recommended for the operating system.

Memory: 8192 MB

When you decide how much memory to assign to a virtual machine, consider how you intend to use the virtual machine and the operating system that it will run.

More about determining the memory to assign to a virtual machine

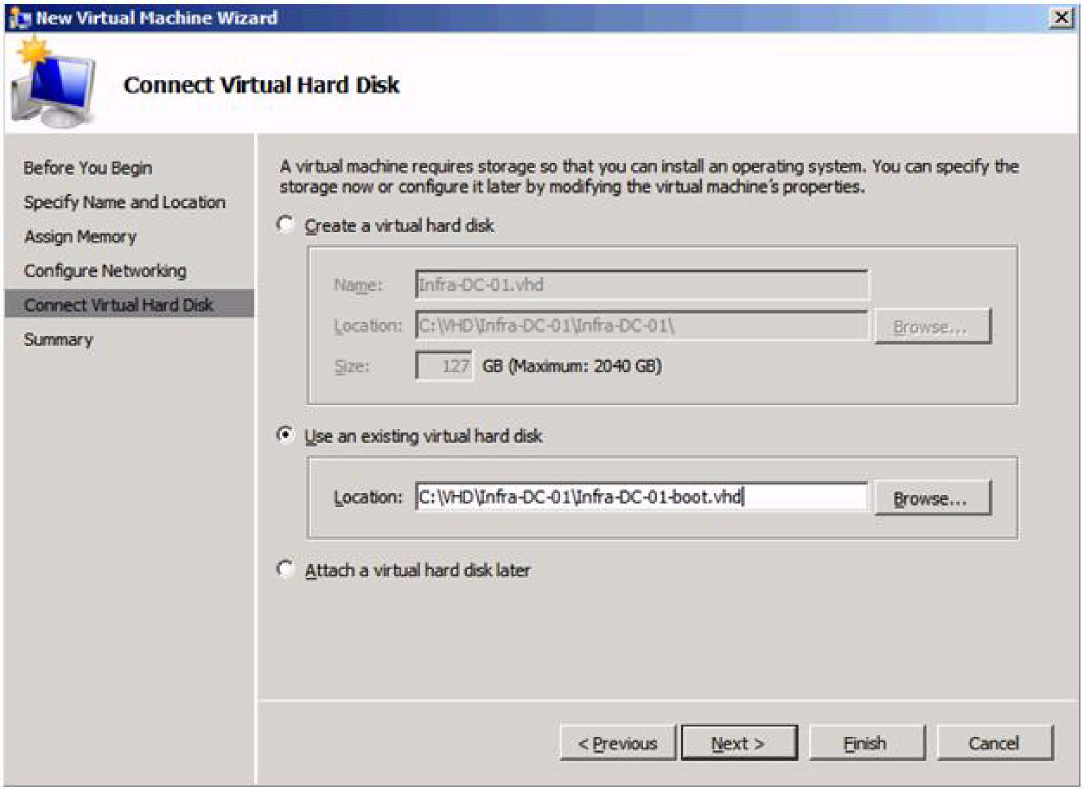


Configure Networking

Each new virtual machine includes a network adapter. You can configure the network adapter to use a virtual network, or it can remain disconnected.

Connection: VM-Data - Virtual Network

More about configuring network adapters



Connect Virtual Hard Disk

A virtual machine requires storage so that you can install an operating system. You can specify the storage now or configure it later by modifying the virtual machine's properties.

○ Create a virtual hard disk

Name: Infra-DC-01.vhd

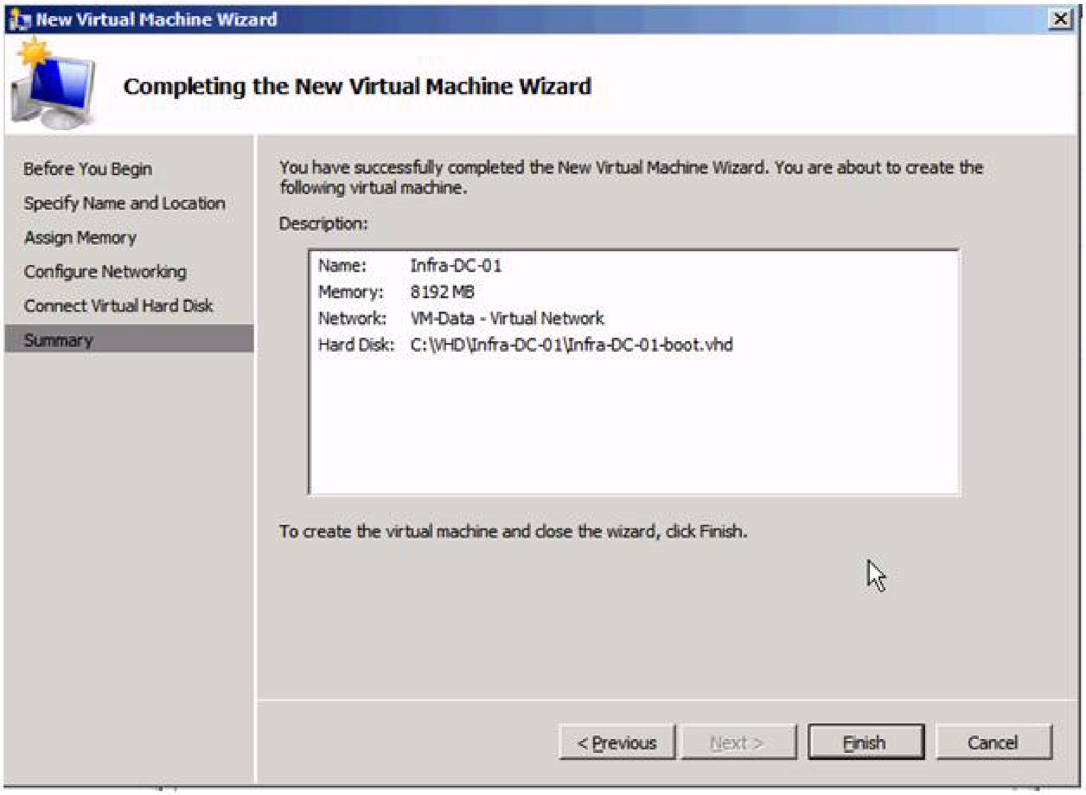
Location: C:\VHD\Infra-DC-01\Infra-DC-01\

Size: 127 GB (Maximum: 2040 GB)

● Use an existing virtual hard disk

Location: C:\VHD\Infra-DC-01\Infra-DC-01-boot.vhd

○ Attach a virtual hard disk later



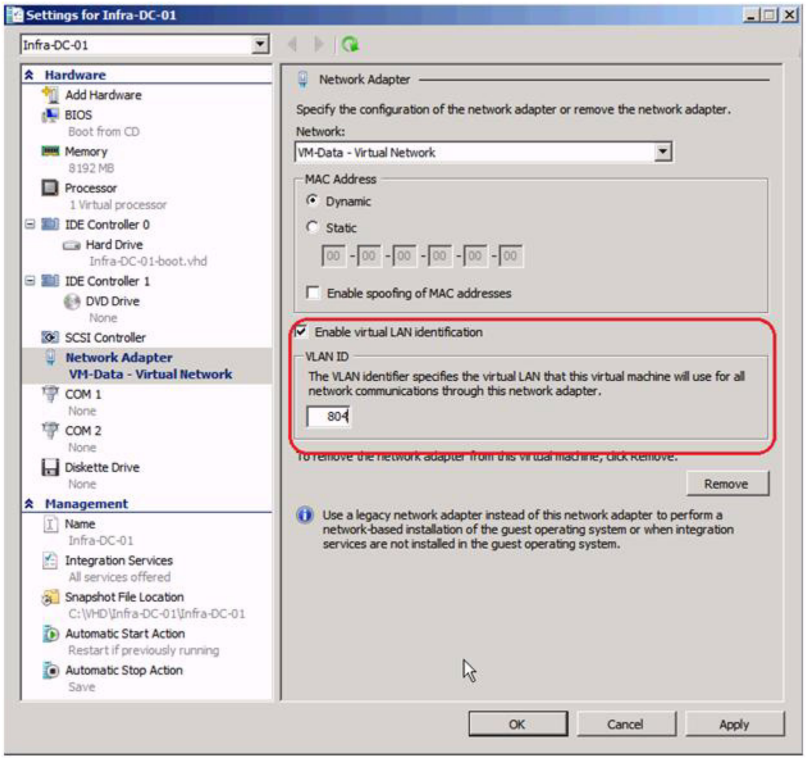
Completing the New Virtual Machine Wizard

You have successfully completed the New Virtual Machine Wizard. You are about to create the following virtual machine.

Description:

Name: Infra-DC-01
Memory: 8192 MB
Network: VM-Data - Virtual Network
Hard Disk: C:\VHD\Infra-DC-01\Infra-DC-01-boot.vhd

To create the virtual machine and close the wizard, click Finish.



Network Adapter

Specify the configuration of the network adapter or remove the network adapter.

Network: VM-Data - Virtual Network

MAC Address

● Dynamic

○ Static

00 - 00 - 00 - 00 - 00 - 00

□ Enable spoofing of MAC addresses

☑ Enable virtual LAN identification

VLAN ID

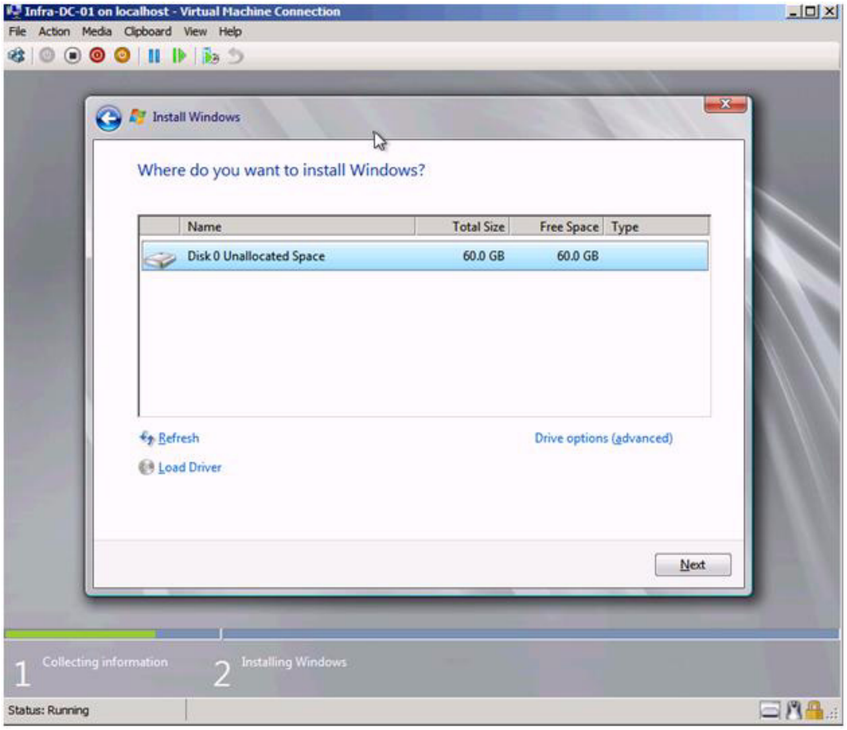
The VLAN identifier specifies the virtual LAN that this virtual machine will use for all network communications through this network adapter.

804

To remove the network adapter from this virtual machine, click Remove.

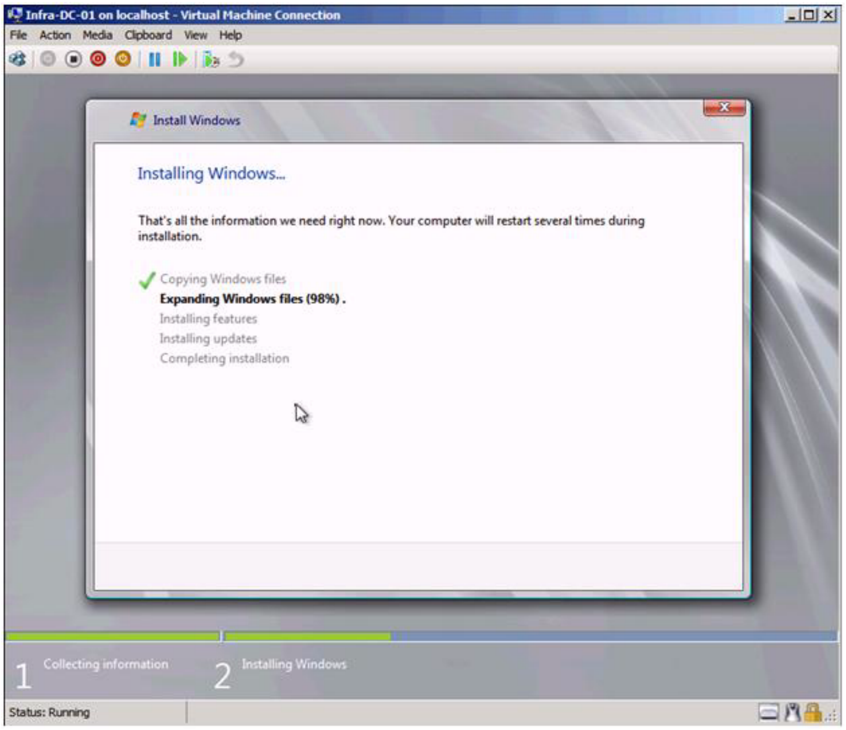
Use a legacy network adapter instead of this network adapter to perform a network-based installation of the guest operating system or when integration services are not installed in the guest operating system.

Install Windows in a Domain Controller Virtual Machine



Where do you want to install Windows?

Name	Total Size	Free Space	Type
Disk 0 Unallocated Space	60.0 GB	60.0 GB	

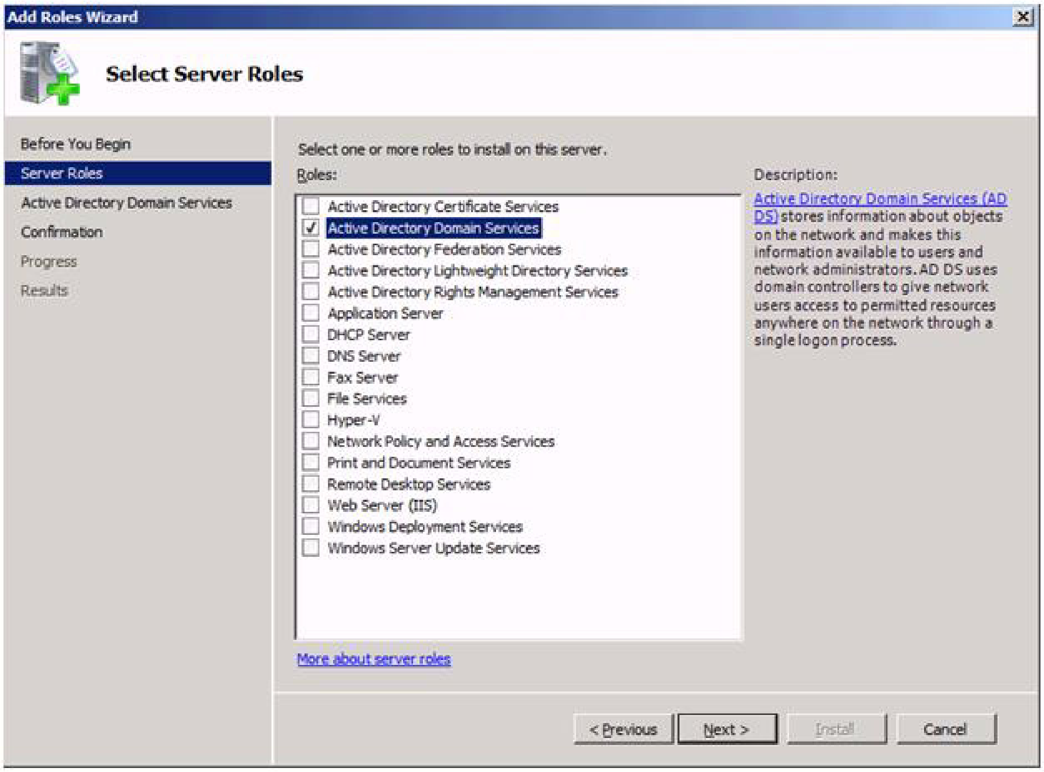

Infra-DC-01 on localhost - Virtual Machine Connection
File Action Media Clipboard View Help
Install Windows
1 Collecting information
2 Installing Windows
Status: Running

Installing Windows...

That's all the information we need right now. Your computer will restart several times during installation.

✓ Copying Windows files
Expanding Windows files (98%) .
Installing features
Installing updates
Completing installation

Install Active Directory Services



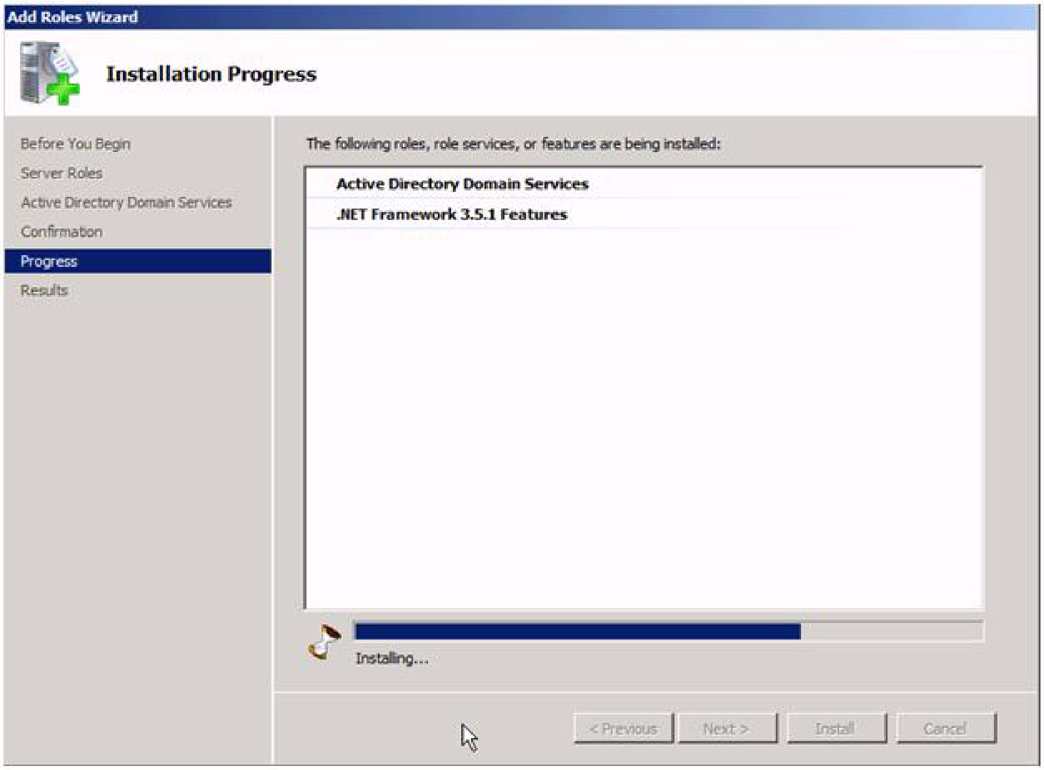
Select one or more roles to install on this server.

Roles:

- □ Active Directory Certificate Services
- ☑ Active Directory Domain Services
- □ Active Directory Federation Services
- □ Active Directory Lightweight Directory Services
- □ Active Directory Rights Management Services
- □ Application Server
- □ DHCP Server
- □ DNS Server
- □ Fax Server
- □ File Services
- □ Hyper-V
- □ Network Policy and Access Services
- □ Print and Document Services
- □ Remote Desktop Services
- □ Web Server (IIS)
- □ Windows Deployment Services
- □ Windows Server Update Services

Description:

Active Directory Domain Services (AD DS) stores information about objects on the network and makes this information available to users and network administrators. AD DS uses domain controllers to give network users access to permitted resources anywhere on the network through a single logon process.



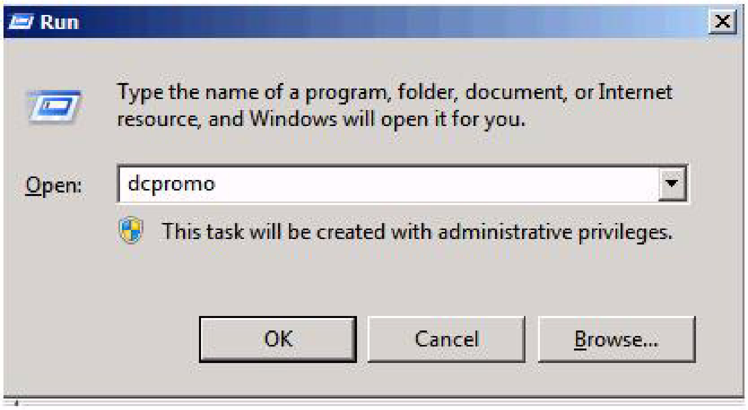
The following roles, role services, or features are being installed:

Active Directory Domain Services

.NET Framework 3.5.1 Features

Installing...

Run **dcpromo** to configure the Domain Controllers.



Type the name of a program, folder, document, or Internet resource, and Windows will open it for you.

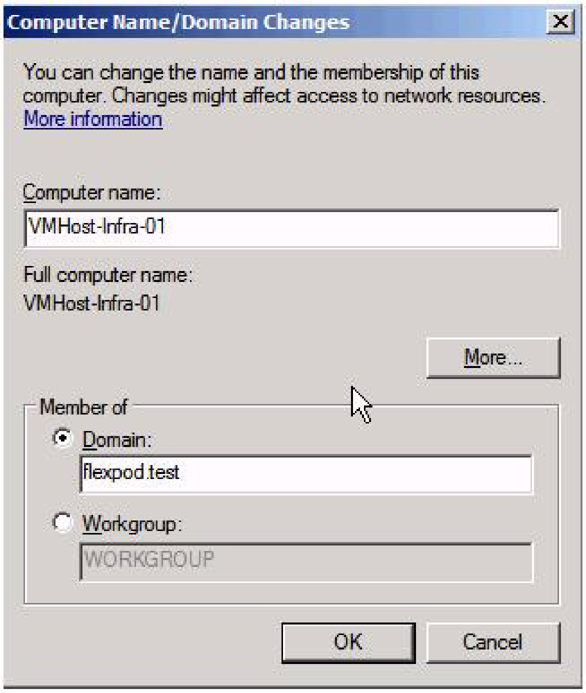
Open: dcpromo

This task will be created with administrative privileges.

Complete the domain controller installation and repeat the process on VM-Host-Infra-02 to install the redundant domain controller.

Join Virtual Machine Host VM-Host-Infra-01 to a Windows Domain

Note The domain name service for each virtual machine host must be configured to use the domain name server that is running on a different physical server for the purpose of high availability.



You can change the name and the membership of this computer. Changes might affect access to network resources. More information

Computer name: VMHost-Infra-01

Full computer name: VMHost-Infra-01

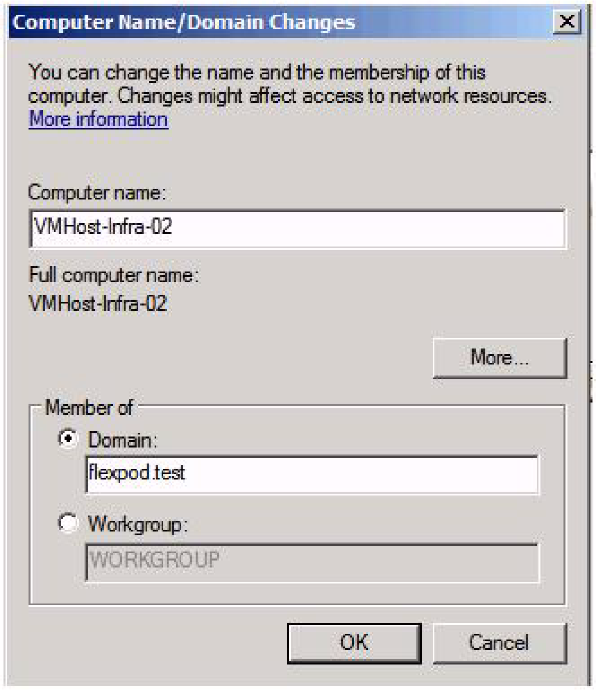
Member of

● Domain: flexpod.test

○ Workgroup: WORKGROUP

Note A reboot is required.

Join Virtual Machine Host VM-Host-Infra-02 to a Windows Domain


Computer Name/Domain Changes

You can change the name and the membership of this computer. Changes might affect access to network resources. More information

Computer name:
VMHost-Infra-02

Full computer name:
VMHost-Infra-02

Member of
● Domain:
flexpod.test

○ Workgroup:
WORKGROUP

Note A reboot is required.

Set Firewall Exceptions (Both Hyper-V Hosts)

To open the firewall security, do the following:

- Open Windows Firewall with Advanced Security, by clicking **Start > Administrative Tools > Windows Firewall with Advanced Security**.

Add SnapDrive

1. Highlight **Inbound Rules** and click **New Rule**.
2. Select **Program** and click **Next**.
3. Enter the program path for the SnapDrive Service for example, %ProgramFiles%\NetApp\SnapDrive\SWSvc.exe.
4. Click **Next**, then select the **Allow the Connection** options and click **Next**, then **Next** again.
5. Enter the rule Name **<SnapDrive>** and Description, and click **Finish**.

Configure Infrastructure Server Cluster

1. Log in to VM-Host-Infra-01using a domain administrative account with local privileges.
2. Open Server Manager and browse to **Features > Failover Cluster Manager**.
3. Validate cluster feasibility:

a. Select **Validate a Configuration**, then click **Next**.

b. Add both nodes one at a time into the Enter server name text field and click **Next**.

c. Select **Run only tests I select** and click **Next**.

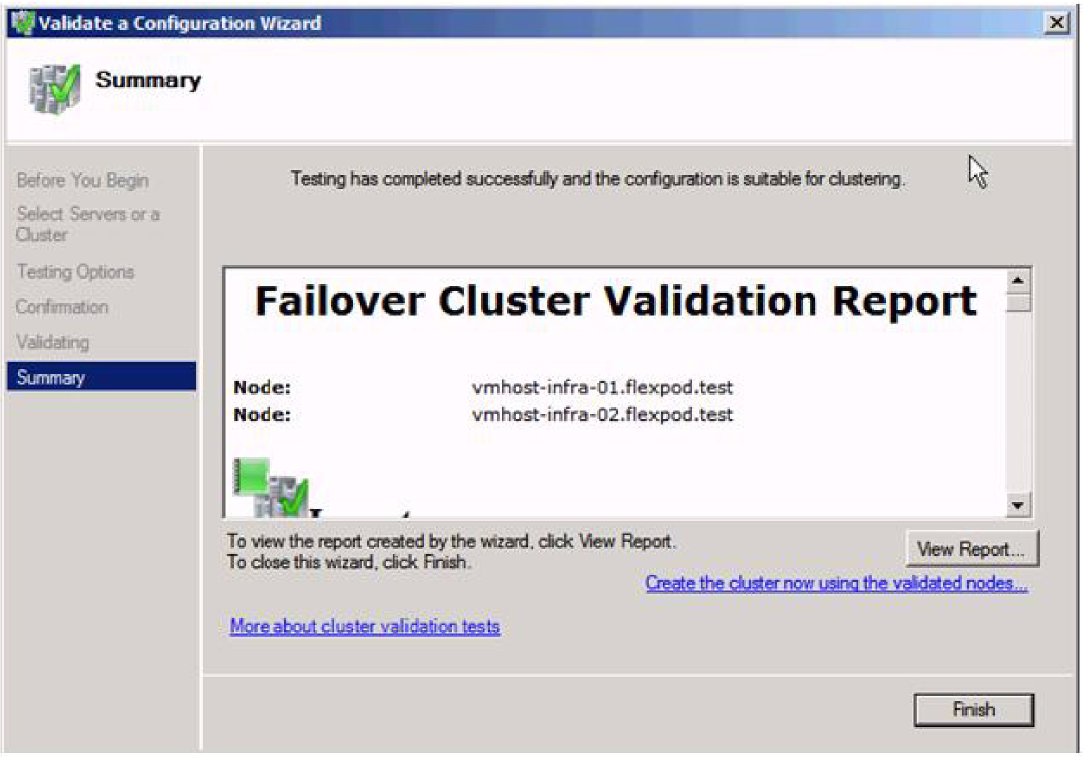
d. Scroll down to the storage section and clear all the storage related checkboxes.

Note These will run after you attach storage.

e. Click **Next > Next**.

f. Review the report and resolve any issues found by the validation wizard before continuing.

g. Click **Finish**.


Validate a Configuration Wizard
Summary
Before You Begin
Select Servers or a Cluster
Testing Options
Confirmation
Validating
Summary

Testing has completed successfully and the configuration is suitable for clustering.

Failover Cluster Validation Report

Node: vmhost-infra-01.flexpod.test
Node: vmhost-infra-02.flexpod.test

To view the report created by the wizard, click View Report.
To close this wizard, click Finish.

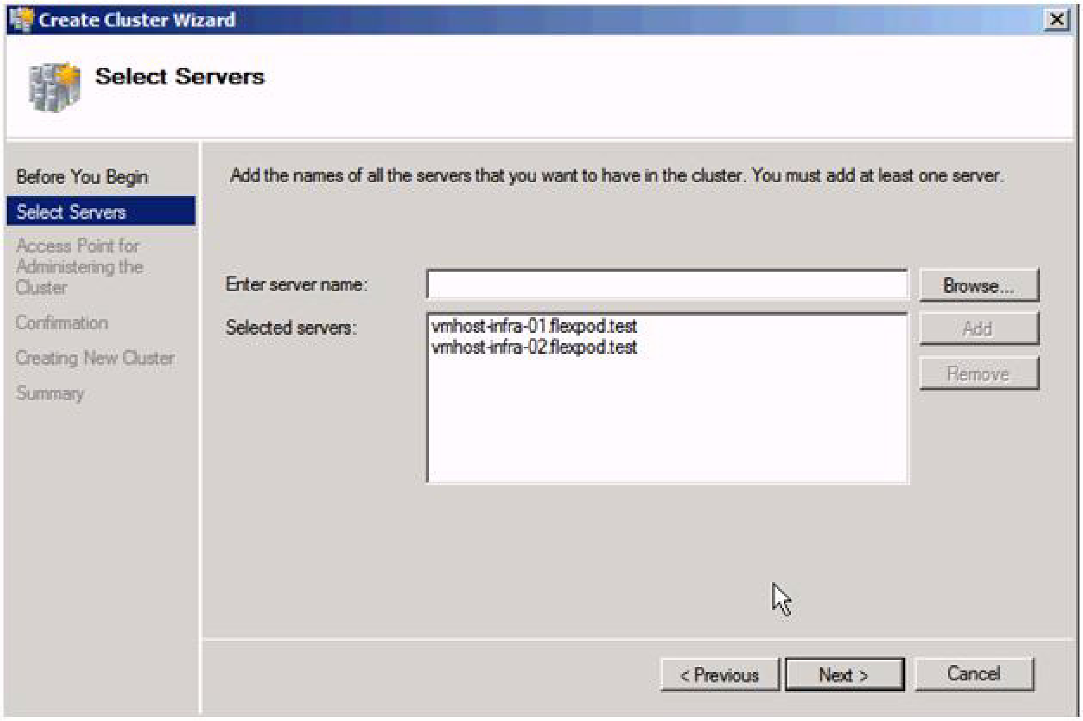
View Report...
Create the cluster now using the validated nodes...
More about cluster validation tests
Finish

4. Create majority node cluster:

a. In the Failover Cluster Manager, select **Create a Cluster**.

b. In the Welcome screen, click **Next**.

c. Add both nodes one at a time into the Enter server name text field and click **Next**.



Add the names of all the servers that you want to have in the cluster. You must add at least one server.

Enter server name:

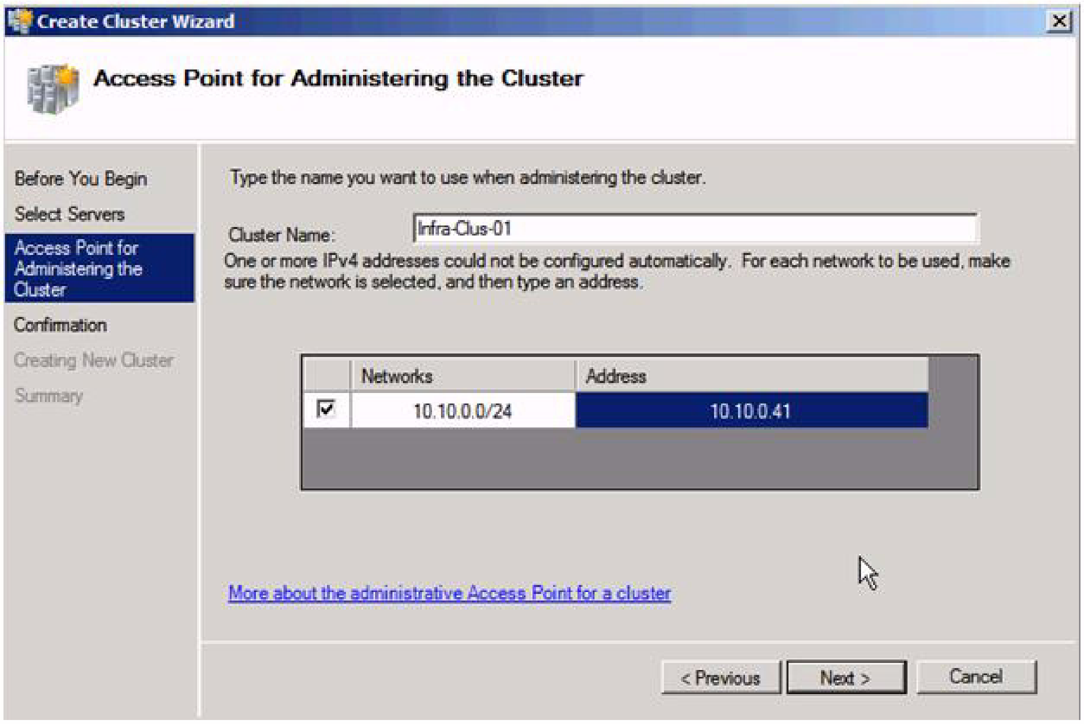
Selected servers:
vmhost-infra-01.flexpod.test
vmhost-infra-02.flexpod.test

d. Select **Yes** to run all validation tests, and click **Next**, then **Next** again.

e. Select **Run all tests** and click **Next**, then **Next** again.

f. Click **Finish**. At this time you may safely ignore any warnings or errors related to clustered disks.

g. Enter the **Cluster Name**, **Cluster IP**, and click **Next**.



Create Cluster Wizard
Access Point for Administering the Cluster
Before You Begin
Select Servers
Access Point for Administering the Cluster
Confirmation
Creating New Cluster
Summary
More about the administrative Access Point for a cluster
< Previous
Next >
Cancel

Type the name you want to use when administering the cluster.

Cluster Name: Infra-Clus-01

One or more IPv4 addresses could not be configured automatically. For each network to be used, make sure the network is selected, and then type an address.

	Networks	Address
☑	10.10.0.0/24	10.10.0.41

h. Review the configuration, click **Next**, then click **Finish**.

5. Provision cluster storage and create a quorum disk:

   a. Log in to the cluster host server and open **SnapDrive**.

   b. Select **Disks** and click **Create Disk**.

   c. In the Welcome screen, click **Next**.

   d. Enter the IP/FQDN for the Controller A and click **Add**.

   e. When enumeration has completed, select the target volume where you intend to add the LUN.

   f. Add a LUN Name, LUN Description and click **Next**.

   g. Select Shared (Microsoft Cluster Services only) and click **Next**.

   h. Verify both nodes are shown for your cluster and click **Next**.

   i. Select **Assign a Drive Letter** and pick a drive letter.

   j. Set the LUN Size to **1 GB** for the Quorum LUN and **500 GB** for the CSV LUNs, click **Next**, then **Next** again.

   k. Highlight each node in the Cluster and select **All Fiber Channel Initiators** to map the new LUN.

   l. Click **Next**, then Select **Automatic** and click **Next**.

   m. Make sure that Select a cluster group by this node is selected.

   n. Select the Cluster Group name **Available Storage**, click **Next**, then click **Finish**.

   o. Repeat for CSV-01, and CSV-02 LUNs. Do not assign a Drive Letter or Volume Mount Point to these LUNs, and also place these LUNs in Available Storage.

6. Create a Cluster SnapManager for Hyper-V SnapInfo Disk:

a. Log in to the cluster host server and open **SnapDrive**.

b. Select **Disks** and click **Create Disk**.

c. In the Welcome screen, click **Next**.

d. Enter the IP/FQDN for the Controller B and click **Add**.

e. When enumeration has completed, select the target volume (CSV_B) where you intend to add the LUN.

f. Add a LUN Name, LUN Description and click **Next**.

g. Select **Shared (Microsoft Cluster Services only)** and click **Next**.

h. Verify both nodes are shown for your cluster and click **Next**.

i. Select **Assign a Drive Letter** and pick a drive letter.

j. Set the LUN Size to **1 GB**, click **Next**, then **Next** again.

k. Highlight each node in the Cluster and select **All Fiber Channel Initiators** to map the new LUN.

l. Click **Next**, then **Select Automatic** and click **Next**.

m. Make sure that **Select a cluster group by this node** is selected.

n. Select the Cluster Group name **Available Storage**, click **Next**, then click **Finish**.

7. Change cluster quorum settings:

a. From the node that currently owns the cluster open **Failover Cluster Manager**.

b. Right-click the virtual cluster name for the cluster you built earlier, and select **More Actions > Configure Cluster Quorum Settings**. Open the **Configure Cluster Quorum Wizard**.

c. In the Before You Begin screen, click **Next**.

d. Select **Node and Disk Majority** and click **Next**.

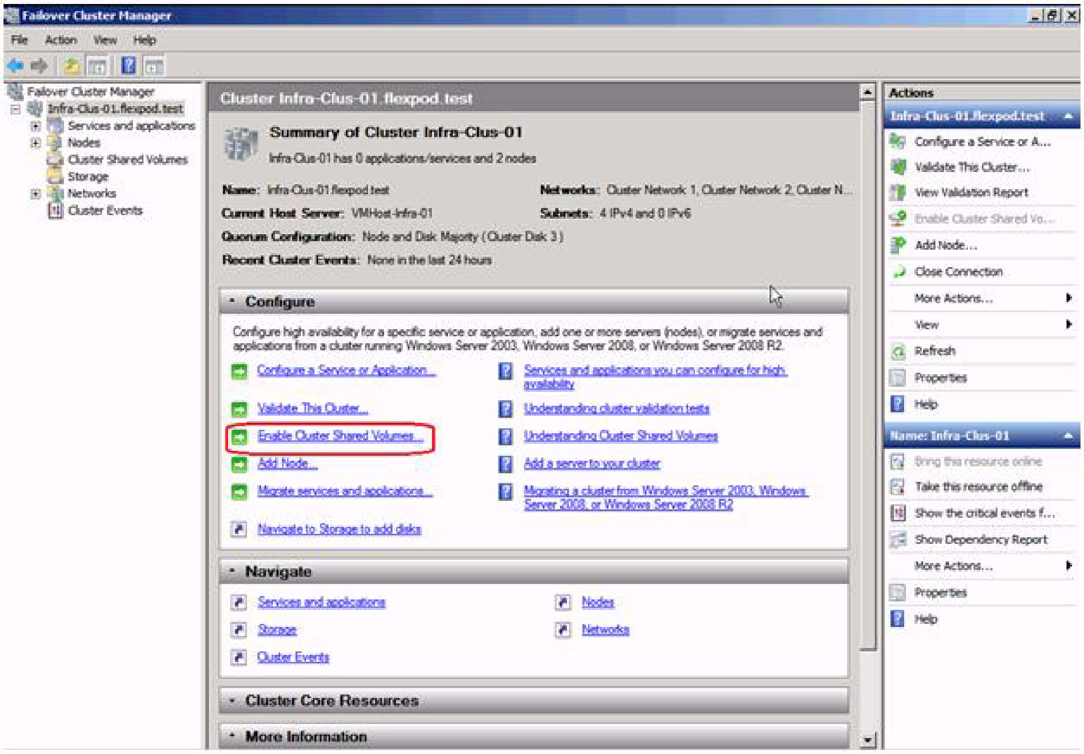
e. Select the Quorum disk with the mapped drive letter and click **Next**.

f. Review the confirmation for accuracy and click **Next**, then click **Finish**.

8. Enable Cluster Shared Volumes:

a. From the node that currently owns the cluster open **Failover Cluster Manager**.

b. In the Configure Section, select **Enable Cluster Shared Volumes**.



Cluster Infra-Clus-01.flexpod.test

Summary of Cluster Infra-Clus-01

Infra-Clus-01 has 0 applications/services and 2 nodes

Name: Infra-Clus-01.flexpod.test

Networks: Cluster Network 1, Cluster Network 2, Cluster N...

Current Host Server: VMHost-Infra-01

Subnets: 4 IPv4 and 0 IPv6

Quorum Configuration: Node and Disk Majority (Cluster Disk 3)

Recent Cluster Events: None in the last 24 hours

Configure

Configure high availability for a specific service or application, add one or more servers (nodes), or migrate services and applications from a cluster running Windows Server 2003, Windows Server 2008, or Windows Server 2008 R2.

Failover Cluster Manager
File
Action
View
Help
Failover Cluster Manager
Infra-Clus-01.flexpod.test
Services and applications
Nodes
Cluster Shared Volumes
Storage
Networks
Cluster Events
Configure a Service or Application...
Services and applications you can configure for high availability
Validate This Cluster...
Understanding cluster validation tests
Enable Cluster Shared Volumes...
Understanding Cluster Shared Volumes
Add Node...
Add a server to your cluster
Migrate services and applications...
Migrating a cluster from Windows Server 2003, Windows Server 2008, or Windows Server 2008 R2
Navigate to Storage to add disks
Navigate
Services and applications
Nodes
Storage
Networks
Cluster Events
Cluster Core Resources
More Information
Actions
Infra-Clus-01.flexpod.test
Configure a Service or A...
Validate This Cluster...
View Validation Report
Enable Cluster Shared Vo...
Add Node...
Close Connection
More Actions...
View
Refresh
Properties
Help
Name: Infra-Clus-01
Bring this resource online
Take this resource offline
Show the critical events f...
Show Dependency Report
More Actions...
Properties
Help

c. Check **I have read the above notice** and click **OK**.

d. Right-click **Cluster Shared Volumes** and select **Add Storage**.

e. Select the volume corresponding to **CSV-01** and click **OK**. You can look in SnapDrive to determine which volume is CSV-01.

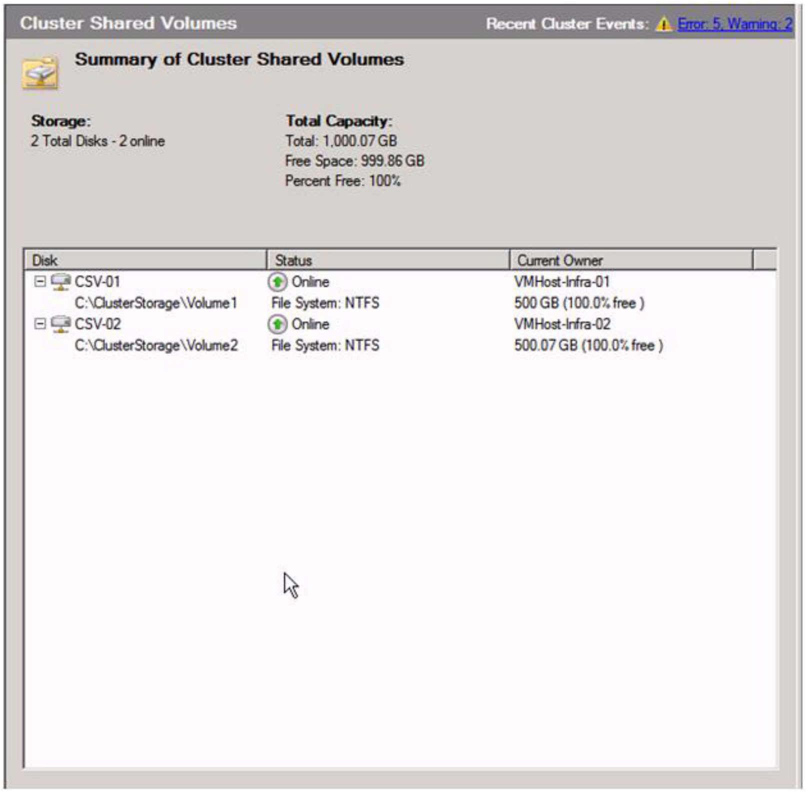
f. Right-click **Cluster Shared Volumes** and select **Add Storage**.

g. Select the remaining volume corresponding to **CSV-02** and click **OK**.

h. Select **Cluster Shared Volumes**.

i. Right-click the **Cluster Disk 1** volume in the center pane and select **Properties**. Rename the resource **CSV-01**.

j. Repeat the resource rename for Cluster Disk 2.



Cluster Shared Volumes

Recent Cluster Events: ⚠ Error: 5, Warning: 2

Summary of Cluster Shared Volumes

Storage:
2 Total Disks - 2 online

Total Capacity:
Total: 1,000.07 GB
Free Space: 999.86 GB
Percent Free: 100%

Disk	Status	Current Owner
⊟ CSV-01	Online	VMHost-Infra-01
C:\ClusterStorage\Volume1	File System: NTFS	500 GB (100.0% free)
⊟ CSV-02	Online	VMHost-Infra-02
C:\ClusterStorage\Volume2	File System: NTFS	500.07 GB (100.0% free)

9. Rename Cluster Volume Mappings:

   a. On Host 1, open **Windows Explorer** and browse to **C:\ClusterStorage**.

   b. Right-click **Volume1** and rename it **CSV-01**.

   c. Right-click **Volume2** and rename it **CSV-02**.

10. Validate cluster (from the node that currently owns the cluster):

    a. Open **Failover Cluster Manager** and right-click the virtual cluster name for the cluster you built earlier and select **Validate This Cluster**.

    b. Click **Next**, then **Select Run All Tests** and click **Next**.

    c. Review the report and resolve any issues found y the validation wizard before continuing.

    d. Click **Finish**.

11. Rename Cluster Networks:

    a. From the **Failover Cluster Manager**, under **Networks**, select **Cluster Network 1**.

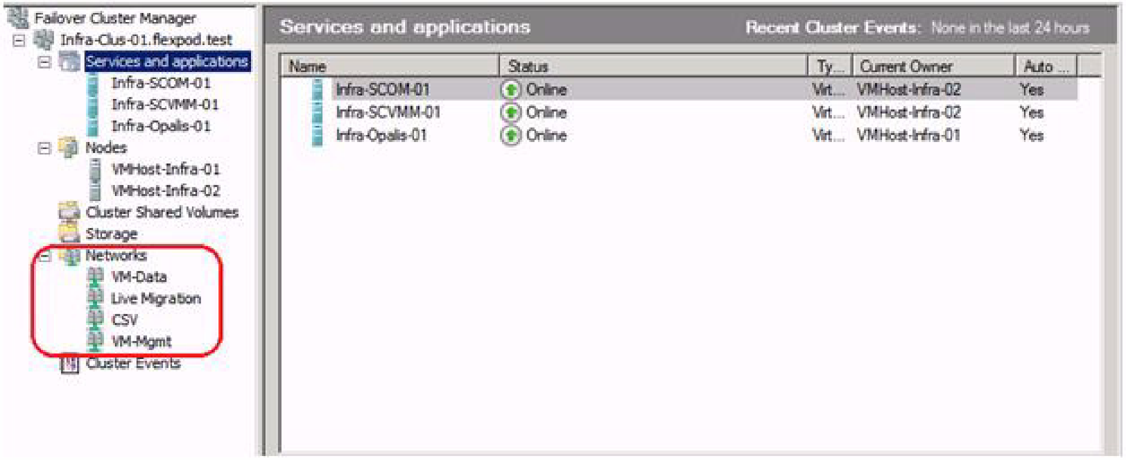
    b. Expand the **Network Connections**.

    c. Right-click the **Cluster Network 1**.

    d. Select **Rename**.

    e. Rename the Network to the adapter name.

f. Repeat these steps for the remaining cluster networks. Rename each one to the adapter name for that Cluster Network.



Name	Status	Ty...	Current Owner	Auto ...
Infra-SCOM-01	Online	Virt...	VMHost-Infra-02	Yes
Infra-SCVMM-01	Online	Virt...	VMHost-Infra-02	Yes
Infra-Opalis-01	Online	Virt...	VMHost-Infra-01	Yes

Configure a Cluster Network for CSV Network Traffic

1. Open a PowerShell command window.
2. Enter the PowerShell command **Import-Module failoverclusters**.
3. Enter the PowerShell command **get-clusternetworkinterface | fl network,name**.

```
PS C:\Users\administrator.FLEXPOD> Import-Module failoverclusters


PS C:\Users\administrator.FLEXPOD> Get-ClusterNetworkInterface | fl
network, name


Network : Cluster Network 1

Name    : VMHost-Infra-01 - VM-Date-Software Switch

Network : Cluster Network 1

Name    : VMHost-Infra-02 - VM-Data Software

Network : Cluster Network 2

Name    : VMHost-Infra-01 - LiveMigration

Network : Cluster Network 2

Name    : VMHost-Infra-02 - LiveMigration

Network : Cluster Network 3

Name    : VMHost-Infra-01 - CSV

Network : Cluster Network 3

Name    : VMHost-Infra-02 - CSV

Network : Cluster Network 4

Name    : VMHost-Infra-01 - VM-Mgmt
```

```
Network : Cluster Network 4
Name     : VMHost-Infra-02 - VM-Mgmt
```

4. Enter the PowerShell command **get-clusternetwork | fl name,metric**.

```
PS C:\Users\administrator.FLEXPOD> Get-ClusterNetwork | fl  name, metric


Name   : Cluster Network 1
Metric : 10100


Name   : Cluster Network 2
Metric : 1100


Name   : Cluster Network 3
Metric : 1200


Name   : Cluster Network 4
Metric : 10000
```

5. Change the CSV network metric by entering the PowerShell command `(get-clusternetwork ‟Cluster Network 3”).Metric=900`

```
PS C:\Users\administrator.FLEXPOD> ( Get-ClusterNetwork "Cluster Network 
3").Metric = 900
```

6. Enter the PowerShell command **get-clusternetwork | fl name,metric**.

```
PS C:\Users\administrator.FLEXPOD> Get-ClusterNetwork | fl name, metric


Name   : Cluster Network 1
Metric : 10100


Name   : Cluster Network 2
Metric : 1100


Name   : Cluster Network 3
Metric : 900


Name   : Cluster Network 4
Metric : 10000
```

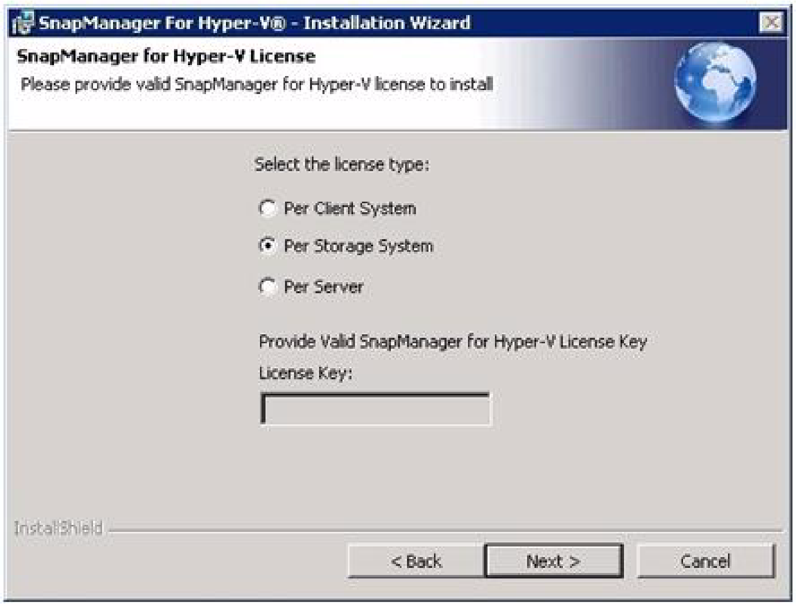
Install SnapManager for Hyper-V (Both Hyper-V Hosts)

SnapManager for Hyper-V is used to back up and restore data. To begin, prepare each storage system and Hyper-V parent host in the configuration for use with SnapManager for Hyper-V. Before installing the SnapManager for Hyper-V software, have the following information available:

- License key information
- System login credentials

Complete the following installation steps:

1. Download SnapManager for Hyper-V from the NetApp Support (formerly NOW) site.
2. Launch the SnapManager for Hyper-V executable file. Launch the wizard.
3. Accept the EULA.
4. Select the Per Storage System license type.



SnapManager For Hyper-V® - Installation Wizard

SnapManager for Hyper-V License

Please provide valid SnapManager for Hyper-V license to install

Select the license type:

○ Per Client System

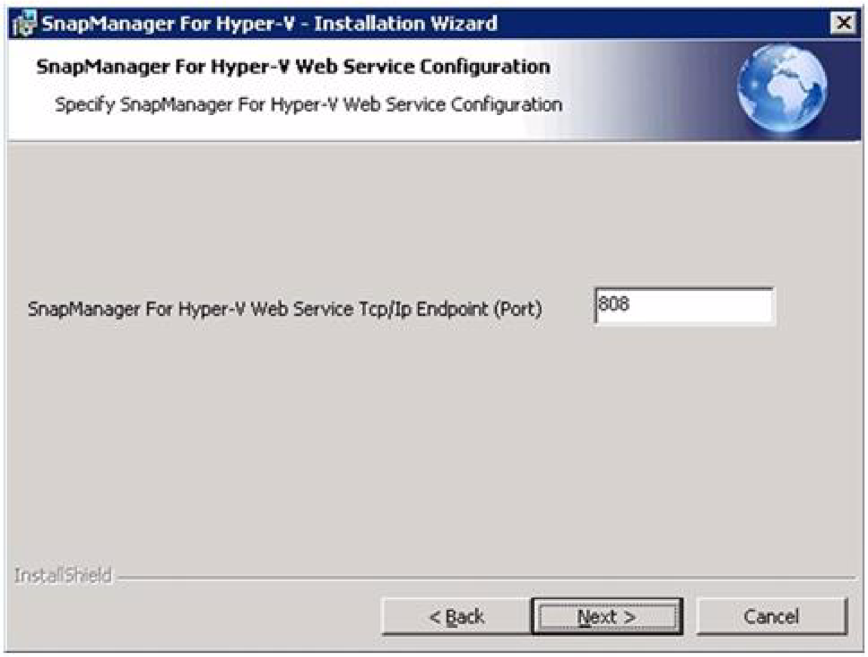
● Per Storage System

○ Per Server

Provide Valid SnapManager for Hyper-V License Key

License Key:

5. Enter the port number for the SnapManager Web service communication. Click **Next**.



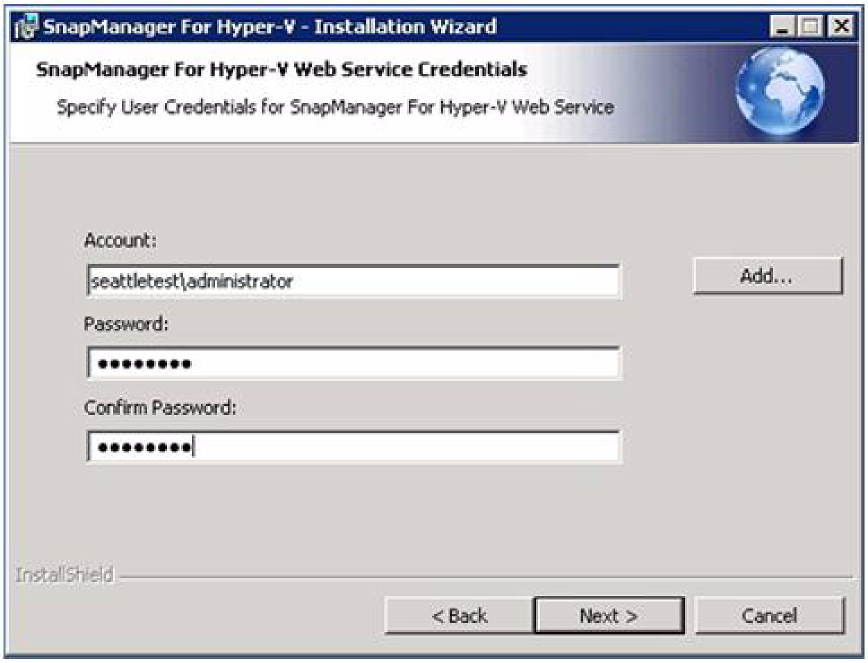
SnapManager For Hyper-V - Installation Wizard

SnapManager For Hyper-V Web Service Configuration

Specify SnapManager For Hyper-V Web Service Configuration

SnapManager For Hyper-V Web Service Tcp/Ip Endpoint (Port) 808

6. Provide user credentials of the account containing administrator privileges.



SnapManager For Hyper-V - Installation Wizard

SnapManager For Hyper-V Web Service Credentials

Specify User Credentials for SnapManager For Hyper-V Web Service

Account: seattletest\administrator

Password: •••••••••

Confirm Password: •••••••••

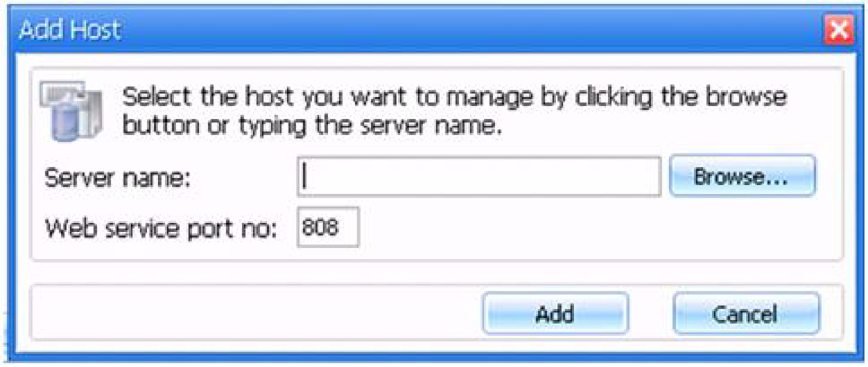
Add a Hyper-V Parent Host or Cluster

Hosts and virtual machine resources can be configured and managed with policies to protect and restore data. View and export report information about the data to assist with monitoring and troubleshooting. Use SnapManager for Hyper-V to add, view, and remove Hyper-V parent hosts or clusters.

1. From the navigation pane, click **Protection**.
2. From the Actions pane, click **Add host**.
3. Type the name of the host or click **Browse**, and then click **Add**.

The host can be the local host or a remote host configured as a Hyper-V server with SMHV installed. The client system and host being added must be in the same Windows domain, or credentials of the administrator user on the remote host must be stored using the Windows Credential Manager on the client system.

Note When adding a single host, you need to manage the dedicated virtual machines on that host. When adding a host cluster, you need to manage the shared virtual machines on the host cluster.



Select the host you want to manage by clicking the browse button or typing the server name.

Server name:

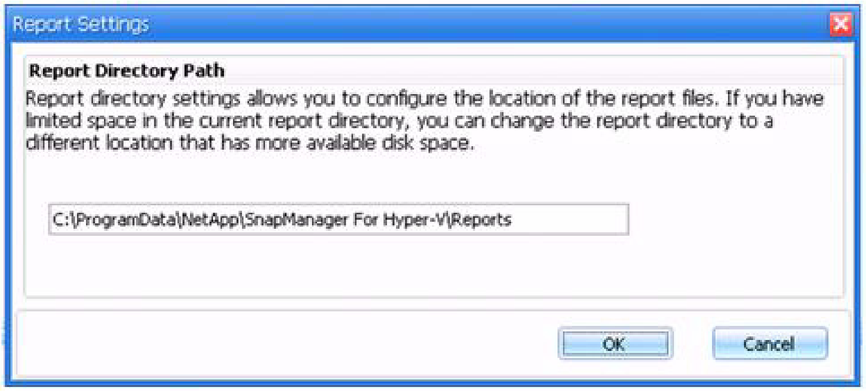
Web service port no: 808

Configure SnapManager for Hyper-V Environment

When a new host is added after SnapManager for Hyper-V is installed, the Configuration Wizard initiates. Configure the report settings, E-mail notifications, AutoSupport settings, and SnapInfo settings using the Configuration Wizard.

Report settings

Report path settings can be configured to store reports for SnapManager for Hyper-V operations. Configure the report settings before adding VM resources to a dataset. If the report settings are not configured when a Hyper-V parent host is added to SnapManager for Hyper-V, they can be configured later using the Configuration Wizard.



Report Directory Path

Report directory settings allows you to configure the location of the report files. If you have limited space in the current report directory, you can change the report directory to a different location that has more available disk space.

C:\ProgramData\NetApp\SnapManager For Hyper-V\Reports

To configure the report settings for a parent host cluster, manually create the report directory on each cluster node.

Note The report path should not reside on a CSV.

Event Notification Settings

Event notification settings can be configured to send e-mail, Syslog, and AutoSupport messages when an event occurs. If event notification settings are not configured when the Hyper-V parent host is added to the SnapManager for Hyper-V, they can be configured later using the Configuration Wizard.

Note Configure the event notification settings before adding virtual machine resources to a dataset.

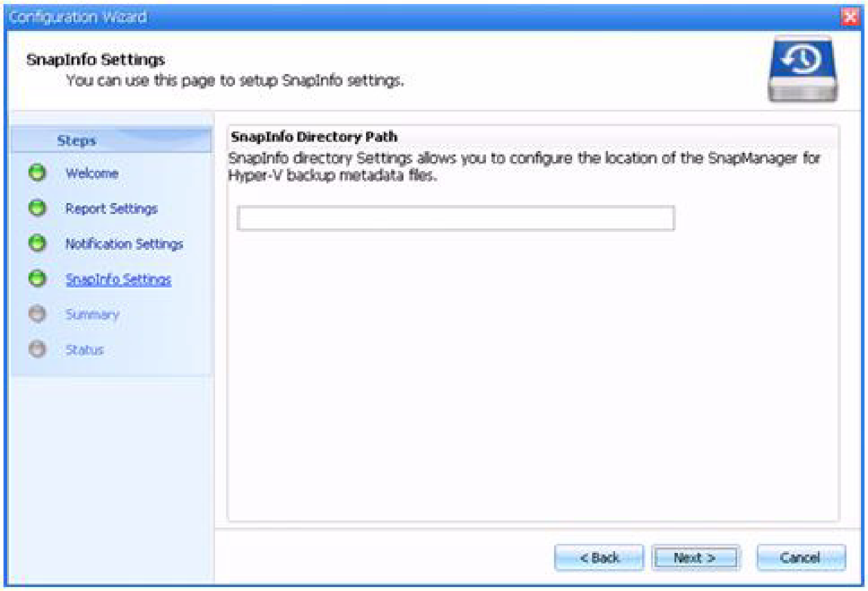
SnapInfo Settings

SnapInfo settings can be configured for a host to add the virtual machine resources within that host to a dataset.

Note SnapInfo settings must be configured before adding virtual machine resources to a dataset.

The SnapInfo path stores the dataset backup metadata; this path must reside on a Data ONTAP LUN because SnapManager for Hyper-V creates a backup of the SnapInfo after a regular backup occurs.

Note In the configuration specified in this document, for the two Hyper-V hosts, SnapInfo can be set to C:\VHD\SnapInfo. For the cluster, a small cluster-shared LUN with a drive mapping was created earlier using SnapDrive. SnapInfo for the cluster can be placed in this LUN.



SnapInfo Settings
You can use this page to setup SnapInfo settings.

SnapInfo Directory Path
SnapInfo directory Settings allows you to configure the location of the SnapManager for Hyper-V backup metadata files.

To set up and use SnapManager for Hyper-V, refer to the *SnapManager 1.0 for Hyper-V Installation and Administration Guide* from the NetApp Support (formerly NOW) site.

Create Virtual Machines and Resources for Deploying Infrastructure Roles

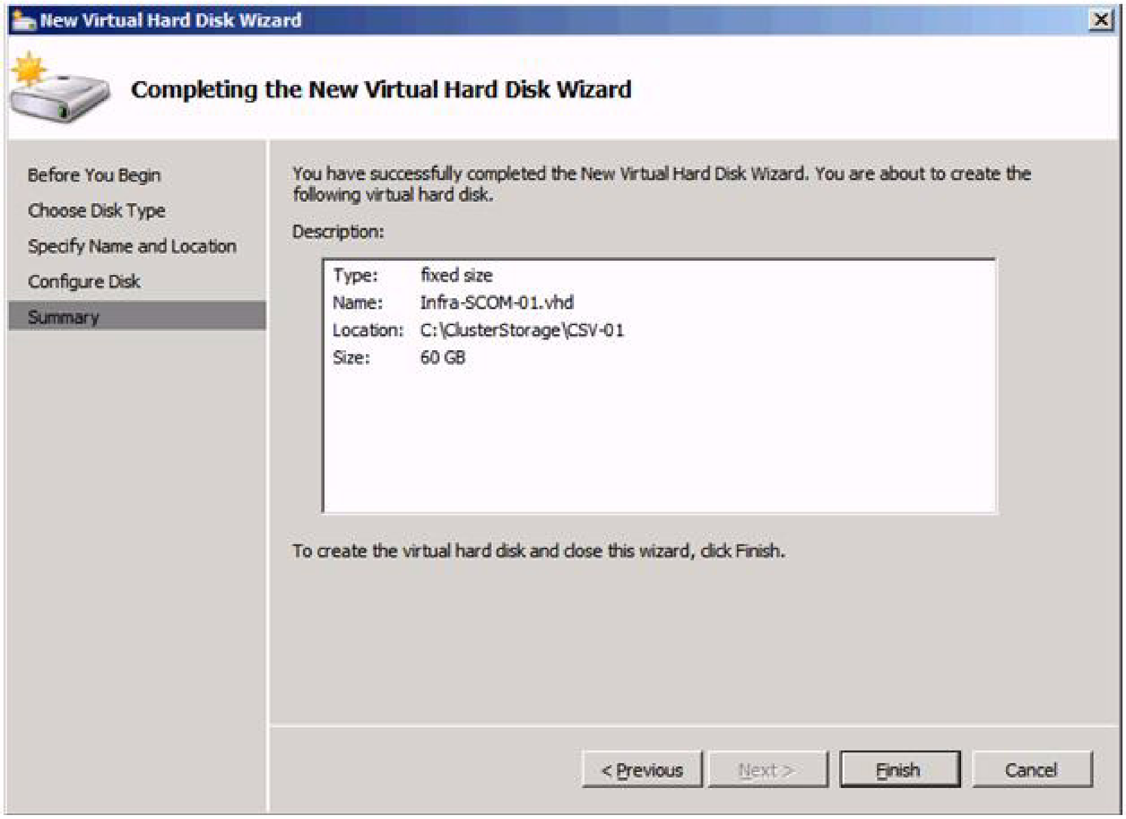
Create VHD for Infrastructure Roles

Create the following VHD storage resources (Table 17) that will be used by the virtual machines running system center roles.

Table 17 VHD Storage Resources

VM Host	VM Name	Name	Location	Size	Type
Infra-VM-Host-01	Infra-SQL-01	Infra-SQL-01.vhd	C:\VHD\Infra-SQL-01	60 GB	Fixed
Infra-VM-Host-02	Infra-SQL-02	Infra-SQL-02.vhd	C:\VHD\Infra-SQL-02	60 GB	Fixed
Infra-VM-Host-01	Infra-SCOM-01	Infra-SCOM-01.vhd	C:\ClusterStorage\CSV-01\Infra-SCOM-01	60 GB	Fixed
Infra-VM-Host-02	Infra-SCVMM-01	Infra-SCVMM-01.vhd	C:\ClusterStorage\CSV-02\Infra-SCVMM-01	60 GB	Fixed
Infra-VM-Host-01	Infra-Opalis-01	Infra-Oplis-01.vhd	C:\ClusterStorage\CSV-01\Infra-Opalis-01	60 GB	Fixed

1. Open the Hyper-V Manager and select the **Hyper-V** server in the left pane.
2. Click **New** and select **Hard Disk**.
3. Choose the **Fixed size disk** type and click **Next**.
4. Provide the VHD name and location and click l **Next**.
5. Select **Create a new blank virtual hard disk** and provide the disk size. Click **Next**.
6. Click **Finish**.
7. Repeat steps 1 through 6 for each VHD.


New Virtual Hard Disk Wizard
Completing the New Virtual Hard Disk Wizard
Before You Begin
Choose Disk Type
Specify Name and Location
Configure Disk
Summary
< Previous
Next >
Finish
Cancel

You have successfully completed the New Virtual Hard Disk Wizard. You are about to create the following virtual hard disk.

Description:

Type: fixed size
Name: Infra-SCOM-01.vhd
Location: C:\ClusterStorage\CSV-01
Size: 60 GB

To create the virtual hard disk and close this wizard, click Finish.

Create Infrastructure Virtual Machines

Domain Controller Virtual Machine (optional)

Most environments will already have an Active Directory infrastructure and will not require additional domain controllers do be deployed for the FlexPod Validated with Microsoft Private Cloud architecture. The optional domain controllers can be omitted from the configuration in this case or used as a resource domain. The domain controller virtual machines will not be clustered because redundancy is provided by deploying multiple domain controllers running in virtual machines on different servers. Since these virtual machines reside on Hyper-V hosts that run Windows Failover cluster, but are not clustered themselves, Hyper-V Manager should be used to manage them instead of Virtual Machine Manager.

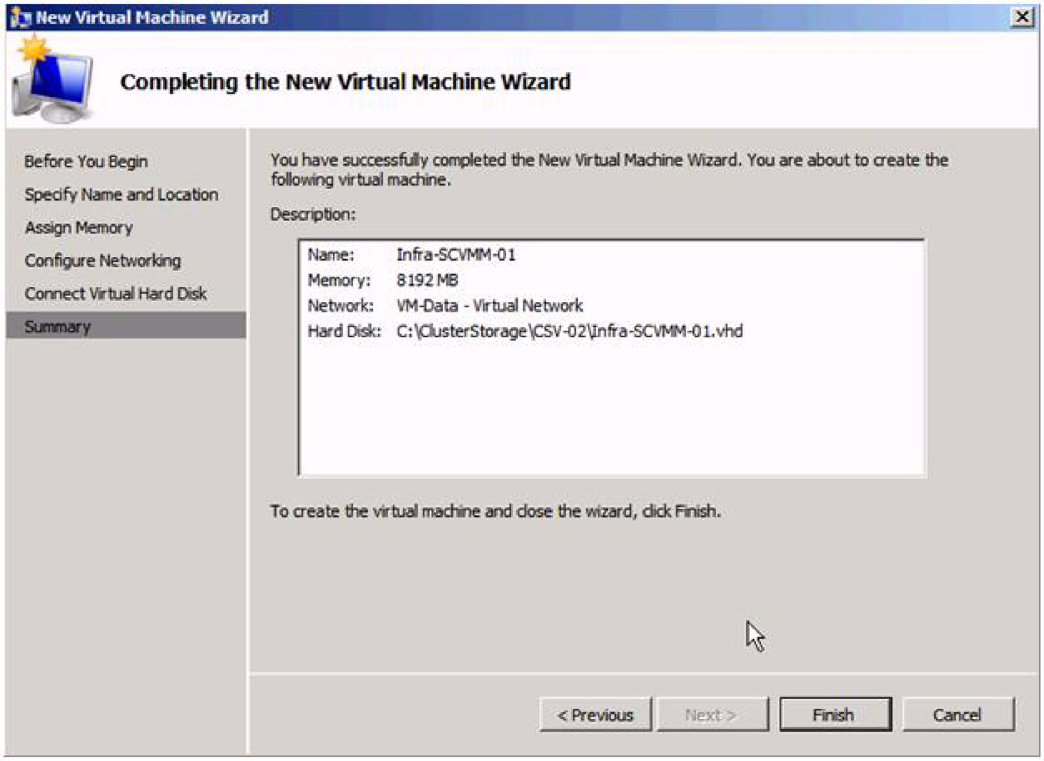
Create the following virtual machines (Table 18) that will be used by the virtual machines running system center roles.

Table 18 Infrastructure Virtual Machines

VM Host	VM Name	Hard Disk	Network	Memory
Infra-VM-Host-01	Infra-SQL-01	C:\VHD\Infra-SQL-01\Infra-SQL-01.vhd	VM-Data – Virtual Network	8 GB
Infra-VM-Host-02	Infra-SQL-02	C:\VHD\Infra-SQL-02\Infra-SQL-02.vhd	VM-Data – Virtual Network	8 GB
Infra-VM-Host-01	Infra-SCOM-01	C:\ClusterStorage\CSV-01\Infra-SCOM-01.vhd	VM-Data – Virtual Network	8 GB
Infra-VM-Host-02	Infra-SCVMM-01	C:\ClusterStorage\CSV-02\Infra-SCVMM-01.vhd	VM-Data – Virtual Network	8 GB
Infra-VM-Host-01	Infra-Opalis-01	C:\ClusterStorage\CSV-01\Infra-Opalis-01.vhd	VM-Data – Virtual Network	8 GB

1. Open the Hyper-V Manager and select the **Hyper-V server** in the left pane.
2. Click **New** in the right pane and select **Virtual Machine**.
3. Provide the name. Check the box for storing the virtual machine in a different location and provide the path. Click **Next**.
4. Enter the memory size and Click **Next**.
5. Select the Network connection **VM-Data-Virtual Network**. Click **Next**.
6. Select the option to use an existing virtual hard disk and specify the path to the VHD created in the previous section. Click **Next**.
7. Select the option to install the operating system later and click **Finish**.

8. Repeat steps 1 through 7 for each virtual machine.

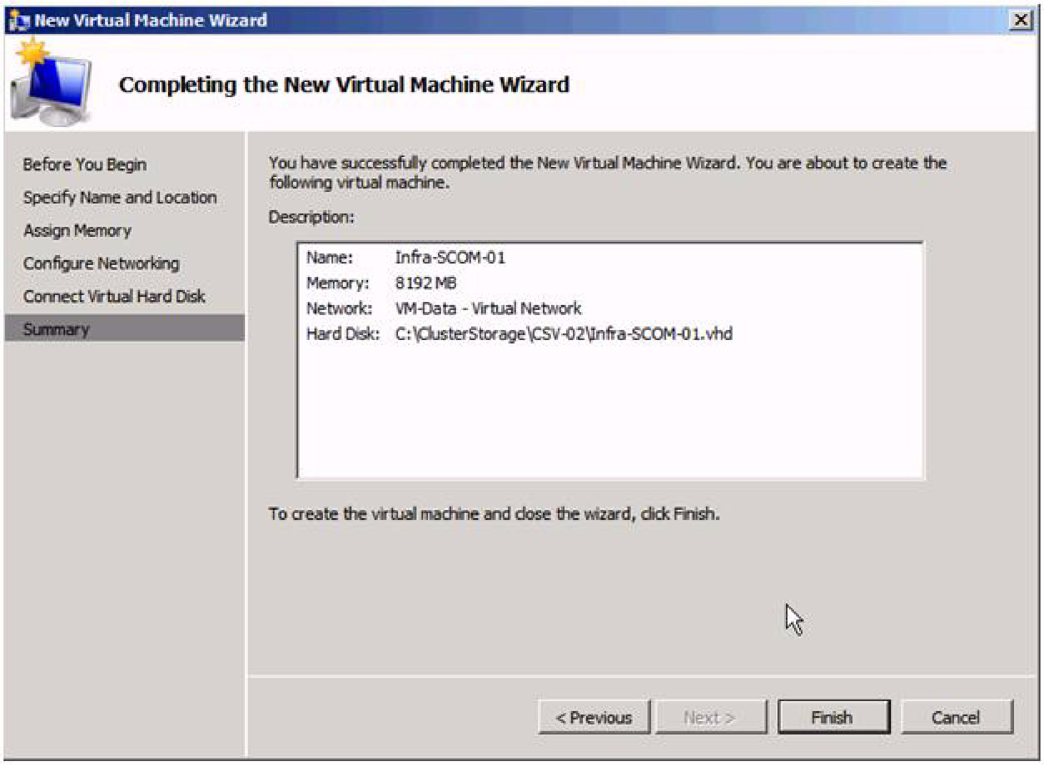

New Virtual Machine Wizard
Completing the New Virtual Machine Wizard
Before You Begin
Specify Name and Location
Assign Memory
Configure Networking
Connect Virtual Hard Disk
Summary
< Previous
Next >
Finish
Cancel

You have successfully completed the New Virtual Machine Wizard. You are about to create the following virtual machine.

Description:

Name: Infra-SCVMM-01
Memory: 8192 MB
Network: VM-Data - Virtual Network
Hard Disk: C:\ClusterStorage\CSV-02\Infra-SCVMM-01.vhd

To create the virtual machine and close the wizard, click Finish.

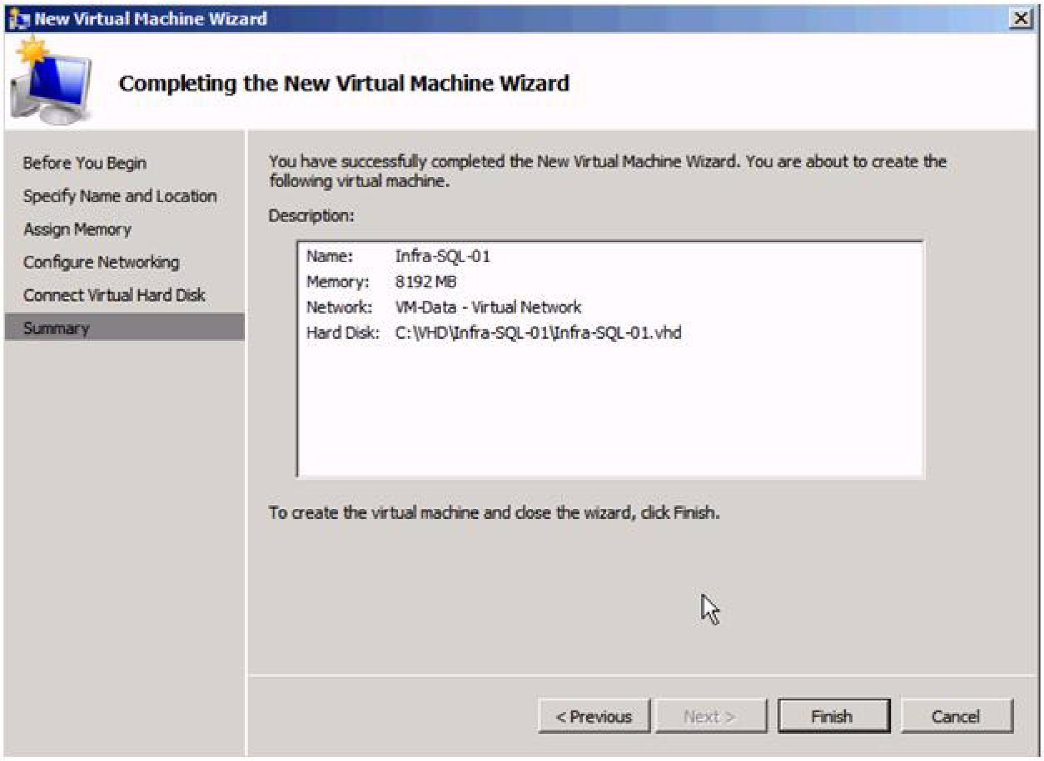

New Virtual Machine Wizard
Completing the New Virtual Machine Wizard
Before You Begin
Specify Name and Location
Assign Memory
Configure Networking
Connect Virtual Hard Disk
Summary
< Previous
Next >
Finish
Cancel

You have successfully completed the New Virtual Machine Wizard. You are about to create the following virtual machine.

Description:

Name: Infra-SCOM-01
Memory: 8192 MB
Network: VM-Data - Virtual Network
Hard Disk: C:\ClusterStorage\CSV-02\Infra-SCOM-01.vhd

To create the virtual machine and close the wizard, click Finish.

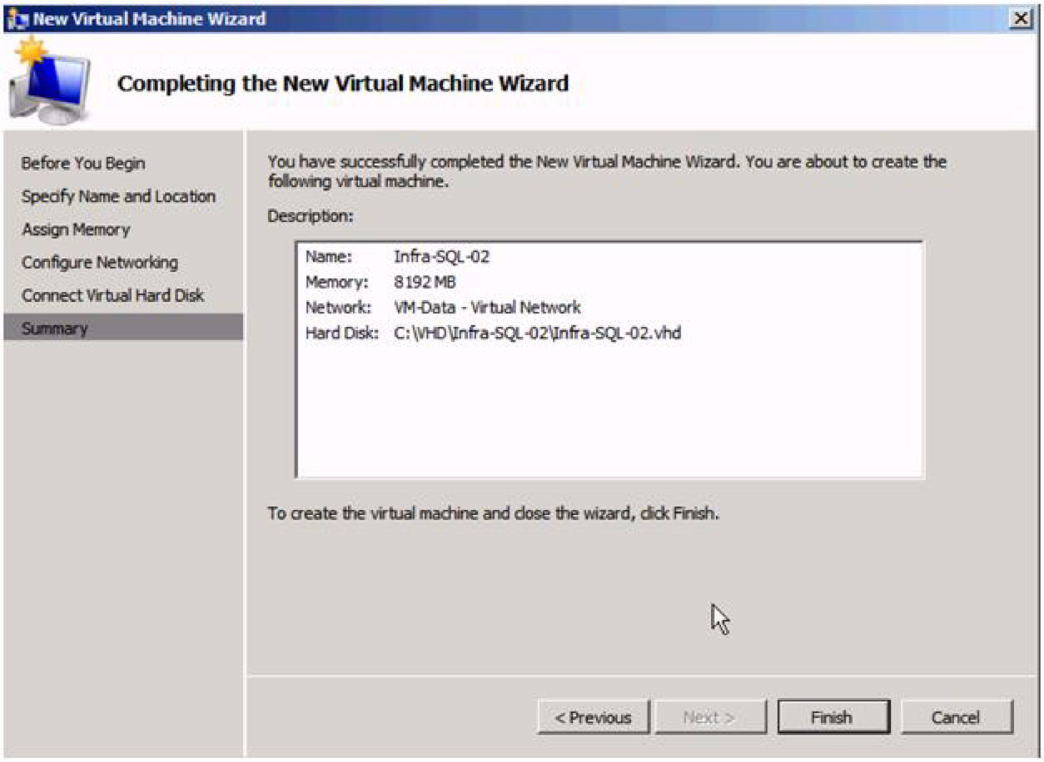

New Virtual Machine Wizard
Completing the New Virtual Machine Wizard
Before You Begin
Specify Name and Location
Assign Memory
Configure Networking
Connect Virtual Hard Disk
Summary
< Previous
Next >
Finish
Cancel

You have successfully completed the New Virtual Machine Wizard. You are about to create the following virtual machine.

Description:

Name: Infra-SQL-01
Memory: 8192 MB
Network: VM-Data - Virtual Network
Hard Disk: C:\VHD\Infra-SQL-01\Infra-SQL-01.vhd

To create the virtual machine and close the wizard, click Finish.


New Virtual Machine Wizard
Completing the New Virtual Machine Wizard
Before You Begin
Specify Name and Location
Assign Memory
Configure Networking
Connect Virtual Hard Disk
Summary
< Previous
Next >
Finish
Cancel

You have successfully completed the New Virtual Machine Wizard. You are about to create the following virtual machine.

Description:

Name: Infra-SQL-02
Memory: 8192 MB
Network: VM-Data - Virtual Network
Hard Disk: C:\VHD\Infra-SQL-02\Infra-SQL-02.vhd

To create the virtual machine and close the wizard, click Finish.

Modify the Virtual Machine Settings

Update the logical processor setting and virtual network adapters with the following information (Table 19).

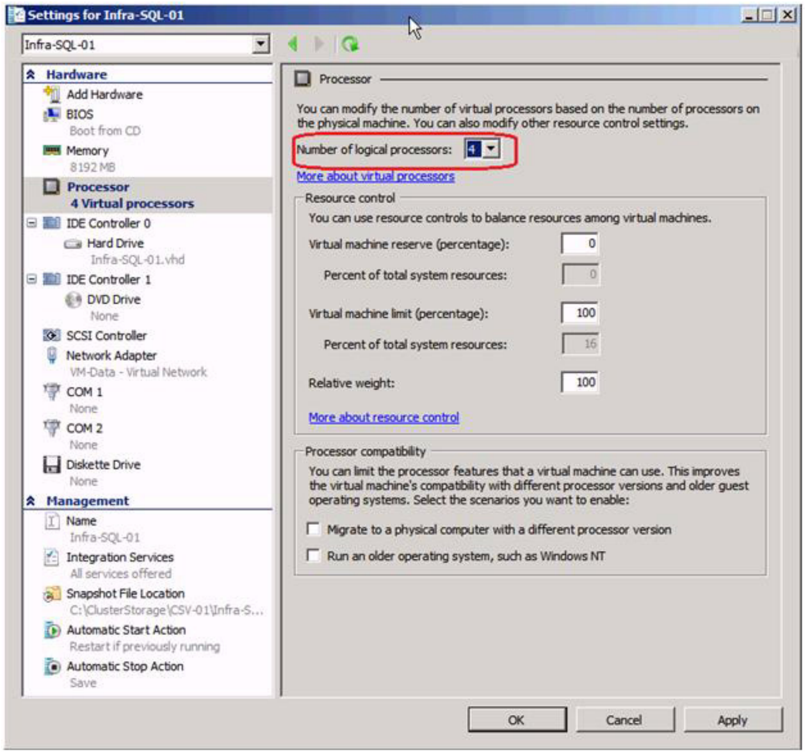
Table 19 Virtual Machine Settings

VM Name	Logical Processors	Network	VLAN ID
Infra-SQL-01	4	VM-Data	804
		iSCSI Fabric-A	802
		iSCSI Fabric-B	802
		App-Cluster-Comm	806
Infra-SQL-02	4	VM-Data	804
		iSCSI Fabric-A	802
		iSCSI Fabric-B	802
		App-Cluster-Comm	806
Infra-SCOM-01	2	VM-Data	804
Infra-SCVMM-01	2	VM-Data	804
		iSCSI Fabric-A	802
		iSCSI Fabric-B	802
Infra-Opalis-01	2	VM-Data	804

Update the virtual machine setting using the following procedure.

1. Using the Hyper-V Manager select the virtual machine in the center pane.
2. Click **Settings** in the lower right pane.
3. Click **Processor** in the left Hardware pane.
4. Configure the correct number of logical processors using the drop down box and the information from Table 19.
5. Select the **VM-Data network adapter** in the right pane.
6. Check the box that enables **virtual LAN identification**.
7. Enter the **VLAN ID** in the text box from the table above.
8. Click **Apply**.
9. Select **Add Hardware** in the right pane to add additional network adapters.
10. Select **Network Adapter** and click the **Add** button.
11. Select the appropriate network in the Network drop-down box.
12. Check the box that enables **virtual LAN identification**.
13. Enter the **VLAN ID** in the text box from the table above.
14. Click **Apply**.
15. Repeat steps 9 through 14 to add additional network adapters.
16. Click **OK** to close the settings window.
17. Repeat steps 1 through 16 for all virtual machines.

Configure Virtual Processor Count



Settings for Infra-SQL-01

Infra-SQL-01

Hardware
- Add Hardware
- BIOS
  Boot from CD
- Memory
  8192 MB
- Processor
  4 Virtual processors
- IDE Controller 0
  - Hard Drive
    Infra-SQL-01.vhd
- IDE Controller 1
  - DVD Drive
    None
- SCSI Controller
- Network Adapter
  VM-Data - Virtual Network
- COM 1
  None
- COM 2
  None
- Diskette Drive
  None

Management
- Name
  Infra-SQL-01
- Integration Services
  All services offered
- Snapshot File Location
  C:\ClusterStorage\CSV-01\Infra-S...
- Automatic Start Action
  Restart if previously running
- Automatic Stop Action
  Save

Processor

You can modify the number of virtual processors based on the number of processors on the physical machine. You can also modify other resource control settings.

Number of logical processors: 4

More about virtual processors

Resource control

You can use resource controls to balance resources among virtual machines.

Virtual machine reserve (percentage): 0

Percent of total system resources: 0

Virtual machine limit (percentage): 100

Percent of total system resources: 16

Relative weight: 100

More about resource control

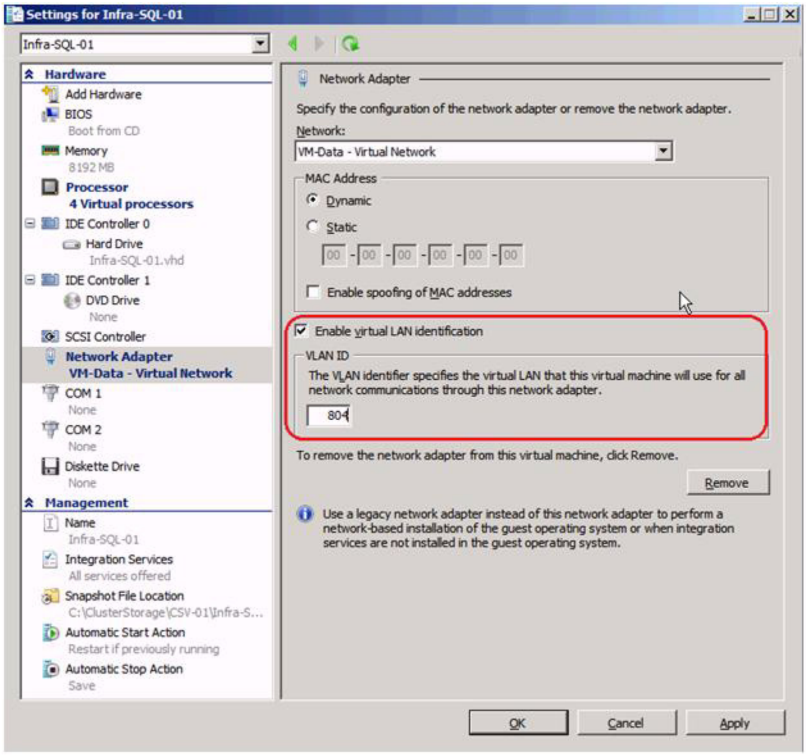
Processor compatibility

You can limit the processor features that a virtual machine can use. This improves the virtual machine's compatibility with different processor versions and older guest operating systems. Select the scenarios you want to enable:

☐ Migrate to a physical computer with a different processor version

☐ Run an older operating system, such as Windows NT

Configure Virtual LAN Identification



Settings for Infra-SQL-01

Infra-SQL-01

Hardware
- Add Hardware
- BIOS
  Boot from CD
- Memory
  8192 MB
- Processor
  4 Virtual processors
- IDE Controller 0
  - Hard Drive
    Infra-SQL-01.vhd
- IDE Controller 1
  - DVD Drive
    None
- SCSI Controller
- Network Adapter
  VM-Data - Virtual Network
- COM 1
  None
- COM 2
  None
- Diskette Drive
  None

Management
- Name
  Infra-SQL-01
- Integration Services
  All services offered
- Snapshot File Location
  C:\ClusterStorage\CSV-01\Infra-S...
- Automatic Start Action
  Restart if previously running
- Automatic Stop Action
  Save

Network Adapter

Specify the configuration of the network adapter or remove the network adapter.

Network:
VM-Data - Virtual Network

MAC Address

● Dynamic

○ Static

00 - 00 - 00 - 00 - 00 - 00

☐ Enable spoofing of MAC addresses

☑ Enable virtual LAN identification

VLAN ID

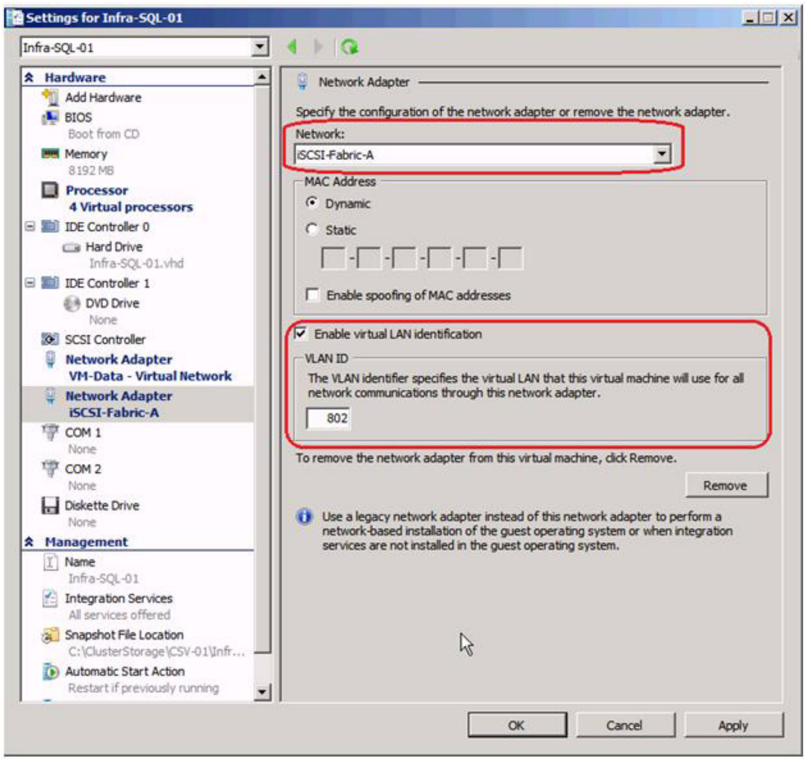
The VLAN identifier specifies the virtual LAN that this virtual machine will use for all network communications through this network adapter.

804

To remove the network adapter from this virtual machine, click Remove.

Use a legacy network adapter instead of this network adapter to perform a network-based installation of the guest operating system or when integration services are not installed in the guest operating system.

Add iSCSI Fabric A Interface



Settings for Infra-SQL-01

Infra-SQL-01

Hardware
- Add Hardware
- BIOS: Boot from CD
- Memory: 8192 MB
- Processor: 4 Virtual processors
- IDE Controller 0
  - Hard Drive: Infra-SQL-01.vhd
- IDE Controller 1
  - DVD Drive: None
- SCSI Controller
- Network Adapter: VM-Data - Virtual Network
- Network Adapter: iSCSI-Fabric-A
- COM 1: None
- COM 2: None
- Diskette Drive: None

Management
- Name: Infra-SQL-01
- Integration Services: All services offered
- Snapshot File Location: C:\ClusterStorage\CSV-01\Infr...
- Automatic Start Action: Restart if previously running

Network Adapter

Specify the configuration of the network adapter or remove the network adapter.

Network: iSCSI-Fabric-A

MAC Address
- ● Dynamic
- ○ Static

□ Enable spoofing of MAC addresses

☑ Enable virtual LAN identification

VLAN ID

The VLAN identifier specifies the virtual LAN that this virtual machine will use for all network communications through this network adapter.

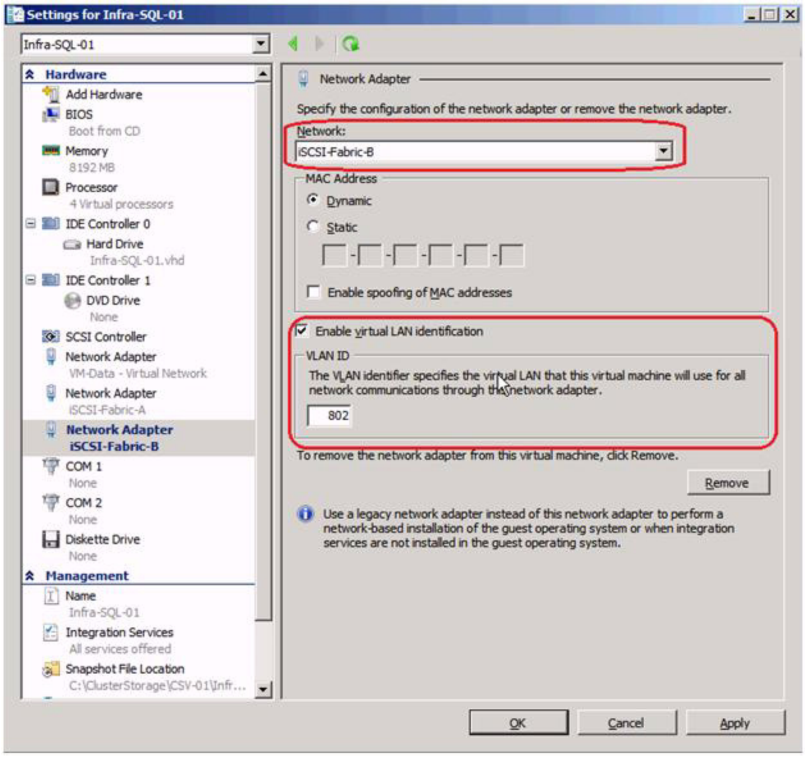
802

To remove the network adapter from this virtual machine, click Remove.

Remove

Use a legacy network adapter instead of this network adapter to perform a network-based installation of the guest operating system or when integration services are not installed in the guest operating system.

Add iSCSI Fabric B Interface



Settings for Infra-SQL-01

Infra-SQL-01

Hardware
- Add Hardware
- BIOS: Boot from CD
- Memory: 8192 MB
- Processor: 4 Virtual processors
- IDE Controller 0
  - Hard Drive: Infra-SQL-01.vhd
- IDE Controller 1
  - DVD Drive: None
- SCSI Controller
- Network Adapter: VM-Data - Virtual Network
- Network Adapter: iSCSI-Fabric-A
- Network Adapter: iSCSI-Fabric-B
- COM 1: None
- COM 2: None
- Diskette Drive: None

Management
- Name: Infra-SQL-01
- Integration Services: All services offered
- Snapshot File Location: C:\ClusterStorage\CSV-01\Infr...

Network Adapter

Specify the configuration of the network adapter or remove the network adapter.

Network: iSCSI-Fabric-B

MAC Address
- ● Dynamic
- ○ Static

□ Enable spoofing of MAC addresses

☑ Enable virtual LAN identification

VLAN ID

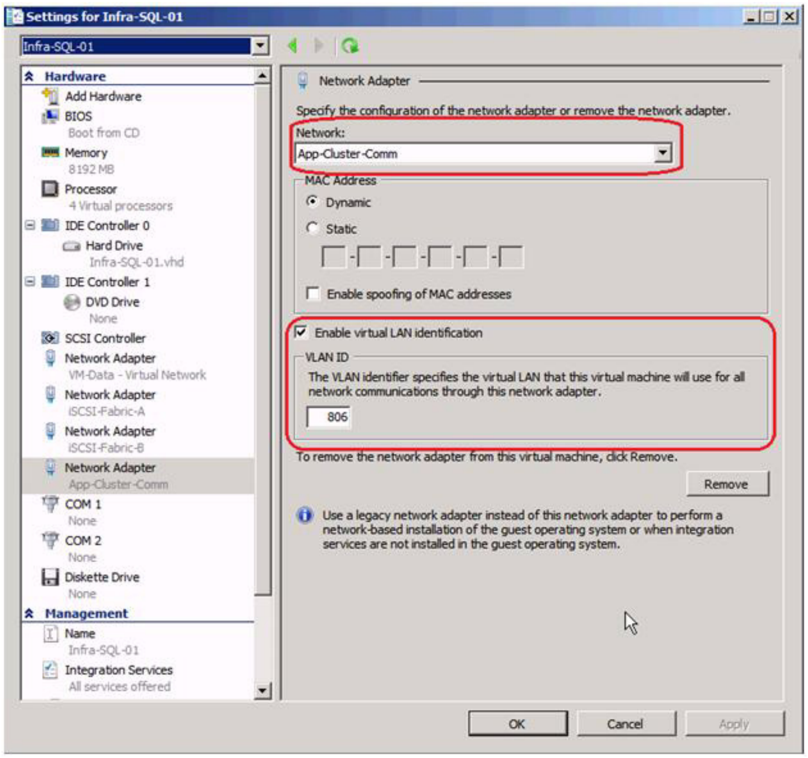
The VLAN identifier specifies the virtual LAN that this virtual machine will use for all network communications through this network adapter.

802

To remove the network adapter from this virtual machine, click Remove.

Remove

Use a legacy network adapter instead of this network adapter to perform a network-based installation of the guest operating system or when integration services are not installed in the guest operating system.



Settings for Infra-SQL-01

Network Adapter

Specify the configuration of the network adapter or remove the network adapter.

Network: App-Cluster-Comm

MAC Address

● Dynamic

○ Static

□ Enable spoofing of MAC addresses

☑ Enable virtual LAN identification

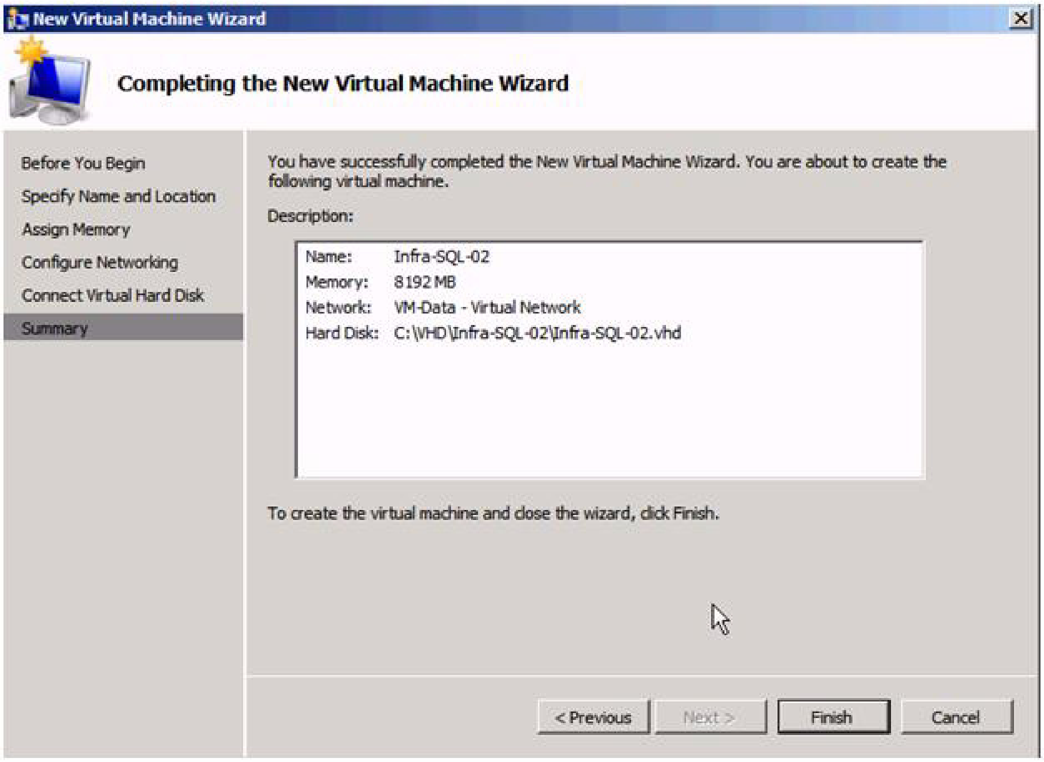
VLAN ID

The VLAN identifier specifies the virtual LAN that this virtual machine will use for all network communications through this network adapter.

806

To remove the network adapter from this virtual machine, click Remove.

Use a legacy network adapter instead of this network adapter to perform a network-based installation of the guest operating system or when integration services are not installed in the guest operating system.



New Virtual Machine Wizard

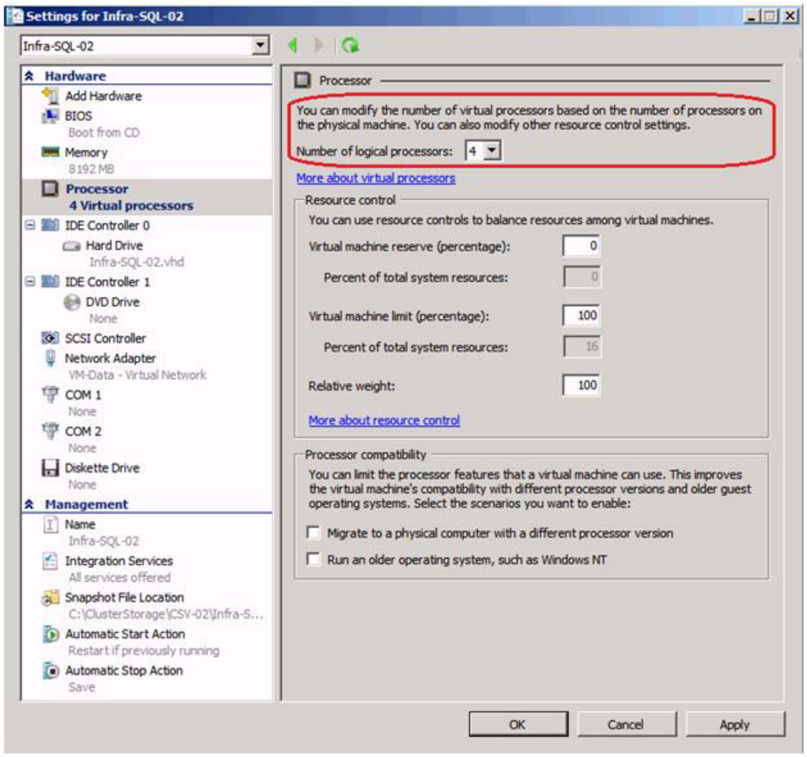
Completing the New Virtual Machine Wizard

You have successfully completed the New Virtual Machine Wizard. You are about to create the following virtual machine.

Description:

Name: Infra-SQL-02
Memory: 8192 MB
Network: VM-Data - Virtual Network
Hard Disk: C:\VHD\Infra-SQL-02\Infra-SQL-02.vhd

To create the virtual machine and close the wizard, click Finish.



Processor

You can modify the number of virtual processors based on the number of processors on the physical machine. You can also modify other resource control settings.

Number of logical processors: 4

More about virtual processors

Resource control

You can use resource controls to balance resources among virtual machines.

Virtual machine reserve (percentage): 0

Percent of total system resources: 0

Virtual machine limit (percentage): 100

Percent of total system resources: 16

Relative weight: 100

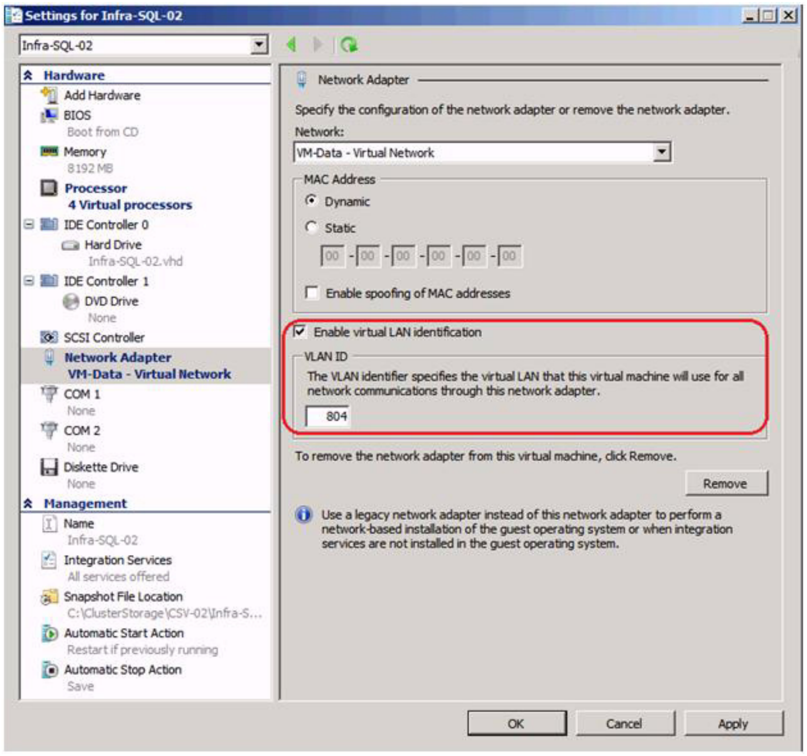
More about resource control

Processor compatibility

You can limit the processor features that a virtual machine can use. This improves the virtual machine's compatibility with different processor versions and older guest operating systems. Select the scenarios you want to enable:

☐ Migrate to a physical computer with a different processor version

☐ Run an older operating system, such as Windows NT



Network Adapter

Specify the configuration of the network adapter or remove the network adapter.

Network: VM-Data - Virtual Network

MAC Address

● Dynamic

○ Static

00 - 00 - 00 - 00 - 00 - 00

☐ Enable spoofing of MAC addresses

☑ Enable virtual LAN identification

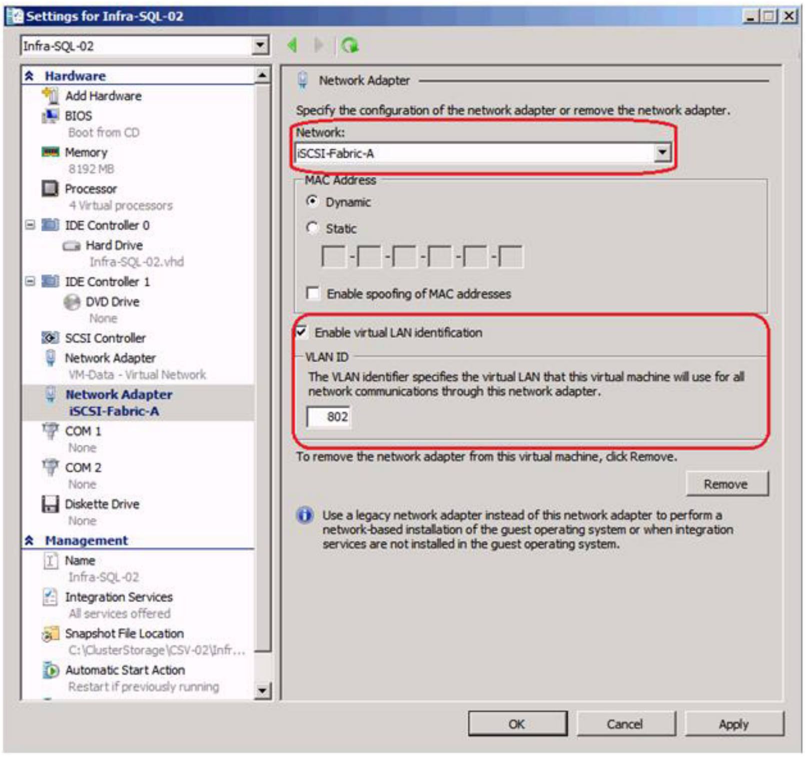
VLAN ID

The VLAN identifier specifies the virtual LAN that this virtual machine will use for all network communications through this network adapter.

804

To remove the network adapter from this virtual machine, click Remove.

Use a legacy network adapter instead of this network adapter to perform a network-based installation of the guest operating system or when integration services are not installed in the guest operating system.



Settings for Infra-SQL-02

Network Adapter

Specify the configuration of the network adapter or remove the network adapter.

Network: iSCSI-Fabric-A

MAC Address

● Dynamic

○ Static

☐ Enable spoofing of MAC addresses

☑ Enable virtual LAN identification

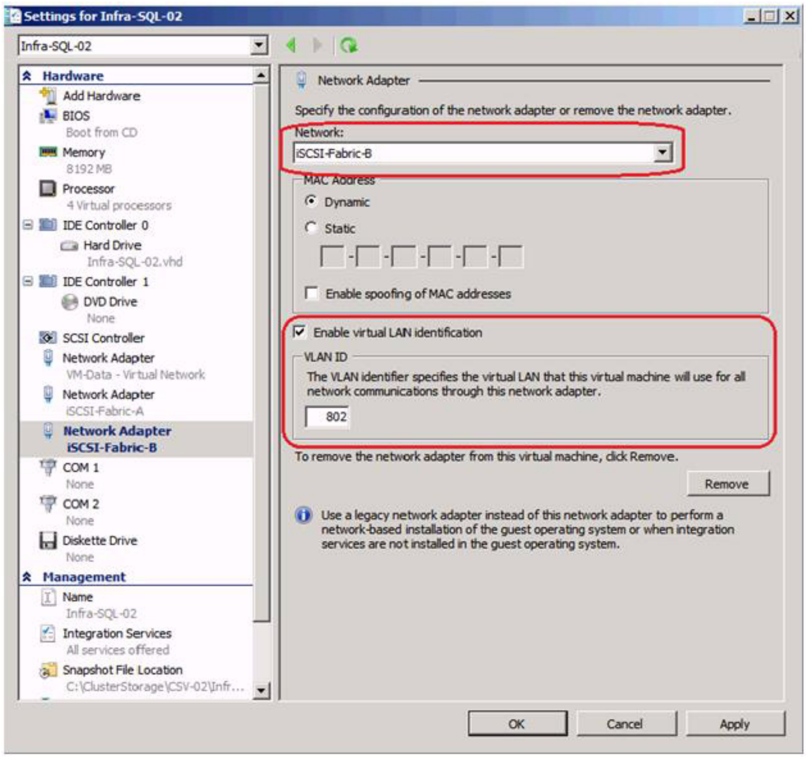
VLAN ID

The VLAN identifier specifies the virtual LAN that this virtual machine will use for all network communications through this network adapter.

802

To remove the network adapter from this virtual machine, click Remove.

Use a legacy network adapter instead of this network adapter to perform a network-based installation of the guest operating system or when integration services are not installed in the guest operating system.



Settings for Infra-SQL-02

Network Adapter

Specify the configuration of the network adapter or remove the network adapter.

Network: iSCSI-Fabric-B

MAC Address

● Dynamic

○ Static

☐ Enable spoofing of MAC addresses

☑ Enable virtual LAN identification

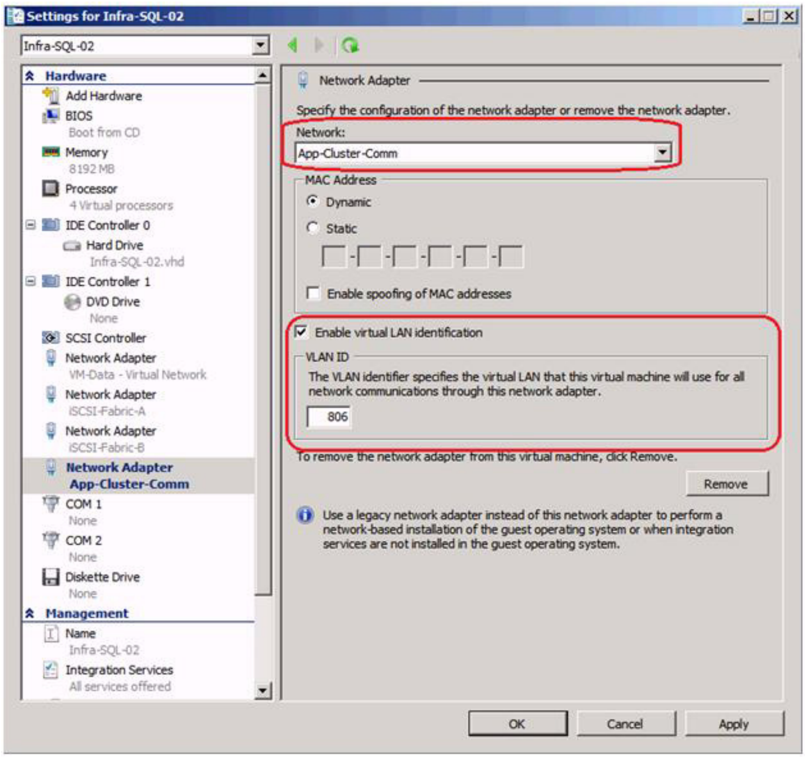
VLAN ID

The VLAN identifier specifies the virtual LAN that this virtual machine will use for all network communications through this network adapter.

802

To remove the network adapter from this virtual machine, click Remove.

Use a legacy network adapter instead of this network adapter to perform a network-based installation of the guest operating system or when integration services are not installed in the guest operating system.



Network Adapter

Specify the configuration of the network adapter or remove the network adapter.

Network: App-Cluster-Comm

MAC Address

● Dynamic

○ Static

□ Enable spoofing of MAC addresses

☑ Enable virtual LAN identification

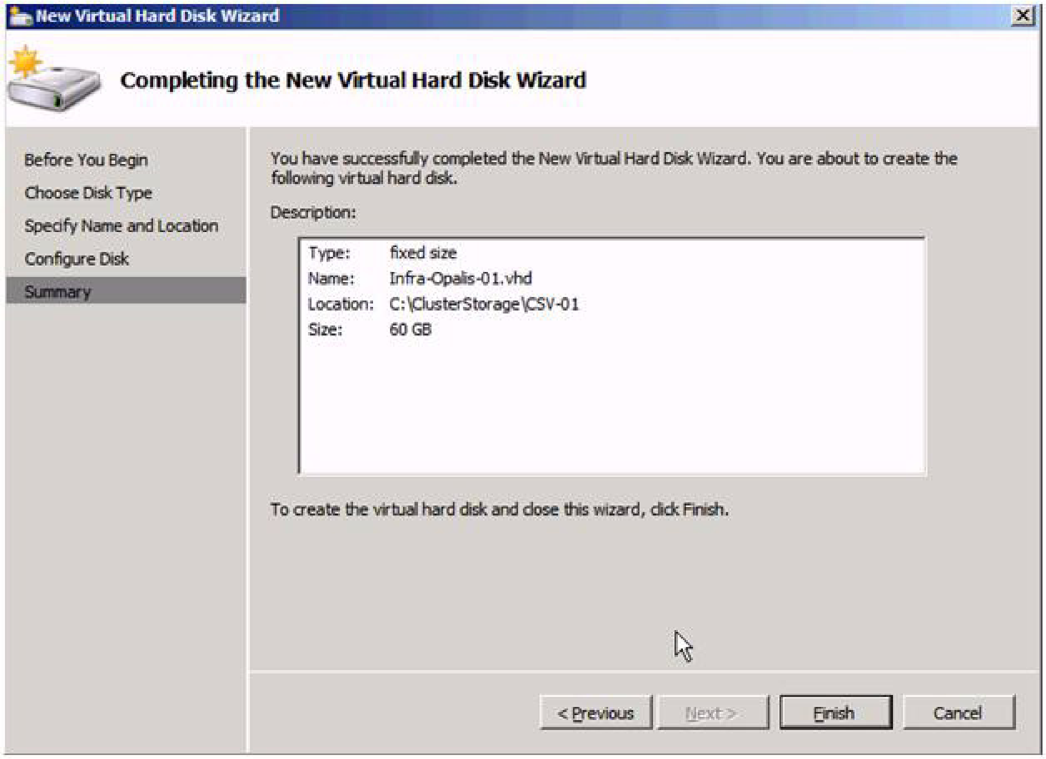
VLAN ID

The VLAN identifier specifies the virtual LAN that this virtual machine will use for all network communications through this network adapter.

806

To remove the network adapter from this virtual machine, click Remove.

Use a legacy network adapter instead of this network adapter to perform a network-based installation of the guest operating system or when integration services are not installed in the guest operating system.



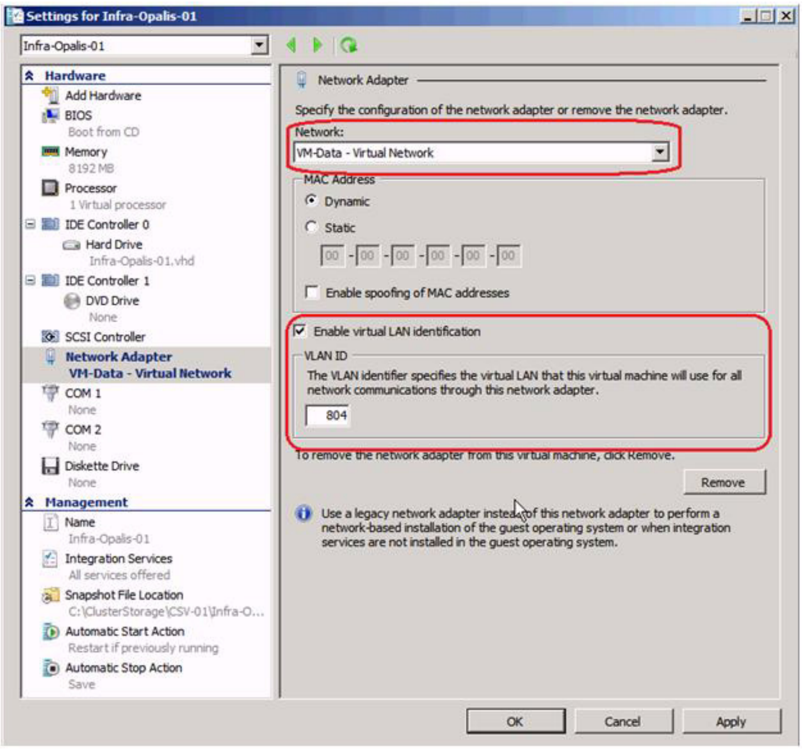
Completing the New Virtual Hard Disk Wizard

You have successfully completed the New Virtual Hard Disk Wizard. You are about to create the following virtual hard disk.

Description:

Type: fixed size
Name: Infra-Opalis-01.vhd
Location: C:\ClusterStorage\CSV-01
Size: 60 GB

To create the virtual hard disk and close this wizard, click Finish.



Settings for Infra-Opalis-01

Infra-Opalis-01

Hardware

- Add Hardware
- BIOS: Boot from CD
- Memory: 8192 MB
- Processor: 1 Virtual processor
- IDE Controller 0
  - Hard Drive: Infra-Opalis-01.vhd
- IDE Controller 1
  - DVD Drive: None
- SCSI Controller
- Network Adapter: VM-Data - Virtual Network
- COM 1: None
- COM 2: None
- Diskette Drive: None

Management

- Name: Infra-Opalis-01
- Integration Services: All services offered
- Snapshot File Location: C:\ClusterStorage\CSV-01\Infra-O...
- Automatic Start Action: Restart if previously running
- Automatic Stop Action: Save

Network Adapter

Specify the configuration of the network adapter or remove the network adapter.

Network: VM-Data - Virtual Network

MAC Address

● Dynamic

○ Static

00 - 00 - 00 - 00 - 00 - 00

□ Enable spoofing of MAC addresses

☑ Enable virtual LAN identification

VLAN ID

The VLAN identifier specifies the virtual LAN that this virtual machine will use for all network communications through this network adapter.

804

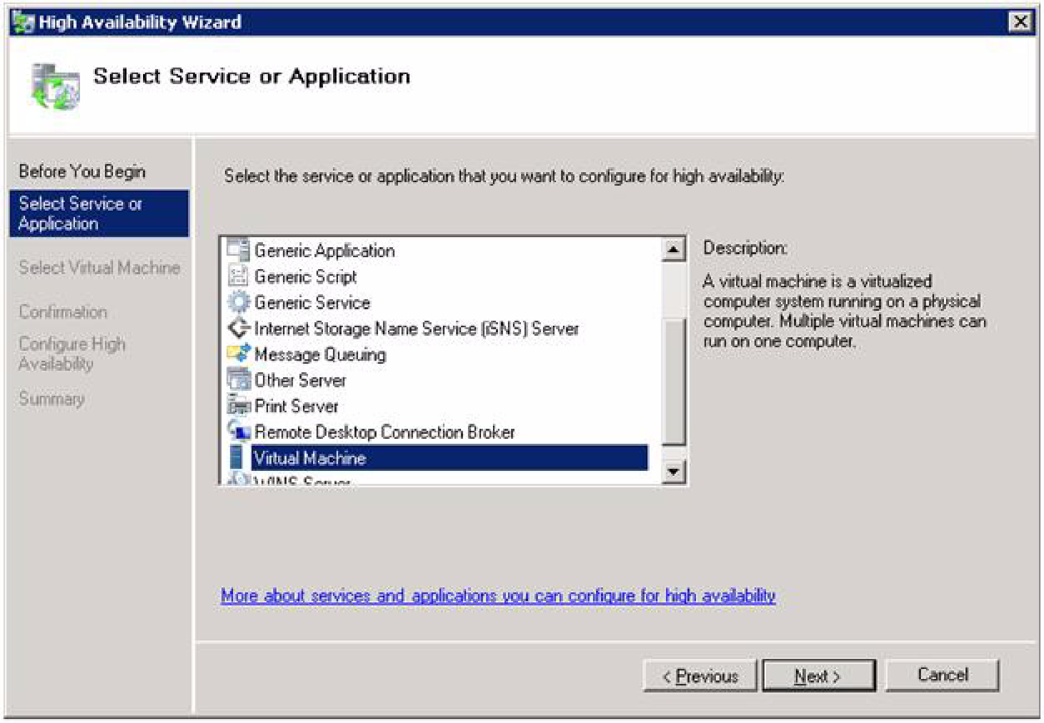
To remove the network adapter from this virtual machine, click Remove.

Use a legacy network adapter instead of this network adapter to perform a network-based installation of the guest operating system or when integration services are not installed in the guest operating system.

Create a Clustered Application or Service

1. Navigate to **Failover Cluster Manager** and select the cluster name in the left pane.
2. Click **Configure a Service or Application** in the right pane.
3. Scroll down to select **Virtual Machine** and click **Next**.
4. Select the Virtual Machines to cluster and click **Next**.
   - Infra-SCOM-01
   - Infra-SCVMM-01
   - Infra-OPALIS-01

Note Do not select the SQL Server or Domain Controller virtual machines. These virtual machines are not clustered.



High Availability Wizard
Select Service or Application
Before You Begin
Select Service or Application
Select Virtual Machine
Confirmation
Configure High Availability
Summary

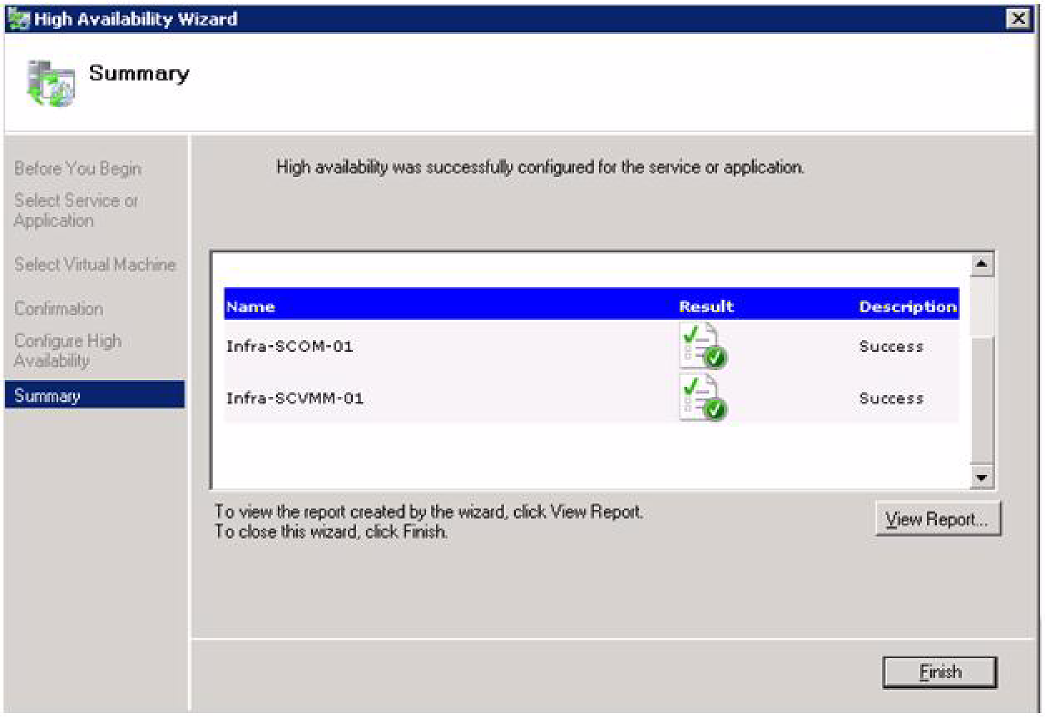
Select the service or application that you want to configure for high availability:

- Generic Application
- Generic Script
- Generic Service
- Internet Storage Name Service (iSNS) Server
- Message Queuing
- Other Server
- Print Server
- Remote Desktop Connection Broker
- Virtual Machine
- WINS Server

Description:

A virtual machine is a virtualized computer system running on a physical computer. Multiple virtual machines can run on one computer.

More about services and applications you can configure for high availability
< Previous
Next >
Cancel

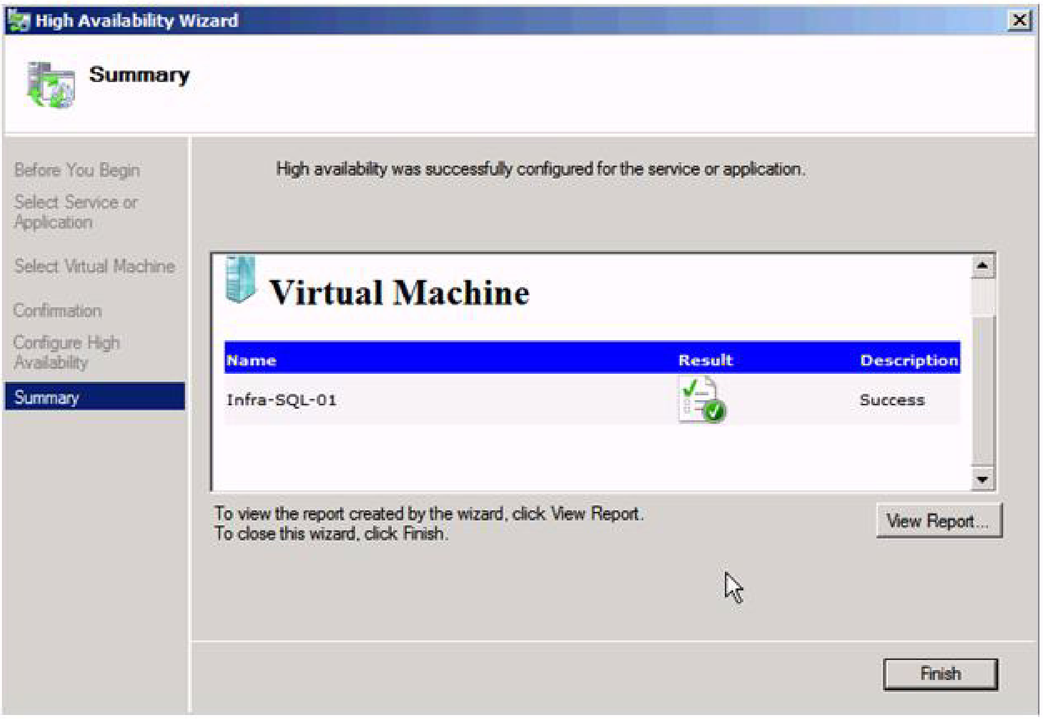


High Availability Wizard
Summary
Before You Begin
Select Service or Application
Select Virtual Machine
Confirmation
Configure High Availability
Summary

High availability was successfully configured for the service or application.

Name	Result	Description
Infra-SCOM-01	✓	Success
Infra-SCVMM-01	✓	Success

To view the report created by the wizard, click View Report.
To close this wizard, click Finish.

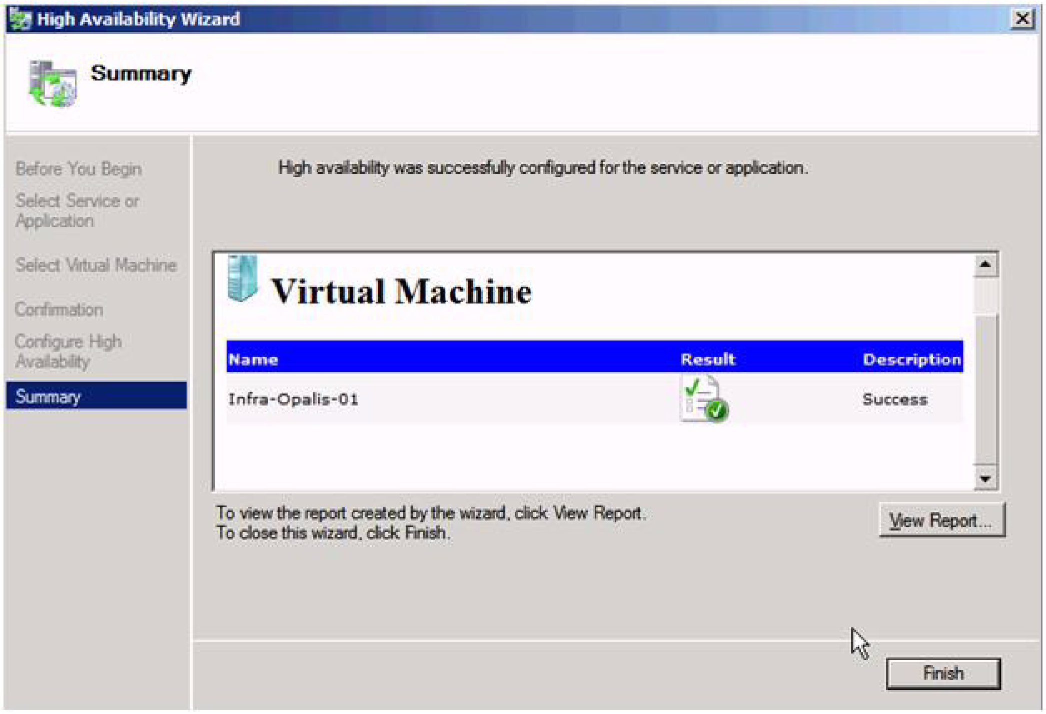


High availability was successfully configured for the service or application.

Virtual Machine

Name	Result	Description
Infra-SQL-01	✓	Success

To view the report created by the wizard, click View Report.
To close this wizard, click Finish.



High availability was successfully configured for the service or application.

Virtual Machine

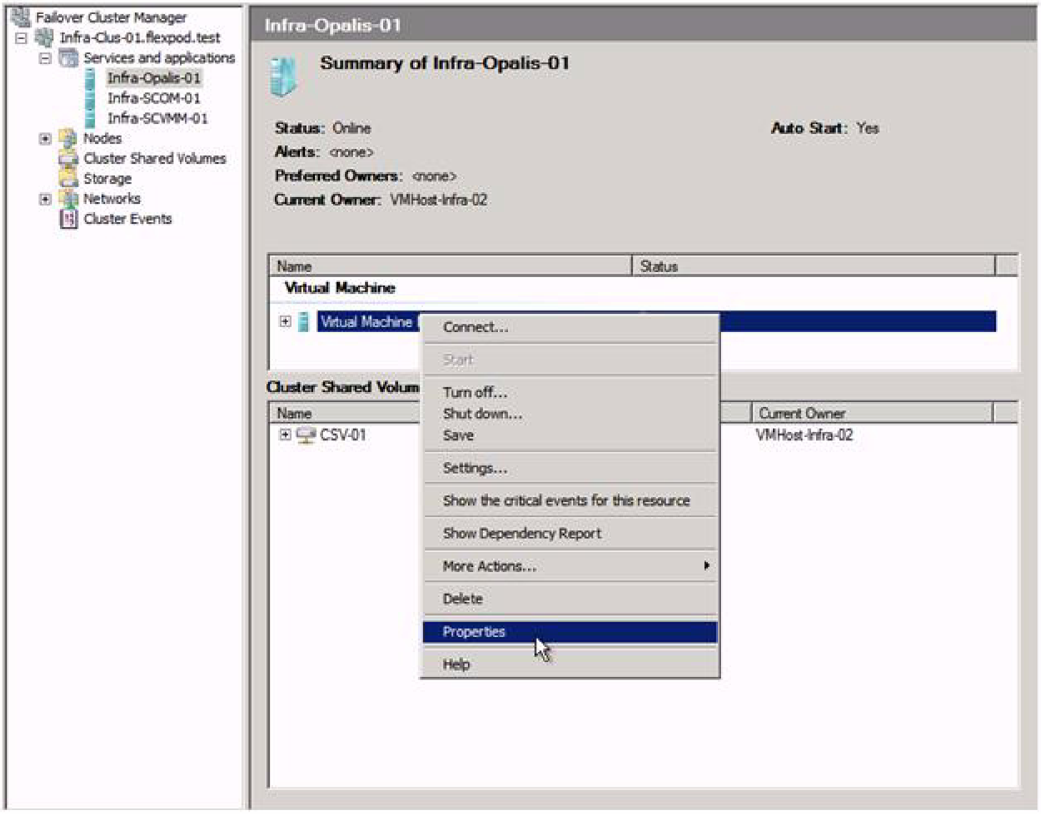
Name	Result	Description
Infra-Opalis-01	✓	Success

To view the report created by the wizard, click View Report.
To close this wizard, click Finish.

Configure Live Migration Network for the Virtual Machines

1. Navigate to any clustered virtual machine under Services and applications object in the left pane.

2. Right-click on the **virtual machine** in the center pane and select **Properties**.
3. Clear the checkbox for all networks except the Live Migration network.
4. Click **OK** to accept the settings.



Summary of Infra-Opalis-01

Status: Online

Auto Start: Yes

Alerts: <none>

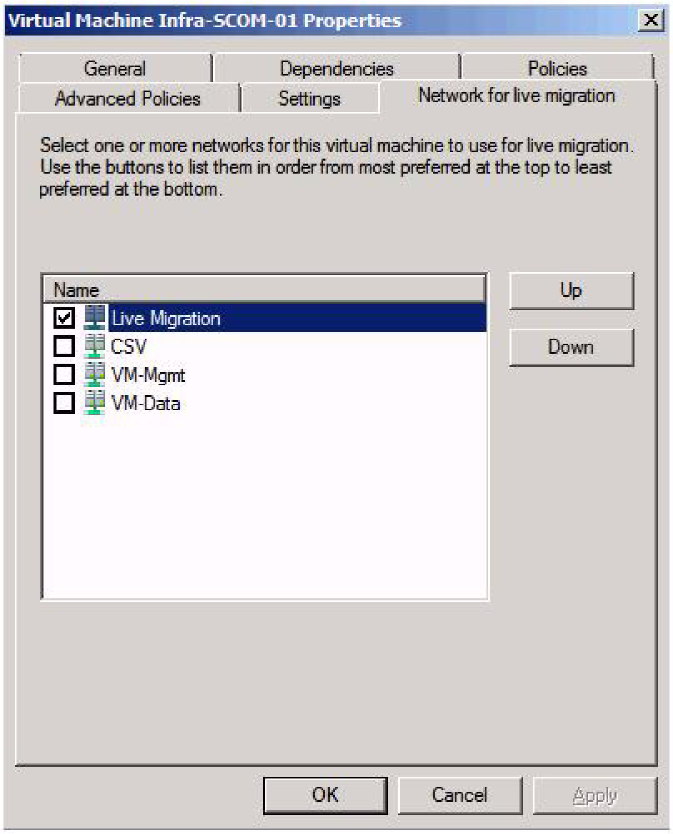
Preferred Owners: <none>

Current Owner: VMHost-Infra-02

Name	Status
Virtual Machine	
Virtual Machine	

Cluster Shared Volum

Name	Current Owner
CSV-01	VMHost-Infra-02


Virtual Machine Infra-SCOM-01 Properties
General
Dependencies
Policies
Advanced Policies
Settings
Network for live migration

Select one or more networks for this virtual machine to use for live migration. Use the buttons to list them in order from most preferred at the top to least preferred at the bottom.

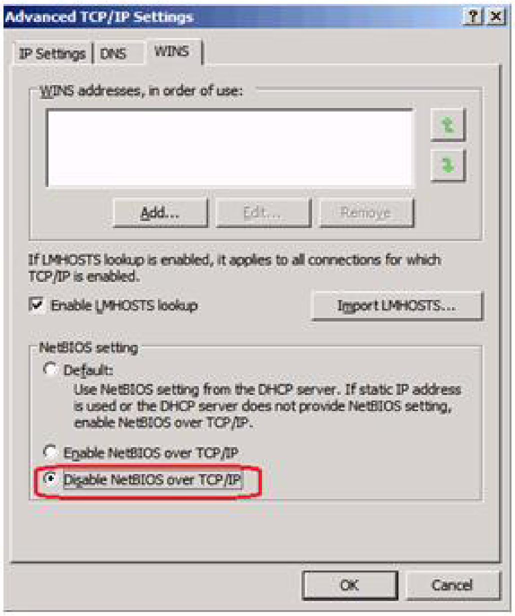
Name
☑ Live Migration
□ CSV
□ VM-Mgmt
□ VM-Data

Optional Optimization for CSV and Live Migration Networks

Disable NetBios Over TCP/IP for the CSV Network

1. Open **Network Connections**.
2. Right-click on the **CSV Network adapter** and select **Properties**.
3. Select **Internet Protocol Version 4 (TCP/IP**) and click **Properties**.
4. Click **Advanced**.

5. Select the option **Disable NetBios over TCP/IP** and click **OK**.



WINS addresses, in order of use:

If LMHOSTS lookup is enabled, it applies to all connections for which TCP/IP is enabled.

☑ Enable LMHOSTS lookup

NetBIOS setting

○ Default:
Use NetBIOS setting from the DHCP server. If static IP address is used or the DHCP server does not provide NetBIOS setting, enable NetBIOS over TCP/IP.

○ Enable NetBIOS over TCP/IP

● Disable NetBIOS over TCP/IP

Installing Highly Available Microsoft System Center Components

Installing Clustered Microsoft SQL Server 2008

The main management component is a clustered Microsoft SQL Server® with two dedicated SQL Server instances. The f iSCSI LUNs listed in Table 20 are required.

Table 20 QL Server data locations

LUN	Purpose	Scope	Size
LUN 1, iSCSI	SQL Server databases	Per instance	Varies
LUN 2, iSCSI	SQL Server logging	Per instance	Varies
LUN 3, iSCSI	SQL Server cluster quorum	Per cluster	1GB
LUN 4, iSCSI	SQL Server DTC	Per cluster	1GB
LUN 5, iSCSI	SQL Data Warehouse database	Per instance	Varies
LUN 6, iSCSI	SQL Data Warehouse logging	Per instance	Varies

When the infrastructure has been completely deployed, deploy the following databases and instances.

Table 21 Databases

DB Client	Instance Name	DB name	Authentication
VMM SSP	<Instance 1>	<SCVMMSSP>	Win Auth
Ops Mgr	<Instance 1>	<Ops Mgr_DB>	Win Auth
Ops Mgr	<Instance 2>	<Ops Mgr_DW_DB>	Win Auth
VMM	<Instance 1>	<VMM_DB>	Win Auth
Opalis	<Instance 2>	<Opalis_DB	Win Auth

This section provides step-by-step instructions for installing SQL Server 2008.

For detailed installation help, reference the Setup Help file included with the SQL Server download or product DVD.

Active Directory Preparation

1. Create three domain user accounts to perform the following actions.

Note These accounts require no special delegation: SQL Server Agent (ex. SQLAgent), SQL Server DB Engine (for example, SQLDatabase), and Snap Drive User (for example, SnapDrive).

2. Global Security group for the System Center SQL Server Administrators.
3. Add the **<SQL Server Agent>** and **<SQL Server DB Engine>** to the **< System Center SQL Server Administrators >** group.

Configure Windows Failover Cluster for the SQL Server

1. Install Windows Server 2008 R2 SP1Enterprise in the SQL server virtual machines.
2. Update Windows Server with the latest available updates.
3. Install antivirus software and configure according to the guidelines provided in Knowledge Base article ID 961804 on the Microsoft Support Web site.
4. Log in and add the **<SnapDrive>** account and the **<System Center SQL Server Administrators>** group to the local administrator group.
5. Log in using the account from **<SnapDrive>**.
6. Enable the ISCSI Initiator by clicking **Start > Administrative Tools > iSCSI initiator**. Click **Yes** to start the Microsoft iSCSI service.
7. Click **OK** to close the iSCSI Initiator Properties Panel.
8. Install all the prerequisites software from the sections below.

Windows Features

1. Open **Server Manager** and select **Features**.
2. Click the **Add Features** link launching the Add Features wizard.
3. Expand **.NET Framework 3.5.1 Features**.

4. Select the **.NET Framework 3.5.1 Feature**.
5. Select the **Failover Clustering** feature.
6. Select the **Multipath I/O** feature.
7. Click **Next > Install**.

NetApp SnapDrive 6.4

1. Download **NetApp SnapDrive 6.4**.
2. Install Microsoft Hotfixes **KB2494016-x64**, **KB2520235-x64**, and **KB2531907-x64**.
3. Launch the SnapDrive Installer, click **Next**, and accept the EULA and click **Next**.
4. Select the **Storage based Licensing method** and click **Next**.
5. Enter your User Name, and Organization information, and click **Next**.
6. Enter the account information for the **<SnapDrive >** account created earlier.
7. Click **Next**.
8. Click **Next** and then select the **Enable Transport Protocol Settings** Option.
9. Select **HTTPS**.
10. Enter the user name and password for the Storage System administrative account.
11. Click **Next > Next > Next > Install > Finish**.

NetApp DSM MPIO 3.5

1. Download the NetApp DSM MPIO 3.5 package from the NetApp Support site.
2. Install Microsoft Hotfixes **KB2522766-x64** and **KB2528357-v2-x64**. A reboot is required after each Hotfix.
3. Launch the **DSM MPIO Installer**.
4. Click **Next**, then click **OK** to acknowledge the EULA requirement.
5. Accept the EULA and click **Next**.
6. Enter the **DSM License Key** and click **Next**.
7. Retain the system account selected and click **Next**.
8. Click **Next**, then **Next** again then **Install**. Restart the system when the installation completes.

Set Firewall Exceptions

1. Open Windows Firewall with Advanced Security by clicking S**tart > Administrative Tools > Windows Firewall with Advanced Security**.

SnapDrive

1. Highlight **Inbound Rules** and click **New Rule**.
2. Select **Program** and click **Next**.

3. Enter the program path for the SnapDrive service for example, %ProgramFiles%\NetApp\SnapDrive\SWSvc.exe.
4. Click **Next**, then select **Allow the Connection** and click **Next**, then **Next** again.
5. Enter the rule Name **<SnapDrive>** and Description and click **Finish**.

SQL Server

1. Click **New Rule**.
2. Select **Port** and click **Next**.
3. Select **TCP** and enter the Specific local port **1433**. Click **Next**.
4. Select **Allow the connection** and click **Next** then **Next** again.
5. Give a rule Name **<SQL Server>** and Description and click **Finish**.
6. Repeat for the Data warehouse SQL Server instance using a port of your specification (for example, 1444).

SQL Server Discovery

1. Click **New Rule**.
2. Select **Port** and click **Next**.
3. Select **TCP** and enter the Specific local port **445**. Click **Next**.
4. Select **Allow the connection** and click **Next**, then click **Next** again.
5. Give a rule Name **<SQL Server Discovery>** and Description and click **Finish**.

Enable Jumbo Frames for iSCSI NICs in SQL Cluster Virtual Machines

1. Open **Network Connections**.
2. Right-click on the **iSCSI-Fabric-A Network** adapter and click **Properties** and then click the **Configure** button.
3. Select **Advanced** tab.

Note Select Jumbo Packet in the Property list box and set the value to 9014 Bytes. The 9014 Byte value in this dialog box is the correct Hyper-V synthetic adapter setting for UCS, Nexus and FAS array MTU setting of 9000 Bytes.

4. Repeat steps 2 through 4 for the second iSCSI Adapter.

Configure the SQL Server Cluster

1. Log in to **node 1** using a domain administrative account with local privileges.
2. Open **Server Manager** and browse to **Features > Failover Cluster Manager**.
3. Validate cluster feasibility:
   a. Select **Validate a Configuration**, then click **Next**.

b. Add both nodes one at a time into the Enter Name text field and click **Next**.

c. Select **Run only tests I select** and click **Next**.

d. Scroll down to the storage section and clear all the storage related checkboxes.

Note These will run after you attach your iSCSI storage.

e. Click **Next > Next**.

f. Review the report and resolve any issues found by the validation wizard before continuing.

g. Click **Finish**.

4. Create a majority node cluster:

   a. In the **Failover Cluster Manager**, select **Create a Cluster**.

   b. In the Welcome screen, click **Next**.

   c. Add both nodes one at a time into the Enter Name text field and click **Next**.

   d. Select **Yes** to run all validation tests and click **Next**, then **Next** again.

   e. Select **Run all test** and click **Next**, then **Next** again.

   f. Click **Finish**. At this time you may safely ignore any warnings or errors related to clustered disks.

   g. Enter the Cluster Name, Cluster IP, and click **Next**.

   h. Review the configuration and click **Next**, then click **Finish**.

5. Provision cluster storage:

   a. Log in to **node 1** using a domain administrative account with local privileges.

   b. Establish iSCSI Connections. Log in to the cluster host server and open **SnapDrive**. Browse to iSCSI Management within SnapDrive. Click **Establish iSCSI Session**.

   c. Enter the IP or name of the vFiler0 instance NetApp controller. Click **Next**.

   d. Select the source and destination IP addresses associated with iSCSI network A.

   e. If CHAP authentication is required configure it at this time, then click **Next**.

   f. Review for accuracy and click **Finish**.

   g. Repeat steps i-v for iSCSI network B.

   h. Repeat for NetApp Controller B.

6. Create quorum:

   a. Log in to the cluster host server and open **SnapDrive**.

   b. Select **Disks** and click **Create Disk**.

   c. In the Welcome screen click **Next**.

   d. Enter the IP/FQDN for the Storage Controller and click **Add**.

   e. When enumeration has completed, select the target volume where you intend to add the LUN.

   f. Add a LUN Name, LUN Description and click **Next**.

   g. Select **Shared (Microsoft Cluster Services only)** and click **Next**.

   h. Verify both nodes are shown for your cluster and click **Next**.

   i. Select **Assign a Drive Letter** and pick a drive letter.

   j. Set the LUN Size to the size designated earlier, click **Next** then **Next** again.

   k. Highlight each node in the Cluster and select the iSCSI initiators to map the new LUN.

   l. Click **Next**, then Select **Automatic** and click **Next**.

   m. Make sure that **Select a cluster group by this node** is selected.

   n. Select the Cluster Group name and click **Next** and then click **Finish**.

   o. Repeat for SQL and Data Warehouse Server Data and SQL and Data Warehouse Server Log LUNs.

7. Create data LUNs (DTC):

   a. Log in to the cluster host server and open **SnapDrive**.

   b. Select **Disks** and click **Create Disk**.

   c. In the Welcome screen click **Next**.

   d. Enter the IP/FQDN for the Storage Controller and click **Add**.

   e. When the enumeration has completed, select the target volume where you intend to add the LUN.

   f. Add a LUN Name and LUN Description. Click **Next**.

   g. Select **Shared (Microsoft Cluster Services only)** and click **Next**.

   h. Verify both nodes are shown for your cluster and click **Next**.

   i. Select **Assign a Drive Letter** and pick a drive letter.

   j. Set the LUN Size to the size designated earlier, click **Next**, then **Next** again.

   k. Highlight each node in the Cluster, and select the iSCSI initiators to map the new LUN.

   l. Click **Next** then select **Automatic** and click **Next**.

   m. Make sure that **Select a cluster group by this node** is selected.

   n. Select the **Available Storage** group name. Click **Next** then click **Finish**.

   o. Repeat these steps for all remaining LUNs.

8. Change cluster quorum settings:

   a. From the node that currently owns the cluster open Failover Cluster Manager.

   b. Right-click the virtual cluster name for the cluster you built earlier, and select **More Actions > Configure Cluster Quorum Settings**.

   c. In the Before You Begin screen, click **Next**.

   d. Select **Node** and **Disk Majority** and click **Next**.

   e. Select the **Quorum** disk and click **Next**.

   f. Review the confirmation for accuracy and click **Next** then click **Finish**.

9. Validate cluster (from the node that currently owns the cluster):

   a. Open **Failover Cluster Manager** and right-click the virtual cluster name for the cluster you built earlier and select **Validate This Cluster**.

   b. Click **Next**, then select **Run All Tests** and click **Next**.

   c. Review the report and resolve any issues found by the validation wizard before continuing.

   d. Click **Finish**.

10. Create MSTC resource:

a. From the Node that currently owns the cluster open **Failover Cluster Manager**.

b. Open the virtual cluster name for the cluster you created earlier, and select **Services** and **applications**.

c. From the actions pane, select **Configure a Service or Application**, then click **Next**.

d. Select **Distributed Transaction Coordinator (DTC)** and click **Next**.

e. Confirm the Name of the new resource, enter a IP Address and click **Next**.

f. Select the DTC Drive provisioned earlier and click **Next**.

g. Verify the configuration and click **Next** to create resource, and click **Finish**.

h. Rename the cluster networks according to purpose. For example, VM-Data, iSCSI-A.

i. Right-click on the two iSCSI networks and select **Properties**.

j. Select the radio button to **Do not allow cluster network communication on this network**.

k. Click **OK**.

Install SQL Server 2008 Cluster

Step 1 Installing SQL Server on Node 1

1. Log in to **Node 1** using a domain account with local administrator privileges.
2. Download **SQL Server 2008 Service Pack 1**.
3. Extract the Service Pack on to the SQL Server Drive by running the following command:

```
SQLServer2008R2SP1-KB252858-x64-ENU.exe /x:C:\SP1
```

4. Install the SQL Server Setup support Files by running the following command:

```
C:\SP1\1033_enu_lp\x64\setup\sqlsupport_msi\sqlsupport.msi
```

5. Click **Next**, accept the License Agreement, then click **Next**.
6. Enter the Name and Company information and click **Next**, click **Install**, then click **Finish**.
7. From a command prompt launch the **setup.exe** from the SQL Server 2008 DVD by running the following command:

```
<DVD Drive Letter>:\Setup.exe /PCUSource=C:\SP1
```

8. Acknowledge any compatibility warnings. Click **Installation**.
9. Select **Installation**, **New SQL Server failover cluster installation**.
10. Acknowledge any compatibility warnings. Click **OK**.
11. Resolve any failed prerequisite checks and click **OK**.
12. Click **Install** to install setup support files.
13. Resolve any support rule errors and click **Next**.
14. Enter your **Product key** and click **Next**.
15. Accept the Microsoft Software License Terms. Click **Next**.
16. Feature selection:

    l. Under Instance features, select the following:

    m. Instance Features

n. Database Engine Services

o. Shared Features

p. Management Tools - Basic

q. Change the Shared feature directory and the shared feature directory (x86) to point to the HD designated for SQL Server.

r. Click **Next**.

17. Enter the SQL Server Network Name.

18. Select **Default instance**. Change the Instance root directory to point to the SQL Server HD. Click **Next**.

19. In the Disk Space Requirements page, click **Next**.

20. Select the **SQL Server (MSSQLSERVER)** cluster resource. Click **Next**.

21. Select the shared disks for the Database and Logs and click **Next**.

22. Specify **SQL Server Instance** network settings and click **Next**.

23. Select **Use service SIDs** and click **Next**.

24. Service accounts:

    a. Enter the **<SQL Server Agent>** account information into the SQL Server Agent.

    b. Enter the **<SQL Server DB Engine>** account to the SQL Server Database Engine.

    c. Click **Next**.

25. Database engine configuration:

    a. In the Account Provisioning window:

    b. Select **Windows authentication mode**.

    c. Under Specify System Center SQL Server Administrators, click **Add**.

    d. In the resulting popup enter the **<System Center SQL Server Administrators Group>** created earlier. Click **OK**.

26. In the Data Directories tab:

    a. Change the Data root Directory to the **<Database LUN Drive Letter>**.

    b. Change the User database log directory to the **<Log LUN Drive Letter>** and click **Next**.

27. Choose whether or not to send error reports to Microsoft and click **Next**.

28. Resolve any Cluster Installation Rules and click **Next**, then click **Install**.

29. Review the installation report. Click **Next**, then click **Close**.

Step 2 Adding Node 2 to SQL Server

1. Download **SQLServer2008 Service Pack 1**.

2. Extract the Service Pack onto the SQL Server Drive by running the following command:

```
SQLServer2008R2SP1-KB2528583-x64-ENU.exe /x:C:\SP1
```

3. Install the SQL Server Setup support Files by running the following command:

```
C:\SP1\1033_enu_lp\x64\setup\sqlsupport_msi\sqlsupport.msi
```

4. Click **Next**, Accept the License Agreement, and then click **Next**.

5. Enter the Name and Company information.

6. Click **Next**, click **Install**, then click **Finish**.

7. From a command prompt launch the **setup.exe** from the SQL Server 2008 DVD by running the following command:

   ```
   <DVD Drive Letter>:\Setup.exe /PCUSource=C:\SP1
   ```
8. Acknowledge any compatibility warnings and click **Run Program**.
9. Select **Installation**, **Add node to a SQL Server failover cluster**.
10. Acknowledge any compatibility warnings. Click **Run Program**.
11. Resolve any failed prerequisite checks and click **OK**.
12. Click **Install** to install setup support files.
13. Resolve any Support Rule errors and click **Next**.
14. Enter your **Product key** and click **Next**.
15. Accept the Microsoft Software License Terms. Click **Next**.
16. Select SQL Server instance name **MSSQLSERVER**. Click **Next**.
17. Enter the Passwords for all service accounts and click **Next**.
18. Choose whether or not to send error reports to Microsoft. Click **Next**.
19. Resolve any Cluster Installation Rules and click **Next** and then click **Install**.
20. Review the Add Node Progress. Click **Next** and then click **Close**.

Step 3 Verify Cluster Operation

1. Open the **Failover Cluster Manager**.
2. Expand Services and applications and select **SQL Server (MSSQLSERVER)**.
3. Select **Move this service or application to…**, then click **Move to node <Node 2>**.
4. At the confirmation prompt click **Move SQL Server (MSSQLSERVER to <Node 2>**.
5. Repeat for the DTC cluster resource.
6. Failback all resources to **node 1**.

Step 4 Add SQL Server Instance

1. Log in to **node 2** using a domain account with local administrator privileges.
2. From a command prompt launch the setup.exe from the SQL Server 2008 DVD by running the following command:

   ```
   <DVD Drive Letter>:\Setup.exe /PCUSource=C:\SP1
   ```
3. Acknowledge any compatibility warnings. Click **Run Program**.
4. Select **Installation**, **New SQL Server failover cluster installation**.
5. Acknowledge any compatibility warnings. Click **OK**.
6. Resolve any failed prerequisite checks.
7. Click **Install** to install setup support files.
8. Resolve any Support Rule errors and click **Next**.
9. Enter your **Product key** and click **Next**.
10. Accept the Microsoft Software License Terms, click **Next**.
11. Under Instance features, select the following and click **Next**.
12. Database Engine Services.

13. Instance configuration:
    a. Enter the SQL Server Network Name.
    b. Select **Named Instance** and enter an instance name.
14. In the Disk Space Requirements page, click **Next**.
15. Select the **SQL Server (<Data Warehouse Instance name>) cluster resource** and click **Next**.
16. Select the shared disks for the Database and Logs and click **Next**.
17. Specify **SQL Server Instance network settings** and click **Next**.
18. Select **Use service SIDs** and click **Next**.
19. Service accounts:
    a. Enter the **<SQL Server Agent>** password information into the SQL Server Agent.
    b. Enter the **<SQL Server DB Engine>** password to the SQL Server Database Engine.
    c. Click **Next**.
20. Database Engine Configuration-Account provisioning:
    a. Select **Windows authentication mode**.
    b. Under Specify System Center SQL Server Administrators click **Add**.
    c. In the resulting popup enter the **<System Center SQL Server Administrators Group>** created earlier.
    d. Click **OK**.
    e. Click **Next**.
21. Data directories:
    a. Change the Data root Directory to the **<Database LUN Drive Letter>.**
    b. Change the User database log directory to the **<Log LUN Drive Letter>**.
    c. Click **Next**.
22. Choose whether or not to send error reports to Microsoft and click **Next**.
23. Resolve any Cluster Installation Rules and click **Next**, then click **Install**.
24. Review the installation report and click **Next**, then click **Close**.

Step 5 Add Node 1 to SQL Server Cluster

1. From a command prompt Launch the Setup.exe from the SQL Server 2008 DVD by running the following command:

   <DVD Drive Letter>:\Setup.exe /PCUSource=C:\SP1
2. Acknowledge any compatibility warnings. Click **Run Program**.
3. Select **Installation**, **Add node to a SQL Server failover cluster**.
4. Acknowledge any compatibility warnings, click **Run Program**.
5. Resolve any failed prerequisite checks and click **OK**.
6. Click **Install** to install setup support files.
7. Resolve any Support Rule errors and click **Next**.
8. Enter your **Product key**, and click **Next**.
9. Accept the Microsoft Software License Terms, click **Next**.

10. Select SQL Server instance name **<Data Warehouse Instance name>**. Click **Next**.
11. Enter the passwords for all service accounts. Click **Next**.
12. Choose whether or not to send error reports to Microsoft. Click **Next**.
13. Resolve any Cluster Installation Rules. Click **Next** and then click **Install**.
14. Review the Add Node Progress and click **Next** and then click **Close**.

Step 6 Configure Remote Access

1. Log in to the **Data Warehouse SQL Server instance**.
2. Open SQL Server Configuration Manager by clicking **Start > All Programs > Microsoft SQL Server 2008 > Configuration Tools > SQL Server Configuration Manager**.
3. Expand SQL Server Network Configuration and select Protocols for **<Data Warehouse Instance name>**.
4. Right-click **TCP/IP** and select **Properties**.
5. Click the **IP Address** tab.
6. Scroll down and for every interface you want to enable SQL Server communications, change enabled to **True** and enter the port added to the firewall earlier (for example, 1444).
7. Click **Apply**.

Step 7 Verify Cluster Operation

1. Open **Failover Cluster Manager**.
2. Expand **Services** and **applications** and select **SQL Server (<Data Warehouse Instance name>)**.
3. Select **Move this service or application to…**, Click **Move to node <Node 1>**.
4. At the confirmation prompt click **Move SQL Server (<Data Warehouse Instance name>to <Node 1>**.
5. Repeat for the DTC cluster resource.
6. Failback all resources to Node 1.

System Center Operations Manager Installation

For detailed installation help, refer to the Setup Help file included with the SCOM download or product DVD.

Note Before installing SCOM components, see the System Requirements section to make sure you have all prerequisite software and hardware installed.

Installing System Center Operations Manager 2007 R2

Step 1 Active Directory Preparation

1. Create five domain user accounts to perform the following actions. With the exception of the SDK and Action account, no special delegation is required. The Action account must have local administrator permissions on any Windows system you intend to manage, because this is the account use to install the Operations Manager Agent. The SDK account must be able to modify its own SPN.

- Management Server Action (for example, OpsMgrAction)
- SDK and Configuration Service (for example, OpsMgrSDK)
- Data Reader (for example, OpsMgrReader)
- Data Warehouse Write Action (for example, OpsMgrWrite)
- Operations Manager Administrator (for example, OpsMgrAdmin)

2. Create a Global Security group for the Operations Manager Administrators.
3. Add the **<Operations Manager administrator>** and **<SDK and Configuration Service >** accounts to the **<Operations Manager Administrative>** group.
4. Add the **<Operations Manager administrator>** account to the **<SQL Server Administrators>** group.
5. With a Domain Administrators account open ADSIEdit:
   a. Find the SDK domain user account, right-click and select **Properties**.
   b. Select the **Security** tab, click **Advanced**.
   c. Click **Add**. Type **SELF** in the object box and click **OK**.
   d. Select the **Properties** tab.
   e. Change the Apply to: This object only.
   f. Scroll down and select the **Allow** checkbox for Read servicePrincipalName and Write servicePrincipalName.
6. Click **OK** > **OK** > **OK**, and close **ADSIEdit**.

Step 2 Deploy Operations Manager Database

1. Log in to the SQL Server instance, through a domain account that is a member of the **<SQL Server Administrators>** group.
2. Launch **SetupOM.exe** from SCOM DVD.
3. Select **Check Prerequisites: Select Operational Database**, and click **Check**.
4. Resolve any issues and click **Close**.
5. Select **Install Operations Manager 2007 R2** and in the Welcome screen click **Next**.
6. Accept the license agreement and click **Next**.
7. Enter the user name, organization and click **Next**.
8. Select only the database component and click **Next**.
9. Enter the Management Group name.
10. Under Operations Manager Administrators, click **Browse**. Enter the **<Operations Manager Administrative group>**.
11. Click **Next**, then click **Next**.
12. Verify that the data file and log file locations are going to the correct LUNS and click **Next**.
13. Select whether or not to send error reporting to Microsoft. Click **Next**.
14. Click **Install**.
15. Click **Finish**.

Step 3 Install Windows Server 2008 R2 SP1 Enterprise in the SCOM Virtual Machine

1. Update Windows Server with the latest available updates and any prescribed antivirus software.

2. Log in and add the **<Operations Manager Administrative group>** and **<SDK and Configuration Service>** account to the local administrators group.
3. Log in with the **<Operations Manager Administrator>** account to install the prerequisite software.

Step 4 Install Prerequisite Software

Windows Features

1. Open Server Manager and select **Features**, then **Add Features**, this launches the Wizard.
2. Expand **.NET Framework 3.5.1 Features** and select the **.NET Framework 3.5.1** sub-feature.
3. Scroll down to SNMP Services and select the **SNMP Service**, then click **Next** >**Install** > **Close**.

IIS Server Role

1. Open Server Manager and select **Roles**, then click **Add Roles**, this launches the Wizard.
2. Select **Web Server (IIS)**, click **Next**, and make sure the following Role Services are selected.

- IIS Web Server
- Common HTTP
  - Static Content
  - Default Document
  - Directory Browsing
  - HTTP Errors
- Application Development
  - ASP .NET
  - .Net Extensibility
  - ISAPI Extensions
  - ISAPI Filters
- Health and Diagnostics
  - HTTP Logging
  - Request Monitor
- Security
  - Windows Authentication
  - Request Filtering
- Performance
  - Static Content Compression
- Management Tools
  - IIS Management Console
  - IIS 6 Management Compatibility
  - IIS 6 Metabase Compatibility
  - IIS 6 WMI Compatibility

3. Click **Next**.

4. Click **Install**.
5. Click **Close**.

Install ASP.NET Ajax Extensions 1.0

Download and Install the ASP.NET Ajax Extensions from http://go.microsoft.com/fwlink/?LinkID=89064&clcid=0x409 and then restart.

Step 5 Install SQL Server Reporting Services

1. Download **SQLServer2008 Service Pack 1**.
2. Extract the Service Pack onto the SCOM Server Drive by running the following command:

```
SQLServer2008SP1-KB968369-x64-ENU.exe /x:C:\SP1
```

3. Install the SQL Server Setup support Files by running the following command:

```
C:\SP1\x64\setup\1033\sqlsupport.msi
```

4. Click **Next**, Accept the license agreement and click **Next**.
5. Enter the Name, and Company information. Click **Next** then click **Install**.
6. From a command prompt launch the **Setup.exe** from the SQL Server 2008 DVD by running the following command:

```
<DVD Drive Letter>:\Setup.exe /PCUSource=<SCOM Drive Letter>:\SP1
```

7. Acknowledge any compatibility warnings. Click **Run Program**.
8. Select **Installation**, **New SQL Server stand-alone installation**.
9. Acknowledge any compatibility warnings. Click **Run Program**.
10. Resolve any failed prerequisite checks and click **OK**.
11. Click **Install** to install setup support files.
12. Resolve any Support Rule errors and click **Next**.
13. Enter your product key, and click **Next**, then click Accept the Software License Terms. Click **Next**.
14. Under Instance features, select the following:
15. Reporting Services
16. Change the Shared feature directory and Shared feature directory (x86) to the **<SCOM drive letter>**.
17. Change the Instance root directory to the **<SCOM drive letter>** and click **Next** then **Next** again.
18. Select **NT AUTHORITY\NETWORK SERVICE** for the reporting service account name and click **Next**.
19. Click **Next**.
20. Choose whether or not to send error reports, and usage data to Microsoft, and click **Next**.
21. Fix any Installation Rule errors, and click **Next**, then **Next** again, then **Install**.
22. Review the installation report and click **Close**.

Step 6 Install Operations Manager

1. Launch **SetupOM.exe** from the Operations Manager DVD.
2. Click **Check Prerequisites**.
3. From the Prerequisite Viewer, select **Server**, **Console**, **PowerShell**, **Web Console**, and **Reporting**, click **Check**.

4. Before you continue, resolve any issues found, and click **Close**.
5. Click **Install Operations Manager 2007 R2**.
6. Click **Next** on the welcome screen.
7. Accept the EULA and click **Next**.
8. Enter your user name, and organization information. Click **Next**.
9. In the Custom Setup screen:
    a. Select the **Management Server**, **User Interfaces**, **Command Shell**, and **Web Console**.
    b. Change the installation path for each component by highlighting them one at a time, and clicking **Browse**. Change the path to the **<SCOM Drive Letter>**.
    c. Click **Next**.
10. Enter the FQDN for the virtual SQL Server Instance created earlier. Click **Next**.
11. Enter the account information for the **<Management Server Action>** account. Click **Next**.
12. Enter the account information for the **<SDK and Configuration Service>** account. Click **Next**.
13. Select **Use Windows Authentication** and click **Next**.
14. Choose whether or not to participate in the customer experience improvement program, and click **Next**.
15. Clear the Start Console checkbox and click **Finish**.
16. Encryption key backup:
    a. Click **Next** then select **Backup the Encryption key** and click **Next**.
    b. Enter a UNC path not on the operations manager server and click **Next**.
    c. Enter a password to secure the encryption key and click **Next**, then click **Finish**.

Step 7 Configure Web Console Security

1. Open IIS Manager by selecting **Start > Administrative Tools > Internet Information Services (IIS) Manager**.
2. Click the root of the IIS management server (servername <domain>\user).
3. In the center pane, scroll down and open **Server Certificates**.
4. In the actions pane click **Create Self-Signed Certificate**. Enter a name for the new certificate, then click **OK**.
5. Expand **Server**, expand **Sites**, and select **Operations Manager 2007 Web Console**.
6. In the actions pane click Bindings and do as follows:
    a. Click **Add**.
    b. Change the type to **https**, and select the new certificate.
    c. Click **OK** and then click **Close**.

Step 8 Provision Data Warehouse Database

1. Log in to data warehouse SQL Server instance, using a domain account that is a member of the **<SQL Server Administrators>** group.
2. Launch **SetupOM.exe** from SCOM DVD.
3. Select Check Prerequisites:
    a. Select **Data Warehouse** and click **Check**.

   b. Resolve any issues found and click **Close**.

4. Select **Install Operations Manager 2007 R2 Reporting**.
5. In the Welcome screen, click **Next**.
6. Accept the license agreement and click **Next**.
7. Enter the user name, organization and click **Next**.
8. In the Custom Setup screen:
   a. Select only the Data Warehouse component.
   b. Change the installation path to point to the SQL Server VHD, and click **Next**.
9. Select the **SQL Server Data Warehouse Instance** and click Next.
10. Verify that the data file and log file locations are going to the correct LUNS and click **Next**.
11. Click **Install**.
12. Click **Finish**.

Step 9 Install Operation Manager Reporting

1. Log in to **Operations Manager** server.
2. Launch the SQL Server Reporting Services by clicking S**tart > All Programs > Microsoft SQL Server 2008 > Configuration Tools > Reporting Services Configuration Manager**.
3. Click **Connect**.
4. Verify that the Report Service Status is Started.
5. Select **Web Service URL** from the left pane.
6. Click **Apply** to create the Web instance.
7. Select **Database** from the left pane.
8. Click **Change Database**.
9. Select **Create a new report server database** and click **Next**.
10. Enter the FQDN for the SQL Database Failover Cluster.
11. Click **Next**.
12. Accept all defaults and click **Next**.
13. Retain the credentials set to Service Credentials and click **Next**.
14. Click **Next** to provision the database.
15. Click **Finish**.
16. Select **Report Manager URL** from the left pane.
17. Click **Apply** to create the virtual directory.
18. Select **E-mail Settings** from the left pane.
19. Enter the Sender Address and SMTP server and click **Apply**.
20. Click **Exit** to close the Report Server Configuration server.
21. Launch **SetupOM.exe** from the SCOM DVD.
22. Select **Install Operations Manager 2007 R2 Reporting**.
23. In the Welcome screen, click **Next**.
24. Accept the license agreement and click **Next**.

25. Enter the user name, organization and click **Next**.
26. Select **Reporting Server** and click **Next**.
27. Enter the FQDN for the SCOM Server and click **Next**.
28. In the Data Warehouse screen, enter:
    a. Enter the name and instance of the Data Warehouse SQL Server instance.
    b. Enter the SQL Server Port that was configured for remote access.
    c. Click **Next**.
29. Select the **Reporting** server and click **Next**.
30. Enter the account information for the **<Data Warehouse Write Action>** account, and click **Next**.
31. Enter the account information for the **<Data Reader>** account and click **Next**.
32. Choose whether or not to send operational data reports to Microsoft and click **Next**.
33. Click **Install**.
34. Click **Finish**.

Configure the Operations Manager

1. Log in to **Operations Manager Server**.
2. Open the Operations Manager Console, by clicking **Start > All Programs > System Center Operations Manager 2007 R2 > Operations Console**.
3. Add devices to manage; from the top center pane click **Required: Configure computers and devices to manage**.
4. Select **Windows Computers** and click **Next**.
5. Select **Advanced discovery** and click **Next**.
6. Select **Browse for or type computer names** and click **Browse**.
7. Enter all management and Hyper-V hosts and click **Next**.
8. Select **Use selected Management Server Action Account**, and then click **Discover**.
9. Select all devices to monitor, click **Next**, and then click **Finish**.
10. Enable Agent proxy for cluster hosts.
11. From the Operations Manager Console select **Administration**.
12. In the right pane expand **Device management** and select **Agent Managed**.
13. Select the first cluster host. Right-click and select **Properties**.
14. Click the **Security** tab.
15. Check **Allow this agent to act as a proxy and discover managed object on other computers**.
16. Click **OK**.
17. Repeat for each cluster host in your environment.
18. Add Management Packs:
    a. Download and install the following Management Packs from Microsoft. Note the installers only extract the management packs into the correct folders. Accept all defaults.
    b. Windows Server Operating System Management Pack for Operations Manager 2007

c. Windows Server Internet Information Services 7 Management Pack for Operations Manager 2007

d. Windows Server Failover Clustering Management Pack for Operations Manager 2007

e. Windows Server Hyper-V Management Pack for Operations Manager 2007

f. SQL Server Monitoring Management Pack

g. From the Operations Manager Console, select **Administration**.

h. In the top left under Actions: click **Import management packs**.

i. Click **Add > Add from disk…**

j. Browse to %ProgramFiles(x86)%\System Center Management Packs.

k. In the following order expand each folder for all the management packs that were just added. When they are expanded, select all the .MP files and click **Open**.

l. Windows Server Base OS System Center Operations Manager 2007 MP

m. Internet Information Services MP

n. Windows Cluster Operations Manager 2007 MP

o. Windows Server Hyper-V Operations Manager 2007 MP

p. SQLServerMP

q. When all the management packs have been added to the wizard, click **Install**.

r. Click **Yes**.

s. When all management packs have finished importing click **Close**.

Install System Center Virtual Machine Manager

Step 1 Active Directory Preparation

1. Create two domain user accounts to perform the following actions. These account require no special delegation.

- SCVMM Database (for example, SCVMMDatabase)
- SCVMM Service (for example, SCVMMService)

2. Create a Global Security group for the SCVMM Server Administrators.
3. Add the **<SCVMM Service>** and **< Management Server Action >** accounts to the **<SCVMM Server Administrators>** group.
4. Add the **<SCVMM Service>** to the **<Operations Manager Administrators>** group.
5. Add the **<SCVMM Database>** to the **<SQL Server Administrators>** group.

Step 2 Install Windows Server 2008 R2 SP1Enterprise in the SCVMM Virtual Machines

1. Update Windows Server with the latest updates.
2. Install antivirus software.
3. Log in and add the **<SCVMM Server Administrators>** group, **<SnapDrive>**, and **<SCVMM Service >** accounts to the local administrators group.
4. Log in using an account with both domain and local administrative privileges.

Step 3 Install Prerequisite Software

Windows Features

1. Open Server Manager and select **Features**.
2. Click the **Add Features** link to launch the **Add Features wizard**.
3. Expand **.NET Framework 3.5.1 Features**.
4. Select the **.NET Framework 3.5.1 Feature**.
5. Select the **Multipath I/O** feature.
6. Click **Next** > **Install** > **Close**.

Add Web Server Role

1. Open Server Manager and select **Roles**.
2. Click **Add Role**.
3. Select **Web Server (IIS)** and click **Next**.
4. In the introduction to IIS page, click **Next**.
5. Select the following role service:

- IIS Web Server
- Common HTTP
  - Static Content
  - Default Document
  - Directory Browsing
  - HTTP Errors
- Application Development
  - ASP .NET
  - .Net Extensibility
  - ISAPI Extensions
  - ISAPI Filters
- Health and Diagnostics
  - HTTP Logging
  - Request Monitor
- Security
  - Request Filtering
- Performance
  - Static Content
- Management Tools
  - IIS Management Console
  - IIS 6 Management Compatibility
  - IIS 6 Metabase Compatibility
  - IIS 6 WMI Compatibility

6. Click **Next > Install > Close**.

Install SQL Management Tools - Basic

1. Download **SQLServer2008 Service Pack 1**.
2. Extract the Service Pack onto the SCVMM Server drive by running the following command:
   ```
   SQLServer2008SP1-KB968369-x64-ENU.exe /x:<SCVMM Drive Letter>:\SP1
   ```
3. Install the SQL Server setup support files by running the following command:
   ```
   <SCVMM Drive Letter>:\SP1\x64\setup\1033\sqlsupport.msi
   ```
4. Click **Next**. Accept the license agreement and click **Next**.
5. Enter the name, and company information, click **Next**, and then click **Install**.
6. From a command prompt launch the **Setup.exe** from the SQL Server 2008 DVD by running the following command:
   ```
   <DVD Drive Letter>:\Setup.exe /PCUSource=<SCVMM Drive Letter>:\SP1
   ```
7. Acknowledge any compatibility warnings and click **Run Program**.
8. Select **Installation**, **New SQL Server stand-alone installation**.
9. Acknowledge any compatibility warnings and click **Run Program**.
10. Resolve any failed prerequisite checks and click **OK**.
11. Click **Install** to install the setup support files.
12. Resolve any support rule errors. Click **Next**.
13. Enter your Product key, and click **Next**.
14. Accept the Microsoft Software License Terms. Click **Next**.
15. In the Feature Selection screen-Under Instance features select the following:
    a. Shared Features
    b. Management Tools -Basic
    c. Change the Shared feature directory and the Shared feature directory (x86) to the **<SCVMM drive letter>** and click **Next**.
16. Choose whether or not to send error reports and usage data to Microsoft, and click **Next**.
17. Fix any Installation Rule errors. Click **Next**, click **Install**, then click **Next**.
18. Review the installation report and click **Close**.

Enable iSCSI

1. Enable the ISCSI Initiator by clicking **Start > Administrative Tools > iSCSI initiator**. Click **Yes** to start the Microsoft iSCSI service.
2. Click **OK** to close the iSCSI Initiator Properties Panel.

Enable Jumbo Frames for iSCSI NICs in SCVMM Virtual Machine

1. Open **Network Connections**.
2. Right-click on the **iSCSI-Fabric-A Network** adapter and click **Properties**, then click the **Configure** button.
3. Select the **Advanced** tab.
4. Select **Jumbo Packet** in the property list box and set the value to **9014 Bytes**.

Note The 9014 Byte value in this dialog box is the correct Hyper-V synthetic adapter setting for Cisco UCS, Cisco Nexus and FAS array MTU setting of 9000 bytes.

5. Repeat steps 2 through 4 for the second iSCSI adapter.

NetApp SnapDrive 6.4

1. Download **NetApp SnapDrive 6.4**.
2. Launch the **SnapDrive Installer**, click **Next**, accept the EULA and click **Next** again.
3. Select the **Storage based Licensing** method and click **Next**.
4. Enter your user name, and organization information, and click **Next**.
5. Enter the account information for the **<SnapDrive >** account created earlier.
6. Click **Next**.
7. Click **Next** and then select the HTTPS for the **Enable Transport Protocol Settings**.
8. Enter the user name and password for storage systems root user.
9. Click **Next > Next > Next > Install > Finish**.

NetApp DSM MPIO 3.5

1. Download the **NetApp DSM MPIO 3.5** package from the NetApp Support site.
2. Install Microsoft Hotfixes **KB2522766-x64** and **KB2528357-v2-x64**. A restart is required after each Hotfix.
3. Launch the **DSM MPIO Installer**.
4. Click **Next** then click **OK** to acknowledge the ALUA requirement.
5. Accept the EULA and click **Next**.
6. Enter the DSM license key and click **Next**.
7. Leave the system account selected and click **Next**.
8. Click **Next**, then **Next** again then **Install** and when complete restart the system.

Step 1 Provision Storage

1. Log in to the **SCVMM server** using a domain administrative account with local privileges.
2. Establish iSCSI Connections.
   a. Open **SnapDrive**.
   b. Browse to **iSCSI management** within SnapDrive.
   c. Click **Establish iSCSI Session**.
   d. Enter the IP address/name or the NetApp controller. Click **Next**.
   e. Select the source and destination IP addresses associated with iSCSI network A.
   f. If CHAP authentication is required, configure at this time.
   g. Click **Next**. Review for accuracy and then click **Finish**.

h. Repeat these steps for iSCSI network B.

3. Create VM library drive:

a. Open **SnapDrive** and selects **Disks** and click **Create Disk**.

b. In the Welcome screen, click **Next**.

c. Enter the IP/FQDN for the vFiler0 controller and click **Add**.

d. When the enumeration has completed, select the target volume where you intend to add the LUN.

e. Add a LUN name, LUN description, and click **Next**.

f. Select **Dedicated**. Click **Next**.

g. Select **Assign a Drive Letter** and pick a drive letter.

h. Set the LUN size, for example 500g, and click **Next**.

i. Select the iSCSI initiators to which to map the new LUN to and click **Next**.

j. Select **Automatic** and click **Next** and then click **Finish**.

Step 2 Install System Center Virtual Machine Manager

1. From the product DVD or network share, double-click **setup.exe**.
2. In the Setup menu, click **VMM Server**.
3. In the License Terms page, click **I accept the terms of this agreement**. Click **Next**.
4. In the Customer Experience Improvement Page (CEIP) page, click **Yes** to participate or **No** to opt out of the CEIP. Click **Next**.
5. In the Product Registration page, enter your name and the name of your company. Click **Next**.
6. In the Prerequisites Check page, review any alerts or warnings about inadequate hardware or uninstalled software prerequisites. You can continue if you receive warnings, but alerts must be resolved before you can proceed with the installation. Click **Next**.
7. In the Installation Settings page, select the appropriate path for your System Center SCVMM2008 program files location. These should be placed on the SCVMM VHD provisioned earlier.
8. In the SQL Server Settings page:

a. Select **Use a supported version of SQL Server**.

b. Enter the FQDN of the virtual SQL Server Cluster.

c. Select **Use the following credentials**.

d. Enter the **<SCVMM Database>** account and password.

e. Select the default MSSQLSERVER instance.

f. Select **Create a new database** and click **Next**.

9. In the Library Share Settings page, click **Change** to change the share location. Select the LUN provisioned earlier, click **Make New Folder** ,rename the new folder to **Virtual machine Manager Library Files**. Select the **Virtual machine Manager Library Files Folder**. Click **OK**.
10. Click **Next**.
11. During installation, the Setup Wizard creates a folder named VHDs and two virtual hard disks of different sizes (16GB and 60GB) that you can use to create a new virtual machine or use as additional disk drives.

12. In the Port Assignments page, assign the ports you want to use for communications and file transfers between SCVMM components. If Windows Firewall is turned on, the wizard will attempt to add firewall exceptions for each port.

Note You can change the default port settings to avoid conflicts with other applications in your environment. However, the port settings that you assign for the SCVMM server must identically match the port settings you assign when installing associated SCVMM components.

13. Under VMM Service Account, select **Other account**. Enter the **<SCVMM Service>** account information. Click **Next**, and then click **Install**.
14. In the Installation page, after setup is complete, click the link in the Status window to check for the latest SCVMM updates.

Step 3 Install System Center Virtual Machine Manager Administrator Console

1. From the product DVD or network share, double-click **setup.exe**.
2. In the Setup menu, click **VMM Administrator Console**.
3. In the License Terms page click **I accept the terms of this agreement**. Click **Next**.
4. In the Customer Experience Improvement Page (CEIP) page, click **Next**.
5. In the Prerequisites Check page, review any alerts or warnings about inadequate hardware or uninstalled software prerequisites. You can continue if you receive warnings, but alerts must be resolved before you can proceed with the installation. Click **Next**.
6. In the Installation Settings page, select the appropriate path for your System Center SCVMM2008 program files location. These should be placed on the SCVMM VHD provisioned earlier.
7. In the Configuration Settings page, do one of the following:
   a. Click **Next** to use the default port (8100) for the SCVMM Administrator Console to communicate with the SCVMM server.
   b. Assign a different port that you want to use for the SCVMM Administrator Console to communicate with the SCVMM server, and then click **Next**.

Note The port settings that you assign for the SCVMM Administrator Console must identically match the port settings that you assigned in the SCVMM server.

8. Click **Install**.
9. In the Installation page, after setup is complete, check for the latest VMM updates, and open **VMM Administrator Console**. Click **Close**.
10. The Connect to Server dialog box opens the first time you open the console.
11. Click **Connect** to connect to the local SCVMM server (localhost) using the **default port (8100)**.
12. In the Server name box, type the name of the computer where the SCVMM server is installed, followed by a colon and the port that you want to use to connect the SCVMM Administrator Console to the SCVMM server, and then click **Connect**.

Step 4 Configure SCVMM

1. From the Virtual Machine Manager (VMM) console, select **All Hosts**. From the Actions pane select **Add host**.

2. Select **Windows Server-based host on an Active Directory** domain, and enter credentials for a domain account that has permissions to both search AD, and to install the agent on the Hyper-V hosts.
3. Click **Search** and do the following:
   a. Select the **Hyper-V** checkbox and click **Search**.
   b. Select every Hyper-V host you want to add to SCVMM, and click **Add**, then **Yes**, then **Yes**, then **OK**.
4. Click **Next**, **Next**, then **Next** again.
5. Click **Add Hosts**.

Step 5 Install the OnCommand Plugin 3.0 Rapid Provisioning cmdlets

1. Download the **OnCommand Plugin 3.0** from the NOW™ site. Although the cmdlets are a separate product from OnCommand Plugin, they share a common installer.
2. Launch the **OnCommand Plugin** executable file.
3. In the Welcome screen click **Next**.
4. Accept the EULA, and click **Next**.
5. Enter User Name and Organization. Click **Next**.
6. Change the installation path to point to the SCVVM VHD (for example, D:\Program Files\NetApp\OnCommand\MS_Plugin\). Click **Next**.
7. Select only the **Cmdlets** feature and click **Next >Install > Finish**.
8. Enter the credentials for the SCVMM service account and click **Next**.
9. Open the Rapid Provisioning PowerShell prompt by launching the **OnCommand® Cmdlets** link on the desktop.
10. Type **Set-ExecutionPolicy -ExecutionPolicy AllSigned**. Type **Y** to confirm.
11. Close and reopen **OnCommand® Cmdlets**.
12. Enter **A** to always run NetApp Cmdlets.
13. Run **Add-OCStorageSystem** for each Controller.
14. Test by running **Get-OCStorage**.

Step 6 Installing the Virtual Machine Manager Self-Service Portal (Optional)

The Self-Service Portal Setup wizard installs all three of the self-service portal components.

Table 22 Service Accounts Requested During Self-service Portal Setup

Account Name	Requested during	Used for	Prerequisites	High Security
Service Account	VMMSSP server component setup	Running the Windows Service implementation of the VMMSSP server component, the Virtual Machine Manager Self-Service Portal 2.0 service, and underlying services and processes. The server component also uses this account for external communication, such as: Communicating with the VMM server and performing tasks that require interacting with the VMM server. Communicating with the VMMSSP database.	Make sure this is an Active Directory domain account. Before you install the VMMSSP server component, make sure this account has administrative permissions on the VMM Administrator Console. You must also make sure that this account is granted **Local Administrator** permissions on the computer where you plan to install the server component.	Use a low-privilege domain account
Application Pool Identity	VMMSSP Web site component setup	Running the application pool used for the VMMSSP Web site component. The VMMSSP Web site component also uses this account for external communication, such as: Communicating with the VMMSSP server and database components. Running tasks that require interacting with the other self-service portal components.	This account can be a domain account.	Use a low-privilege domain account.

Table 23 Ports And Protocols For The Self-service Portal

Connection Type	Protocol	Default Port	Where to Change the Setting
VMMSSP Web site to/from VMMSSP server	WCF	8000	During self-service portal setup. After setup, in the **<services>** section of the Microsoft.DITSC.ProvisioningService.exe.config file. For more information, see "Tuning the Self-Service Portal with Global Parameters" in the *Virtual Machine Manager Self-Service Portal 2.0: Datacenter Administration Guide*.
Client to/from VMMSSP Web site	HTTP/HTTPS	Without SSL: 80 With SSL: 443	During self-service portal setup. After setup, in the **Site Bindings** dialog box for the VMMSSP Web site in IIS. For information about configuring SSL for the portal, see the "Post Installation: Hardening the Self-Service Portal Website" section in this guide.
VMMSSP Web site to/from VMMSSP database	Tabular Data Stream (TDS)	1433	During self-service portal setup.
VMMSSP server to/from VMMSSP database	TDS	1433	During self-service portal setup.
VMMSSP Web site to/from virtual machine hosts	Remote Desktop Protocol (RDP)	2179	This port cannot be changed.

Preparation a Checklist

Before you install the self-service portal, be sure that you have prepared the following:

- A service account and an application pool identity for the self-service portal, as defined in Table 22.

Note You must create the service account and application pool identity before you run the Self-Service Portal Setup wizard. The wizard does not create new accounts.

- If appropriate, a SQL Server maintenance account as described in the section Active Directory Preparation.
- If appropriate, firewall port exceptions for the ports listed in Table 23.

Note You must have administrator permissions on the computers on which you intend to install the self-service portal components. You also must be a member of the local Administrators group on the computer running SQL Server.

Install the VMMSSP Server Component and Database Component

Note This procedure assumes that you have a separate database server available, running SQL Server 2008 Enterprise Edition or Standard Edition.

1. Download the **SetupVMMSSP.exe** file to the computer which you will install the VMMSSP server component.
2. To begin the installation process, on the computer on which you are installing the server component, right-click **SetupVMMSSP.exe**, and click **Run** as administrator.
3. In the Welcome page, click **Install**.
4. Review and accept the license agreement and click **Next**.
5. Click **VMMSSP server component** and click **Next**.
6. In the Check Prerequisites for the Server Component page, wait for the wizard to complete the prerequisite checks, and then review the results. If any of the prerequisites are missing, follow the instructions provided. When all of the prerequisites are met, click **Next**.
7. Accept or change the file location and then click **Next**.
8. Configure the VMMSSP database:
   a. In Database server, type the name of the database server that will host the new VMMSSP database (or that hosts an existing database).
   b. Click **Get Instances** to get the SQL Server instances available in the database server. In SQL Server instance, select the SQL Server instance that manages the new (or existing) database.
   c. In Port, type the port number that the SQL Server instance uses for incoming and outgoing communication. The default port is 1433.
   d. Under Credentials, click the type of authentication that the database will use for incoming connections (Windows authentication or SQL Server authentication).
   e. If you clicked SQL Server authentication, type the user name and password of a SQL Server account to use to access the database.
   f. If you want the self-service portal to create a new database (for example, if you are running the Setup wizard for the first time), click **Create a new database**.

Note If you are installing the self-service portal for the first time you must select the option to create a new database. The self-service portal database name is DITSC and cannot be changed.

   g. If you want the self-service portal to use an existing database, click **Use an existing database**. The DITSC database is selected and cannot be changed.

Note If you are upgrading from the release candidate version of the self-service portal, make sure you have followed the procedure in Upgrading from the Release Candidate Version of the Self-Service Portal before continuing.

h. When you finish configuring the self-service portal database, click **Next**.

9. Type the user name, password, and domain of the service account for the VMMSSP server component. Click **Test account** to make sure that this account functions. When finished, click **Next**.

Note For more information about considerations and requirements for the service account, see the section Active Directory Preparation.

10. Enter the settings to configure the server component. These settings include the port numbers of the WCF endpoint for the TCP protocol. When finished, click **Next**.

Note The VMMSSP server component uses the TCP endpoint port to listen for client requests. The WCF service uses the HTTP endpoint port for publishing the self-service portal service metadata. The metadata will be available using HTTP protocol with a GET request. For more information about WCF endpoints, see the Fundamental Windows Communication Foundation Concepts topic in the MSDN Library.

11. In the Datacenter administrators box, type the names of the accounts that you want to be able to administer the self-service portal. In the self-service portal, these users will be members of the DCIT Admin user role and have full administrative permissions.

Note For more information about the DCIT Admin user role, see the section Active Directory Preparation.

12. In the Installation Summary page, review the settings that you selected, and then click **Install**. When the installation finishes, click **Close**.

Install the VMMSSP Web Site Component

Note This procedure assumes that you have already installed the VMMSSP server component and that you have placed the downloaded SetupVMMSSP.exe file on all computers on which you plan to install the VMMSSP Web site component.

1. To begin the installation process, on the computer on which you are installing the VMMSSP Web site component, right-click **SetupVMMSSP.exe** and then click **Run** as administrator.
2. On the Welcome page, click **Install**.
3. Review and accept the license agreement and then click **Next**.
4. Click **VMMSSP** Web site component and then click **Next**.
5. In the Check Prerequisites for the VMMSSP Website Component page, wait for the wizard to complete the prerequisite checks, and then review the results. If any of the prerequisites are missing, follow the instructions provided. When all of the prerequisites are met, click **Next**.
6. Accept or change the file location and then click **Next**.

7. You can use this setting to install the component on a computer other than the one running the Setup wizard.
8. Use the following steps to configure the IIS Web site for the self-service portal. For information about the IIS Web site properties required to configure the portal, see Understanding Sites, Applications and Virtual Directories on IIS 7.

Note For information about the application pool identity required to configure the VMMSSP Web site component, see Service Accounts Requested During Self-service Portal Setup.

   a. In IIS Website name, type the name that IIS will use for the self-service portal. The default name is VMMSSP.
   b. In Port number, type the port number that IIS will use for the self-service portal. The default port is 80.
   c. In Application pool name, type a name for the application pool that the Setup wizard will create for the VMMSSP Web site. The default name is VMMSSPAppPool.
   d. Type the domain, user name, and password of the account that you have configured for the application pool to use. For information about the application pool identity for the self-service portal, see Service Accounts Requested During Self-service Portal Setup.
   e. When you finish configuring the IIS properties for the self-service portal, click **Next**.
9. Use the following steps to configure the VMMSSP database.
   a. In Database server, type the name of the database server that hosts the database that you configured for the VMMSSP server component.
   b. To see a list of the SQL Server instances associated with the specified database server, click **Get Instances**. In SQL Server instance, select the SQL Server instance that manages the new (or existing) VMMSSP database.
   c. In Port, type the port number that the SQL Server instance uses for incoming and outgoing communication. The default port is 1433.
   d. Under Credentials, click the type of authentication that the database uses for incoming connections (Windows authentication or SQL Server authentication).
   e. If you clicked SQL Server authentication, type the user name and password of a SQL Server account to use to access the database. Make sure that this account information matches the information you configured when you installed the VMMSSP server component.
   f. Click **Use an existing database**. The self-service portal automatically locates the existing DITSC database.
   g. After configuring the database, click **Next**.
10. Enter the settings to configure how the VMMSSP Web site communicates with the VMMSSP server component. These settings include the host name of the WCF server (the name of the computer running the VMMSSP server component) and the TCP endpoint port number to communicate with the server component. When finished, click **Next**.
11. On the Installation Summary page, review the settings that you selected, and then click Install. When the installation finishes, click Close.

Enable SSP Rapid Provisioning

1. In the Self-Service Portal, navigate to **Self Service Portal Settings > Customize Virtual Machine Actions > MasterActionXML**.

2. Select **CopyActionXML**.
3. Type the name for the new action script. For example, enter ONTapRapidProvisioning.
4. To create a virtual machine action, navigate to **CreateVM > Edit**.
5. Paste the **ONTapCreateVM.txt** content into the Script section of the edit window.
6. Paste the **ONTapCreateVMLocked.txt** content into the LockedScript section.
7. Set the options for the create action script.
   a. For the Successful Return Code, enter **0**.
   b. Select the **Timeout** box and enter **9999**.
   c. Clear the **Continue on Error** box.
8. Click **Save and Close**.
9. To delete a virtual machine action, navigate to **DeleteVM > Edit**.
10. Paste the **ONTapDeleteVM.txt** content into the Script section of the edit window.
11. Paste the **ONTapDeleteVMLocked.txt** content into the LockedScript section.
12. Set the options for the delete action script.
    a. For the Successful Return Code, enter **0**.
    b. Select the Timeout box and enter **9999**.
    c. Clear the **Continue on Error** box.
13. Click **Save and Close**.
14. Navigate to **Infrastructure > ServiceRole > Edit**.
15. From the Action XML drop-down list, select **ONTapRapidProvisioning**.

Note This step makes sure that the use of the script during the CreateVM or DeleteVM action. This script name must match the name you used to create the script.

Step 7 SCOM Administrative Console

1. From the SCOM DVD or network share double-click **SetupOM.exe**.
2. Select **Install Operation Manager 2007 R2**.
3. In the Welcome screen, click **Next**.
4. In the License Terms page, click **I accept the terms of this agreement** and click **Next**.
5. In the Product Registration page, enter your name and the name of your company. Click **Next**.
6. In the feature selection page, select only the **User Interface** and **Command Shell**. Change the installation to target the **SCVMM VHD**, and click **Next**.
7. In the Customer Experience Improvement Page (CEIP) page, click **Yes** to participate or **No** to opt out of the CEIP and click **Next**.
8. Click **Install**.
9. Uncheck **Start the Console**.
10. Click **Finish**.

Configure SCVMM SCOM Integration

1. Log in to the SCOM server with a domain account that is both a SCVMM and SCOM Administrator.
2. From the product DVD or network share, double-click **setup.exe**.
3. In the Setup menu, click **Configure Operations Manager**.
4. In the License Terms page click **I accept the terms of this agreement** and click **Next**.
5. In the Microsoft Update page select either **Use Microsoft Update** or **I don't want to use Microsoft Update**. Click **Next**.
6. In the Customer Experience Improvement Page (CEIP) page click **Next**.
7. In the Prerequisites Check page, review any alerts or warnings about inadequate hardware or uninstalled software prerequisites. You can continue if you receive warnings, but alerts must be resolved before you can proceed with the installation. Click **Next**.
8. In the Installation Settings page, select the appropriate path for your System Center SCVMM2008 program files location. These should be placed on the SCOM VHD provisioned earlier. (for example, D:\Program Files\Microsoft System Center Virtual Machine Manager 2008 R2).
9. In the Port Assignment page, enter the FQDN for the SCVMM server and the port specified during SCVMM installation.
10. Click **Install**.
11. In the Installation page, after setup is complete, click the link in the Status window to check for the latest SCVMM updates. The Connect to Server dialog box opens the first time you open the console.
12. In the Server name box, enter the name of the computer where the SCVMM server is installed, followed by a colon and the port that you want to use to connect the SCVMM Administrator Console to the SCVMM server and click **Connect**.

Note The port settings that you assign for the SCVMM Administrator Console must identically match the port settings that you assigned in the SCVMM server.

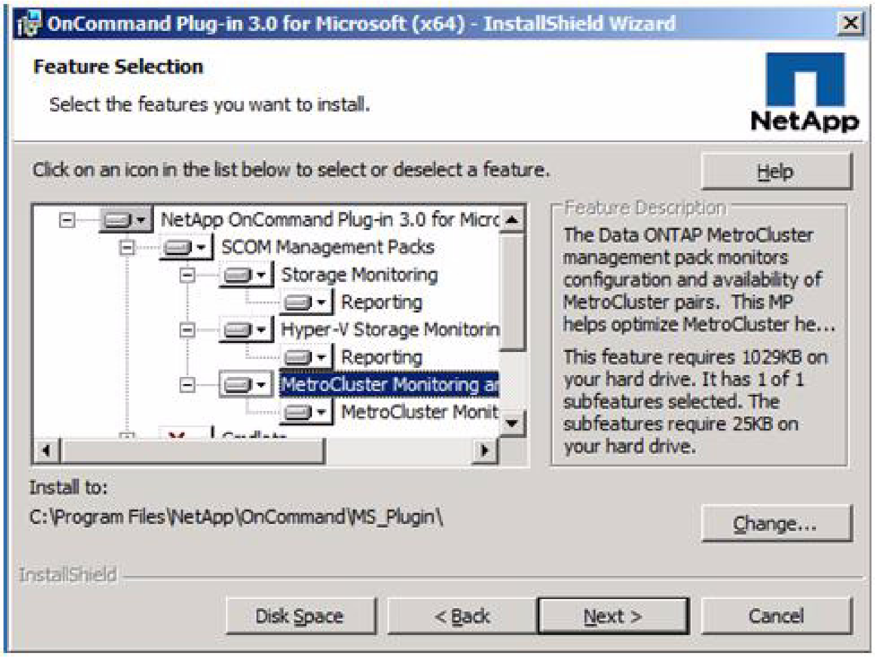
13. Click **Install**.
14. In the Installation page, after setup is complete, select the **Start Console** checkbox and click **Close**.
15. The Connect to Server dialog box opens, enter the **FQDN to the SCVMM** server, and click **Connect**.
16. Enable PRO Scripts:
    a. From within the VMM console click the **PowerShell** icon, launching a PowerShell console.
    b. At the prompt, type **A** to select [A]lways to always trust remote signed scripts from this snap-in. If you do not see a prompt, the policy already allows PRO to run scripts.
17. Enable PRO Tips:
    a. From the Administration pane, select **General**.
    b. Right-click **Pro Settings** and select **Modify**.
    c. Click **Enable PTO Tips**.
    d. Click **OK**.
18. Configure System Center integration:
    a. From within the VMM console, click **Administration** and then click **System Center**.

- b. Right-click **Operations Manager Reporting URL** and select **Modify**.
- c. Enter **http://<SCOM Server>/ ReportServer** and click **OK**.
- d. Right-click **Operations Manager Server** and select **Modify**.
- e. Enter the FQDN of the Operations Manager Server and click **OK**.

19. Close the VMM console.

Install OnCommand Plugin 3.0 for Microsoft SCOM

1. In the SCOM Server, log in to Operations Manager using a domain account with permissions.
2. Download OnCommand Plugin 3.0 for Microsoft (x64) from the NOW site.
3. Launch the installer:
   - a. In the welcome screen, click **Next**.
   - b. Accept the EULA and click **Next**.
   - c. Enter a User Name, and Organization information, and click **Next**.
   - d. Click **Next**.
   - e. Select the following features under Products and click **Next**:
   - – SCOM Management Packs:
   - • Storage Monitoring with Reporting
   - • Hyper-V Storage Monitoring with Reporting
   - • MetroCluster™ Monitoring and Management (optional)
   - • Documentation.



OnCommand Plug-in 3.0 for Microsoft (x64) - InstallShield Wizard

Feature Selection

Select the features you want to install.

Click on an icon in the list below to select or deselect a feature.

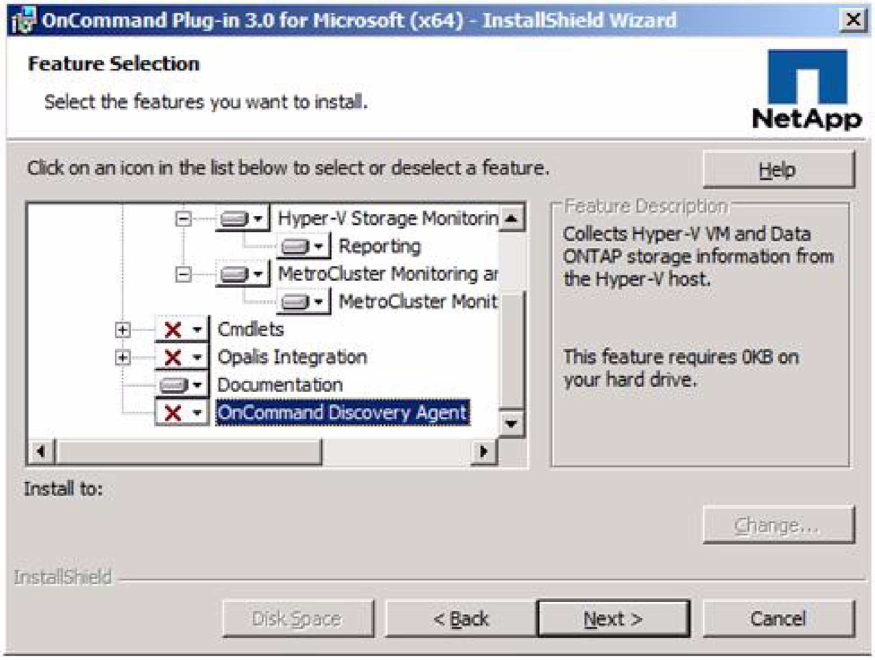
Feature Description

The Data ONTAP MetroCluster management pack monitors configuration and availability of MetroCluster pairs. This MP helps optimize MetroCluster he...

This feature requires 1029KB on your hard drive. It has 1 of 1 subfeatures selected. The subfeatures require 25KB on your hard drive.

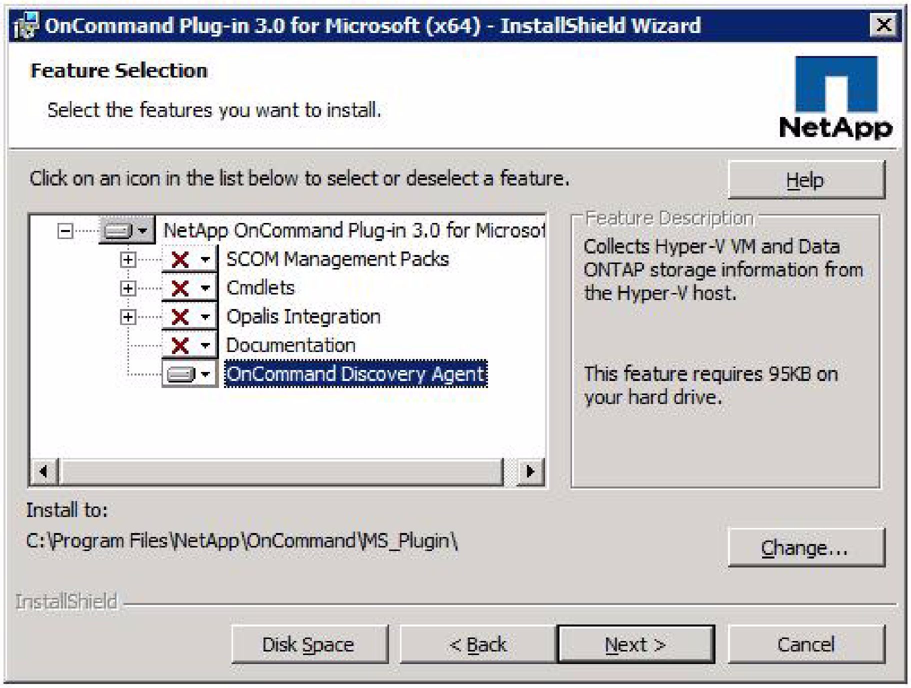
Install to:

C:\Program Files\NetApp\OnCommand\MS_Plugin\


OnCommand Plug-in 3.0 for Microsoft (x64) - InstallShield Wizard
Feature Selection
Select the features you want to install.
NetApp
Click on an icon in the list below to select or deselect a feature.
Help
Hyper-V Storage Monitorin
Reporting
MetroCluster Monitoring ar
MetroCluster Monit
Cmdlets
Opalis Integration
Documentation
OnCommand Discovery Agent
Feature Description
Collects Hyper-V VM and Data ONTAP storage information from the Hyper-V host.
This feature requires 0KB on your hard drive.
Install to:
Change...
InstallShield
Disk Space
< Back
Next >
Cancel

4. Enter the credentials for the OpsMgr Administrator and click **Next**.
5. Click **Install**.
6. Click **Finish**.
7. Deploy the **OnCommand Plugin 3.0 Agent**:
   a. Log in to each Hyper-V host and run the **OnCommand Plugin** installer.
   b. From the Welcome screen click **Next**.
   c. Accept the EULA and click **Next**.
   d. Click **Next**.

e. Select only the **OnCommand Discovery Agent** and click **Next**.



OnCommand Plug-in 3.0 for Microsoft (x64) - InstallShield Wizard

Feature Selection

Select the features you want to install.

Click on an icon in the list below to select or deselect a feature.

- NetApp OnCommand Plug-in 3.0 for Microsof
  - ☒ SCOM Management Packs
  - ☒ Cmdlets
  - ☒ Opalis Integration
  - ☒ Documentation
  - OnCommand Discovery Agent

Feature Description

Collects Hyper-V VM and Data ONTAP storage information from the Hyper-V host.

This feature requires 95KB on your hard drive.

Install to:

C:\Program Files\NetApp\OnCommand\MS_Plugin\

f. Click **Install**.

g. Click **Finish**.

h. Repeat for each Hyper-V host.

8. Configure SNMP:

a. Open **Server Manager**. Select **Configuration** and select **Services**.

b. Scroll down to SNMP Service, right-click and select **Properties**.

c. Click the **Security** tab.

d. Under Accepted community names, click **Add**.

e. Under Community rights select **READ ONLY**, and enter a Community Name. This community name should be the SNMP v1 community name on the two storage controllers.

f. Under Accept SNMP packets from these hosts click **Add**.

g. Enter the hostname or IP Address for the NetApp controller.

h. Repeat for each controller in your environment and then click **OK**.

9. Enable Data ONTAP discovery:

a. From the **Operations Manager Console**, click **Authoring > Management Packs Objects > Rules**.

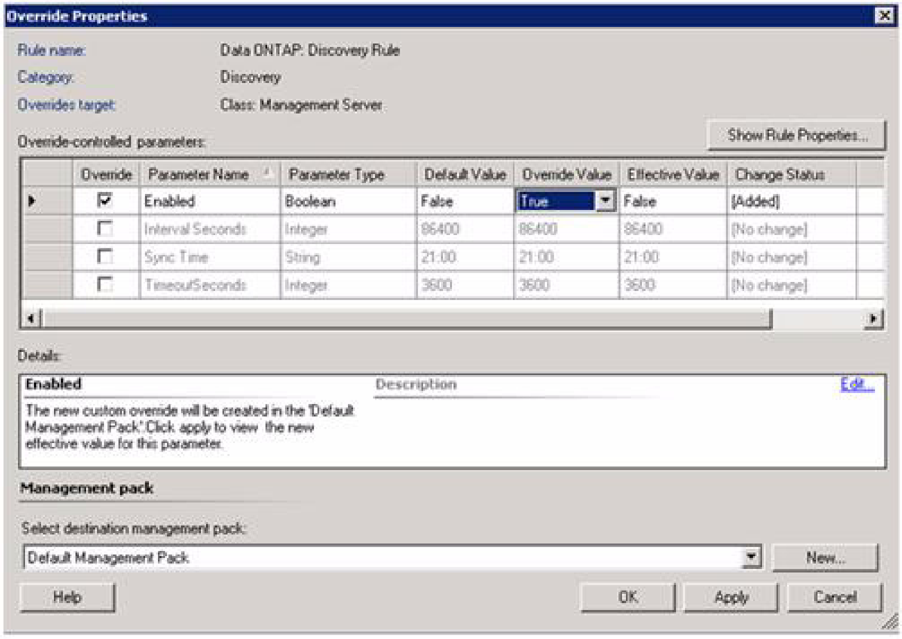
b. In the top look for box enter **Data ONTAP**, and click **Find Now**.

c. Scroll down to **Type: Management Server**.

d. Right-click **Data ONTAP: Discovery Rule** and click **Overrides > Override the Rule > For all objects of class: Management Server**.

e. Select the **OverRide** checkbox for the row where Parameter Name is Enabled.

f. Change the Override Value selection to **True**, and click **OK**.



Rule name: Data ONTAP: Discovery Rule

Category: Discovery

Overrides target: Class: Management Server

Override-controlled parameters:

Override	Parameter Name	Parameter Type	Default Value	Override Value	Effective Value	Change Status
☑	Enabled	Boolean	False	True	False	[Added]
□	Interval Seconds	Integer	86400	86400	86400	[No change]
□	Sync Time	String	21:00	21:00	21:00	[No change]
□	TimeoutSeconds	Integer	3600	3600	3600	[No change]

Details:

Enabled — Description

The new custom override will be created in the 'Default Management Pack'.Click apply to view the new effective value for this parameter.

Management pack

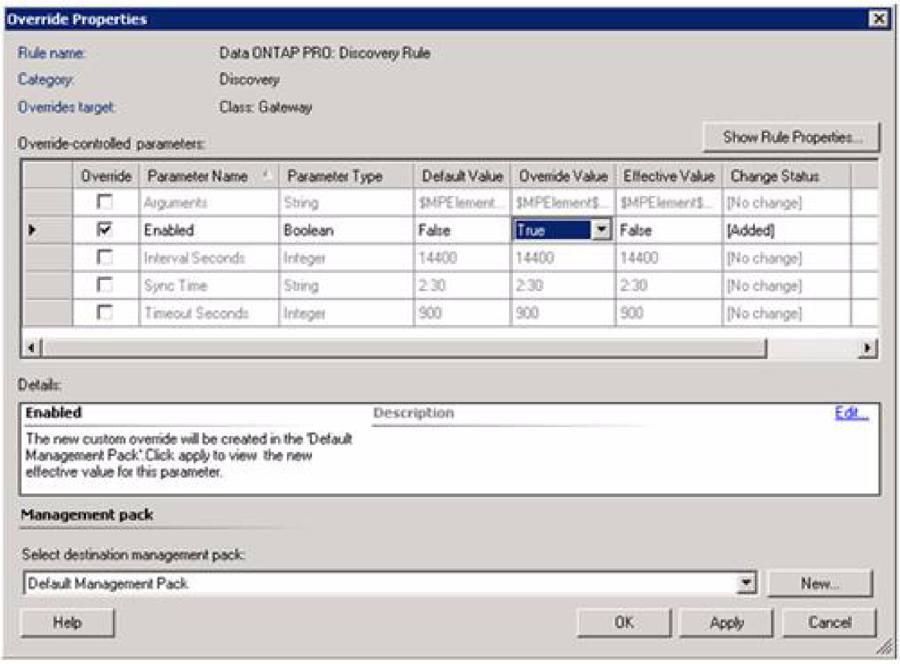
Select destination management pack: Default Management Pack

g. Go to **Type: Data ONTAP Virtualization: Management Server**.

h. Right-click **Data ONTAP PRO: Discovery Rule**, and click **Overrides > Override the Rule > For all objects of class: Data ONTAP Virtualization: Management Server**.

i. Select the **Override** checkbox for the row where Parameter Name is Enabled.

j. Change the Override Value selection to **True** and click **OK**.



Rule name: Data ONTAP PRO: Discovery Rule

Category: Discovery

Overrides target: Class: Gateway

Override-controlled parameters:

Override	Parameter Name	Parameter Type	Default Value	Override Value	Effective Value	Change Status
□	Arguments	String	$MPElement...	$MPElement$...	$MPElement$...	[No change]
☑	Enabled	Boolean	False	True	False	[Added]
□	Interval Seconds	Integer	14400	14400	14400	[No change]
□	Sync Time	String	2:30	2:30	2:30	[No change]
□	Timeout Seconds	Integer	900	900	900	[No change]

Details:

Enabled — Description

The new custom override will be created in the 'Default Management Pack'.Click apply to view the new effective value for this parameter.

Management pack

Select destination management pack: Default Management Pack

k. (Optional) If MetroCluster is a part of your installation, you can enable the Data ONTAP MetroCluster: Discovery Rule.

10. Discover NetApp controllers:

a. From the **Operations Manager Console**, select **Administration**.

b. From the left pane click **Discovery Wizard**.

c. Select **Network Device** and click **Next**.

d. Enter an IP Range, and the community string entered on the storage systems and click **Discover**.

e. Select the checkboxes next to the IP addresses of the two storage controllers and click **Next**.

f. Click **Finish**.

11. Add NetApp controllers:

a. From the **Operations Manager Console** select **Monitoring**.

b. Expand **Monitoring** and select **Discovered Inventory**.

c. From the Action pane, select **Change Target Type**. (If there is no action pane, select **View > Actions**, or press **Ctrl+T**).

d. In the resulting popup select **Management Server** and click **OK**.

e. From the Actions pane under Health Service Tasks, Select **Data ONTAP: Run discovery task**.

f. After the task is finished, click **Close**.

12. Add controller credentials:

a. From the **Operations Manager Console** select **Monitoring**.

b. Expand **Monitoring**, and select **Discovered Inventory**.

c. From the Actions pane under Health Service Tasks, **Select Data ONTAP: Manage Controller Credentials**.

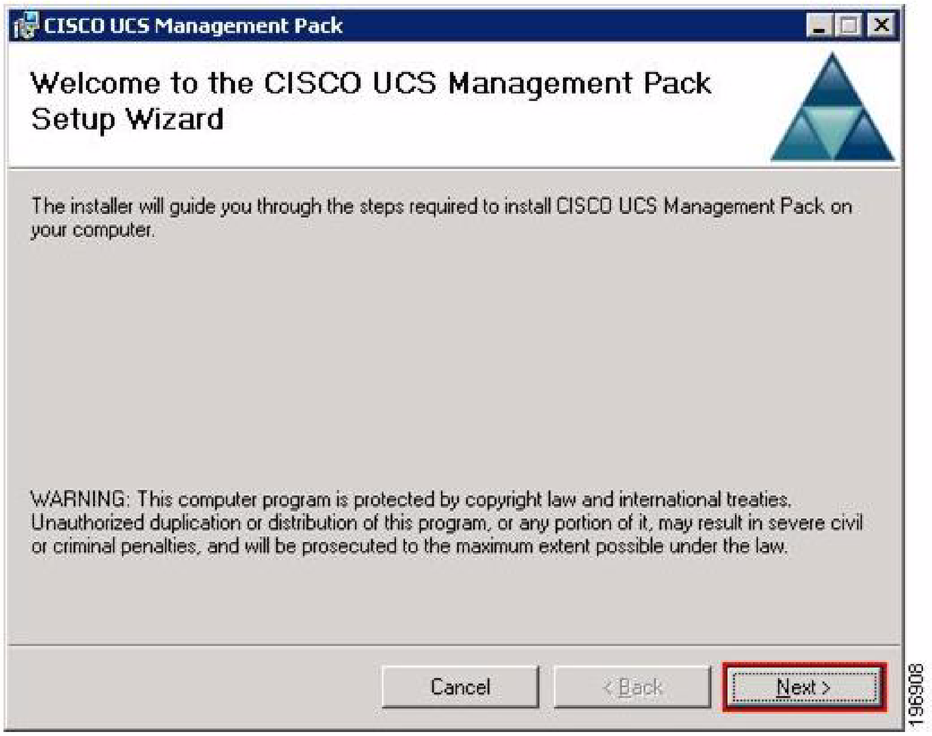
d. Enter the login credentials for each controller. It may be necessary to use the Data ONTAP: Add Controller Task to add the controllers before putting in credentials.

Install Cisco UCS Management Pack for Microsoft SCOM

In the Operation Manager KMS Server, log in to Operations Manager using a domain account with permissions.

To install the management pack, follow these steps:

1. Start **Cisco.UCS.MP.Install.msi** and click **Next**.



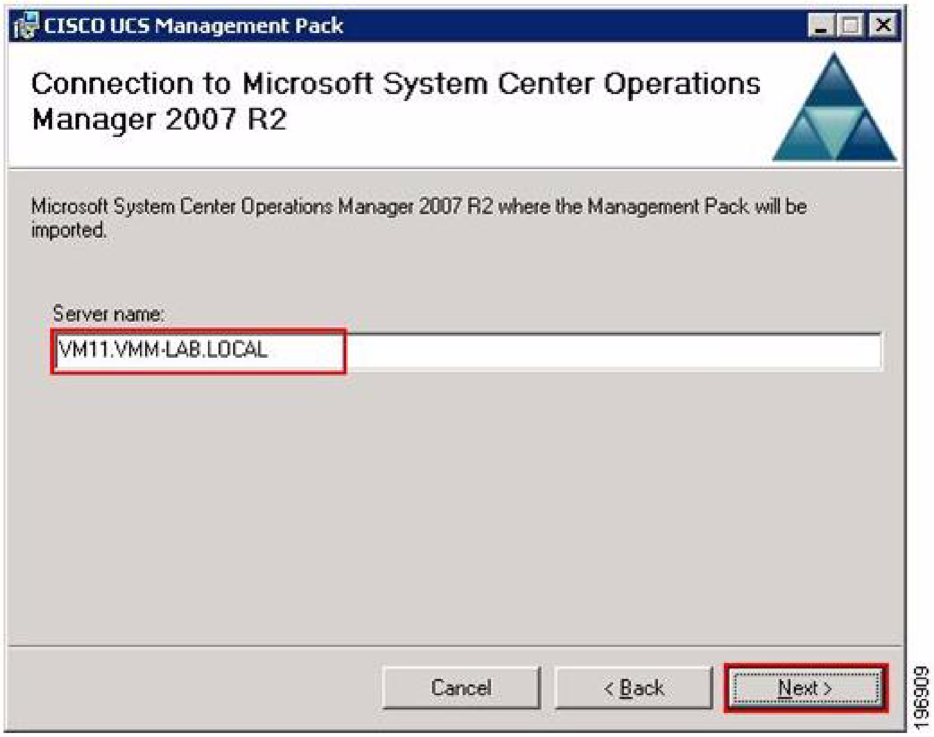
CISCO UCS Management Pack

Welcome to the CISCO UCS Management Pack Setup Wizard

The installer will guide you through the steps required to install CISCO UCS Management Pack on your computer.

WARNING: This computer program is protected by copyright law and international treaties. Unauthorized duplication or distribution of this program, or any portion of it, may result in severe civil or criminal penalties, and will be prosecuted to the maximum extent possible under the law.

2. Enter a server name in the Server Name field. Click **Next**.



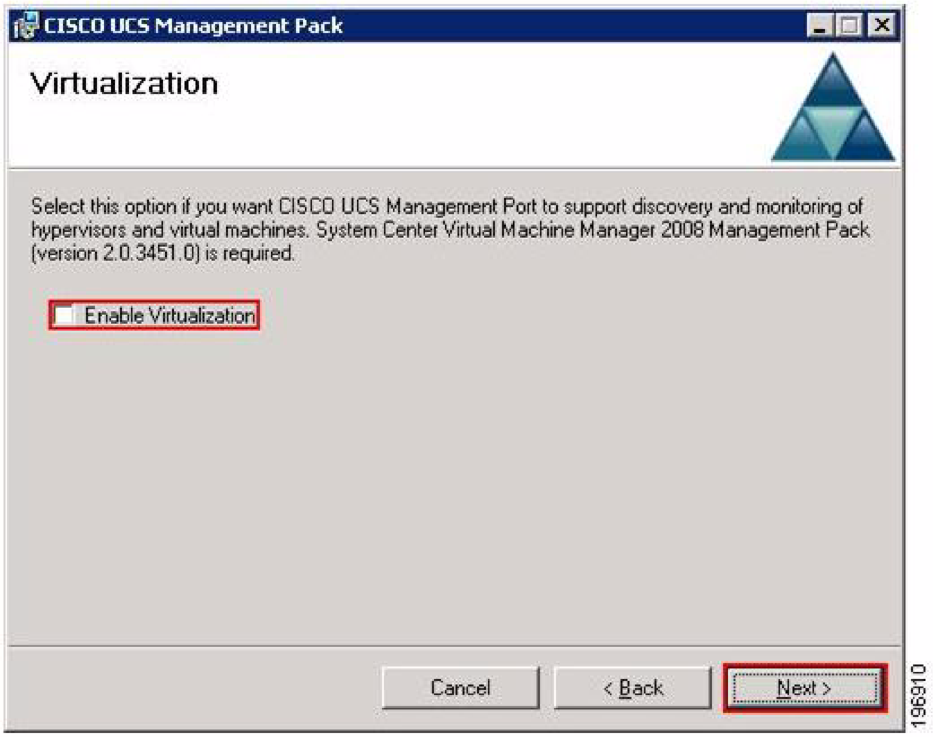
CISCO UCS Management Pack

Connection to Microsoft System Center Operations Manager 2007 R2

Microsoft System Center Operations Manager 2007 R2 where the Management Pack will be imported.

Server name: VM11.VMM-LAB.LOCAL

3. Select the **Enable Virtualization** checkbox if you want to support the discovery and monitoring of hypervisors and virtual machines. Click **Next**.



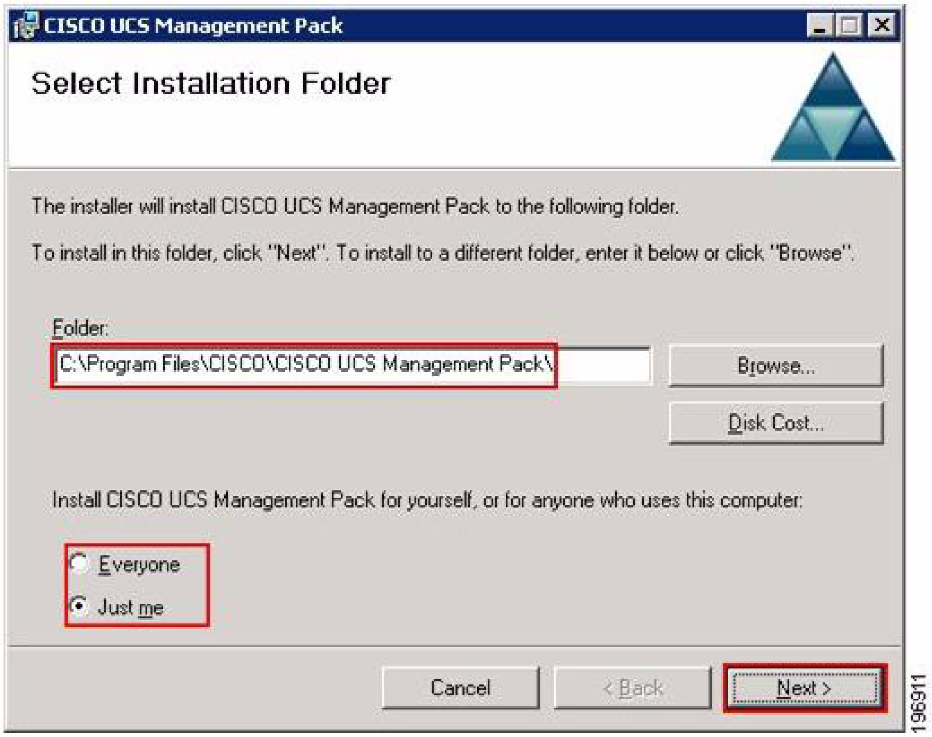
Select this option if you want CISCO UCS Management Port to support discovery and monitoring of hypervisors and virtual machines. System Center Virtual Machine Manager 2008 Management Pack (version 2.0.3451.0) is required.

☐ Enable Virtualization

Enabling virtualization support requires that the System Center Virtual Machine Manager (SCVMM) 2008 (version 2.0.3451.0) is installed, prior to the installation of the Cisco UCS Manager Management Pack. Prior to installation, the management packs specific to SCVMM 2008 must be installed in the Operations Manager console. Consult the SCVMM and SCOM R2 documentation for installation details.

Note The System Center Virtual Machine Manager 2008 Management Pack version 2.0.3451.0 is required for SCOM 2007 R2.

4. Enter a path to folder where the management pack is installed in the Folder field.



CISCO UCS Management Pack

Select Installation Folder

The installer will install CISCO UCS Management Pack to the following folder.

To install in this folder, click "Next". To install to a different folder, enter it below or click "Browse".

Folder:
C:\Program Files\CISCO\CISCO UCS Management Pack\

Install CISCO UCS Management Pack for yourself, or for anyone who uses this computer:

○ Everyone

● Just me

5. Select the **Everyone** or **Just Me** radio button to install the management pack for yourself or for anyone else who uses it and click **Next**.
6. Click **Next** to confirm the installation and then click **Close**.
7. Perform the following steps if during the installation an error occurred and you were asked to import an appropriate management pack independently:
   a. Click **Go** on the top tool bar in System Center Operations Manager and then click **Administration** from the drop-down menu.
   b. Right-click the **Management Packs** node and then select **Import Management Packs** from the drop-down menu. The Import Management Packs wizard appears.
   c. Click **Add** and then select **Add from Disk**.
   d. Click **No** in Online Catalog Connection.
   e. Navigate to the folder selected during installation process in the Select Management Packs to Import dialog box.
   f. Click **Open** and then click **Install**.
   g. Click **Close** when the management pack is imported.

Assigning an IP Address to the Management Port

To assign an IP address to the management port, follow these steps:

1. Click **Go** on the top tool bar in the SCOM and then select **Authoring** from the drop-down menu.
2. Expand the **Management Pack Templates** node.

3. Select **Cisco UCS Management Port** and then click the **Add Monitoring Wizard** tab under the top tool bar.
4. The Add Monitoring Wizard appears and Cisco UCS Management Port is selected in the Select the Monitoring Type area.
5. Use the wizard to add a management port IP address and port number:
   a. Click **Next**.
   b. Enter an IP address and port number in the URL field and click **Next**.
   c. Enter a name in the Name field.
   d. When you enter a name, it appears in the Create Destination Management Pack field. Alternatively, you can select the Use Existing Management Pack or Create New checkbox to create a management pack or browse for a preexisting management pack.
   e. (Optional) Enter a description in the Description field and click **Next**.
   f. (Optional) Select the **Virtualization** checkbox, if you want to monitor any virtual machines.
   g. Click **Next**.
   h. Use the Summary page to make sure that you have the proper configuration. Click **Create**.

An IP address is now assigned to the management port.

Creating an Account for Administrators

To create an account for administrators, follow these steps:

1. Click **Go** on the top tool bar in the SCOM and then select **Administration** from the drop-down menu.
2. Right-click **Accounts** and then select **Create Run as Accounts** from the drop-down menu. The Create Run as Accounts wizard appears.

Note By using the Run as Accounts option, you create an account for an administrator to log in to the Cisco UCS system from SCOM to retrieve required information. The administrator account details must be available in the Cisco UCS platform to authenticate the user.

3. Use the wizard to create an account:
   a. Read the introduction and then click **Next**.
   b. Select **Simple Authentication** from the Run as Account Type drop-down list.
   c. Enter a display name in the Display Name field.
   d. (Optional) Enter a description in the Description field and then click **Next**.
   e. Enter a user name in the User Name field.
   f. Enter a password in the Password field and then reenter the same password in the Confirm Password field.
   g. Select the **Less Secure** radio button and click **Create**.

An account for the administrator is now created.

Adding an Account to a Profile

To add an account to a profile, follow these steps:

1. Click **Go** located on the top tool bar in the SCOM and then select **Administration** from the drop-down list.
2. Click **Profiles**.
3. Right-click the appropriate account and then select **Properties** from the drop-down list.
4. The Run as Profile wizard appears.
5. Use the wizard to create an account:
   a. Click **Run as Accounts**.
   b. Click **Add**.
   c. Select an account from the Run as Account drop-down list.
   d. Click either the **All Targeted Objects** or the **A Selected Class** radio button and then click **OK**.

The account is now added to the profile.

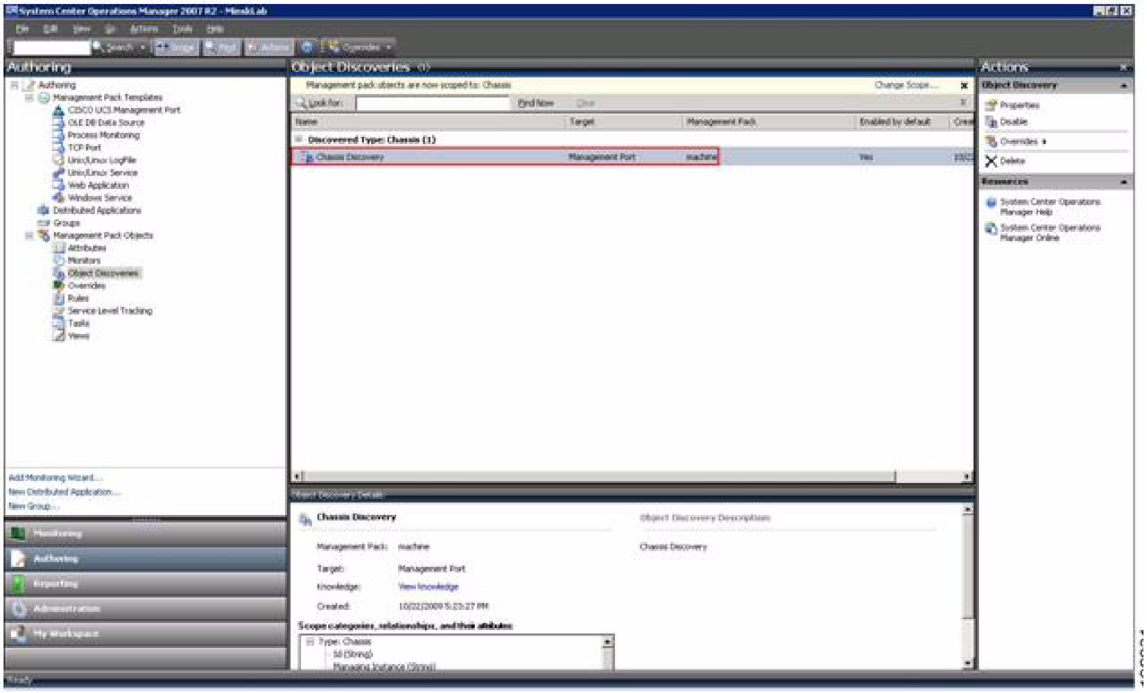
Adjusting the Discovery Interval

To adjust the discovery interval, follow these steps:

1. Click Go on the top tool bar in the SCOM, and then select Authoring from the drop-down menu.
2. Click the Objects Discoveries node, and then click Scope.
3. Click Clear All, and then select the View all Targets radio button.
4. Enter Chassis in the Look For field.
5. Select the Chassis checkbox and click OK.

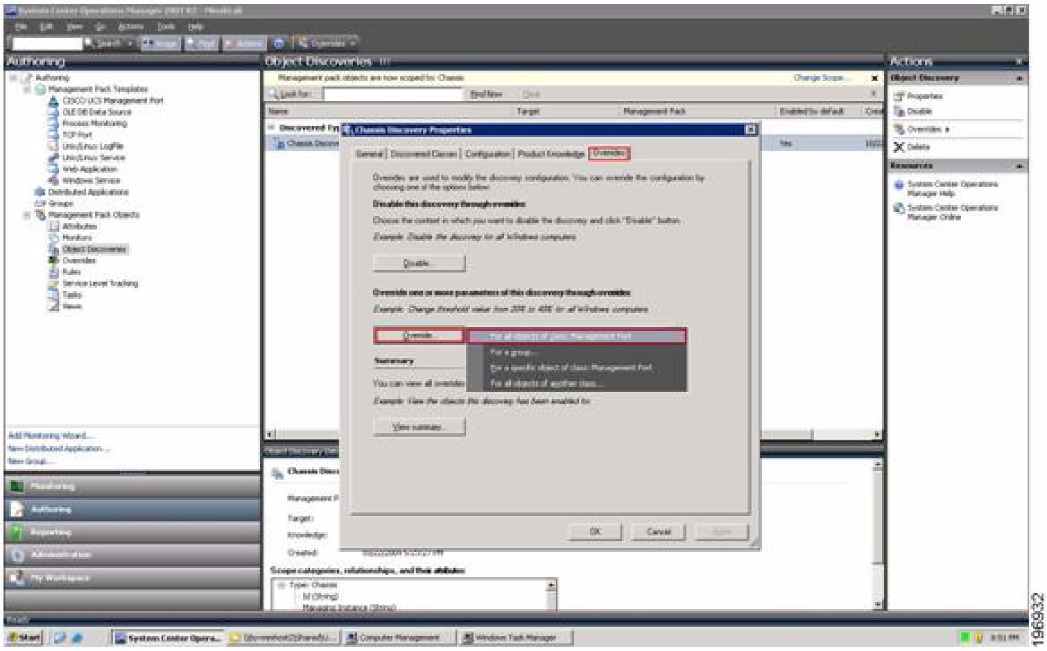
Note The Management Pack column value has to match the name entered while processing the management pack template.

6. Double-click the **Chassis Discovery** row.


System Center Operations Manager 2007 R2 - MinskLab
Authoring
Object Discoveries
Actions
Management pack objects are now scoped to: Chassis
Change Scope...
Discovered Type: Chassis (1)
Chassis Discovery
Management Port
machine
Yes
Object Discovery
Properties
Disable
Overrides
Delete
Resources
System Center Operations Manager Help
System Center Operations Manager Online
Object Discovery Details
Management Pack: machine
Target: Management Port
Knowledge: View knowledge
Created: 10/22/2009 5:23:27 PM
Object Discovery Description
Chassis Discovery
Scope categories, relationships, and their attributes
Monitoring
Authoring
Reporting
Administration
My Workspace
Ready

7. Click the **Overrides** tab and click **Override**.

8. Select **For all Objects of Class: Management Port** from the drop-down list.


Chassis Discovery Properties
General
Discovered Classes
Configuration
Product Knowledge
Overrides
Overrides are used to modify the discovery configuration. You can override the configuration by choosing one of the options below.
Disable this discovery through overrides
Choose the context in which you want to disable the discovery and click "Disable" button.
Example: Disable the discovery for all Windows computers
Disable...
Override one or more parameters of this discovery through overrides
Example: Change threshold value from 20% to 40% for all Windows computers
Override...
For all objects of class: Management Port
For a group...
For a specific object of class: Management Port
For all objects of another class...
Summary
You can view all overrides
Example: View the objects this discovery has been enabled for
View summary...
OK
Cancel
Apply
196932

9. Select the **Interval Seconds** checkbox.

10. Change the value in the Override Value column to another value and click **OK**.

11. Click **OK** again.

The discovery interval is now adjusted.

Note You must perform these steps for all classes of objects, such as Management Port, Chassis, Server, Organization, and Associated Service Profile. To change the intervals for Rules and Monitors perform the steps, but start from the node Rules or Monitors.

Opalis Integration Server

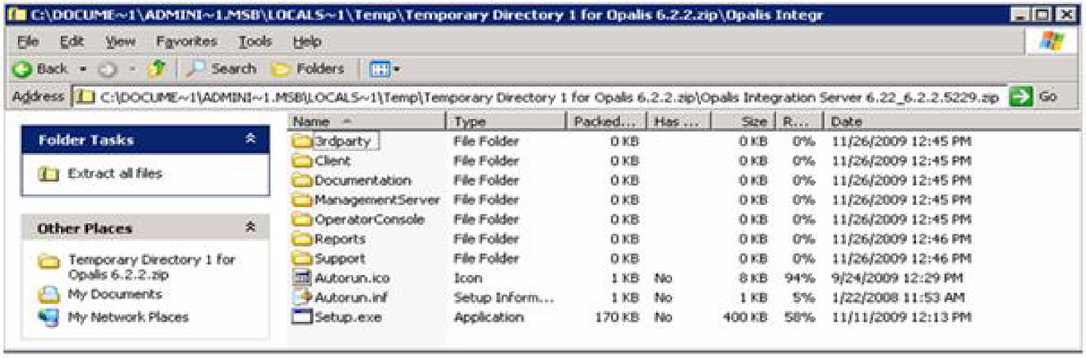
This section provides a step-by-step guide for installing Opalis Integration Server. Opalis is an optional component that provides runbook automation. NetApp integration is provided via OnCommand plug-in for Microsoft environments. Note that these instructions assume a new installation of Opalis Integration Server 6.3. Since Opalis 6.3 is a patch on top of 6.2.2, the instructions below will detail installing 6.2.2 and will apply the 6.3 patch on top of the base 6.2.2 install. See Opalis documentation for other install scenarios.

Installing Opalis 6.2.2 SP1

Before you begin you need to create a service account for Opalis. It is recommended that this be a dedicated domain account with a nonexpiring password. Add this account to the local administrators group before installing Opalis. Also, this account will need access to the SQL Server created in the Install SQL Server 2008 Cluster section, so you will need to add this account to the SQL Server security group (Operations Manager SQL Server Admins) created in that section.

To install Opalis 6.22 SP1, do the following:

1. Run **opalis_full.exe** or other source media to begin installation process.
2. Agree to license terms and provide an extract location.
3. Before installing the 6.3 patch, you must install Opalis 6.2.2. Open the **Opalis 6.2.2.zip** folder and within that folder, open the **Opalis Integration Server 6.22_6.2.2.5229.zip** folder.



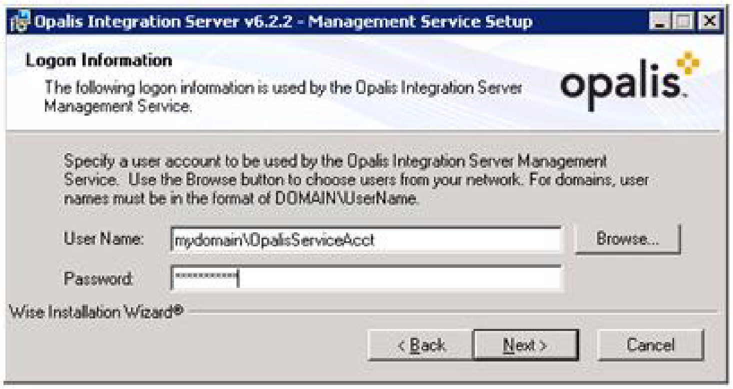
C:\DOCUME~1\ADMINI~1.MSB\LOCALS~1\Temp\Temporary Directory 1 for Opalis 6.2.2.zip\Opalis Integr

Address: C:\DOCUME~1\ADMINI~1.MSB\LOCALS~1\Temp\Temporary Directory 1 for Opalis 6.2.2.zip\Opalis Integration Server 6.22_6.2.2.5229.zip

Name	Type	Packed...	Has ...	Size	R...	Date
3rdparty	File Folder	0 KB		0 KB	0%	11/26/2009 12:45 PM
Client	File Folder	0 KB		0 KB	0%	11/26/2009 12:45 PM
Documentation	File Folder	0 KB		0 KB	0%	11/26/2009 12:45 PM
ManagementServer	File Folder	0 KB		0 KB	0%	11/26/2009 12:45 PM
OperatorConsole	File Folder	0 KB		0 KB	0%	11/26/2009 12:45 PM
Reports	File Folder	0 KB		0 KB	0%	11/26/2009 12:46 PM
Support	File Folder	0 KB		0 KB	0%	11/26/2009 12:46 PM
Autorun.ico	Icon	1 KB	No	8 KB	94%	9/24/2009 12:29 PM
Autorun.inf	Setup Inform...	1 KB	No	1 KB	5%	1/22/2008 11:53 AM
Setup.exe	Application	170 KB	No	400 KB	58%	11/11/2009 12:13 PM

4. Extract this zip file to a local directory.
5. Right-click **Install Opalis Integration Server** and then click **Run as administrator**.
6. Select **Install Opalis Integration Server**, click **Step 1. Install Management Server**.
7. Click **Next**. Accept the license and click **Next**.
8. Enter user information and click **Next**. Accept the default installation folder and click **Next**.

9. Enter the service account. As noted previously, it is recommended that this be a domain account with a non-expiring password.



Opalis Integration Server v6.2.2 - Management Service Setup

Logon Information

The following logon information is used by the Opalis Integration Server Management Service.

Specify a user account to be used by the Opalis Integration Server Management Service. Use the Browse button to choose users from your network. For domains, user names must be in the format of DOMAIN\UserName.

User Name: mydomain\OpalisServiceAcct

Password: ***********

10. Click **Next** to begin the installation.
11. Click **Finish** when the installation is complete.
12. Click **Step 2: Configure the Database**.
13. Accept the default database type **SQL Server**. Click **Next**.
14. Enter the database details created in the Install SQL Server 2008 Cluster section of this document.
15. Click **Next**.
16. Select **Create New Database** and accept the default database name.
17. Click **Finish**.
18. Run **Step 3: Import a license** and click **Import**.
19. Open your **.lic** file for the Opalis base pack (5-OISBP_25.lic) and enter your license key.
20. Repeat this process for any additional license files.

Installing the Opalis 6.3 Patch

To install the Opalis 6.3 patch, do the following:

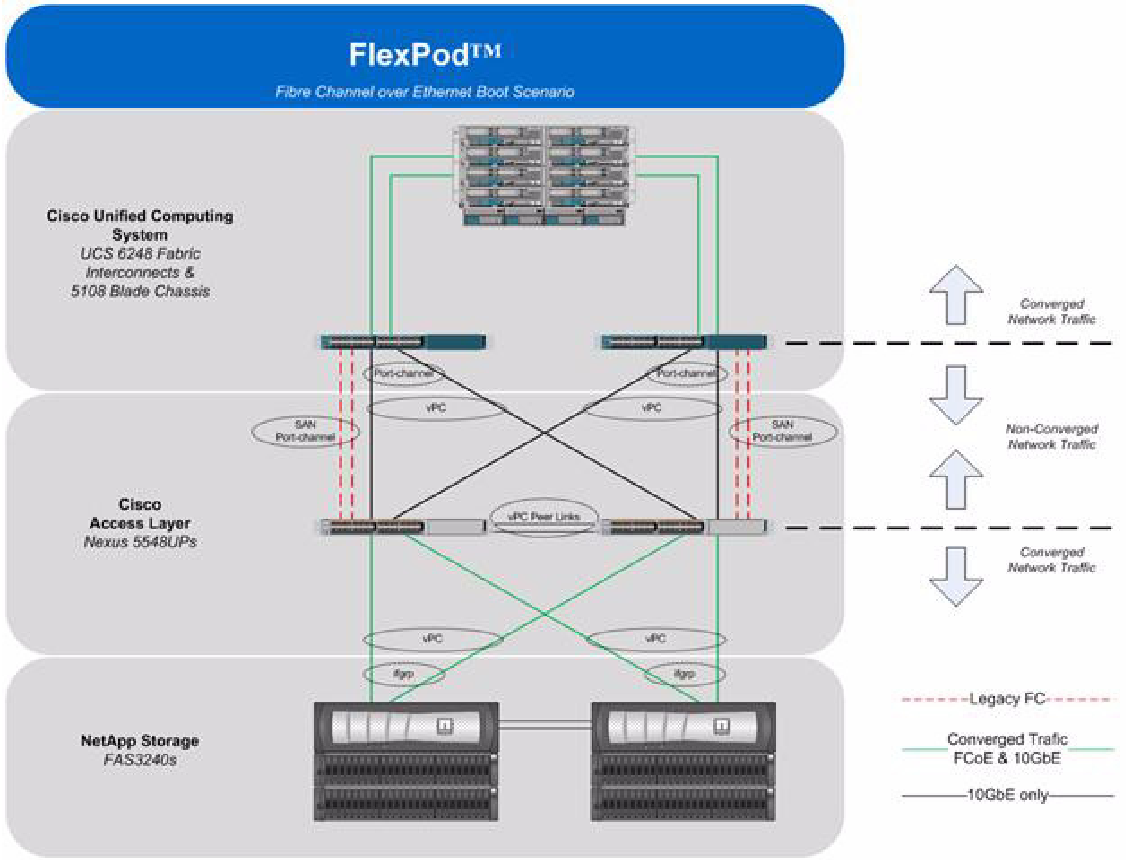
1. Open the **Management Server installation** folder. By default, this is located in System Drive: Program Files\Opalis Software\Opalis Integration Server\Management Service. Browse to the **Components\Objects** folder.
2. Copy the **OpalisIntegrationServer_FoundationObjects.msi** file provided in the Opalis 6.3 zip file to the **System Drive:\Program Files (x86)\Opalis Software\Opalis Integration Server\Management Service\Components\Objects** directory. Replace the existing file.
3. Run the **OpalisIntegrationServer_ManagementService_630_PATCH.msp** installer. Do not change any of the default values.
4. Deploy your **Opalis Clients** via the deployment manager.
5. After you deploy the clients from the Deployment Manager, copy the **OpalisIntegrationServer_Client_630_PATCH.msp** file included in the 6.3 release to each client.
6. Run the **OpalisIntegrationServer_Client_630_PATCH.msp** installer. Do not change any of the default values.

Appendix

Alternate Cisco Nexus 5548 Deployment Procedure: Part 2 for FCoE

The following steps provide the details to complete the configuration of the Nexus infrastructure for the FlexPod environment.

Figure 3 Nexus Infrastructure for the FlexPod Environment


FlexPod™
Fibre Channel over Ethernet Boot Scenario
Cisco Unified Computing System
UCS 6248 Fabric Interconnects &
5108 Blade Chassis
Port-channel
Port-channel
vPC
vPC
SAN Port-channel
SAN Port-channel
Cisco Access Layer
Nexus 5548UPs
vPC Peer Links
vPC
vPC
ifgrp
ifgrp
NetApp Storage
FAS3240s
Converged Network Traffic
Non-Converged Network Traffic
Converged Network Traffic
Legacy FC
Converged Trafic FCoE & 10GbE
10GbE only

Create VSANs, Assign FC Ports, and Turn on FC Ports

The following steps provide the details to configure VSANs, assigning FC ports and enabling FC ports.

Note This procedure sets up FCoE connections between the Nexus 5548s and the NetApp Storage Systems. If you want to use FCoE connections between the Nexus 5548s and the NetApp Storage Systems using the NetApp Unified Target Adapter (UTA). Use the Alternate Cisco Nexus 5548 Deployment Procedure: Part 2 for FCoE.

Cisco Nexus 5548 A

1. From the global configuration mode, type **vlan <Fabric A FCoE VLAN ID>**.

2. Type **name FCoE_Fabric_A**.
3. Type **fcoe vsan <VSAN A ID>**.
4. Type **exit**.
5. Type **interface po11**.
6. Type **switchport trunk allowed vlan add <Fabric A FCoE VLAN ID>**.
7. Type **exit**.
8. Type **interface vfc11**.
9. Type **bind interface po11**.
10. Type **no shutdown**.
11. Type **exit**.
12. Type **interface po12**.
13. Type **switchport trunk allowed vlan add <Fabric A FCoE VLAN ID>**.
14. Type **exit**.
15. Type **interface vfc12**.
16. Type **bind interface po12**.
17. Type **no shutdown**.
18. Type **exit**.
19. Type **interface san-port-channel 1**.
20. Type **channel mode active**.
21. Type **exit**.
22. Type **vsan database**.
23. Type **vsan <VSAN A ID> name Fabric_A**.
24. Type **vsan <VSAN A ID> interface fc1/31-32**.
25. Type **vsan <VSAN A ID> interface san-port-channel 1**.
26. Type **vsan <VSAN A ID> interface vfc11**.
27. Type **vsan <VSAN A ID> interface vfc12**.
28. Type **exit**.
29. Type **interface fc1/31-32**.
30. Type **channel-group 1 force**.
31. Type **no shutdown**.
32. Type **exit**.
33. Type **show int san-port-channel 1 to confirm connectivity**.
34. Type **interface fc1/31**.
35. Type **switchport description <UCSM A:fc1/31>**.
36. Type **exit**.
37. Type **interface fc1/32**.
38. Type **switchport description <UCSM A:fc1/32>**.
39. Type **exit**.

Cisco Nexus 5548 B

1. From the global configuration mode, type **vlan <Fabric B FCoE VLAN ID>**.
2. Type **name FCoE_Fabric_B**.
3. Type **fcoe vsan <VSAN B ID>**.
4. Type **exit**.
5. Type **interface po11**.
6. Type **switchport trunk allowed vlan add <Fabric B FCoE VLAN ID>**.
7. Type **exit**.
8. Type **interface vfc11**.
9. Type **bind interface po11**.
10. Type **no shutdown**.
11. Type **exit**.
12. Type **interface po12**.
13. Type **switchport trunk allowed vlan add <Fabric B FCoE VLAN ID>**.
14. Type **exit**.
15. Type **interface vfc12**.
16. Type **bind interface po12**.
17. Type **no shutdown**.
18. Type **exit**.
19. Type **interface san-port-channel 2**.
20. Type **channel mode active**.
21. Type **exit**.
22. Type **vsan database**.
23. Type **vsan <VSAN B ID> name Fabric_B**.
24. Type **vsan <VSAN B ID> interface fc1/31-32**.
25. Type **vsan <VSAN B ID> interface san-port-channel 2**.
26. Type **vsan <VSAN A ID> interface vfc11**.
27. Type **vsan <VSAN A ID> interface vfc12**.
28. Type **exit**.
29. Type **interface fc1/31-32**.
30. Type **channel-group 2 force**.
31. Type **no shutdown**.
32. Type **exit**.
33. Type **show int san-port-channel 2 to confirm connectivity**.
34. Type **interface fc1/31**.
35. Type **switchport description <UCSM B:fc1/31>**.
36. Type **exit**.
37. Type **interface fc1/32**.

38. Type **switchport description <UCSM B:fc1/32>**.
39. Type **exit**.

Create Device Aliases and Create Zones for FCoE Devices

The following steps provide the details to configure device aliases and zones for the primary boot path. Instructions are given for all target ports, however, the redundant path is enabled following the operating system installation.

Cisco Nexus 5548 A

1. From the global configuration mode, **type device-alias database**.
2. Type **device-alias name VM-Host-Infra-01_A pwwn <Fabric-A WWPN>**.
3. Type **device-alias name VM-Host-Infra-02_A pwwn <Fabric-A WWPN>**.
4. Type **device-alias name controller_A_2a pwwn <Controller A 2a WWPN>**.
5. Type **device-alias name controller_B_2a pwwn <Controller B 2a WWPN>**.

Obtain this information from the table in the section Gather the Necessary Information.

6. After all of the necessary device-alias are created, type **exit**.
7. Type **device-alias commit**.
8. Create the zone for each service profile.
   a. Type **zone name VM-Host-Infra-01_A vsan <Fabric A VSAN ID>**.
   b. Type **member device-alias VM-Host-Infra-01_A**.
   c. Type **member device-alias controller_A_2a**.
   d. Type **exit**.
9. After the zone for the primary path of the first Cisco UCS service profiles has been created, create a zoneset to organize and manage them.
10. Create the zoneset and add the necessary members.
    a. Type **zoneset name flexpod vsan <Fabric A VSAN ID>**.
    b. Type **member VM-Host-Infra-01_A**.
    c. Type **exit**.
11. Activate the zoneset.
    a. Type **zoneset activate name flexpod vsan < Fabric A VSAN ID>**.
    b. Type **exit**.
12. Type **copy run start**.

Cisco Nexus 5548 B

1. From the global configuration mode, **type device-alias database**.
2. Type **device-alias name VM-Host-Infra-01_B pwwn <Fabric-B WWPN>**.
3. Type **device-alias name VM-Host-Infra-02_B pwwn <Fabric-B WWPN>**.
4. Type **device-alias name controller_A_2b pwwn <Controller A 0d WWPN>**.
5. Type **device-alias name controller_B_2b pwwn <Controller B 0d WWPN>**.

Obtain this information from the tables in the section Gather the Necessary Information.

6. After all of the necessary device-alias are created, type **exit**.
7. Type **device-alias commit**.
8. Create the zones for each service profile.
   a. Type **zone name VM-Host-Infra-02_B vsan <Fabric B VSAN ID>**.
   b. Type **member device-alias VM-Host-Infra-02_B**.
   c. Type **member device-alias controller_B_0d**.
9. Type **exit**.
10. After all of the zones for the Cisco UCS service profiles have been created, create a zoneset to organize and manage them.
11. Create the zoneset and add the necessary members.
    a. Type **zoneset name flexpod vsan <Fabric B VSAN ID>**.
    b. Type **member VM-Host-Infra-02_B**.
    c. Type **exit**.
12. Activate the zoneset.
    a. Type **zoneset activate name flexpod vsan <Fabric B VSAN ID>**.
    b. Type **exit**.
    c. Type **copy run start**.
13. Return to the section NetApp FAS3240A Deployment Procedure: Part 2.

Alternate Create Zones for Redundant Paths for FCoE

The following steps provide the details to configure the zones for the secondary boot path for each service profile.

Cisco Nexus 5548 A

1. From the global configuration mode, create the zones for the redundant path for each service profile.
   a. Type **zone name VM-Host-Infra-01_A vsan <Fabric A VSAN ID>**.
   b. Type **member device-alias controller_B_2a**.
   c. Type **exit**.
   d. Type **zone name VM-Host-Infra-02_A vsan <Fabric A VSAN ID>**.
   e. Type **member device-alias VM-Host-Infra-02_A**.
   f. Type **member device-alias controller_B_2a**.
   g. Type **member device-alias controller_A_2a**.
   h. Type **exit**.
2. Modify the zoneset and add the necessary members.
   a. Type **zoneset name flexpod vsan <Fabric A VSAN ID>**.
   b. Type **member VM-Host-Infra-02**.
   c. Type exit.
3. Activate the zoneset.

   a. Type **zoneset activate name flexpod vsan <Fabric A VSAN ID>**.
   b. Type **exit**.
   c. Type **copy run start**.

Cisco Nexus 5548 B

1. From the global configuration mode, create the zones for the redundant path for each service profile.
   a. Type **zone name VM-Host-Infra-01_B vsan <Fabric B VSAN ID>**.
   b. Type **member device-alias VM-Host-Infra-01_B**.
   c. Type **member device-alias controller_A_2b**.
   d. Type **member device-alias controller_B_2b**.
   e. Type **exit**.
   f. Type **zone name VM-Host-Infra-02_B vsan <Fabric B VSAN ID>**.
   g. Type **member device-alias controller_A_2b**.
   h. Type **exit**.
2. Modify the zoneset and add the necessary members.
   a. Type **zoneset name flexpod vsan <Fabric B VSAN ID>**.
   b. Type **member VM-Host-Infra-01_B**.
   c. Type **exit**.
3. Activate the zoneset.
   a. Type **zoneset activate name flexpod vsan <Fabric B VSAN ID>**.
   b. Type **exit**.
   c. Type **copy run start**.

Note Return to the Clone the Windows Server 2008 R2 SP1 Installation section.

Cisco Nexus Configurations

Nexus A (Sample Running Configuration)

```
!Command: show running-config
!Time: Thu Mar  1 13:26:52 2012

version 5.0(3)N2(2a)
feature fcoe
feature npiv
feature fport-channel-trunk
no feature telnet
no telnet server enable
```

```
cfs eth distribute
feature lacp
feature vpc
feature lldp
username admin password 5 $1$vhyEnoq8$fEeCFXDyQDTPDBltqDhU0.  role
network-admin
ip domain-lookup
hostname Nexus5548-A
logging event link-status default
ip access-list classify_Silver
  10 permit ip 192.168.102.0/24 any
  20 permit ip any 192.168.102.0/24
  30 permit ip 192.168.106.0/24 any
  40 permit ip any 192.168.106.0/24
class-map type qos class-fcoe
class-map type qos match-all class-gold
  match cos 4
class-map type qos match-all class-silver
  match access-group name classify_Silver
class-map type queuing class-fcoe
  match qos-group 1
class-map type queuing class-gold
  match qos-group 3
class-map type queuing class-silver
  match qos-group 4
class-map type queuing class-all-flood
  match qos-group 2
class-map type queuing class-ip-multicast
  match qos-group 2
policy-map type qos system_qos_policy
  class class-gold
    set qos-group 3
  class class-silver
    set qos-group 4
  class class-fcoe
    set qos-group 1
policy-map type queuing system_q_in_policy
  class type queuing class-fcoe
    bandwidth percent 20
  class type queuing class-gold
```

```
    bandwidth percent 33
  class type queuing class-silver
    bandwidth percent 29
  class type queuing class-default
    bandwidth percent 18
policy-map type queuing system_q_out_policy
  class type queuing class-fcoe
    bandwidth percent 20
  class type queuing class-gold
    bandwidth percent 33
  class type queuing class-silver
    bandwidth percent 29
  class type queuing class-default
    bandwidth percent 18
class-map type network-qos class-fcoe
  match qos-group 1
class-map type network-qos class-gold
  match qos-group 3
class-map type network-qos class-silver
  match qos-group 4
class-map type network-qos class-all-flood
  match qos-group 2
class-map type network-qos class-ip-multicast
  match qos-group 2
policy-map type network-qos jumbo
  class type network-qos class-fcoe
    pause no-drop
    mtu 2158
  class type network-qos class-default
    mtu 9000
    multicast-optimize
policy-map type network-qos system_nq_policy
  class type network-qos class-gold
    set cos 4
    mtu 9000
  class type network-qos class-fcoe
    pause no-drop
    mtu 2158
  class type network-qos class-silver
    set cos 2
    mtu 9000
  class type network-qos class-default
    mtu 9000
    multicast-optimize
system qos
  service-policy type qos input system_qos_policy
  service-policy type queuing input system_q_in_policy
  service-policy type queuing output system_q_out_policy
  service-policy type network-qos system_nq_policy
slot 1
  port 29-32 type fc
snmp-server user admin network-admin auth md5
0x2e8af112d36e9af1466f4e4db0ce36a3 priv
0x2e8af112d36e9af1466f4e4db0ce36a3 localizedkey
snmp-server enable traps entity fru
ntp server 10.61.185.11 use-vrf management
vrf context management
  ip route 0.0.0.0/0 10.61.185.1
vlan 1
vlan 2
  name Native-VLAN
vlan 805
  name VM-MGMT-VLAN
vlan 801
  name CSV-VLAN
vlan 802
  name iSCSI-Fabric-A
vlan 803
  name LiveMigration-VLAN
vlan 806
  name App-Cluster-Comm-VLAN
vlan 804
  name VM-Data-VLAN
vlan 807
  name iSCSI-Fabric-B
spanning-tree port type edge bpduguard default
spanning-tree port type edge bpdufilter default
spanning-tree port type network default
vpc domain 23
  role priority 10
  peer-keepalive destination 10.61.185.70 source 10.61.185.69
vsan database
  vsan 101 name "Fabric_A"
device-alias database
  device-alias name FAS3270-1a_0c pwwn 50:0a:09:82:8d:73:42:07
  device-alias name FAS3270-1b_0c pwwn 50:0a:09:82:9d:73:42:07
  device-alias name vm-host-infra-01-fabric-a pwwn
20:00:00:25:b5:00:0a:0f
  device-alias name vm-host-infra-02-fabric-a pwwn
20:00:00:25:b5:00:0a:1f

device-alias commit

fcdomain fcid database
  vsan 101 wwn 24:01:54:7f:ee:23:52:40 fcid 0x550000 dynamic
  vsan 101 wwn 50:0a:09:82:8d:73:42:07 fcid 0x550001 dynamic
!               [FAS3270-1a_0c]
  vsan 101 wwn 50:0a:09:82:9d:73:42:07 fcid 0x550002 dynamic
!               [FAS3270-1b_0c]
  vsan 101 wwn 20:00:00:25:b5:00:0a:0f fcid 0x550003 dynamic
!               [vm-host-infra-01-fabric-a]
  vsan 101 wwn 20:00:00:25:b5:00:0a:1f fcid 0x550004 dynamic
!               [vm-host-infra-02-fabric-a]


interface san-port-channel 1
  channel mode active

interface port-channel10
  description vPC peer-link
  switchport mode trunk
  vpc peer-link
  switchport trunk native vlan 2
  switchport trunk allowed vlan 801-807
  spanning-tree port type network

interface port-channel11
  description FAS3270-1a
  switchport mode trunk
  vpc 11
  switchport trunk native vlan 805
  switchport trunk allowed vlan 802,805,807
  spanning-tree port type edge trunk

interface port-channel12
  description FAS3270-1b
  switchport mode trunk
  vpc 12
  switchport trunk native vlan 805
  switchport trunk allowed vlan 802,805,807
  spanning-tree port type edge trunk

interface port-channel13
  description UCS-2a
  switchport mode trunk
  vpc 13
  switchport trunk native vlan 2
  switchport trunk allowed vlan 801-807
  spanning-tree port type edge trunk

interface port-channel14
  description UCS-2b
  switchport mode trunk
  vpc 14
  switchport trunk native vlan 2
  switchport trunk allowed vlan 801-807
  spanning-tree port type edge trunk

interface port-channel20
  description icecore
  switchport mode trunk
  vpc 20
  switchport trunk native vlan 2
  switchport trunk allowed vlan 805
  spanning-tree port type network

vsan database
  vsan 101 interface san-port-channel 1
  vsan 101 interface fc1/29
  vsan 101 interface fc1/30
```

```
interface fc1/29
  switchport description FAS3270-1a:0c
  no shutdown

interface fc1/30
  switchport description FAS3270-1b:0c
  no shutdown

interface fc1/31
  switchport description UCS-2a:fc1/31
  channel-group 1 force
  no shutdown

interface fc1/32
  switchport description UCS-2a:fc1/32
  channel-group 1 force
  no shutdown

interface Ethernet1/1
  description FAS3270-1a:e2a
  switchport mode trunk
  switchport trunk native vlan 805
  switchport trunk allowed vlan 802,805,807
  channel-group 11 mode active

interface Ethernet1/2
  description FAS3270-1b:e2a
  switchport mode trunk
  switchport trunk native vlan 805
  switchport trunk allowed vlan 802,805,807
  channel-group 12 mode active

interface Ethernet1/3
  description UCS-2a:Eth1/19
  switchport mode trunk
  switchport trunk native vlan 2
  switchport trunk allowed vlan 801-807
  channel-group 13 mode active
```

```
interface Ethernet1/4
  description UCS-2b:Eth1/19
  switchport mode trunk
  switchport trunk native vlan 2
  switchport trunk allowed vlan 801-807
  channel-group 14 mode active

interface Ethernet1/5
  description Nexus5548-2:Eth1/5
  switchport mode trunk
  switchport trunk native vlan 2
  switchport trunk allowed vlan 801-807
  channel-group 10 mode active

interface Ethernet1/6
  description Nexus5548-2:Eth1/6
  switchport mode trunk
  switchport trunk native vlan 2
  switchport trunk allowed vlan 801-807
  channel-group 10 mode active

interface Ethernet1/7

interface Ethernet1/8

interface Ethernet1/9

interface Ethernet1/10

interface Ethernet1/11

interface Ethernet1/12

interface Ethernet1/13

interface Ethernet1/14

interface Ethernet1/15

interface Ethernet1/16
interface Ethernet1/17

interface Ethernet1/18

interface Ethernet1/19

interface Ethernet1/20
  description core:Eth1/21
  switchport mode trunk
  switchport trunk native vlan 2
  switchport trunk allowed vlan 805
  channel-group 20 mode active

interface Ethernet1/21

interface Ethernet1/22

interface Ethernet1/23

interface Ethernet1/24

interface Ethernet1/25

interface Ethernet1/26

interface Ethernet1/27

interface Ethernet1/28

interface mgmt0
  ip address 10.61.185.69/24
line console
line vty
boot kickstart bootflash:/n5000-uk9-kickstart.5.0.3.N2.2a.bin
boot system bootflash:/n5000-uk9.5.0.3.N2.2a.bin
interface fc1/31
interface fc1/32
interface fc1/29
interface fc1/30
interface fc1/31
interface fc1/32
!Full Zone Database Section for vsan 101
zone name vm-host-infra-01-fabric-a vsan 101
    member pwwn 20:00:00:25:b5:00:0a:0f
!               [vm-host-infra-01-fabric-a]
    member pwwn 50:0a:09:82:8d:73:42:07
!               [FAS3270-1a_0c]
    member pwwn 50:0a:09:82:9d:73:42:07
!               [FAS3270-1b_0c]

zone name vm-host-infra-02-fabric-a vsan 101
    member pwwn 20:00:00:25:b5:00:0a:1f
!               [vm-host-infra-02-fabric-a]
    member pwwn 50:0a:09:82:8d:73:42:07
!               [FAS3270-1a_0c]
    member pwwn 50:0a:09:82:9d:73:42:07
!               [FAS3270-1b_0c]

zoneset name flexpod vsan 101
    member vm-host-infra-01-fabric-a
    member vm-host-infra-02-fabric-a

zoneset activate name flexpod vsan 101
```

Nexus B (Sample Running Configuration)

```
!Command: show running-config
!Time: Thu Mar  1 13:28:07 2012

version 5.0(3)N2(2a)
feature fcoe
feature npiv
feature fport-channel-trunk
no feature telnet
no telnet server enable
cfs eth distribute
feature lacp
feature vpc
feature lldp
```

```
username admin password 5 $1$QwOvH6l4$uemTjjt9Bz9c2SSA1DPOX.  role network-admin
ip domain-lookup
hostname Nexus5548-2
logging event link-status default
ip access-list classify_Silver
  10 permit ip 192.168.102.0/24 any
  20 permit ip any 192.168.102.0/24
  30 permit ip 192.168.106.0/24 any
  40 permit ip any 192.168.106.0/24
class-map type qos class-fcoe
class-map type qos match-all class-gold
  match cos 4
class-map type qos match-all class-silver
  match access-group name classify_Silver
class-map type queuing class-fcoe
  match qos-group 1
class-map type queuing class-gold
  match qos-group 3
class-map type queuing class-silver
  match qos-group 4
class-map type queuing class-all-flood
  match qos-group 2
class-map type queuing class-ip-multicast
  match qos-group 2
policy-map type qos system_qos_policy
  class class-gold
    set qos-group 3
  class class-silver
    set qos-group 4
  class class-fcoe
    set qos-group 1
policy-map type queuing system_q_in_policy
  class type queuing class-fcoe
    bandwidth percent 20
  class type queuing class-gold
    bandwidth percent 33
  class type queuing class-silver
    bandwidth percent 29
  class type queuing class-default
```

```
    bandwidth percent 18
policy-map type queuing system_q_out_policy
  class type queuing class-fcoe
    bandwidth percent 20
  class type queuing class-gold
    bandwidth percent 33
  class type queuing class-silver
    bandwidth percent 29
  class type queuing class-default
    bandwidth percent 18
class-map type network-qos class-fcoe
  match qos-group 1
class-map type network-qos class-gold
  match qos-group 3
class-map type network-qos class-silver
  match qos-group 4
class-map type network-qos class-all-flood
  match qos-group 2
class-map type network-qos class-ip-multicast
  match qos-group 2
policy-map type network-qos jumbo
  class type network-qos class-fcoe
    pause no-drop
    mtu 2158
  class type network-qos class-default
    mtu 9000
    multicast-optimize
policy-map type network-qos system_nq_policy
  class type network-qos class-gold
    set cos 4
    mtu 9000
  class type network-qos class-fcoe
    pause no-drop
    mtu 2158
  class type network-qos class-silver
    set cos 2
    mtu 9000
  class type network-qos class-default
    mtu 9000
    multicast-optimize
```

```
system qos
  service-policy type qos input system_qos_policy
  service-policy type queuing input system_q_in_policy
  service-policy type queuing output system_q_out_policy
  service-policy type network-qos system_nq_policy
slot 1
  port 28-32 type fc
snmp-server user admin network-admin auth md5
0xe481d1d2fee4aaa498237df1852270e8 priv
0xe481d1d2fee4aaa498237df1852270e8 localizedkey
snmp-server enable traps entity fru
ntp server 10.61.185.11 use-vrf management
vrf context management
  ip route 0.0.0.0/0 10.61.185.1
vlan 1
vlan 2
  name Native-VLAN
vlan 805
  name VM-MGMT-VLAN
vlan 801
  name CSV-VLAN
vlan 802
  name iSCSI-Fabric-A
vlan 803
  name LiveMigration-VLAN
vlan 806
  name App-Cluster-Comm-VLAN
vlan 804
  name VM-Data-VLAN
vlan 807
  name iSCSI-Fabric-B
spanning-tree port type edge bpduguard default
spanning-tree port type edge bpdufilter default
spanning-tree port type network default
vpc domain 23
  role priority 20
  peer-keepalive destination 10.61.185.69 source 10.61.185.70
vsan database
  vsan 102 name "Fabric_B"
  vsan 202
```

```
device-alias database
  device-alias name FAS3270-1a_0d pwwn 50:0a:09:81:8d:73:42:07
  device-alias name FAS3270-1b_0d pwwn 50:0a:09:81:9d:73:42:07
  device-alias name vm-host-infra-01-fabric-b pwwn
20:00:00:25:b5:00:0b:0f
  device-alias name vm-host-infra-02-fabric-b pwwn
20:00:00:25:b5:00:0b:1f

device-alias commit

fcdomain fcid database
  vsan 102 wwn 24:02:54:7f:ee:23:8b:00 fcid 0x3f0000 dynamic
  vsan 102 wwn 50:0a:09:81:9d:73:42:07 fcid 0x3f0001 dynamic
!              [FAS3270-1b_0d]
  vsan 102 wwn 50:0a:09:81:8d:73:42:07 fcid 0x3f0002 dynamic
!              [FAS3270-1a_0d]
  vsan 102 wwn 20:00:00:25:b5:00:0b:0f fcid 0x3f0003 dynamic
!              [vm-host-infra-01-fabric-b]
  vsan 102 wwn 20:00:00:25:b5:00:0b:1f fcid 0x3f0004 dynamic
!              [vm-host-infra-02-fabric-b]


interface san-port-channel 2
  channel mode active

interface port-channel10
  description vPC peer-link
  switchport mode trunk
  vpc peer-link
  switchport trunk native vlan 2
  switchport trunk allowed vlan 801-807
  spanning-tree port type network

interface port-channel11
  description FAS3270-1a
  switchport mode trunk
  vpc 11
  switchport trunk native vlan 805
  switchport trunk allowed vlan 802,805,807
  spanning-tree port type edge trunk
```

```
interface port-channel12
  description FAS3270-1b
  switchport mode trunk
  vpc 12
  switchport trunk native vlan 805
  switchport trunk allowed vlan 802,805,807
  spanning-tree port type edge trunk

interface port-channel13
  description UCS-2a
  switchport mode trunk
  vpc 13
  switchport trunk native vlan 2
  switchport trunk allowed vlan 801-807
  spanning-tree port type edge trunk

interface port-channel14
  description UCS-2b
  switchport mode trunk
  vpc 14
  switchport trunk native vlan 2
  switchport trunk allowed vlan 801-807
  spanning-tree port type edge trunk

interface port-channel20
  description core
  switchport mode trunk
  vpc 20
  switchport trunk native vlan 2
  switchport trunk allowed vlan 805
  spanning-tree port type network

vsan database
  vsan 102 interface san-port-channel 2
  vsan 102 interface fc1/29
  vsan 102 interface fc1/30

interface fc1/29
  switchport description FAS3270-1a:0d
  no shutdown

interface fc1/30
  switchport description FAS3270-1b:0d
  no shutdown

interface fc1/31
  switchport description UCS-2b:fc1/31
  channel-group 2 force
  no shutdown

interface fc1/32
  switchport description UCS-2b:fc1/32
  channel-group 2 force
  no shutdown

interface Ethernet1/1
  description FAS3270-1a:e2b
  switchport mode trunk
  switchport trunk native vlan 805
  switchport trunk allowed vlan 802,805,807
  channel-group 11 mode active

interface Ethernet1/2
  description FAS3270-1b:e2b
  switchport mode trunk
  switchport trunk native vlan 805
  switchport trunk allowed vlan 802,805,807
  channel-group 12 mode active

interface Ethernet1/3
  description UCS-2a:Eth1/20
  switchport mode trunk
  switchport trunk native vlan 2
  switchport trunk allowed vlan 801-807
  channel-group 13 mode active

interface Ethernet1/4
  description UCS-2b:Eth1/20
  switchport mode trunk
  switchport trunk native vlan 2
  switchport trunk allowed vlan 801-807
  channel-group 14 mode active

interface Ethernet1/5
  description Nesus5548-1:Eth1/5
  switchport mode trunk
  switchport trunk native vlan 2
  switchport trunk allowed vlan 801-807
  channel-group 10 mode active

interface Ethernet1/6
  description Nexus5548-1:Eth1/6
  switchport mode trunk
  switchport trunk native vlan 2
  switchport trunk allowed vlan 801-807
  channel-group 10 mode active

interface Ethernet1/7

interface Ethernet1/8

interface Ethernet1/9

interface Ethernet1/10

interface Ethernet1/11

interface Ethernet1/12

interface Ethernet1/13

interface Ethernet1/14

interface Ethernet1/15

interface Ethernet1/16

interface Ethernet1/17
interface Ethernet1/18

interface Ethernet1/19

interface Ethernet1/20
  description core:Eth1/22
  switchport mode trunk
  switchport trunk native vlan 2
  switchport trunk allowed vlan 805
  channel-group 20 mode active

interface Ethernet1/21

interface Ethernet1/22

interface Ethernet1/23

interface Ethernet1/24

interface Ethernet1/25

interface Ethernet1/26

interface Ethernet1/27

interface Ethernet1/28

interface mgmt0
  ip address 10.61.185.70/24
line console
line vty
boot kickstart bootflash:/n5000-uk9-kickstart.5.0.3.N2.2a.bin
boot system bootflash:/n5000-uk9.5.0.3.N2.2a.bin
interface fc1/31
interface fc1/32
interface fc1/29
interface fc1/30
interface fc1/31
interface fc1/32
!Full Zone Database Section for vsan 102
```

```
zone name vm-host-infra-01-fabric-b vsan 102
    member pwwn 20:00:00:25:b5:00:0b:0f
!               [vm-host-infra-01-fabric-b]
    member pwwn 50:0a:09:81:8d:73:42:07
!               [FAS3270-1a_0d]
    member pwwn 50:0a:09:81:9d:73:42:07
!               [FAS3270-1b_0d]

zone name vm-host-infra-02-fabric-b vsan 102
    member pwwn 20:00:00:25:b5:00:0b:1f
!               [vm-host-infra-02-fabric-b]
    member pwwn 50:0a:09:81:8d:73:42:07
!               [FAS3270-1a_0d]
    member pwwn 50:0a:09:81:9d:73:42:07
!               [FAS3270-1b_0d]

zoneset name flexpod vsan 102
    member vm-host-infra-01-fabric-b
    member vm-host-infra-02-fabric-b

zoneset activate name flexpod vsan 102
```