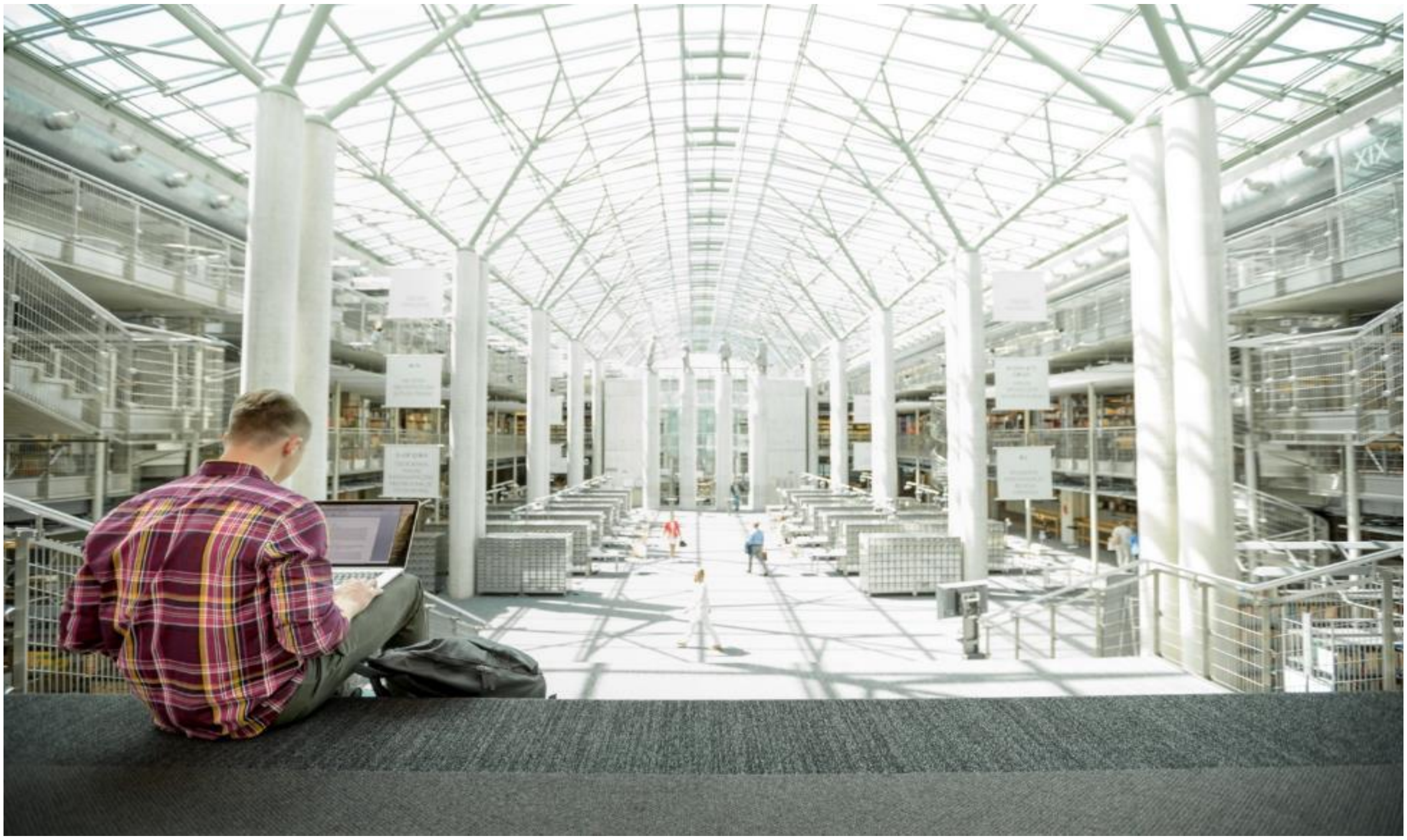

FlexPod Datacenter with Cisco UCS 4.2(1) in UCS Managed Mode, VMware vSphere 7.0 U2, and NetApp ONTAP 9.9

Deployment Guide for FlexPod Datacenter with Cisco UCS Managed M6 Servers, VMware vSphere 7.0 U2, and NetApp ONTAP 9.9

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In partnership with

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Executive Summary

Cisco Validated Designs (CVDs) include systems and solutions that are designed, tested, and documented to facilitate and improve customer deployments. These designs incorporate a wide range of technologies and products into a portfolio of solutions that have been developed to address the business needs of customers. Cisco and NetApp have partnered to deliver FlexPod®, which serves as the foundation for a variety of workloads and enables efficient architectural designs that are based on customer requirements. A FlexPod solution is a validated approach for deploying Cisco and NetApp technologies as a shared cloud infrastructure.

Hybrid cloud adoption is accelerating and FlexPod is at the center of on premises infrastructure. As business applications move into the cloud, management applications must also follow suit where practical. In this updated design, FlexPod is introducing SaaS based management with Cisco Intersight and NetApp® Active IQ. These platforms offer AI powered analytics for infrastructure management and operational intelligence.

This document describes the Cisco and NetApp FlexPod Datacenter with NetApp ONTAP® 9.9 on NetApp AFF A400 all-flash storage system, Cisco UCS Manager unified software release 4.2(1) with 3rd Generation Intel Xeon Scalable Processors in Cisco UCS M6 Servers and VMware vSphere 7.0 Update 2. Cisco UCS Manager (UCSM) 4.2(1) provides consolidated support of all current Cisco UCS Fabric Interconnect models (6200, 6300, 6324 (Cisco UCS Mini)), 6400, 2200/2300/2400 series IOM, Cisco UCS B-Series, and Cisco UCS C-Series. Also included are Cisco Intersight and NetApp Active IQ SaaS management platforms. FlexPod Datacenter with NetApp ONTAP 9.9.1, Cisco UCS unified software release 4.2(1), and VMware vSphere 7.0 Update 2 is a predesigned, best-practice datacenter architecture built on the Cisco Unified Computing System (Cisco UCS), the Cisco Nexus® 9000 family of switches, MDS 9000 multilayer fabric switches, and NetApp AFF A-Series storage arrays running ONTAP 9.9.1 data management software.

Solution Overview

Introduction

The current industry trend in datacenter design is towards shared infrastructures. By using virtualization along with pre-validated IT platforms, enterprise customers have embarked on the journey to the cloud by moving away from application silos and toward shared infrastructure that can be quickly deployed, thereby increasing agility, and reducing costs. Cisco and NetApp have partnered to deliver FlexPod, which uses best of breed storage, server, and network components to serve as the foundation for a variety of workloads, enabling efficient architectural designs that can be quickly and confidently deployed.

Audience

The audience for this document includes, but is not limited to; sales engineers, field consultants, professional services, IT managers, partner engineers, and customers who want to take advantage of an infrastructure built to deliver IT efficiency and enable IT innovation.

Purpose of this Document

This document provides a step-by-step configuration and implementation guide for the FlexPod Datacenter with Cisco UCS Fabric Interconnects, NetApp AFF storage, Cisco MDS, and Cisco Nexus 9000 solution.

What's New in this Release?

The primary FlexPod Datacenter with VMware vSphere 7.0 Update 2 validated design introduced new hardware and software into the portfolio, enabling 10/25/40/100GbE along with native 32Gb FC via the Cisco MDS Fibre Channel switch or the Cisco Nexus 93180YC-FX switch. This primary design has been updated to include the latest Cisco and NetApp hardware and software as follows:

- Support for the Cisco UCS 4.2(1) unified software release, Cisco UCS B200-M6 and C220-M6 servers with 3rd Generation Intel Xeon Scalable Processors and Cisco UCS C225-M6 servers with AMD EPYC 3rd Generation Processors, all with Cisco 1400 Series Virtual Interface Cards (VICs)
- Support for 200 Series Intel Optane Persistent Memory in Memory Mode with specific memory configurations and App Direct Mode
- Configuration of the Cisco Nexus switches, NetApp storage, Cisco UCS, Cisco MDS switches, VMware ESXi and vCenter, NetApp ONTAP Tools, and NetApp AIQUM with Ansible playbooks
- Cisco UCS Best Practice Recommended Virtualization BIOS Policies for Intel-based M6, Intel-based M5, and AMD-based C125 servers
- Support for NVMe over Fibre Channel (FC-NVMe) VMware datastores
- Support for NFS 4.1 VMware datastores
- Support for NetApp FlexGroup datastores (NFS 3 and 4.1)

- Support for Cisco Intersight Integration with NetApp storage for storage inventory, monitoring, and orchestration
- Support Cisco Intersight Cloud Orchestrator (ICO), providing orchestration of NetApp storage, Cisco UCS servers, and VMware vCenter and ESXi
- Support for the Cisco UCS Manager Plugin for VMware vCenter 3.0.5
- Support for the latest release of NetApp ONTAP® 9.9.1
- Support for NetApp ONTAP Tools for VMware vSphere 9.8P2
- Support for NetApp SnapCenter and NetApp SnapCenter Plug-in for VMware vSphere Version 4.6
- Support for NetApp Active IQ Unified Manager 9.10
- Support for Cisco Nexus NX-OS System Software 9.3(8)
- Support for Cisco MDS NX-OS System Software 8.4(2c)
- Support for Cisco Data Center Network Manager (DCNM)-SAN Version 11.5(1)

Deployment Hardware and Software

Architecture

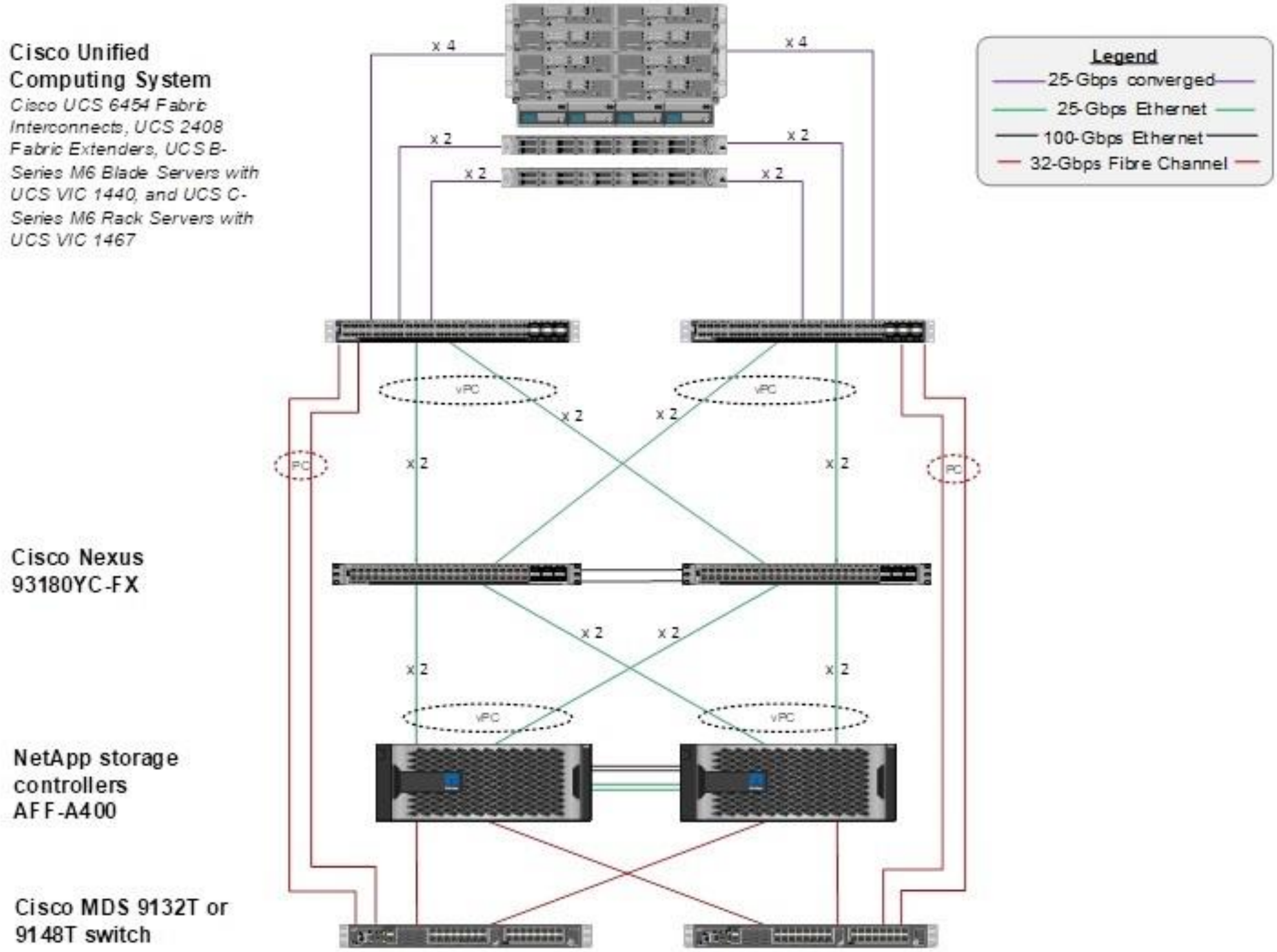
FlexPod is a defined set of hardware and software that serves as an integrated foundation for both virtualized and non-virtualized solutions. VMware vSphere® built on FlexPod includes NetApp AFF storage, Cisco Nexus® networking, Cisco MDS storage networking, the Cisco Unified Computing System (Cisco UCS®), and VMware vSphere software in a single package. The design is flexible enough that the networking, computing, and storage can fit in one data center rack or be deployed according to a customer's data center design. Port density enables the networking components to accommodate multiple configurations of this kind.

One benefit of the FlexPod architecture is the ability to customize or " flex" the environment to suit a customer's requirements. A FlexPod can easily be scaled as requirements and demand change. The unit can be scaled both up (adding resources to a FlexPod unit) and out (adding more FlexPod units). The reference architecture detailed in this document highlights the resiliency, cost benefit, and ease of deployment of a Fibre Channel and IP-based storage solution. A storage system capable of serving multiple protocols across a single interface allows for customer choice and investment protection because it truly is a wire-once architecture.

Figure 1 shows the VMware vSphere built on FlexPod components and the network connections for a configuration with the Cisco UCS 6454 Fabric Interconnects. This design has port-channeled 25 Gb Ethernet connections between the Cisco UCS 5108 Blade Chassis and the Cisco UCS Fabric Interconnects via the Cisco UCS 2408 Fabric Extenders, port-channeled 25 Gb Ethernet connections between the C-Series rackmounts and the Cisco UCS Fabric Interconnects, and port-channeled 25 Gb Ethernet connections between the Cisco UCS Fabric Interconnects and Cisco Nexus 9000s, and between the Cisco Nexus 9000s and NetApp AFF A400 storage array. This infrastructure option expanded with Cisco MDS switches sitting between the Cisco UCS Fabric Interconnects and the NetApp AFF A400 to provide FC-booted hosts with 32 Gb FC block-level access to shared storage. The reference architecture reinforces the " wire-once" strategy, because as additional storage is added to the architecture, no re-cabling is required from the hosts to the Cisco UCS fabric interconnects.

Topology

Figure 1. FlexPod with Cisco UCS 6454 Fabric Interconnects and NetApp AFF A-Series


Cisco Unified Computing System
Cisco UCS 6454 Fabric Interconnects, UCS 2408 Fabric Extenders, UCS B-Series M6 Blade Servers with UCS VIC 1440, and UCS C-Series M6 Rack Servers with UCS VIC 1467
Cisco Nexus 93180YC-FX
NetApp storage controllers AFF-A400
Cisco MDS 9132T or 9148T switch
Legend
25-Gbps converged
25-Gbps Ethernet
100-Gbps Ethernet
32-Gbps Fibre Channel
x 4
x 4
x 2
x 2
x 2
x 2
vPC
vPC
PC
PC
x 2
x 2
x 2
x 2
x 2
x 2
x 2
x 2
vPC
vPC

The reference 25Gb based hardware configuration includes:

- Two Cisco Nexus 93180YC-FX switches
- Two Cisco UCS 6454 fabric interconnects
- Two Cisco MDS 9132T multilayer fabric switches
- One NetApp AFF A400 or A800 (HA pair) running ONTAP 9.9.1 with NVMe SSD disks

Software Revisions

Table 1 lists the software revisions for this solution.

Table 1. Software Revisions

Layer	Device	Image	Comments
Compute	Cisco UCS Fabric Interconnects 6454, Cisco UCS M6 Servers	4.2(1i)	Includes the Cisco UCS Manager and Cisco UCS VIC 1440
Network	Cisco Nexus 93180YC-FX NX-OS	9.3(8)	
	Cisco MDS 9132T	8.4(2c)	
Storage	NetApp AFF A400	ONTAP 9.9.1	Validated with ONTAP 9.8 and 9.9.1
Software	Cisco UCS Manager	4.2(1i)	
	UCS Manager Plugin for VMware vCenter	3.0.5	
	Cisco Data Center Network Manager (SAN)	11.5(1)	With update with log4j patch
	Cisco Intersight Assist Appliance	1.0.9-342	Will update to release with log4j patch
	VMware vSphere	7.0 Update 2	With log4j workaround
	VMware ESXi nfnic FC Driver	5.0.0.15	Supports FC-NVMe
	VMware ESXi nenic Ethernet Driver	1.0.35.0	
	NetApp ONTAP Tools for VMware vSphere	9.8P2	formerly Virtual Storage Console (VSC) with log4j patch
	NetApp NFS Plug-in for VMware VAAI	2.0	
	NetApp SnapCenter for vSphere	4.6	Includes the vSphere plug-in for SnapCenter with log4j patch
	NetApp Active IQ Unified Manager	9.10	With log4j patch
Management	Cisco Intersight	N/A	
	NetApp Active IQ	N/A	

Configuration Guidelines

This document explains how to configure a fully redundant, highly available configuration for a FlexPod unit with ONTAP storage. Therefore, reference is made to which component is being configured with each step, either 01 or 02 or A and B. For example, node01 and node02 are used to identify the two NetApp storage controllers that are provisioned with this document, and Cisco Nexus A or Cisco Nexus B identifies the pair of Cisco Nexus switches that are configured. The Cisco UCS Fabric Interconnects are similarly configured. Additionally, this document details the steps for provisioning multiple Cisco UCS hosts, and these examples are identified as: VM-Host-Infra-01, VM-Host-Infra-02 to represent infrastructure hosts deployed to each of the fabric interconnects in this document. Finally, to indicate that you should include information pertinent to your environment in a given step, <text> appears as part of the command structure. See the following example for the network port vlan create command:

Usage:

```
network port vlan create ?
 [-node] <nodename>                    Node
 { [-vlan-name] {<netport>|<ifgrp>}    VLAN Name
 |  -port {<netport>|<ifgrp>}          Associated Network Port
 [-vlan-id] <integer> }                Network Switch VLAN Identifier
```

Example:

```
network port vlan create -node <node01> -vlan-name a0a-<vlan id>
```

This document is intended to enable you to fully configure the customer environment. In this process, various steps require you to insert customer-specific naming conventions, IP addresses, and VLAN schemes, as well as to record appropriate MAC addresses. Table 2 describes the VLANs necessary for deployment as outlined in this guide.

Table 2. Necessary VLANs

VLAN Name	VLAN Purpose	ID Used in Validating This Document	Subnet Used in Validating This Document	Default Gateway Used in Validating This Document
OOB-MGMT	VLAN for out-of-band management interfaces	13	192.168.156.0/24	192.168.156.254
IB-MGMT	VLAN for in-band management interfaces	113	10.1.156.0/24	10.1.156.254
Native-Vlan	VLAN to which untagged frames are assigned	2		

VLAN Name	VLAN Purpose	ID Used in Validating This Document	Subnet Used in Validating This Document	Default Gateway Used in Validating This Document
Infra-NFS	VLAN for Infrastructure NFS traffic	3050	192.168.50.0/24	
FCoE-A	VLAN for FCoE encapsulation of VSAN-A	101		
FCoE-B	VLAN for FCoE encapsulation of VSAN-B	102		
vMotion	VLAN for VMware vMotion	3000	192.168.0.0/24	
VM-Traffic	VLAN for Production VM Interfaces	900	10.10.156.0/24	10.10.156.254
Infra-iSCSI-A (Appendix)	VLAN for Infrastructure iSCSI Fabric A traffic and boot	3010	192.168.10.0/24	
Infra-iSCSI-B (Appendix)	VLAN for Infrastructure iSCSI Fabric B traffic and boot	3020	192.168.20.0/24	

Table 3 lists the VMs necessary for deployment as outlined in this document.

Table 3. Virtual Machines

Virtual Machine Description	Host Name	IP Address
vCenter Server		
NetApp ONTAP Tools		
NetApp SnapCenter for vSphere		
Active IQ Unified Manager		
Cisco Intersight Assist		

Virtual Machine Description	Host Name	IP Address
Cisco Data Center Network Manager (DCNM) - SAN		

Physical Infrastructure

FlexPod Cabling

The information in this section is provided as a reference for cabling the physical equipment in a FlexPod environment. To simplify cabling requirements, a cabling diagram was used.

The cabling diagram in this section contains the details for the prescribed and supported configuration of the NetApp AFF 400 running NetApp ONTAP 9.9.1.

For any modifications of this prescribed architecture, consult the NetApp Interoperability Matrix Tool (IMT).

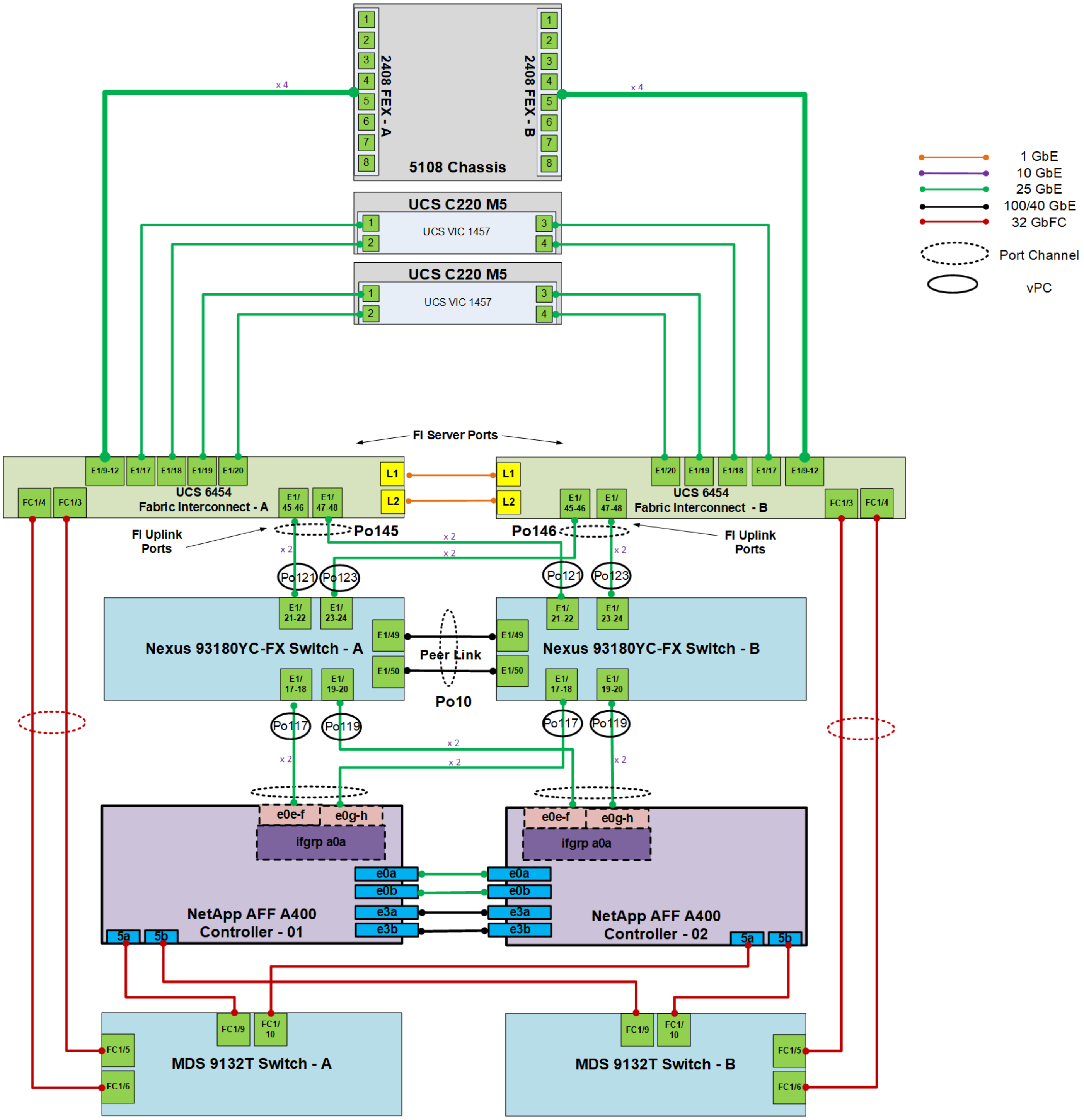
This document assumes that out-of-band management ports are plugged into an existing management infrastructure at the deployment site. These interfaces will be used in various configuration steps.

Be sure to use the cabling directions in this section as a guide.

The NetApp storage controller and disk shelves should be connected according to best practices for the specific storage controller and disk shelves. For disk shelf cabling, refer to NetApp Support.

Figure 2 details the cable connections used in the validation lab for the FlexPod topology based on the Cisco UCS 6454 fabric interconnect. Two 32Gb uplinks connect as port-channels to each Cisco UCS Fabric Interconnect from the MDS switches, and a total of four 32Gb links connect the MDS switches to the NetApp AFF controllers. Also, 25Gb links connect the Cisco UCS Fabric Interconnects to the Cisco Nexus Switches and the NetApp AFF controllers to the Cisco Nexus Switches. Additional 1Gb management connections will be needed for an out-of-band network switch that sits apart from the FlexPod infrastructure. Each Cisco UCS fabric interconnect and Cisco Nexus switch is connected to the out-of-band network switch, and each AFF controller has a connection to the out-of-band network switch. Layer 3 network connectivity is required between the Out-of-Band (OOB) and In-Band (IB) Management Subnets.

Figure 2. FlexPod Cabling with Cisco UCS 6454 Fabric Interconnect

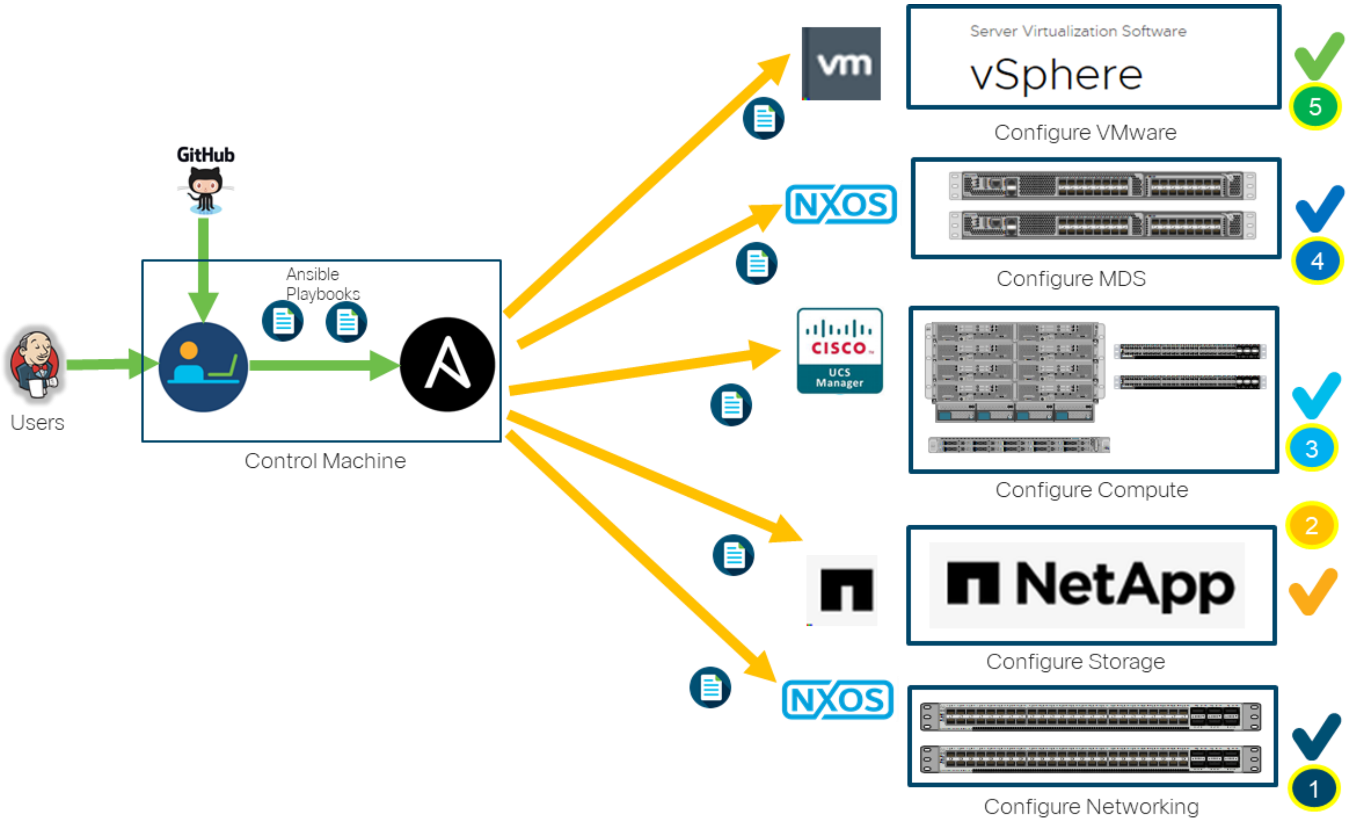


Ansible Automation Workflow and Solution Deployment

If using the published Ansible playbooks to configure the FlexPod infrastructure, complete this section of the document. If completing a manual configuration, skip to the next section of the document. The Ansible automated FlexPod solution uses a management workstation (control machine) to run Ansible playbooks to configure Cisco Nexus, NetApp ONTAP Storage, Cisco UCS, Cisco MDS, and VMware ESXi.

Figure 3 illustrates the FlexPod solution implementation workflow which is explained in the following sections. The FlexPod infrastructure layers are first configured in the order illustrated.

Figure 3. Ansible Automation Workflow



Prerequisites

Setup of the solution begins with a management workstation that has access to the Internet and with a working installation of Ansible. The management workstation commonly runs a variant of Linux or Ma-cOS for ease of use with these command-line-based tools. Instructions for installing the workstation are not included in this document, but basic installation and configuration of Ansible is covered. A guide for getting started with Ansible can be found at the following link:

- Getting Started with Red Hat Ansible: https://www.ansible.com/resources/get-started

- To use the Ansible playbooks demonstrated in this document, the management workstation must also have a working installation of Git and access to the Cisco DevNet public GitHub repository. The Ansible playbooks used in this document are cloned from the public repositories, located at the following links:
  - Cisco DevNet: https://developer.cisco.com/codeexchange/github/repo/ucs-compute-solutions/complete-link
  - GitHub repository: https://github.com/ucs-compute-solutions/FlexPod-UCSM-M6
- The Cisco Nexus and MDS Switches, NetApp Storage and Cisco UCS must be physically racked, cabled, powered, and configured with management IP addresses before the Ansible-based installation procedure can begin as shown in the cabling diagram (Figure 2). If necessary, upgrade the Cisco Nexus Switches to release 9.3(8) and the Cisco UCS to 4.2(1f) with the default firmware packages for both blades and rack servers set to 4.2(1f).
- Before running each Ansible Playbook to setup the Network, Storage, Cisco UCS, and VMware ESXi various variables have to be updated based on the customers environment and specific implementation with values such as the VLANs, pools and ports on Cisco UCS, IP addresses for NFS and iSCSI interfaces and values needed for VMware ESXi.

Day 2 Configuration tasks such as adding datastores or ESXi servers have been performed manually or with Cisco Intersight Cloud Orchestrator (ICO) and the information has been provided in the later sections of this document.

Prepare Management Workstation (Control Machine)

In this section, the installation steps are performed on the CentOS management host to prepare the host for solution deployment to support the automation of Cisco UCS, Cisco Nexus, NetApp Storage, Cisco MDS and VMware ESXi using Ansible Playbooks.

The following steps were performed on a CentOS 8.4 Virtual Machine as the root user.

To prepare the management workstation, follow these steps:

1. Install EPEL repository on the management host.

```
dnf install https://dl.fedoraproject.org/pub/epel/epel-release-latest-8.noarch.rpm
```

2. Install Ansible engine.

```
dnf install ansible
```

3. Verify Ansible version to make sure it is release 2.9 or later.

```
ansible --version
ansible 2.9.23
  config file = /etc/ansible/ansible.cfg
  configured module search path = ['/root/.ansible/plugins/modules',
'/usr/share/ansible/plugins/modules']

  ansible python module location = /usr/lib/python3.6/site-packages/ansible

  executable location = /usr/bin/ansible

  python version = 3.6.8 (default, Mar 19 2021, 08:58:41) [GCC 8.4.1 20200928 (Red Hat 8.4.1-
1)]
```

4. Install UCS SDK.

```
pip3 install ucsmsdk
```

5. You should be able to SSH into each of the Cisco Nexus switches that we will configure using Ansible so that the SSH keys are cached.

```
ssh admin@192.168.156.21

The authenticity of host '192.168.156.21 (192.168.156.21)' can't be established.

RSA key fingerprint is SHA256:YWSl7OaDF7VbOqg9ImRTY2bwFXIrajHAKd/xoOwBCgk.

Are you sure you want to continue connecting (yes/no/[fingerprint])? yes

Warning: Permanently added '192.168.156.21' (RSA) to the list of known hosts.

User Access Verification

Password:
```

6. Install NetApp specific python modules.

```
pip3 install netapp-lib
```

7. Install ansible-galaxy collections for Cisco UCS, Cisco Nexus and NetApp as follows:

```
ansible-galaxy collection install cisco.nxos


ansible-galaxy collection install cisco.ucs


ansible-galaxy collection install netapp.ontap

ansible-galaxy collection install community.vmware
```

Clone GitHub Collection

You need to use a GitHub repository from one public location; the first step in the process is to clone the GitHub collection named FlexPod-UCSM-M6 (https://github.com/ucs-compute-solutions/FlexPod-UCSM-M6.git) to a new empty folder on the management workstation. Cloning the repository creates a local copy, which is then used to run the playbooks that have been created for this solution. To clone the GitHub repository, follow these steps:

1. From the management workstation, create a new folder for the project. The GitHub collection will be cloned in a new folder inside this one, named /root/FlexPod-UCSM-M6.

2. Open a command-line or console interface on the management workstation and change directories to the new folder just created.

3. Clone the GitHub collection using the following command:

```
git clone https://github.com/ucs-compute-solutions/FlexPod-UCSM-M6.git
```

4. Change directories to the new folder named FlexPod-UCSM-M6.

Network Switch Configuration

This section provides a detailed procedure for configuring the Cisco Nexus 93180YC-FX switches for use in a FlexPod environment. The Nexus 93180YC-FX will be used for LAN switching in this solution.

Follow these steps precisely because failure to do so could result in an improper configuration.

Physical Connectivity

Follow the physical connectivity guidelines for FlexPod as explained in section FlexPod Cabling.

FlexPod Cisco Nexus Base

Before the Ansible Nexus switch setup playbook can be run, the Cisco Nexus switches must be brought up with a management IP address. The following procedures describe this basic configuration of the Cisco Nexus switches for use in a base FlexPod environment. This procedure assumes the use of Cisco Nexus 9000 9.3(8), the Cisco suggested Nexus switch release at the time of this validation.

If using the Cisco Nexus 93180YC-FX switches for both LAN and SAN switching, please refer to section FlexPod with Cisco Nexus 93180YC-FX SAN Switching Configuration – Part 1 in the Appendix to execute the Cisco Nexus 93180YC-FX SAN Switching Base Configuration.

The following procedure includes the setup of NTP distribution on both the mgmt0 port and the in-band management VLAN. The interface-vlan feature and ntp commands are used to set this up. This procedure also assumes that the default VRF is used to route the in-band management VLAN.

In this validation, port speed and duplex are hard set at both ends of every 100GE connection.

This validation assumes that both switches have been reset to factory defaults by using the “write erase” command followed by the “reload” command.

Set Up Initial Configuration

Cisco Nexus A

To set up the initial configuration for the Cisco Nexus A switch on <nexus-A-hostname>, follow these steps from a serial console:

1. Configure the switch.

> On initial boot and connection to the serial or console port of the switch, the NX-OS setup should automatically start and attempt to enter Power on Auto Provisioning.

```
Abort Power On Auto Provisioning [yes - continue with normal setup, skip - bypass password
and basic configuration, no - continue with Power On Auto Provisioning] (yes/skip/no)[no]:
yes
Disabling POAP.......Disabling POAP
poap: Rolling back, please wait... (This may take 5-15 minutes)


         ---- System Admin Account Setup ----


Do you want to enforce secure password standard (yes/no) [y]: Enter
Enter the password for "admin": <password>
Confirm the password for "admin": <password>
Would you like to enter the basic configuration dialog (yes/no): yes
Create another login account (yes/no) [n]: Enter
Configure read-only SNMP community string (yes/no) [n]: Enter
Configure read-write SNMP community string (yes/no) [n]: Enter
Enter the switch name: <nexus-A-hostname>
Continue with Out-of-band (mgmt0) management configuration? (yes/no) [y]: Enter
Mgmt0 IPv4 address: <nexus-A-mgmt0-ip>
Mgmt0 IPv4 netmask: <nexus-A-mgmt0-netmask>
Configure the default gateway? (yes/no) [y]: Enter
IPv4 address of the default gateway: <nexus-A-mgmt0-gw>
Configure advanced IP options? (yes/no) [n]: Enter
Enable the telnet service? (yes/no) [n]: Enter
Enable the ssh service? (yes/no) [y]: Enter
Type of ssh key you would like to generate (dsa/rsa) [rsa]: Enter
Number of rsa key bits <1024-2048> [1024]: Enter
Configure the ntp server? (yes/no) [n]: Enter
Configure default interface layer (L3/L2) [L2]: Enter
Configure default switchport interface state (shut/noshut) [noshut]: shut
Enter basic FC configurations (yes/no) [n]: n
Configure CoPP system profile (strict/moderate/lenient/dense) [strict]: Enter
Would you like to edit the configuration? (yes/no) [n]: Enter
```

2. Review the configuration summary before enabling the configuration.

```
Use this configuration and save it? (yes/no) [y]: Enter
```

Cisco Nexus B

To set up the initial configuration for the Cisco Nexus B switch on <nexus-B-hostname>, follow these steps from a serial console:

1. Configure the switch.

> On initial boot and connection to the serial or console port of the switch, the NX-OS setup should automatically start and attempt to enter Power on Auto Provisioning.

```
Abort Power On Auto Provisioning [yes - continue with normal setup, skip - bypass password
and basic configuration, no - continue with Power On Auto Provisioning] (yes/skip/no)[no]:
yes
Disabling POAP.......Disabling POAP
poap: Rolling back, please wait... (This may take 5-15 minutes)

         ---- System Admin Account Setup ----

Do you want to enforce secure password standard (yes/no) [y]: Enter
Enter the password for "admin": <password>
Confirm the password for "admin": <password>
Would you like to enter the basic configuration dialog (yes/no): yes
Create another login account (yes/no) [n]: Enter
Configure read-only SNMP community string (yes/no) [n]: Enter
Configure read-write SNMP community string (yes/no) [n]: Enter
Enter the switch name: <nexus-B-hostname>
Continue with Out-of-band (mgmt0) management configuration? (yes/no) [y]: Enter
Mgmt0 IPv4 address: <nexus-B-mgmt0-ip>
Mgmt0 IPv4 netmask: <nexus-B-mgmt0-netmask>
Configure the default gateway? (yes/no) [y]: Enter
IPv4 address of the default gateway: <nexus-B-mgmt0-gw>
Configure advanced IP options? (yes/no) [n]: Enter
Enable the telnet service? (yes/no) [n]: Enter
Enable the ssh service? (yes/no) [y]: Enter
Type of ssh key you would like to generate (dsa/rsa) [rsa]: Enter
Number of rsa key bits <1024-2048> [1024]: Enter
Configure the ntp server? (yes/no) [n]: Enter
Configure default interface layer (L3/L2) [L2]: Enter
Configure default switchport interface state (shut/noshut) [noshut]: shut
Enter basic FC configurations (yes/no) [n]: Enter
Configure CoPP system profile (strict/moderate/lenient/dense) [strict]: Enter
```

```
Would you like to edit the configuration? (yes/no) [n]: Enter
```

2. Review the configuration summary before enabling the configuration.

```
Use this configuration and save it? (yes/no) [y]: Enter
```

Ansible Nexus Switch Configuration

To configure the Cisco Nexus switches from the management workstation, follow these steps:

1. Add Nexus switch ssh keys to /root/.ssh/known_hosts. Adjust known_hosts as necessary if errors occur.

```
ssh admin@<nexus-A-mgmt0-ip>
exit
ssh admin@<nexus-B-mgmt0-ip>
exit
```

2. Edit the following variable files to ensure proper Cisco Nexus variables are entered:

   - FlexPod-M6/FlexPod-UCSM-M6/inventory
   - FlexPod-M6/FlexPod-UCSM-M6/group_vars/all.yml
   - FlexPod-M6/FlexPod-UCSM-M6/host_vars/n9kA.yml
   - FlexPod-M6/FlexPod-UCSM-M6/host_vars/n9kB.yml
   - FlexPod-M6/FlexPod-UCSM-M6/roles/NEXUSconfig/defaults/main.yml

3. From /root/ FlexPod-M6/FlexPod-UCSM-M6, run the Setup_Nexus.yml Ansible playbook.

```
ansible-playbook ./Setup_Nexus.yml -i inventory
```

4. Once the Ansible playbook has been run on both switches, it is important to configure the local time so that logging time alignment and any backup schedules are correct. For more information on configuring the timezone and daylight savings time or summertime, please see Cisco Nexus 9000 Series NX-OS Fundamentals Configuration Guide, Release 9.3(x). Sample clock commands for the United States Eastern timezone are:

```
clock timezone EST -5 0

clock summer-time EDT 2 Sunday March 02:00 1 Sunday November 02:00 60
```

5. ssh into each switch and execute the following commands:

```
clock timezone <timezone> <hour-offset> <minute-offset>

clock summer-time <timezone> <start-week> <start-day> <start-month> <start-time> <end-week>
<end-day> <end-month> <end-time> <offset-minutes>
```

Cisco Nexus Switch Manual Configuration

This section provides a detailed procedure for manually configuring the Cisco Nexus switches for use in a FlexPod environment. The Cisco Nexus switches will be used for LAN switching in this solution.

Follow these steps precisely because failure to do so could result in an improper configuration.

Physical Connectivity

Follow the physical connectivity guidelines for FlexPod as explained in section FlexPod Cabling.

FlexPod Cisco Nexus Base

The following procedures describe how to configure the Cisco Nexus switches for use in a base FlexPod environment. This procedure assumes the use of Cisco Nexus 9000 9.3(8), the Cisco suggested Nexus switch release at the time of this validation.

If using the Cisco Nexus 93180YC-FX switches for both LAN and SAN switching, please refer to section FlexPod with Cisco Nexus 93180YC-FX SAN Switching Configuration in the Appendix.

The following procedure includes the setup of NTP distribution on both the mgmt0 port and the in-band management VLAN. The interface-vlan feature and ntp commands are used to set this up. This procedure also assumes that the default VRF is used to route the in-band management VLAN.

This procedure sets up and uplink virtual port channel (vPC) with the IB-MGMT and OOB-MGMT VLANs allowed.

In this validation, port speed and duplex are hard set at both ends of every 100GE connection.

This validation assumes that both switches have been reset to factory defaults by using the “write erase” command followed by the “reload” command.

Set Up Initial Configuration

Cisco Nexus A

To set up the initial configuration for the Cisco Nexus A switch on <nexus-A-hostname>, follow these steps from a serial console:

1. Configure the switch.

On initial boot and connection to the serial or console port of the switch, the NX-OS setup should automatically start and attempt to enter Power on Auto Provisioning.

```
Abort Power On Auto Provisioning [yes - continue with normal setup, skip - bypass password
and basic configuration, no - continue with Power On Auto Provisioning] (yes/skip/no)[no]:
yes
Disabling POAP.......Disabling POAP
poap: Rolling back, please wait... (This may take 5-15 minutes)

         ---- System Admin Account Setup ----

Do you want to enforce secure password standard (yes/no) [y]: Enter
Enter the password for "admin": <password>
Confirm the password for "admin": <password>
Would you like to enter the basic configuration dialog (yes/no): yes
Create another login account (yes/no) [n]: Enter
Configure read-only SNMP community string (yes/no) [n]: Enter
Configure read-write SNMP community string (yes/no) [n]: Enter
Enter the switch name: <nexus-A-hostname>
Continue with Out-of-band (mgmt0) management configuration? (yes/no) [y]: Enter
Mgmt0 IPv4 address: <nexus-A-mgmt0-ip>
Mgmt0 IPv4 netmask: <nexus-A-mgmt0-netmask>
Configure the default gateway? (yes/no) [y]: Enter
IPv4 address of the default gateway: <nexus-A-mgmt0-gw>
Configure advanced IP options? (yes/no) [n]: Enter
Enable the telnet service? (yes/no) [n]: Enter
Enable the ssh service? (yes/no) [y]: Enter
Type of ssh key you would like to generate (dsa/rsa) [rsa]: Enter
Number of rsa key bits <1024-2048> [1024]: Enter
Configure the ntp server? (yes/no) [n]: Enter
Configure default interface layer (L3/L2) [L2]: Enter
Configure default switchport interface state (shut/noshut) [noshut]: shut
Enter basic FC configurations (yes/no) [n]: n
Configure CoPP system profile (strict/moderate/lenient/dense) [strict]: Enter
Would you like to edit the configuration? (yes/no) [n]: Enter
```

2. Review the configuration summary before enabling the configuration.

```
Use this configuration and save it? (yes/no) [y]: Enter
```

Cisco Nexus B

To set up the initial configuration for the Cisco Nexus B switch on <nexus-B-hostname>, follow these steps from a serial console:

1. Configure the switch.

> On initial boot and connection to the serial or console port of the switch, the NX-OS setup should automatically start and attempt to enter Power on Auto Provisioning.

```
Abort Power On Auto Provisioning [yes - continue with normal setup, skip - bypass password
and basic configuration, no - continue with Power On Auto Provisioning] (yes/skip/no)[no]:
yes
Disabling POAP.......Disabling POAP
poap: Rolling back, please wait... (This may take 5-15 minutes)

         ---- System Admin Account Setup ----

Do you want to enforce secure password standard (yes/no) [y]: Enter
Enter the password for "admin": <password>
Confirm the password for "admin": <password>
Would you like to enter the basic configuration dialog (yes/no): yes
Create another login account (yes/no) [n]: Enter
Configure read-only SNMP community string (yes/no) [n]: Enter
Configure read-write SNMP community string (yes/no) [n]: Enter
Enter the switch name: <nexus-B-hostname>
Continue with Out-of-band (mgmt0) management configuration? (yes/no) [y]: Enter
Mgmt0 IPv4 address: <nexus-B-mgmt0-ip>
Mgmt0 IPv4 netmask: <nexus-B-mgmt0-netmask>
Configure the default gateway? (yes/no) [y]: Enter
IPv4 address of the default gateway: <nexus-B-mgmt0-gw>
Configure advanced IP options? (yes/no) [n]: Enter
Enable the telnet service? (yes/no) [n]: Enter
Enable the ssh service? (yes/no) [y]: Enter
Type of ssh key you would like to generate (dsa/rsa) [rsa]: Enter
Number of rsa key bits <1024-2048> [1024]: Enter
Configure the ntp server? (yes/no) [n]: Enter
Configure default interface layer (L3/L2) [L2]: Enter
Configure default switchport interface state (shut/noshut) [noshut]: shut
Enter basic FC configurations (yes/no) [n]: Enter
Configure CoPP system profile (strict/moderate/lenient/dense) [strict]: Enter
Would you like to edit the configuration? (yes/no) [n]: Enter
```

2. Review the configuration summary before enabling the configuration.

```
Use this configuration and save it? (yes/no) [y]: Enter
```

FlexPod Cisco Nexus Switch Manual Configuration

Enable Features

Cisco Nexus A and Cisco Nexus B

1. Log in as admin using ssh.

2. Run the following commands:

```
config t
feature nxapi
feature udld
feature interface-vlan
feature lacp
feature vpc
feature lldp
```

Set Global Configurations

Cisco Nexus A and Cisco Nexus B

To set global configurations, follow this step on both switches:

1. Run the following commands to set global configurations:

```
spanning-tree port type network default
spanning-tree port type edge bpduguard default
spanning-tree port type edge bpdufilter default
port-channel load-balance src-dst l4port
ntp server <global-ntp-server-ip> use-vrf management
ntp master 3
clock timezone <timezone> <hour-offset> <minute-offset>
clock summer-time <timezone> <start-week> <start-day> <start-month> <start-time> <end-week>
<end-day> <end-month> <end-time> <offset-minutes>
ip route 0.0.0.0/0 <ib-mgmt-vlan-gateway>
copy run start
```

It is important to configure the local time so that logging time alignment and any backup schedules are correct. For more information on configuring the timezone and daylight savings time or summer time, please see Cisco Nexus 9000 Series NX-OS Fundamentals Configuration Guide, Release 9.3(x). Sample clock commands for the United States Eastern timezone are:

```
clock timezone EST -5 0
clock summer-time EDT 2 Sunday March 02:00 1 Sunday November 02:00 60
```

Create VLANs

Cisco Nexus A and Cisco Nexus B

To create the necessary virtual local area networks (VLANs), follow this step on both switches:

1. From the global configuration mode, run the following commands:

```
vlan <oob-mgmt-vlan-id>
name OOB-MGMT
vlan <ib-mgmt-vlan-id>
name IB-MGMT
vlan <native-vlan-id>
name Native-Vlan
vlan <vmotion-vlan-id>
name vMotion
vlan <vm-traffic-vlan-id>
name VM-Traffic
vlan <infra-nfs-vlan-id>
name Infra-NFS
exit
```

Add NTP Distribution Interface

Cisco Nexus A

1. From the global configuration mode, run the following commands:

```
interface Vlan<ib-mgmt-vlan-id>
ip address <switch-a-ntp-ip>/<ib-mgmt-vlan-netmask-length>
no shutdown
exit
ntp peer <nexus-B-mgmt0-ip> use-vrf management
```

Cisco Nexus B

1. From the global configuration mode, run the following commands:

```
interface Vlan<ib-mgmt-vlan-id>
ip address <switch-b-ntp-ip>/<ib-mgmt-vlan-netmask-length>
no shutdown
exit
ntp peer <nexus-A-mgmt0-ip> use-vrf management
```

Add Individual Port Descriptions for Troubleshooting and Enable UDLD for Cisco UCS Interfaces

Cisco Nexus A

To add individual port descriptions for troubleshooting activity and verification for switch A, follow these steps:

> In this step and in the following sections, configure the AFF nodename <st-node> and Cisco UCS 6454 fabric interconnect clustername <ucs-clustername> interfaces as appropriate to your deployment.

1. From the global configuration mode, run the following commands:

```
interface Eth1/21
description <ucs-clustername>-A:1/45
udld enable
interface Eth1/22
description <ucs-clustername>-A:1/46
udld enable
interface Eth1/23
description <ucs-clustername>-B:1/45
udld enable
interface Eth1/24
description <ucs-clustername>-B:1/46
udld enable
```

> For fibre optic connections to Cisco UCS systems (AOC or SFP-based), entering `udld enable` will result in a message stating that this command is not applicable to fiber ports. This message is expected. If you have fibre optic connections, do not enter the `udld enable` command.

```
interface Eth1/17
description <st-clustername>-01:e0e
interface Eth1/18
description <st-clustername>-01:e0f
interface Eth1/19
description <st-clustername>-02:e0e
interface Eth1/20
description <st-clustername>-02:e0f
interface Eth1/49
description <nexus-b-hostname>:1/49
interface Eth1/50
description <nexus-b-hostname>:1/50
interface Eth1/50
```

```
description Uplink-SW
exit
```

Cisco Nexus B

To add individual port descriptions for troubleshooting activity and verification for switch B and to enable aggressive UDLD on copper interfaces connected to Cisco UCS systems, follow this step:

1. From the global configuration mode, run the following commands:

```
interface Eth1/21
description <ucs-clustername>-A:1/47
udld enable
interface Eth1/22
description <ucs-clustername>-A:1/48
udld enable
interface Eth1/23
description <ucs-clustername>-B:1/47
udld enable
interface Eth1/24
description <ucs-clustername>-B:1/48
udld enable
```

For fibre optic connections to Cisco UCS systems (AOC or SFP-based), entering `udld enable` will result in a message stating that this command is not applicable to fiber ports. This message is expected.

```
interface Eth1/17
description <st-clustername>-01:e0g
interface Eth1/18
description <st-clustername>-01:e0h
interface Eth1/19
description <st-clustername>-02:e0g
interface Eth1/20
description <st-clustername>-02:e0h
interface Eth1/49
description <nexus-a-hostname>:1/49
interface Eth1/50
description <nexus-a-hostname>:1/50
interface Eth1/50
description Uplink-SW
exit
```

Create Port Channels

Cisco Nexus A and Cisco Nexus B

To create the necessary port channels between devices, follow this step on both switches:

1. From the global configuration mode, run the following commands:

```
interface Po10
description vPC peer-link
interface Eth1/49-50
channel-group 10 mode active
no shutdown
interface Po117
description <st-clustername>-01
interface Eth1/17-18
channel-group 117 mode active
no shutdown
interface Po119
description <st-clustername>-02
interface Eth1/19-20
channel-group 119 mode active
no shutdown
interface Po121
description <ucs-clustername>-a
interface Eth1/21-22
channel-group 121 mode active
no shutdown
interface Po123
description <ucs-clustername>-b
interface Eth1/23-24
channel-group 123 mode active
no shutdown
interface Po154
description MGMT-Uplink
interface Eth1/54
channel-group 154 mode active
no shutdown
exit
copy run start
```

Configure Port Channel Parameters

Cisco Nexus A and Cisco Nexus B

To configure port channel parameters, follow this step on both switches:

1. From the global configuration mode, run the following commands:

```
interface Po10
switchport mode trunk
switchport trunk native vlan <native-vlan-id>
switchport trunk allowed vlan <oob-mgmt-vlan-id>, <ib-mgmt-vlan-id>, <infra-nfs-vlan-id>,
<vmotion-vlan-id>, <vm-traffic-vlan-id>
spanning-tree port type network
speed 100000
duplex full

interface Po117
switchport mode trunk
switchport trunk native vlan <native-vlan-id>
switchport trunk allowed vlan <ib-mgmt-vlan-id>, <infra-nfs-vlan-id>
spanning-tree port type edge trunk
mtu 9216

interface Po119
switchport mode trunk
switchport trunk native vlan <native-vlan-id>
switchport trunk allowed vlan <ib-mgmt-vlan-id>, <infra-nfs-vlan-id>
spanning-tree port type edge trunk
mtu 9216

interface Po121
switchport mode trunk
switchport trunk native vlan <native-vlan-id>
switchport trunk allowed vlan <oob-mgmt-vlan-id>, <ib-mgmt-vlan-id>, <infra-nfs-vlan-id>,
<vmotion-vlan-id>, <vm-traffic-vlan-id>
spanning-tree port type edge trunk
mtu 9216

interface Po123
switchport mode trunk
switchport trunk native vlan <native-vlan-id>
switchport trunk allowed vlan <oob-mgmt-vlan-id>, <ib-mgmt-vlan-id>, <infra-nfs-vlan-id>,
<vmotion-vlan-id>, <vm-traffic-vlan-id>
spanning-tree port type edge trunk
mtu 9216

interface Po154
switchport mode trunk
switchport trunk native vlan <native-vlan-id>
switchport trunk allowed vlan <oob-mgmt-vlan-id>, <ib-mgmt-vlan-id>
spanning-tree port type network
mtu 9216

exit
copy run start
```

Configure Virtual Port Channels

Cisco Nexus A

To configure virtual port channels (vPCs) for switch A, follow this step:

1. From the global configuration mode, run the following commands:

```
vpc domain <nexus-vpc-domain-id>
role priority 10
peer-keepalive destination <nexus-B-mgmt0-ip> source <nexus-A-mgmt0-ip>
peer-switch
peer-gateway
auto-recovery
delay restore 150
ip arp synchronize
interface Po10
vpc peer-link
interface Po117
vpc 117
interface Po119
vpc 119
interface Po121
vpc 121
interface Po123
vpc 123
interface Po154
vpc 154
```

```
exit
copy run start
```

Cisco Nexus B

To configure vPCs for switch B, follow this step:

1. From the global configuration mode, run the following commands:

```
vpc domain <nexus-vpc-domain-id>
role priority 20
peer-keepalive destination <nexus-A-mgmt0-ip> source <nexus-B-mgmt0-ip>
peer-switch
peer-gateway
auto-recovery
delay restore 150
ip arp synchronize
interface Po10
vpc peer-link
interface Po117
vpc 117
interface Po119
vpc 119
interface Po121
vpc 121
interface Po123
vpc 123
interface Po154
vpc 154
exit
copy run start
```

Switch Testing Commands

The following commands can be used to check for correct switch configuration:

> Some of these commands need to run after further configuration of the FlexPod components are complete to see complete results.

```
show run
show vpc
show port-channel summary
show ntp peer-status
show cdp neighbors

show lldp neighbors

show run int

show int
show udld neighbors
show int status
```

Storage Configuration

NetApp AFF A400 Controllers

See the following section (NetApp Hardware Universe) for planning the physical location of the storage systems:

- Site Preparation
- System Connectivity Requirements
- Circuit Breaker, Power Outlet Balancing, System Cabinet Power Cord Plugs, and Console Pinout Requirements
- AFF Series Systems

NetApp Hardware Universe

The NetApp Hardware Universe (HWU) application provides supported hardware and software components for any specific ONTAP version. It also provides configuration information for all the NetApp storage appliances currently supported by ONTAP software and a table of component compatibilities.

To confirm that the hardware and software components that you would like to use are supported with the version of ONTAP that you plan to install, follow these steps at the NetApp Support site.

1. Access the HWU application to view the System Configuration guides. Click the Platforms menu to view the compatibility between different version of the ONTAP software and the NetApp storage appliances with your desired specifications.

2. Alternatively, to compare components by storage appliance, click Compare Storage Systems.

Controllers

Follow the physical installation procedures for the controllers found here: https://docs.netapp.com/us-en/ontap-systems/index.html.

Disk Shelves

NetApp storage systems support a wide variety of disk shelves and disk drives. The complete list of disk shelves that are supported by the AFF A400 and AFF A800 is available at the NetApp Support site.

When using SAS disk shelves with NetApp storage controllers, refer to: https://docs.netapp.com/us-en/ontap-systems/sas3/index.html for proper cabling guidelines.

When using NVMe drive shelves with NetApp storage controllers, refer to: https://docs.netapp.com/us-en/ontap-systems/ns224/index.html for installation and servicing guidelines.

NetApp ONTAP 9.9.1

Complete Configuration Worksheet

Before running the setup script, complete the Cluster setup worksheet in the ONTAP 9 Documentation Center. You must have access to the NetApp Support site to open the cluster setup worksheet.

Ansible Storage Configuration

End to End ONTAP Storage Configuration for a FlexPod is automated with Ansible. ONTAP Storage can be deployed via Ansible after the ONTAP Cluster setup is complete and the Cluster management network is configured.

A playbook by name 'Setup_ONTAP.yml' is available at the root of this repository. It calls all the required roles to complete the setup of the ONTAP storage system.

The ONTAP setup is split into three sections, use the tags - ontap_config_part_1, ontap_config_part_2 and ontap_config_part_3 to execute parts of the playbook at the appropriate stage of setup.

Execute the playbook from the Ansible Control machine as an admin/ root user using the following commands:

- After setup of Cisco Nexus switches: ansible-playbook -i inventory Setup_ONTAP.yml -t ontap_config_part_1
- After setup of Cisco UCS: ansible-playbook -i inventory Setup_ONTAP.yml -t ontap_config_part_2
- After setup of VMware vSphere 7.0 Setup: ansible-playbook -i inventory Setup_ONTAP.yml -t ontap_config_part_3

If you would like to run a part of the deployment, you may use the appropriate tag that accompanies each task in the role and run the playbook by running the following command:

```
ansible-playbook -i inventory Setup_ONTAP.yml -t <tag_name>
```

Configure ONTAP Nodes

Before running the setup script, review the configuration worksheets in the Software setup section of the ONTAP 9 Documentation Center to learn about configuring ONTAP. Table 4 lists the information needed to configure two ONTAP nodes. Customize the cluster-detail values with the information applicable to your deployment.

Table 4. ONTAP Software Installation Prerequisites

Cluster Detail	Cluster Detail Value
Cluster node 01 IP address	<node01-mgmt-ip>

Cluster Detail	Cluster Detail Value
Cluster node 01 netmask	<node01-mgmt-mask>
Cluster node 01 gateway	<node01-mgmt-gateway>
Cluster node 02 IP address	<node02-mgmt-ip>
Cluster node 02 netmask	<node02-mgmt-mask>
Cluster node 02 gateway	<node02-mgmt-gateway>
ONTAP 9.8 URL	<url-boot-software>

Configure Node 01

To configure node 01, follow these steps:

1. Connect to the storage system console port. You should see a Loader-A prompt. However, if the storage system is in a reboot loop, press Ctrl-C to exit the autoboot loop when the following message displays:

   ```
   Starting AUTOBOOT press Ctrl-C to abort…
   ```

2. Allow the system to boot up.

   ```
   autoboot
   ```

3. Press Ctrl-C when prompted.

> If ONTAP 9.9.1 is not the version of software being booted, continue with the following steps to install new software. If ONTAP 9.9.1 is the version being booted, choose option 8 and `y` to reboot the node. Then continue with step 16.

4. To install new software, choose option 7 from the menu.

5. Enter `y` to continue the installation.

6. Choose `e0M` for the network port you want to use for the download.

7. Enter `n` to skip the reboot.

8. Choose option 7 from the menu: `Install new software first`

9. Enter `y` to continue the installation

10. Enter the IP address, netmask, and default gateway for `e0M`.

```
Enter the IP address for port e0M: <node01-mgmt-ip>
Enter the netmask for port e0M: <node01-mgmt-mask>
Enter the IP address of the default gateway: <node01-mgmt-gateway>
```

11. Enter the URL where the software can be found.

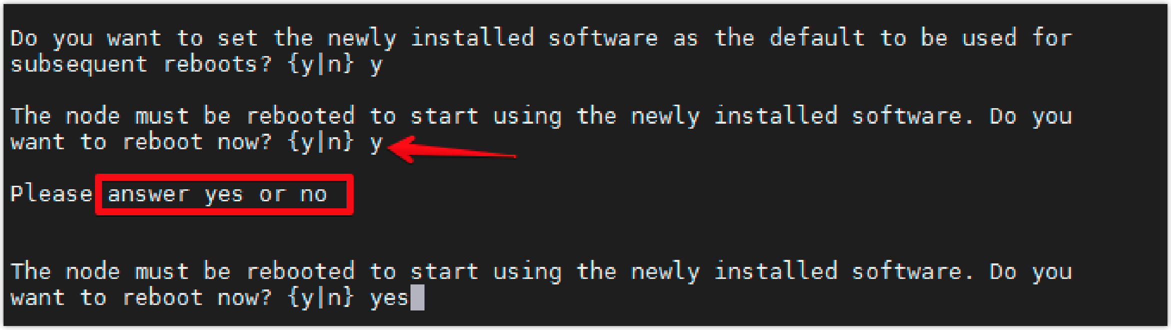
The web server must be pingable from node 01.

```
<url-boot-software>
```

12. Press Enter for the user name, indicating no user name.

13. Enter `y` to set the newly installed software as the default to be used for subsequent reboots.

14. Enter `yes` to reboot the node.



```
Do you want to set the newly installed software as the default to be used for
subsequent reboots? {y|n} y

The node must be rebooted to start using the newly installed software. Do you
want to reboot now? {y|n} y

Please answer yes or no

The node must be rebooted to start using the newly installed software. Do you
want to reboot now? {y|n} yes
```

When installing new software, the system might perform firmware upgrades to the BIOS and adapter cards, causing reboots and possible stops at the Loader-A prompt. If these actions occur, the system might deviate from this procedure.

During the ONTAP installation a prompt to reboot the node requests a Y/N response. The prompt requires the entire Yes or No response to reboot the node and continue the installation.

15. Press Ctrl-C when the following message displays:

```
Press Ctrl-C for Boot Menu
```

16. Choose option 4 for Clean Configuration and Initialize All Disks.

17. Enter `y` to zero disks, reset config, and install a new file system.

18. Enter `yes` to erase all the data on the disks.

The initialization and creation of the root aggregate can take 90 minutes or more to complete, depending on the number and type of disks attached. When initialization is complete, the storage system reboots. Note that SSDs take considerably less time to initialize. You can continue with the configuration of node 02 while the disks for node 01 are zeroing.

Configure Node 02

To configure node 02, follow these steps:

1. Connect to the storage system console port. You should see a Loader-B prompt. However, if the storage system is in a reboot loop, press Ctrl-C to exit the autoboot loop when the following message displays:

```
Starting AUTOBOOT press Ctrl-C to abort…
```

2. Allow the system to boot up.

```
autoboot
```

3. Press Ctrl-C when prompted.

If ONTAP 9.9.1 is not the version of software being booted, continue with the following steps to install new software. If ONTAP 9.9.1 is the version being booted, choose option 8 and `y` to reboot the node, then continue with step 16.

4. To install new software, choose option 7.
5. Enter `y` to continue the installation.
6. Choose `e0M` for the network port you want to use for the download.
7. Enter `n` to skip the reboot.
8. Choose option 7: `Install new software first`
9. Enter `y` to continue the installation
10. Enter the IP address, netmask, and default gateway for e0M.

```
Enter the IP address for port e0M: <node02-mgmt-ip>
Enter the netmask for port e0M: <node02-mgmt-mask>
Enter the IP address of the default gateway: <node02-mgmt-gateway>
```

11. Enter the URL where the software can be found.

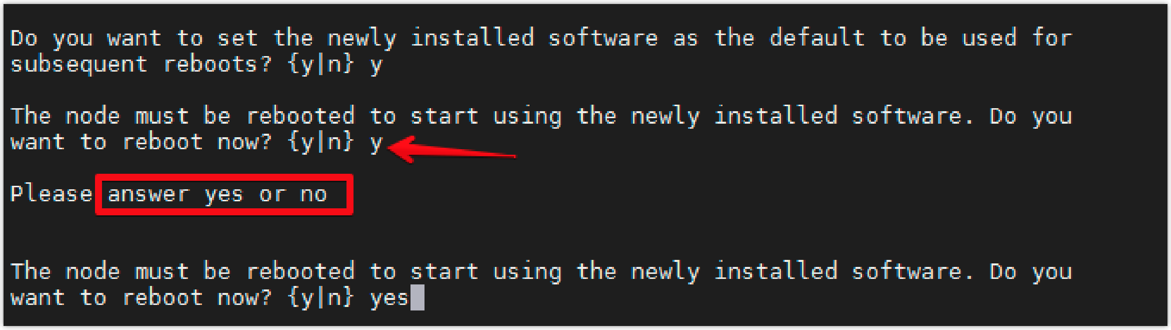
The web server must be pingable from node 02.

```
<url-boot-software>
```

12. Press `Enter` for the username, indicating no user name.

13. Enter `y` to set the newly installed software as the default to be used for subsequent reboots.

14. Enter `yes` to reboot the node.



```
Do you want to set the newly installed software as the default to be used for
subsequent reboots? {y|n} y

The node must be rebooted to start using the newly installed software. Do you
want to reboot now? {y|n} y

Please answer yes or no


The node must be rebooted to start using the newly installed software. Do you
want to reboot now? {y|n} yes
```

When installing new software, the system might perform firmware upgrades to the BIOS and adapter cards, causing reboots and possible stops at the Loader-A prompt. If these actions occur, the system might deviate from this procedure.

During the ONTAP installation a prompt to reboot the node requests a Y/N response. The prompt requires the entire `Yes` or `No` response to reboot the node and continue the installation.

15. Press Ctrl-C when you see this message:

```
Press Ctrl-C for Boot Menu
```

16. Choose option 4 for Clean Configuration and Initialize All Disks.

17. Enter `y` to zero disks, reset config, and install a new file system.

18. Enter `yes` to erase all the data on the disks.

The initialization and creation of the root aggregate can take 90 minutes or more to complete, depending on the number and type of disks attached. When initialization is complete, the storage system reboots. Note that SSDs take considerably less time to initialize.

Set Up Node

From a console port program attached to the storage controller A (node 01) console port, run the node setup script. This script appears when ONTAP 9.9.1 boots on the node for the first time. To set up the node, follow these steps:

1. Follow the prompts to set up node 01.

```
Welcome to node setup.
```

```
You can enter the following commands at any time:
  "help" or "?" - if you want to have a question clarified,
  "back" - if you want to change previously answered questions, and
  "exit" or "quit" - if you want to quit the setup wizard.
     Any changes you made before quitting will be saved.

You can return to cluster setup at any time by typing “cluster setup”.
To accept a default or omit a question, do not enter a value.

This system will send event messages and weekly reports to NetApp Technical Support.
To disable this feature, enter "autosupport modify -support disable" within 24 hours.
Enabling AutoSupport can significantly speed problem determination and resolution should a
problem occur on your system.
For further information on AutoSupport, see:
http://support.netapp.com/autosupport/

Type yes to confirm and continue {yes}: yes

Enter the node management interface port [e0M]: Enter
Enter the node management interface IP address: <node01-mgmt-ip>
Enter the node management interface netmask: <node01-mgmt-mask>
Enter the node management interface default gateway: <node01-mgmt-gateway>
A node management interface on port e0M with IP address <node01-mgmt-ip> has been created

Use your web browser to complete cluster setup by accesing https://<node01-mgmt-ip>

Otherwise press Enter to complete cluster setup using the command line interface:
```

2. To complete cluster setup, open a web browser and navigate to `https://<node01-mgmt-ip>`.

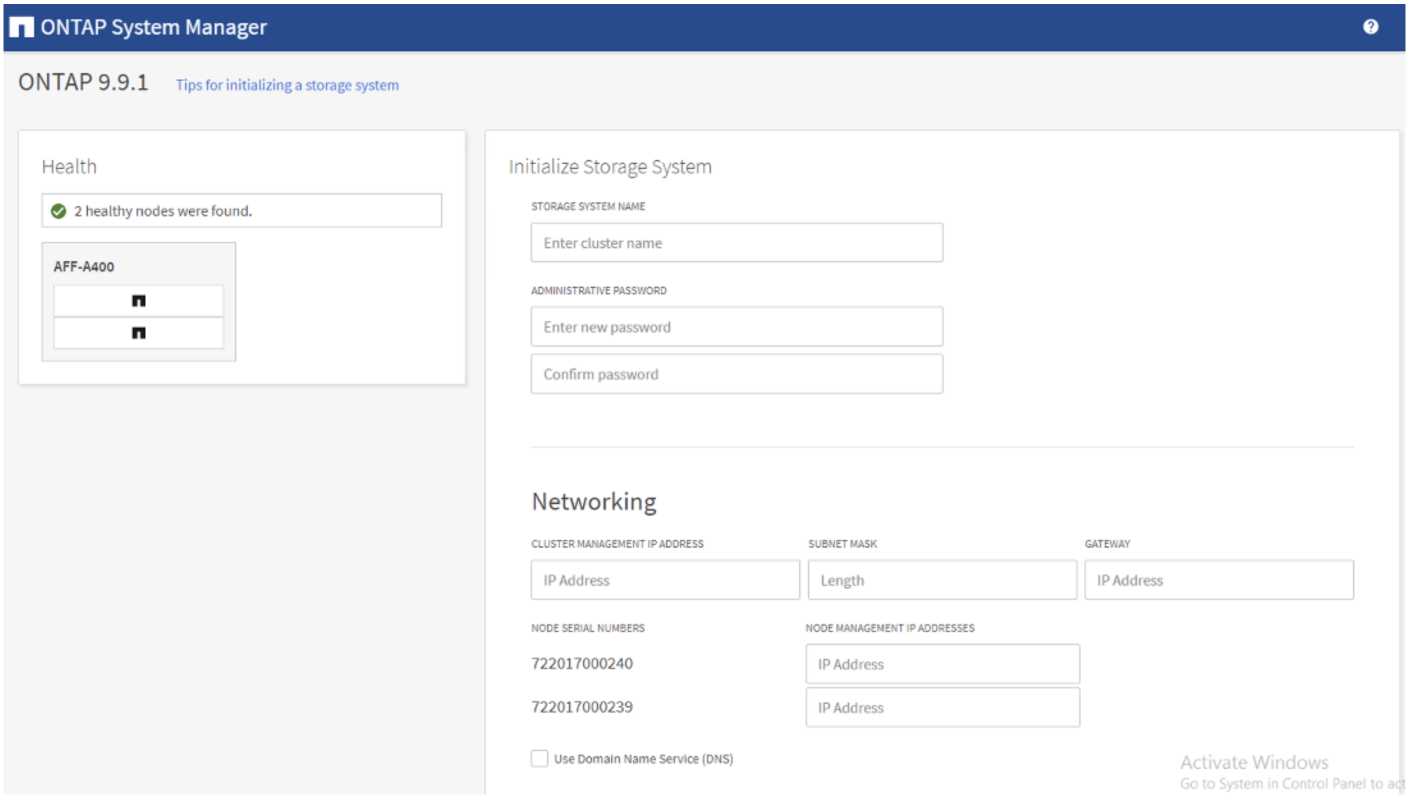
Table 5. Cluster Create in ONTAP Prerequisites

Cluster Detail	Cluster Detail Value
Cluster name	<clustername>
Cluster Admin SVM	<cluster-adm-svm>
Infrastructure Data SVM	<infra-data-svm>
ONTAP base license	<cluster-base-license-key>
Cluster management IP address	<clustermgmt-ip>

Cluster Detail	Cluster Detail Value
Cluster management netmask	<clustermgmt-mask>
Cluster management gateway	<clustermgmt-gateway>
Cluster node 01 IP address	<node01-mgmt-ip>
Cluster node 01 netmask	<node01-mgmt-mask>
Cluster node 01 gateway	<node01-mgmt-gateway>
Cluster node 02 IP address	<node02-mgmt-ip>
Cluster node 02 netmask	<node02-mgmt-mask>
Cluster node 02 gateway	<node02-mgmt-gateway>
Node 01 service processor IP address	<node01-sp-ip>
Node 01 service processor network mask	<node01-sp-mask>
Node 01 service processor gateway	<node01-sp-gateway>
Node 02 service processor IP address	<node02-sp-ip>
Node 02 service processor network mask	<node02-sp-mask>
Node 02 service processor gateway	<node02-sp-gateway>
Node 01 node name	<st-node01>
Node 02 node name	<st-node02>
DNS domain name	<dns-domain-name>
DNS server IP address	<dns-ip>
NTP server A IP address	<switch-a-ntp-ip>
NTP server B IP address	<switch-b-ntp-ip>
SNMPv3 User	<snmp-v3-usr>
SNMPv3 Authentication Protocol	<snmp-v3-auth-proto>
SNMPv3 Privacy Protocol	<snmpv3-priv-proto>

Cluster setup can also be performed using the CLI. This document describes the cluster setup using the NetApp ONTAP System Manager guided setup.

3. Complete the required information on the Initialize Storage System screen:



ONTAP System Manager

ONTAP 9.9.1 Tips for initializing a storage system

Health

2 healthy nodes were found.

AFF-A400

Initialize Storage System

STORAGE SYSTEM NAME: Enter cluster name

ADMINISTRATIVE PASSWORD: Enter new password / Confirm password

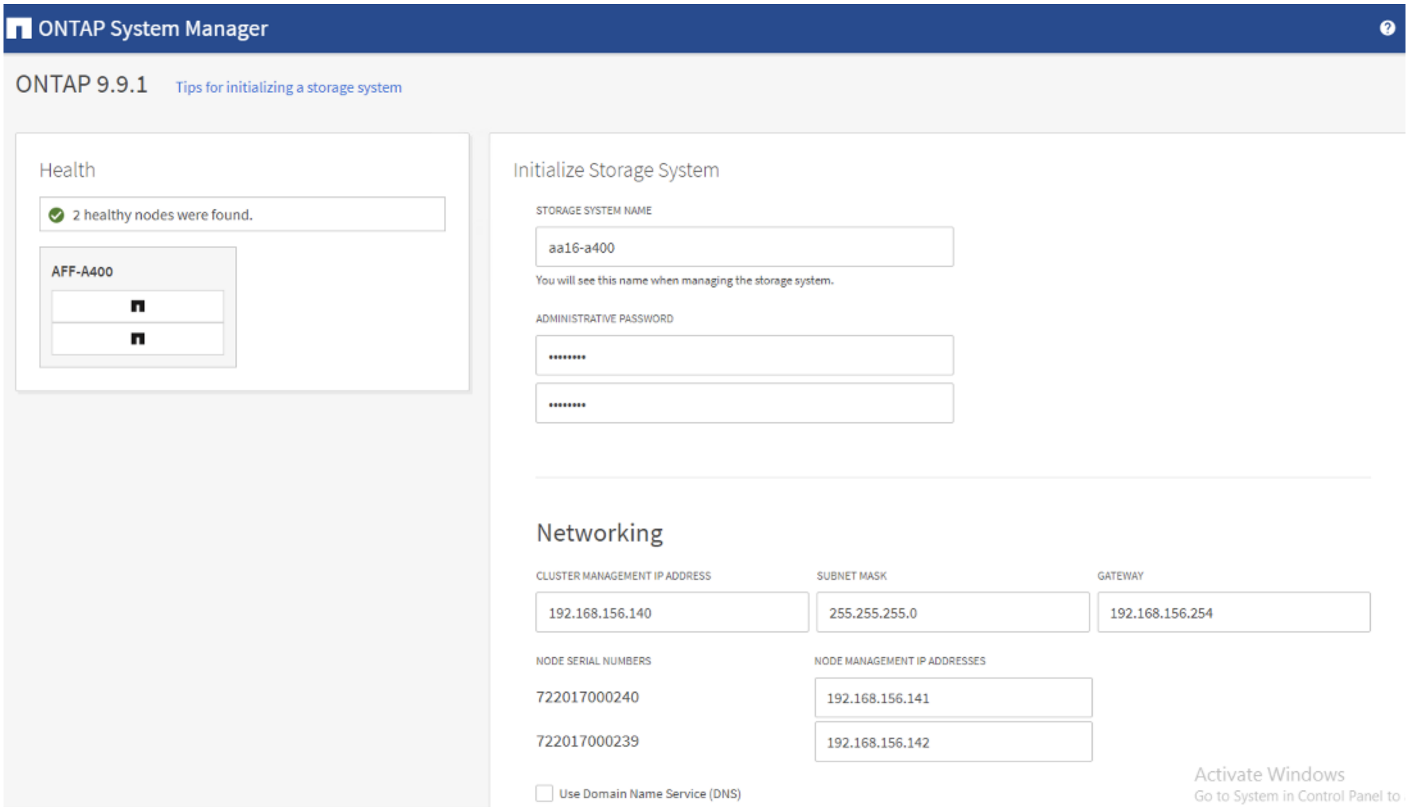
Networking

CLUSTER MANAGEMENT IP ADDRESS	SUBNET MASK	GATEWAY
IP Address	Length	IP Address

NODE SERIAL NUMBERS	NODE MANAGEMENT IP ADDRESSES
722017000240	IP Address
722017000239	IP Address

□ Use Domain Name Service (DNS)

4. In the Cluster screen, follow these steps:
   a. Enter the cluster name and administrator password.
   b. Complete the Networking information for the cluster and each node.
   c. Check the box for Use time services (NTP) and enter the IP addresses of the time servers in a comma separated list.



ONTAP 9.9.1 Tips for initializing a storage system

Health

2 healthy nodes were found.

AFF-A400

Initialize Storage System

STORAGE SYSTEM NAME: aa16-a400

You will see this name when managing the storage system.

ADMINISTRATIVE PASSWORD: •••••••• ••••••••

Networking

CLUSTER MANAGEMENT IP ADDRESS: 192.168.156.140

SUBNET MASK: 255.255.255.0

GATEWAY: 192.168.156.254

NODE SERIAL NUMBERS	NODE MANAGEMENT IP ADDRESSES
722017000240	192.168.156.141
722017000239	192.168.156.142

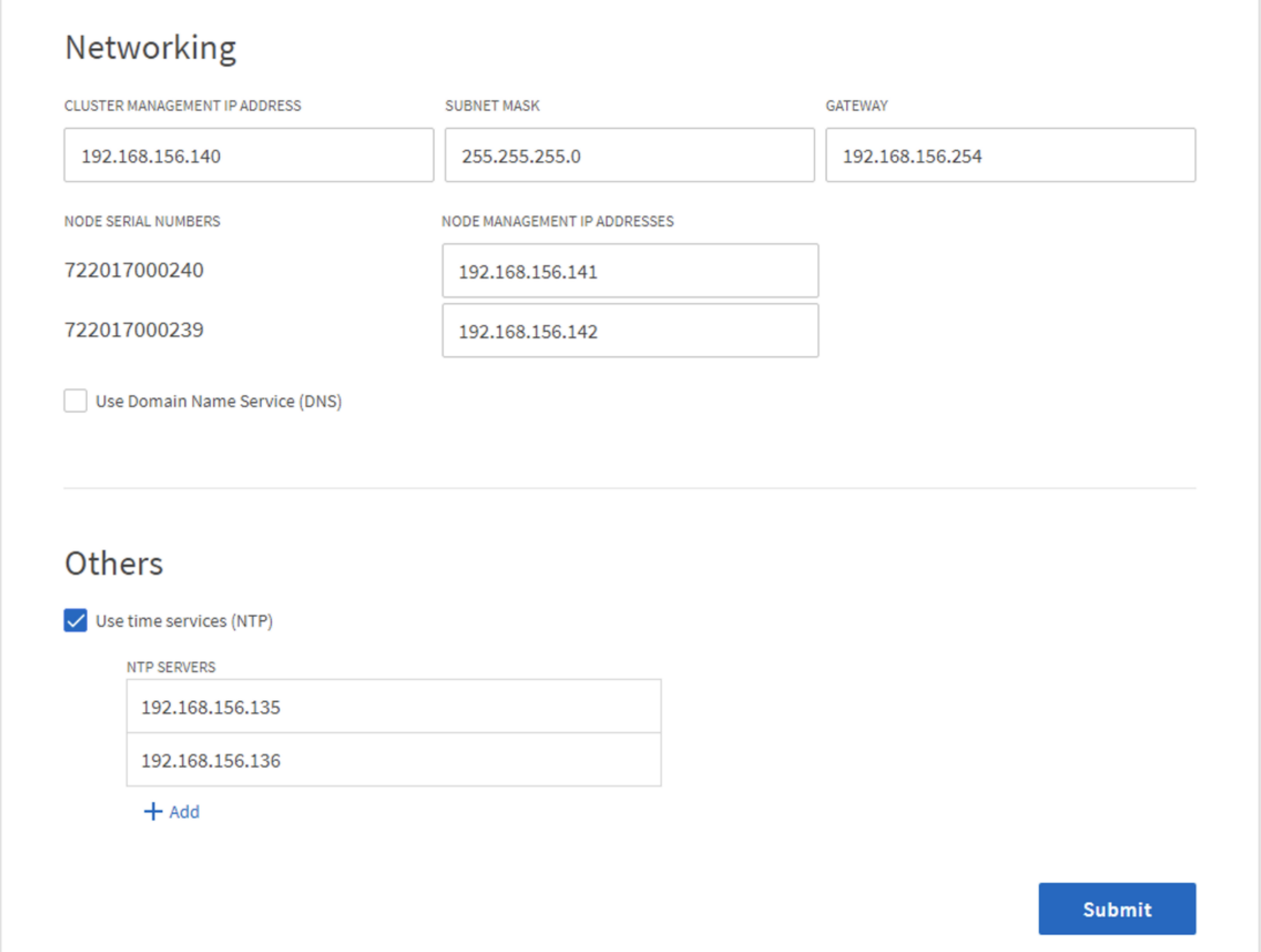
□ Use Domain Name Service (DNS)

The nodes should be discovered automatically; if they are not, Refresh the browser page. By default, the cluster interfaces are created on all the new factory shipping storage controllers.

If all the nodes are not discovered, then configure the cluster using the command line.

The node management interface can be on the same subnet as the cluster management interface, or it can be on a different subnet. In this document, we assume that it is on the same subnet.

5. Click Submit.



Networking

CLUSTER MANAGEMENT IP ADDRESS: 192.168.156.140

SUBNET MASK: 255.255.255.0

GATEWAY: 192.168.156.254

NODE SERIAL NUMBERS	NODE MANAGEMENT IP ADDRESSES
722017000240	192.168.156.141
722017000239	192.168.156.142

☐ Use Domain Name Service (DNS)

Others

☑ Use time services (NTP)

NTP SERVERS

192.168.156.135

192.168.156.136

6. A few minutes will pass while the cluster is configured. When prompted, login to ONTAP System Manager to continue the cluster configuration.

You can use Ansible scripts at this point to configure the remaining part of the Storage Configurations.

7. Edit the following variable files to ensure proper ONTAP Storage variables are entered:

- FlexPod-M6/FlexPod-UCSM-M6/inventory
- FlexPod-M6/FlexPod-UCSM-M6/group_vars/all.yml
- FlexPod-M6/FlexPod-UCSM-M6/group_vars/ontap
- FlexPod-M6/FlexPod-UCSM-M6/vars/ontap_main.yml

8. From /root/ FlexPod-M6/FlexPod-UCSM-M6, run the Setup_ONTAP.yml Ansible playbook.

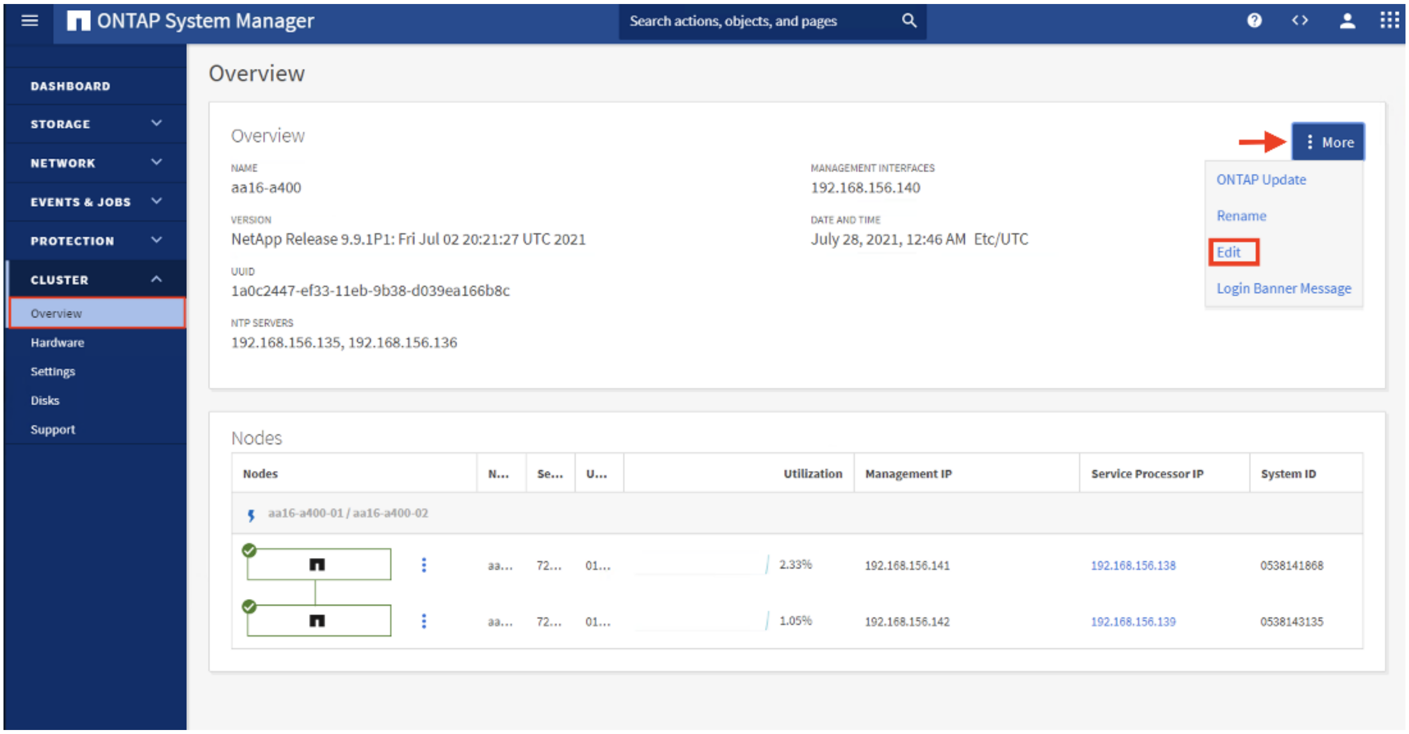
```
ansible-playbook -i inventory Setup_ONTAP.yml -t ontap_config_part_1
```

Use the -vvv tag to see detailed execution output log.

Ansible will implement all the Storage configurations tasks in this section. Skip the following steps and go to the Cisco UCS Configuration section.

9. From the Dashboard click the Cluster menu on the left and choose Overview.

10. Click the More ellipsis button in the Overview pane at the top right of the screen and choose Edit.



Overview

Overview

NAME
aa16-a400

VERSION
NetApp Release 9.9.1P1: Fri Jul 02 20:21:27 UTC 2021

UUID
1a0c2447-ef33-11eb-9b38-d039ea166b8c

NTP SERVERS
192.168.156.135, 192.168.156.136

MANAGEMENT INTERFACES
192.168.156.140

DATE AND TIME
July 28, 2021, 12:46 AM Etc/UTC

Nodes

Nodes	N...	Se...	U...	Utilization	Management IP	Service Processor IP	System ID
aa16-a400-01 / aa16-a400-02							
	aa...	72...	01...	2.33%	192.168.156.141	192.168.156.138	0538141868
	aa...	72...	01...	1.05%	192.168.156.142	192.168.156.139	0538143135

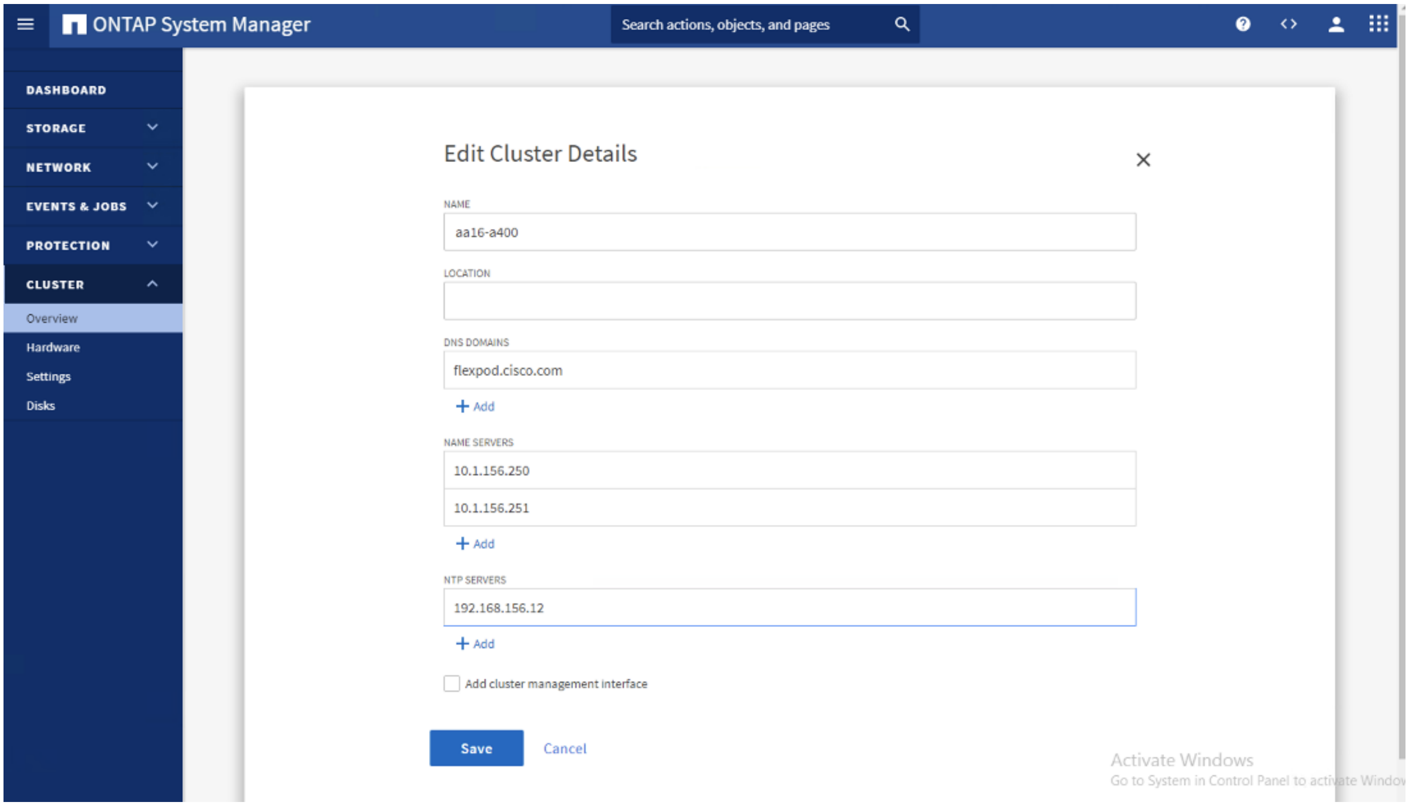
11. Add additional cluster configuration details and click Save to make the changes persistent:

   a. Cluster location

   b. DNS domain name

   c. DNS server IP addresses

DNS server IP addresses can be added individually or with a comma separated list on a single line.



Edit Cluster Details

NAME: aa16-a400

LOCATION:

DNS DOMAINS: flexpod.cisco.com

NAME SERVERS: 10.1.156.250, 10.1.156.251

NTP SERVERS: 192.168.156.12

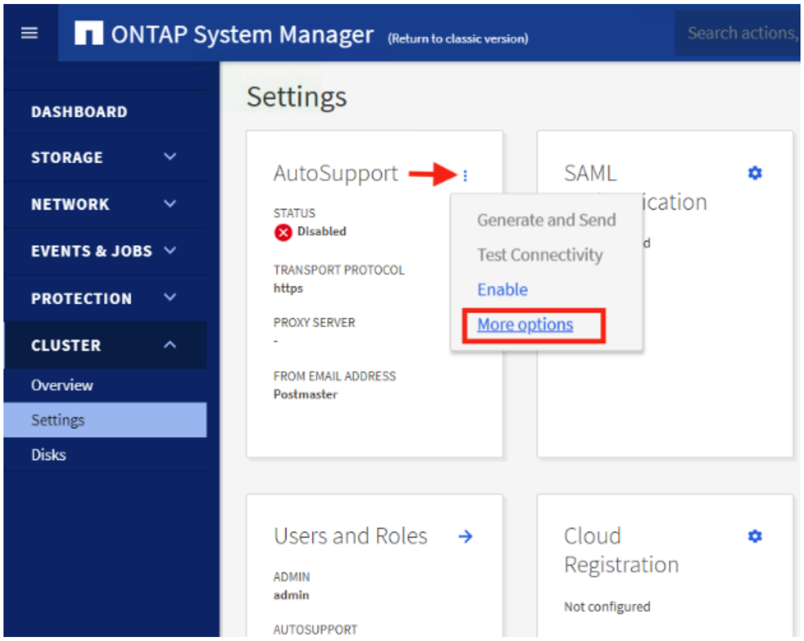
□ Add cluster management interface

12. Click Save to make the changes persistent.

To configure AutoSupport, add licenses and create storage aggregates via the ONTAP CLI, skip this section and configure the options in section Configure and Test AutoSuport.

13. Click the ellipsis in the top right of the AutoSupport tile and choose More options.

14. Choose the Settings menu under the Cluster menu.



15. If AutoSupport was not configured during the initial setup, click the ellipsis in the AutoSupport tile and choose More options.

16. To enable AutoSupport click the slider.

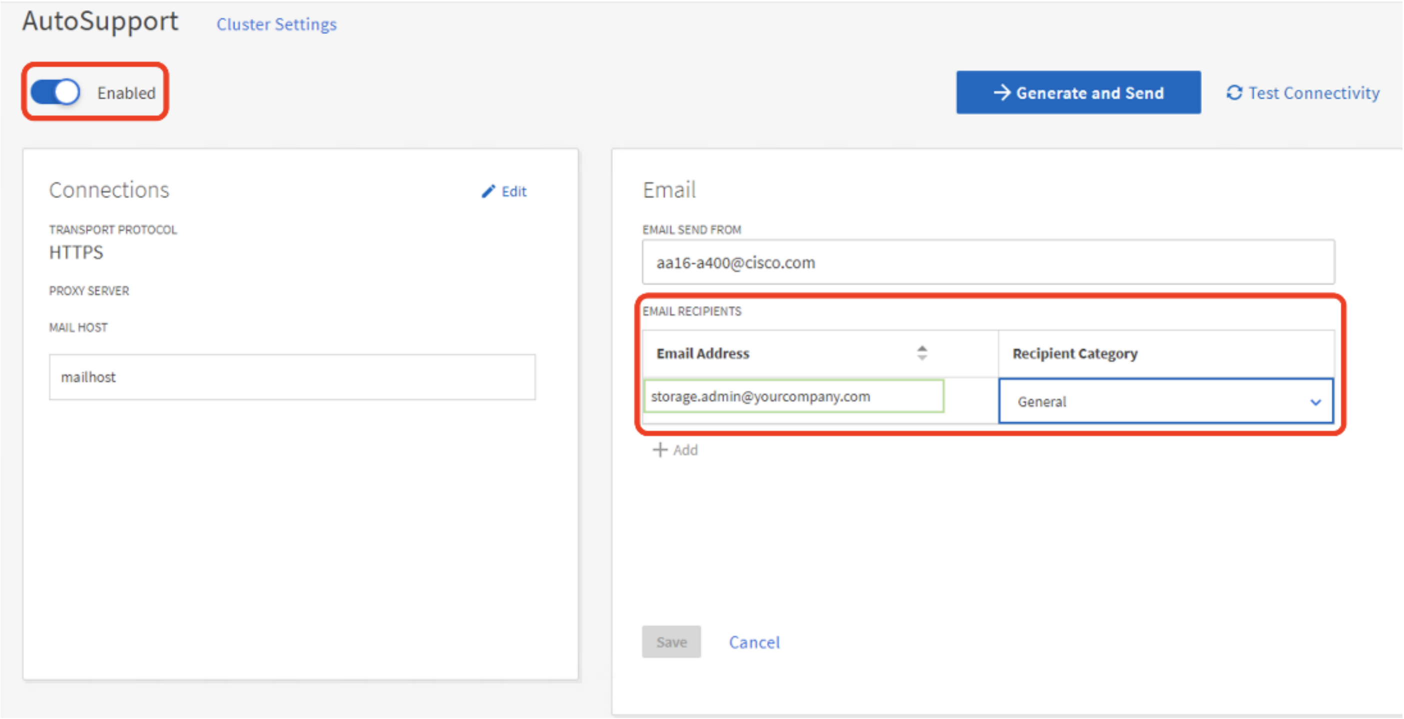
17. Click Edit to change the transport protocol, add a proxy server address and a mail host as needed.

18. Click Save to enable the changes.

19. In the Email tile to the right, click Edit and enter the desired email information:

    a. Email send from address
    b. Email recipient addresses.
    c. Recipient Category.

20. Click Save when complete.



Enabled

Connections

TRANSPORT PROTOCOL
HTTPS

PROXY SERVER

MAIL HOST
mailhost

Email

EMAIL SEND FROM
aa16-a400@cisco.com

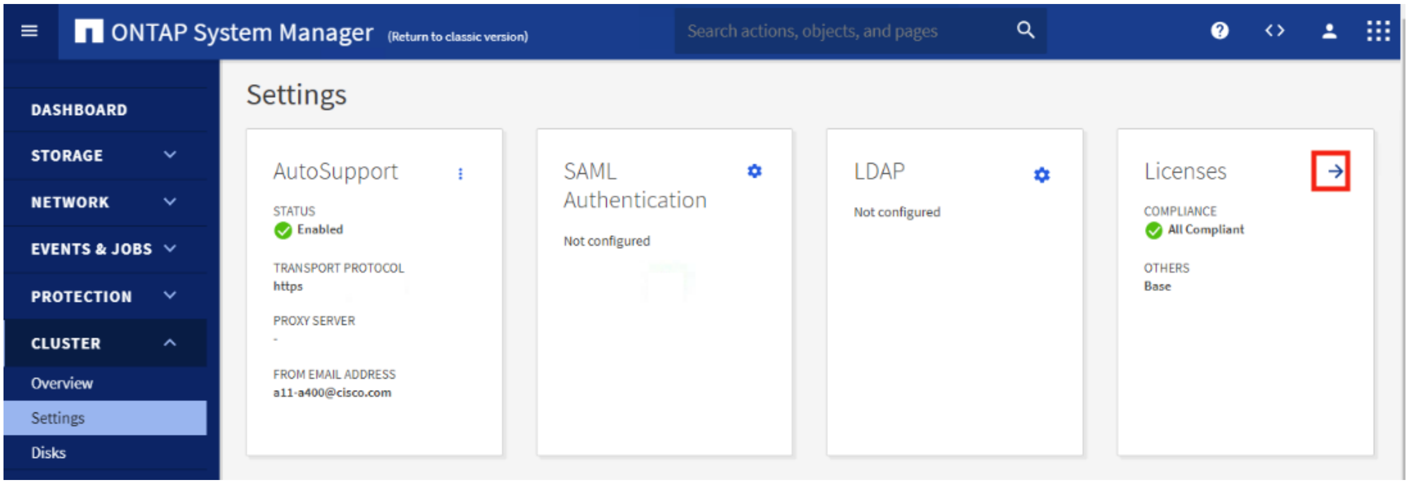
EMAIL RECIPIENTS

Email Address	Recipient Category
storage.admin@yourcompany.com	General

21. Choose Cluster Settings at the top left of the page to return to the cluster settings page.

22. Locate the Licenses tile on the right and click the detail arrow.

23. Add the desired licenses to the cluster by clicking Add and entering the license keys in a comma separated list.


ONTAP System Manager (Return to classic version)
Search actions, objects, and pages
DASHBOARD
STORAGE
NETWORK
EVENTS & JOBS
PROTECTION
CLUSTER
Overview
Settings
Disks

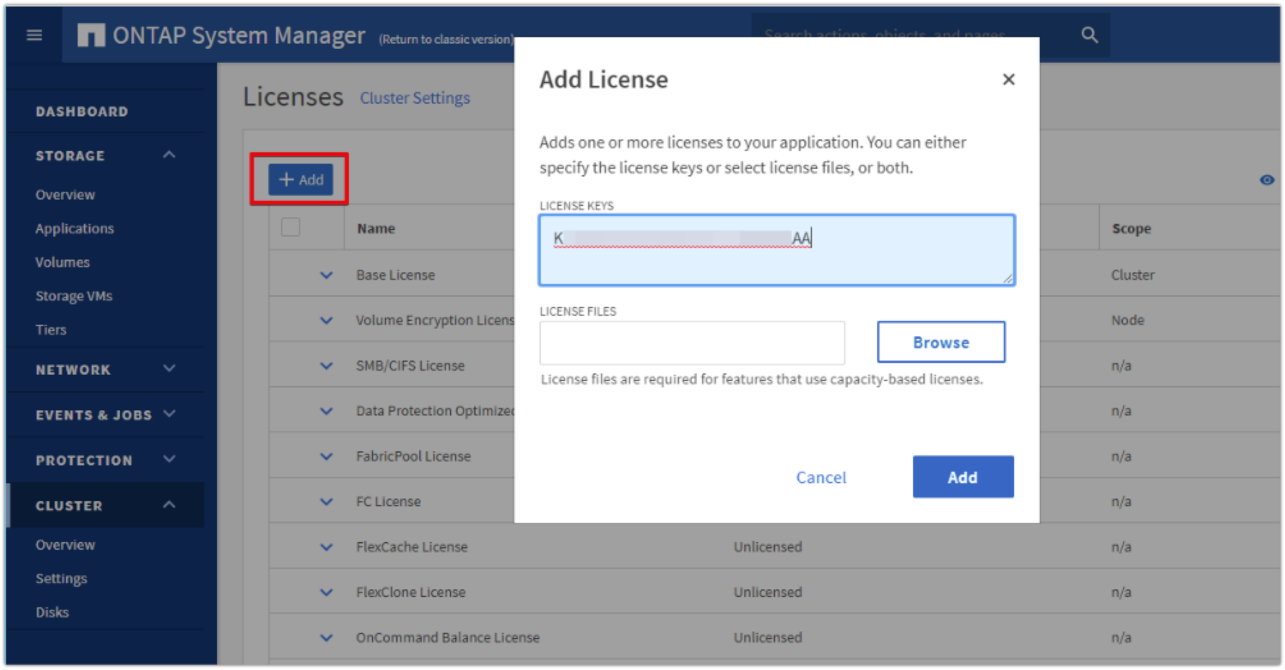
Settings

AutoSupport
STATUS
Enabled
TRANSPORT PROTOCOL
https
PROXY SERVER
-
FROM EMAIL ADDRESS
a11-a400@cisco.com

SAML Authentication
Not configured

LDAP
Not configured

Licenses
COMPLIANCE
All Compliant
OTHERS
Base



Name		Scope
Base License		Cluster
Volume Encryption Licens		Node
SMB/CIFS License		n/a
Data Protection Optimize		n/a
FabricPool License		n/a
FC License		n/a
FlexCache License	Unlicensed	n/a
FlexClone License	Unlicensed	n/a
OnCommand Balance License	Unlicensed	n/a

Add License

Adds one or more licenses to your application. You can either specify the license keys or select license files, or both.

LICENSE KEYS

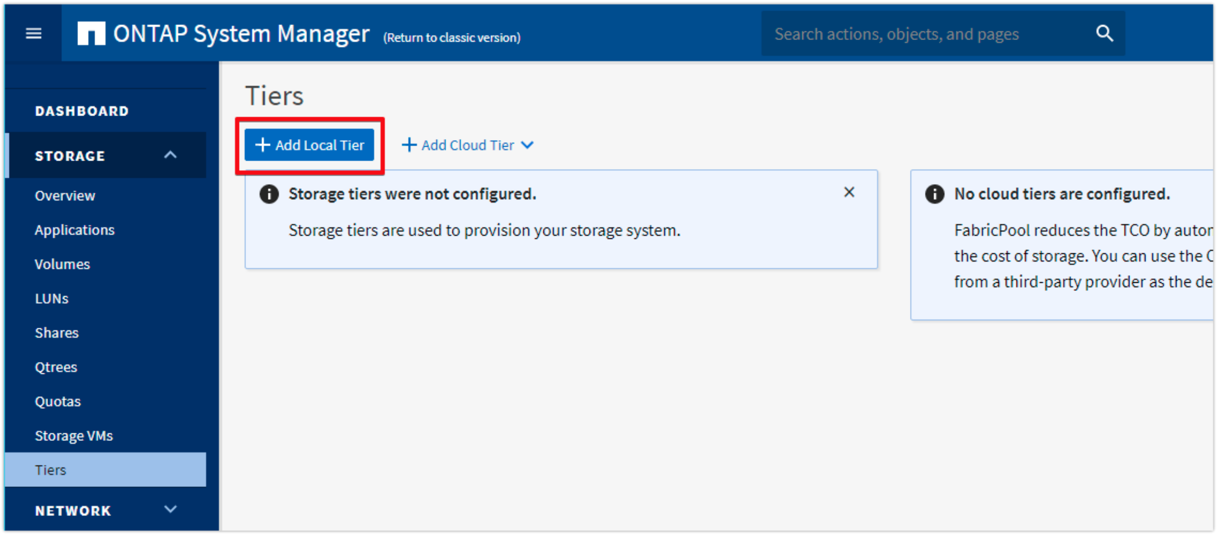
K[redacted]AA

LICENSE FILES

License files are required for features that use capacity-based licenses.

24. Configure storage aggregates by selecting the Storage menu on the left and choosing Tiers.

25. Click Add Local Tier and allow ONTAP System Manager to recommend a storage aggregate configuration.



Storage tiers were not configured.

Storage tiers are used to provision your storage system.

No cloud tiers are configured.

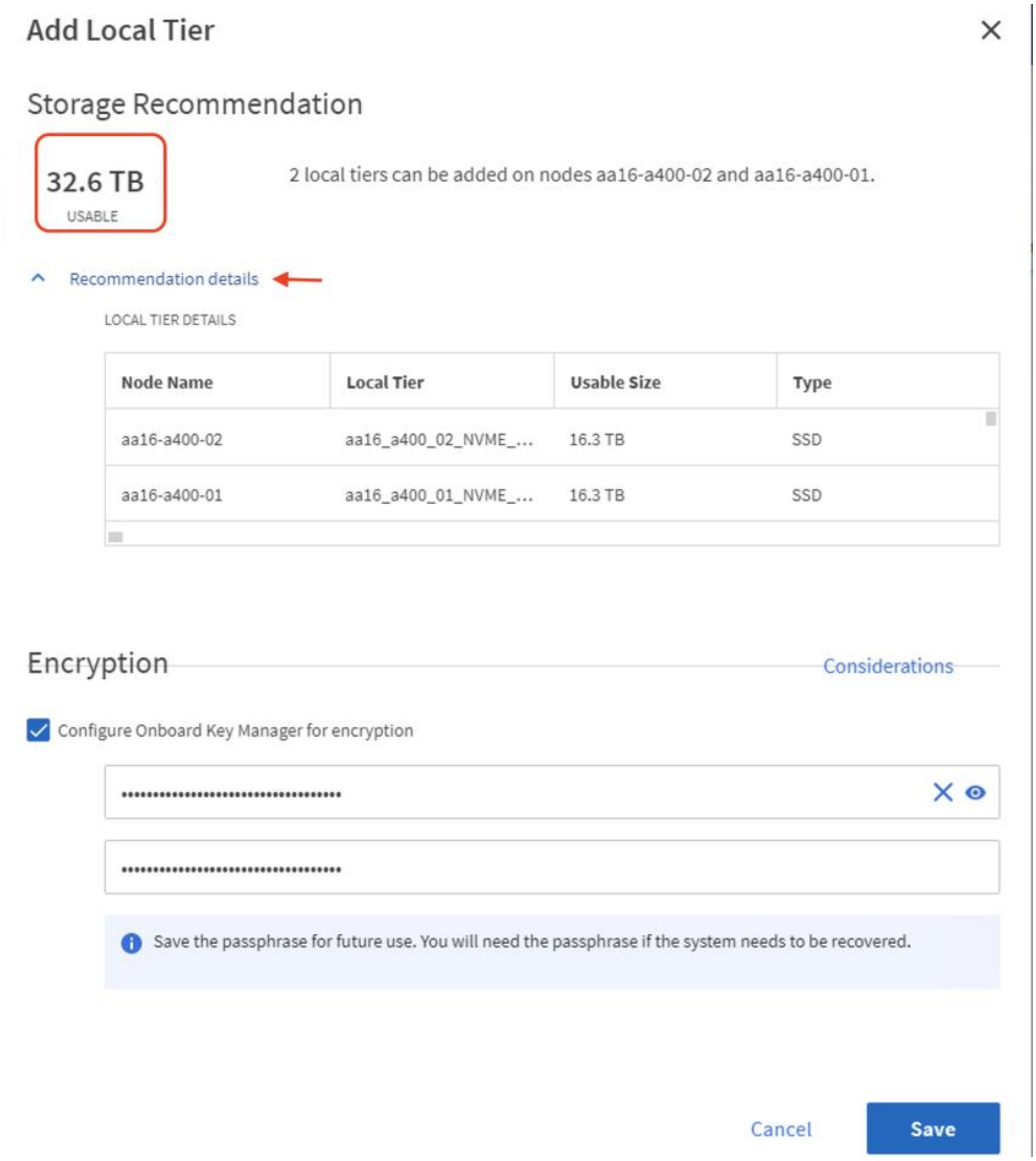
FabricPool reduces the TCO by autor
the cost of storage. You can use the C
from a third-party provider as the de

26. ONTAP will use best practices to recommend an aggregate layout. Click the Recommended details link to view the aggregate information.

27. Optionally, enable NetApp Aggregate Encryption (NAE) by checking the box for Configure Onboard Key Manager for encryption.

28. Enter and confirm the passphrase and save it in a secure location for future use.

29. Click Save to make the configuration persistent.



2 local tiers can be added on nodes aa16-a400-02 and aa16-a400-01.

LOCAL TIER DETAILS

Node Name	Local Tier	Usable Size	Type
aa16-a400-02	aa16_a400_02_NVME_...	16.3 TB	SSD
aa16-a400-01	aa16_a400_01_NVME_...	16.3 TB	SSD

☑ Configure Onboard Key Manager for encryption

••••••••••••••••••••••••••••••••••

••••••••••••••••••••••••••••••••••

Save the passphrase for future use. You will need the passphrase if the system needs to be recovered.

Careful consideration should be taken before enabling aggregate encryption. Aggregate encryption may not be supported for all deployments. Please review the NetApp Encryption Power Guide and the Security Hardening Guide for NetApp ONTAP 9 (TR-4569) to help determine if aggregate encryption is right for your environment.

Log into the Cluster

To log into the cluster, follow these steps:

1. Open an SSH connection to either the cluster IP or the host name.
2. Log into the admin user with the password you provided earlier.

Verify Storage Failover

To confirm that storage failover is enabled, run the following commands for a failover pair:

1. Verify the status of the storage failover.

```
storage failover show
```

Both `<st-node01>` and `<st-node02>` must be capable of performing a takeover. Continue with step 2 if the nodes are capable of performing a takeover.

2. Enable failover on one of the two nodes if it was not completed during the installation.

```
storage failover modify -node <st-node01> -enabled true
```

Enabling failover on one node enables it for both nodes.

3. Verify the HA status for a two-node cluster.

This step is not applicable for clusters with more than two nodes.

```
cluster ha show
```

4. If HA is not configured use the below commands. Only enable HA mode for two-node clusters. Do not run this command for clusters with more than two nodes because it causes problems with failover.

```
cluster ha modify -configured true
Do you want to continue? {y|n}: y
```

5. Verify that hardware assist is correctly configured.

```
storage failover hwassist show
```

6. If hwassist storage failover is not enabled, enable using the following commands.

```
storage failover modify –hwassist-partner-ip <node02-mgmt-ip> -node <st-node01>
storage failover modify –hwassist-partner-ip <node01-mgmt-ip> -node <st-node02>
```

Set Auto-Revert on Cluster Management

To set the `auto-revert` parameter on the cluster management interface, follow this step:

A storage virtual machine (SVM) is referred to as a Vserver or `vserver` in the GUI and CLI.

1. Run the following command:

```
net interface modify -vserver <clustername> -lif cluster_mgmt_lif_1 -auto-revert true
```

Zero All Spare Disks

To zero all spare disks in the cluster, run the following command:

```
disk zerospares
```

Advanced Data Partitioning creates a root partition and two data partitions on each SSD drive in an AFF configuration. Disk autoassign should have assigned one data partition to each node in an HA pair. If a different disk assignment is required, disk autoassignment must be disabled on both nodes in the HA pair by running the `disk option modify` command. Spare partitions can then be moved from one node to another by running the `disk removeowner` and `disk assign` commands.

Set Up Service Processor Network Interface

To assign a static IPv4 address to the Service Processor on each node, run the following commands:

```
system service-processor network modify –node <st-node01> -address-family IPv4 –enable true –
dhcp none –ip-address <node01-sp-ip> -netmask <node01-sp-mask> -gateway <node01-sp-gateway>


system service-processor network modify –node <st-node02> -address-family IPv4 –enable true –
dhcp none –ip-address <node02-sp-ip> -netmask <node02-sp-mask> -gateway <node02-sp-gateway>
```

The Service Processor IP addresses should be in the same subnet as the node management IP addresses.

Create Manual Provisioned Aggregates (Optional)

An aggregate containing the root volume is created during the ONTAP setup process. To manually create additional aggregates, determine the aggregate name, the node on which to create it, and the number of disks it should contain.

To create new aggregates, run the following commands:

```
storage aggregate create -aggregate <aggr1_node01> -node <st-node01> -diskcount <num-disks> -
disktype SSD-NVM
storage aggregate create -aggregate <aggr1_node02> -node <st-node02> -diskcount <num-disks> -
disktype SSD-NVM
```

You should have the minimum number of hot spare disks for hot spare disk partitions recommended for your aggregate.

For all-flash aggregates, you should have a minimum of one hot spare disk or disk partition. For non-flash homogenous aggregates, you should have a minimum of two hot spare disks or disk partitions. For Flash Pool aggregates, you should have a minimum of two hot spare disks or disk partitions for each disk type.

In an AFF configuration with a small number of SSDs, you might want to create an aggregate with all but one remaining disk (spare) assigned to the controller.

The aggregate cannot be created until disk zeroing completes. Run the `storage aggregate show` command to display the aggregate creation status. Do not proceed until both `aggr1_node1` and `aggr1_node2` are online.

Remove Default Broadcast Domains

By default, all network ports are included in separate default broadcast domain. Network ports used for data services (for example, `e0e`, `e0f`, and so on) should be removed from their default broadcast domain and that broadcast domain should be deleted.

To perform this task, run the following commands:

```
network port broadcast-domain delete -broadcast-domain <Default-N> -ipspace Default
network port broadcast-domain show
```

Delete the Default broadcast domains with Network ports (Default-1, Default-2, and so on).

Disable Flow Control on 25/100GbE Data Ports

To disable flow control on 25 and 100GbE data ports, follow these steps:

1. Run the following command to configure the ports .on node 01:

```
network port modify -node <st-node01> -port e4a,e4b -flowcontrol-admin none
network port modify -node <st-node01> -port e0e,e0f,e0g,e0h -flowcontrol-admin none
```

2. Run the following command to configure the ports on node 02:

```
network port modify -node <st-node02> -port e4a,e4b -flowcontrol-admin none


network port modify -node <st-node02> -port e0e,e0f,e0g,e0h -flowcontrol-admin none


aa16-a400::> net port show -node * -port e0e,e0f,e0g,e0h -fields speed-admin,duplex-
admin,flowcontrol-admin
  (network port show)
node         port duplex-admin speed-admin flowcontrol-admin
------------ ---- ------------ ----------- -----------------
aa16-a400-01 e0e  auto         auto        none
aa16-a400-01 e0f  auto         auto        none
```

```
aa16-a400-01 e0g  auto         auto        none
aa16-a400-01 e0h  auto         auto        none
aa16-a400-02 e0e  auto         auto        none
aa16-a400-02 e0f  auto         auto        none
aa16-a400-02 e0g  auto         auto        none
aa16-a400-02 e0h  auto         auto        none
8 entries were displayed.


aa16-a400::> net port show -node * -port e4a,e4b -fields speed-admin,duplex-
admin,flowcontrol-admin
  (network port show)
node         port duplex-admin speed-admin flowcontrol-admin
------------ ---- ------------ ----------- -----------------
aa16-a400-01 e4a  auto         auto        none
aa16-a400-01 e4b  auto         auto        none
aa16-a400-02 e4a  auto         auto        none
aa16-a400-02 e4b  auto         auto        none
4 entries were displayed.
```

Disable Auto-Negotiate on Fibre Channel Ports

In accordance with the best practices for FC host ports, to disable auto-negotiate on each FCP adapter in each controller node, follow these steps:

1. Disable each FC adapter in the controllers with the `fcp adapter modify` command.

```
fcp adapter modify -node <st-node01> -adapter 5a –status-admin down
fcp adapter modify -node <st-node01> -adapter 5b –status-admin down
fcp adapter modify -node <st-node02> -adapter 5a –status-admin down
fcp adapter modify -node <st-node02> -adapter 5b –status-admin down
```

2. Set the desired speed on the adapter and return it to the online state.

```
fcp adapter modify -node <st-node01> -adapter 5a -speed 32 -status-admin up
fcp adapter modify -node <st-node01> -adapter 5b -speed 32 -status-admin up
fcp adapter modify -node <st-node02> -adapter 5a -speed 32 -status-admin up
fcp adapter modify -node <st-node02> -adapter 5b -speed 32 -status-admin up
```

Enable Cisco Discovery Protocol

To enable the Cisco Discovery Protocol (CDP) on the NetApp storage controllers, run the following command to enable CDP in ONTAP:

```
node run -node * options cdpd.enable on
```

To be effective, CDP must also be enabled on directly connected networking equipment such as switches and routers.

Enable Link-layer Discovery Protocol on all Ethernet Ports

To enable the exchange of Link-layer Discovery Protocol (LLDP) neighbor information between the storage and network switches, follow this step:

1. Enable LLDP on all ports of all nodes in the cluster.

```
node run * options lldp.enable on
```

Create Management Broadcast Domain

If the management interfaces are required to be on a separate VLAN, create a new broadcast domain for those interfaces by running the following command:

```
network port broadcast-domain create -broadcast-domain IB-MGMT -mtu 1500
network port broadcast-domain show
```

Create NFS Broadcast Domain

To create an NFS data broadcast domain with a maximum transmission unit (MTU) of 9000, run the following commands to create a broadcast domain for NFS in ONTAP:

```
network port broadcast-domain create -broadcast-domain Infra_NFS -mtu 9000
network port broadcast-domain show
```

Create Interface Groups

To create the LACP interface groups for the 25GbE data interfaces, run the following commands:

```
network port ifgrp create -node <st-node01> -ifgrp a0a -distr-func port -mode multimode_lacp
network port ifgrp add-port -node <st-node01> -ifgrp a0a -port e0e
network port ifgrp add-port -node <st-node01> -ifgrp a0a -port e0f
network port ifgrp add-port -node <st-node01> -ifgrp a0a -port e0g
network port ifgrp add-port -node <st-node01> -ifgrp a0a -port e0h
network port ifgrp create -node <st-node02> -ifgrp a0a -distr-func port -mode multimode_lacp
network port ifgrp add-port -node <st-node02> -ifgrp a0a -port e0e
network port ifgrp add-port -node <st-node02> -ifgrp a0a -port e0f
network port ifgrp add-port -node <st-node02> -ifgrp a0a -port e0g
network port ifgrp add-port -node <st-node02> -ifgrp a0a -port e0h

network port ifgrp show
```

Change MTU on Interface Groups

To change the MTU size on the base interface-group ports before creating the VLAN ports, run the following commands:

```
network port modify –node <st-node01> -port a0a –mtu 9000
network port modify –node <st-node02> -port a0a –mtu 9000
```

Create VLANs

To create VLANs, follow these steps:

1. Create the management VLAN ports and add them to the management broadcast domain.

```
network port vlan create –node <st-node01> -vlan-name a0a-<ib-mgmt-vlan-id>
network port vlan create –node <st-node02> -vlan-name a0a-<ib-mgmt-vlan-id>

network port broadcast-domain add-ports -broadcast-domain IB-MGMT -ports <st-node01>:a0a-<ib-mgmt-vlan-id>,<st-node02>:a0a-<ib-mgmt-vlan-id>

network port vlan show
```

2. Create the NFS VLAN ports and add them to the `Infra_NFS` broadcast domain.

```
network port vlan create –node <st-node01> -vlan-name a0a-<infra-nfs-vlan-id>
network port vlan create –node <st-node02> -vlan-name a0a-<infra-nfs-vlan-id>

network port broadcast-domain add-ports -broadcast-domain Infra_NFS -ports <st-node01>:a0a-<infra-nfs-vlan-id>,<st-node02>:a0a-<infra-nfs-vlan-id>
```

Configure Network Time Protocol

To configure time synchronization on the cluster, follow these steps:

1. Set the time zone for the cluster.

```
timezone -timezone <timezone>
```

For example, in the eastern United States, the time zone is `America/New_York`.

2. Set the date for the cluster.

```
date <ccyymmddhhmm.ss>
```

The format for the date is <[Century][Year][Month][Day][Hour][Minute].[Second]> (for example, 201903271549.30).

Configure Simple Network Management Protocol

To configure the Simple Network Management Protocol (SNMP), follow these steps:

1. Configure basic SNMP information, such as the location and contact. When polled, this information is visible as the `sysLocation` and `sysContact` variables in SNMP.

```
snmp contact <snmp-contact>
snmp location “<snmp-location>”
snmp init 1
options snmp.enable on
```

2. Configure SNMP traps to send to remote hosts, such as an Active IQ Unified Manager server or another fault management system.

```
snmp traphost add <oncommand-um-server-fqdn>
```

Configure SNMPv3 Access

SNMPv3 offers advanced security by using encryption and passphrases. The SNMPv3 user can run SNMP utilities from the traphost using the authentication and privacy settings that you specify. To configure SNMPv3 access, run the following commands:

```
security login create -user-or-group-name <<snmp-v3-usr>> -application snmp -authentication-
method usm

Enter the authoritative entity's EngineID [local EngineID]:

Which authentication protocol do you want to choose (none, md5, sha, sha2-256) [none]:
<<snmp-v3-auth-proto>>

Enter the authentication protocol password (minimum 8 characters long):

Enter the authentication protocol password again:

Which privacy protocol do you want to choose (none, des, aes128) [none]: <<snmpv3-priv-
proto>>

Enter privacy protocol password (minimum 8 characters long):

Enter privacy protocol password again:
```

Refer to the SNMP Configuration Express Guide for additional information when configuring SNMPv3 security users.

Create SVM

To create an infrastructure SVM, follow these steps:

1. Run the `vserver create` command.

```
vserver create –vserver Infra-SVM –rootvolume infra_svm_root –aggregate aggr1_node01 –
rootvolume-security-style unix
```

2. Remove the unused data protocols from the SVM: CIFS, iSCSI.

```
vserver remove-protocols -vserver Infra-SVM -protocols iscsi,cifs
```

3. Add the two data aggregates to the Infra-SVM aggregate list for the NetApp ONTAP Tools.

```
vserver modify -vserver Infra-SVM -aggr-list <aggr1_node01>,<aggr1_node02>
```

4. Enable and run the NFS protocol in the Infra-SVM.

```
vserver nfs create -vserver Infra-SVM -udp disabled -v3 enabled -v4.1 enabled -vstorage enabled
```

If the NFS license was not installed during the cluster configuration, make sure to install the license before starting the NFS service.

5. Verify the NFS `vstorage` parameter for the NetApp NFS VAAI plug-in was enabled.

```
vserver nfs show -fields vstorage
```

Create Load-Sharing Mirrors of SVM Root Volume

To create a load-sharing mirror of an SVM root volume, follow these steps:

1. Create a volume to be the load-sharing mirror of the infrastructure SVM root volume on each node.

```
volume create -vserver Infra-SVM -volume infra_svm_root_m01 -aggregate <aggr1_node01> -size 1GB -type DP

volume create -vserver Infra-SVM -volume infra_svm_root_m02 -aggregate <aggr1_node02> -size 1GB -type DP
```

2. Create a job schedule to update the root volume mirror relationships every 15 minutes.

```
job schedule interval create -name 15min -minutes 15
```

3. Create the mirroring relationships.

```
snapmirror create -source-path Infra-SVM:infra_svm_root -destination-path Infra-SVM:infra_svm_root_m01 -type LS -schedule 15min

snapmirror create -source-path Infra-SVM:infra_svm_root -destination-path Infra-SVM:infra_svm_root_m02 -type LS -schedule 15min
```

4. Initialize the mirroring relationship.

```
snapmirror initialize-ls-set -source-path Infra-SVM:infra_svm_root
snapmirror show -type ls
```

Create Block Protocol (FC) Service

Run the following command to create the FCP service on each SVM. This command also starts the FCP service and sets the worldwide name (WWN) for the SVM:

```
vserver fcp create -vserver Infra-SVM -status-admin up
vserver fcp show
```

If the FC license was not installed during the cluster configuration, make sure to install the license before creating the FC service.

Configure HTTPS Access

To configure secure access to the storage controller, follow these steps:

1. Increase the privilege level to access the certificate commands.

   ```
   set -privilege diag
   Do you want to continue? {y|n}: y
   ```

2. Generally, a self-signed certificate is already in place. Verify the certificate and obtain parameters (for example, the <serial-number>) by running the following command:

   ```
   security certificate show
   ```

3. For each SVM shown, the certificate common name should match the DNS fully qualified domain name (FQDN) of the SVM. Delete the two default certificates and replace them with either self-signed certificates or certificates from a certificate authority (CA). To delete the default certificates, run the following commands:

   ```
   security certificate delete -vserver Infra-SVM -common-name Infra-SVM -ca Infra-SVM -type
   server -serial <serial-number>
   ```

Deleting expired certificates before creating new certificates is a best practice. Run the `security certificate delete command` to delete the expired certificates. In the following command, use TAB completion to select and delete each default certificate.

4. To generate and install self-signed certificates, run the following commands as one-time commands. Generate a server certificate for the Infra-SVM and the cluster SVM. Use TAB completion to aid in the completion of these commands.

   ```
   security certificate create -common-name <cert-common-name> -type  server -size 2048 -country
   <cert-country> -state <cert-state> -locality <cert-locality> -organization <cert-org> -unit
   <cert-unit> -email-addr <cert-email> -expire-days <cert-days> -protocol SSL -hash-function
   SHA256 -vserver Infra-SVM
   ```

5. To obtain the values for the parameters required in step 5 (<cert-ca> and <cert-serial>), run the security certificate show command.

6. Enable each certificate that was just created by using the –server-enabled true and –client-enabled false parameters. Use TAB completion to aid in the completion of these commands.

   ```
   security ssl modify -vserver <clustername> -server-enabled true -client-enabled false -ca
   <cert-ca> -serial <cert-serial> -common-name <cert-common-name>
   ```

7. Disable HTTP cluster management access.

```
system services firewall policy delete -policy mgmt -service http –vserver <clustername>
```

It is normal for some of these commands to return an error message stating that the entry does not exist.

8. Change back to the normal admin privilege level and verify that the system logs are available in a web browser.

```
set –privilege admin


https://<node01-mgmt-ip>/spi

https://<node02-mgmt-ip>/spi
```

Configure NFSv3 and NFSv4.1

To configure NFS on the SVM, follow these steps:

1. Create a new rule for the infrastructure NFS subnet in the default export policy.

```
vserver export-policy rule create –vserver Infra-SVM -policyname default –ruleindex 1 –
protocol nfs -clientmatch <infra-nfs-subnet-cidr> -rorule sys –rwrule sys -superuser sys –
allow-suid true
```

2. Assign the FlexPod export policy to the infrastructure SVM root volume.

```
volume modify –vserver Infra-SVM –volume infra_svm_root –policy default
```

Create FlexVol Volumes

The following information is required to create a NetApp FlexVol® volume:

- The volume name
- The volume size
- The aggregate on which the volume exists

To create a FlexVol volume, run the following commands:

```
volume create -vserver Infra-SVM -volume infra_datastore_01 -aggregate <aggr1_node01> -size
1TB -state online -policy default -junction-path /infra_datastore_01 -space-guarantee none -
percent-snapshot-space 0


volume create -vserver Infra-SVM -volume infra_datastore_02 -aggregate <aggr1_node02> -size
1TB -state online -policy default -junction-path /infra_datastore_02 -space-guarantee none -
percent-snapshot-space 0
```

```
volume create -vserver Infra-SVM -volume infra_swap -aggregate <aggr1_node01> -size 100GB -
state online -policy default -junction-path /infra_swap -space-guarantee none -percent-
snapshot-space 0 -snapshot-policy none.



volume create -vserver Infra-SVM -volume esxi_boot -aggregate <aggr1_node01> -size 320GB -
state online -policy default -space-guarantee none -percent-snapshot-space 0


snapmirror update-ls-set -source-path Infra-SVM:infra_svm_root
```

If you are going to setup and use SnapCenter to backup the infra_datastore volume, add “-snapshot-policy none” to the end of the volume create command for the infra_datastore volume.

Modify Volume Efficiency

On NetApp AFF systems, deduplication is enabled by default. To disable the efficiency policy on the infra_swap volume, run the following command:

```
volume efficiency off –vserver Infra-SVM –volume infra_swap
```

Create FC LIFs

Run the following commands to create four FC LIFs (two on each node):

```
network interface create -vserver Infra-SVM -lif fcp-lif-01a -role data -data-protocol fcp -
home-node <st-node01> -home-port 5a -status-admin up


network interface create -vserver Infra-SVM -lif fcp-lif-01b -role data -data-protocol fcp -
home-node <st-node01> -home-port 5b -status-admin up


network interface create -vserver Infra-SVM -lif fcp-lif-02a -role data -data-protocol fcp -
home-node <st-node02> -home-port 5a -status-admin up


network interface create -vserver Infra-SVM -lif fcp-lif-02b -role data -data-protocol fcp -
home-node <st-node02> -home-port 5b   -status-admin up


network interface show
```

Create NFS LIFs

To create NFS LIFs, run the following commands:

```
network interface create -vserver Infra-SVM -lif nfs-lif-01 -role data -data-protocol nfs -
home-node <st-node01> -home-port a0a-<infra-nfs-vlan-id> –address <node01-nfs-lif-01-ip> -
```

```
netmask <node01-nfs-lif-01-mask> -status-admin up –failover-policy broadcast-domain-wide –
firewall-policy data –auto-revert true


network interface create -vserver Infra-SVM -lif nfs-lif-02 -role data -data-protocol nfs -
home-node <st-node02> -home-port a0a-<infra-nfs-vlan-id> –address <node02-nfs-lif-02-ip> -
netmask <node02-nfs-lif-02-mask>> -status-admin up –failover-policy broadcast-domain-wide –
firewall-policy data –auto-revert true


network interface show
```

Configure FC-NVMe Datastore for vSphere 7U2

To Configure FC-NVMe Datastores for vSphere 7U2 enable the FC-NVMe protocol on an existing SVM or create a separate SVM for FC-NVMe workloads.

To configure FC-NVMe datastore on existing SVM (Infra-SVM) follow these steps:

1. Verify that you have NVMe Capable adapters installed in your cluster.

```
network fcp adapter show -data-protocols-supported fc-nvme
```

2. Add the NVMe protocol to the SVM and list it.

```
vserver add-protocols -vserver Infra-SVM  -protocols nvme
vserver show -vserver Infra-SVM -fields allowed-protocols
aa16-a400::> vserver show -vserver Infra-SVM -fields allowed-protocols
vserver   allowed-protocols
--------- -----------------------
Infra-SVM nfs,fcp,iscsi,ndmp,nvme
```

3. Create NVMe service.

```
vserver nvme create -vserver Infra-SVM
vserver nvme show -vserver Infra-SVM
aa16-a400::> vserver nvme show -vserver Infra-SVM

         Vserver Name: Infra-SVM
Administrative Status: up
```

4. Create NVMe FC LIFs.

```
network interface create -vserver <SVM_name> -lif <lif_name> -role data -data-protocol fc-
nvme -home-node <home_node> -home-port <home_portnetwork>


network interface create -vserver Infra-SVM -lif fc-nvme-lif-01a -role data -data-protocol
fc-nvme -home-node <st-node01> -home-port 5a –status-admin up
```

```
network interface create -vserver Infra-SVM -lif fc-nvme-lif-01b -role data -data-protocol
fc-nvme -home-node <st-node01> -home-port 5b –status-admin up
```

```
network interface create -vserver Infra-SVM -lif fcp-nvme-lif-02a -role data -data-protocol
fc-nvme -home-node <st-node02> -home-port 5a –status-admin up
```

```
network interface create -vserver Infra-SVM -lif fcp-nvme-lif-02b -role data -data-protocol
fc-nvme -home-node <st-node02> -home-port 5b –status-admin up
```

```
network interface show
```

You can only configure two NVMe LIFs per node on a maximum of four nodes.

```
net int show -vserver <vserver name> -data-protocol fc-nvme
aa16-a400::> net int show -vserver Infra-SVM -data-protocol fc-nvme
  (network interface show)
            Logical    Status     Network            Current       Current Is
Vserver     Interface  Admin/Oper Address/Mask       Node          Port    Home
----------- ---------- ---------- ------------------ ------------- ------- ----
Infra-SVM
            fc-nvme-lif-01a
                         up/up    20:0f:d0:39:ea:17:12:9b
                                                     aa16-a400-01  5a      true
            fc-nvme-lif-01b
                         up/up    20:10:d0:39:ea:17:12:9b
                                                     aa16-a400-01  5b      true
            fcp-nvme-lif-02a
                         up/up    20:11:d0:39:ea:17:12:9b
                                                     aa16-a400-02  5a      true
            fcp-nvme-lif-02b
                         up/up    20:12:d0:39:ea:17:12:9b
                                                     aa16-a400-02  5b      true
4 entries were displayed.
```

5. Create Volume

```
Volume create -vserver SVM-name -volume vol_name -aggregate aggregate_name -size volume_size
-space-guarantee none -percent-snapshot-space 0
aa16-a400::> vol create -vserver Infra-SVM -volume NVMe_datastore_01 -aggregate
aa16_a400_01_NVME_SSD_1 -size 100G -state online -space-guarantee none -percent-snapshot-
space 0
[Job 162] Job succeeded: Successful
```

Add Infrastructure SVM Administrator

To add the infrastructure SVM administrator and SVM administration LIF in the in-band management network, follow these steps:

1. Run the following commands:

```
network interface create –vserver Infra-SVM –lif svm-mgmt –role data –data-protocol none –
home-node <st-node02> -home-port  a0a-<ib-mgmt-vlan-id> –address <svm-mgmt-ip> -netmask <svm-
mgmt-mask> -status-admin up –failover-policy broadcast-domain-wide –firewall-policy mgmt –
auto-revert true
```

2. Create a default route that enables the SVM management interface to reach the outside world.

```
network route create –vserver Infra-SVM -destination 0.0.0.0/0 –gateway <svm-mgmt-gateway>


network route show
```

3. Set a password for the SVM vsadmin user and unlock the user.

```
security login password –username vsadmin –vserver Infra-SVM
Enter a new password:  <password>
Enter it again:  <password>

security login unlock –username vsadmin –vserver Infra-SVM
```

A cluster serves data through at least one and possibly several SVMs. These steps have created a single data SVM. If you would like to configure your environment with multiple SVMs, this is a good time to create them.

Configure AutoSupport

NetApp AutoSupport® sends support summary information to NetApp through HTTPS. To configure AutoSupport, run the following command:

```
system node autosupport modify -node * -state enable –mail-hosts <mailhost> -transport https
-support enable -noteto <storage-admin-email>
```

Cisco Intersight-based Cisco UCS Infrastructure Upgrade

Cisco Intersight can be used to upgrade Cisco UCS Managed Infrastructure. This procedure demonstrates an Intersight-based upgrade of a Cisco UCS Infrastructure (Cisco UCS Manager, fabric interconnects, and IOM modules) from software release 4.2(1f) to 4.2(1i).

If you do not already have a Cisco Intersight account, to claim your Cisco UCS into a new account on Cisco Intersight, connect to https://intersight.com. If you have an existing Intersight account, connect to https://intersight.com and sign in with your Cisco ID, select the appropriate account, and skip to step 6.

To upgrade Cisco UCS infrastructure using Cisco Intersight, follow these steps:

1. Click Create an account.

2. Sign-in with your Cisco ID.

3. Read, scroll through and accept the End User License Agreement and click Next.

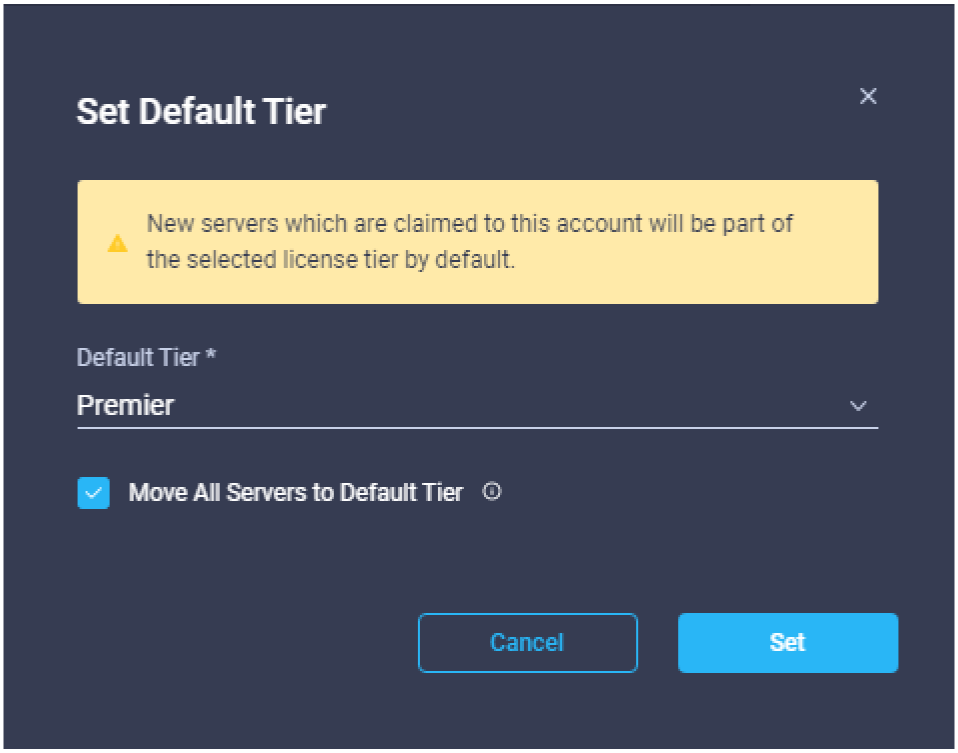
4. Enter an Account Name and click Create.

5. Choose ADMIN > Targets. Click Claim Target. Select Cisco UCS Domain (UCSM Managed) and click Start. Fill in the Device ID and Claim Code and click Claim. The Device ID and Claim Code can be obtained by connecting to Cisco UCS Manager and selecting Admin > All > Device Connector. The Device ID and Claim Code are on the right.

6. To claim your Cisco UCS system into an existing Intersight account, log into the account at https://Intersight.com. Choose Administration > Devices. Click Claim a New Device. Under Direct Claim, fill in the Device ID and Claim Code and click Claim. The Device ID and Claim Code can be obtained by connecting to Cisco UCS Manager and selecting Admin > All > Device Connector. The Device ID and Claim Code are on the right.

7. From the Cisco Intersight window, click ⚙ and then click Licensing. If this is a new account, all servers connected to the UCS Domain will appear under the Base license Tier. If you have purchased Cisco Intersight licenses and have them in your Cisco Smart Account, click Register and follow the prompts to register this Cisco Intersight account to your Cisco Smart Account. Cisco Intersight also offers a one-time 90-day trial of Premier licensing for new accounts. Click Start Trial and then Start to begin this evaluation. The remainder of this section will assume Premier licensing.

8. From the Licensing Window, click Set Default Tier. From the drop-down list choose Premier for Tier and click Set.



Set Default Tier

New servers which are claimed to this account will be part of the selected license tier by default.

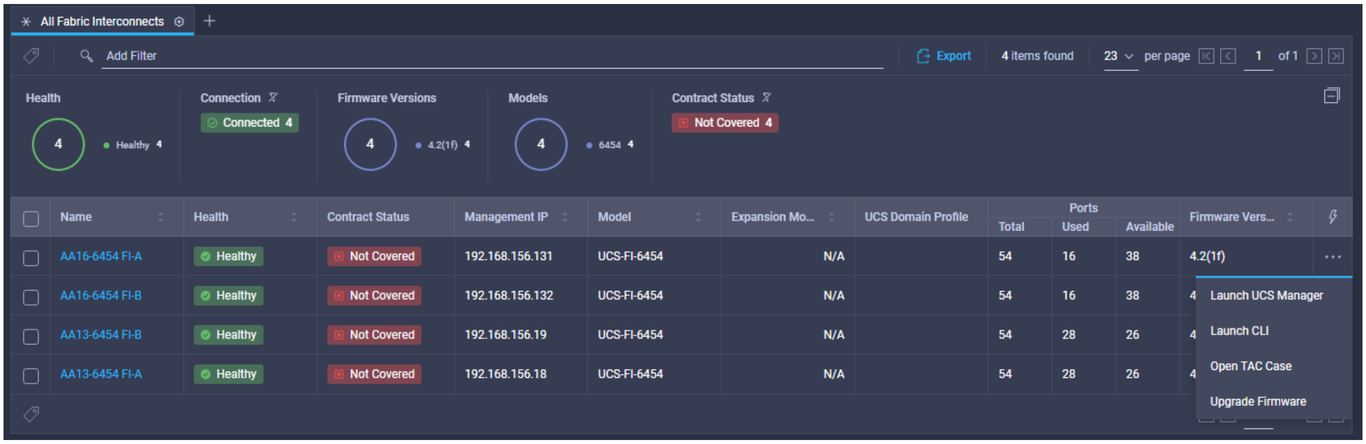
Default Tier *

Premier

☑ Move All Servers to Default Tier

9. Click Refresh to refresh the Intersight window with Premier, Advantage, and Essentials features added.

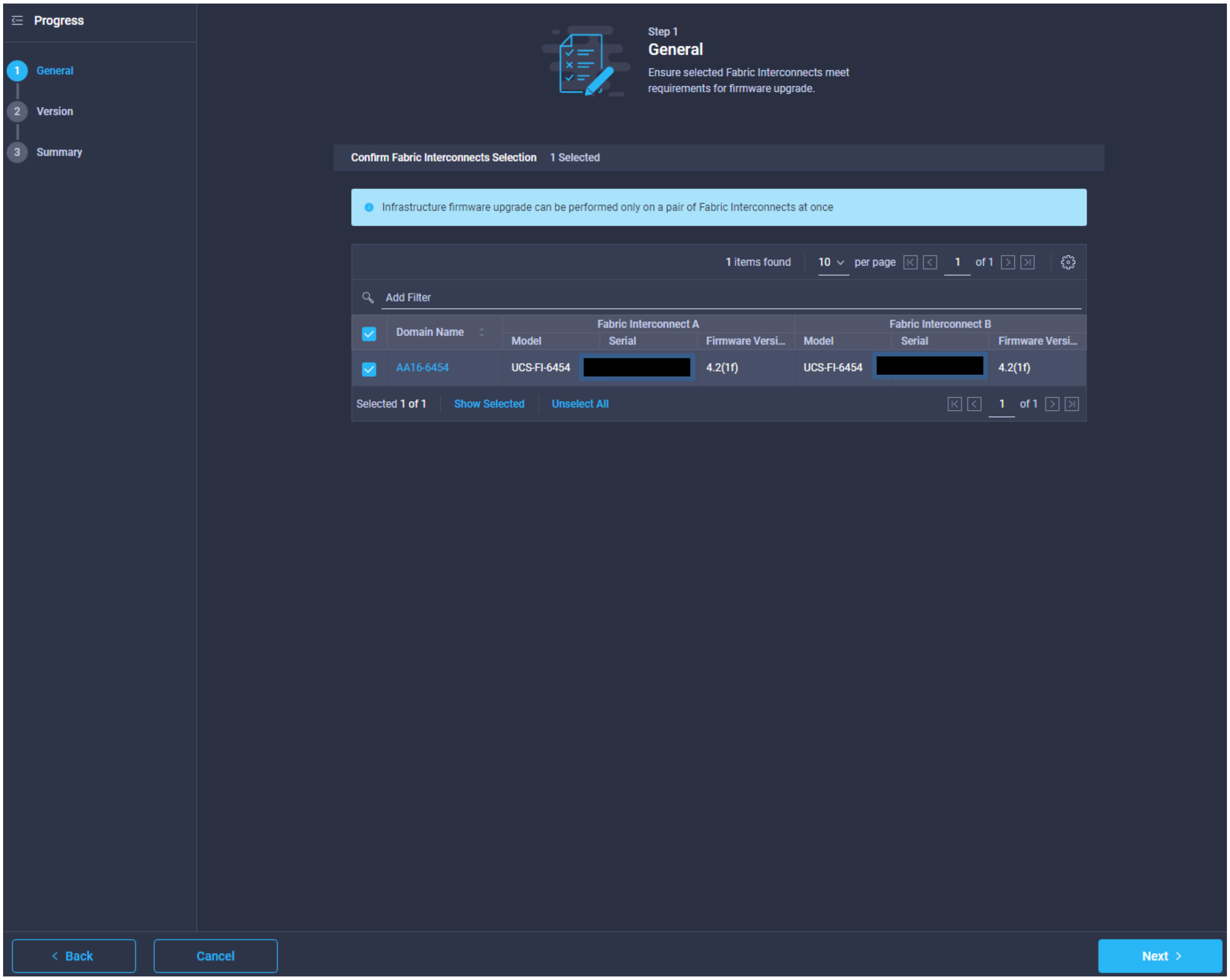
10. To start the upgrade, select OPERATE > Fabric Interconnects. To the right of one of the fabric interconnects that you want to upgrade, click ... and select Upgrade Firmware.



□	Name	Health	Contract Status	Management IP	Model	Expansion Mo...	UCS Domain Profile	Ports			Firmware Vers...
								Total	Used	Available	
□	AA16-6454 FI-A	Healthy	Not Covered	192.168.156.131	UCS-FI-6454	N/A		54	16	38	4.2(1f)
□	AA16-6454 FI-B	Healthy	Not Covered	192.168.156.132	UCS-FI-6454	N/A		54	16	38	4
□	AA13-6454 FI-B	Healthy	Not Covered	192.168.156.19	UCS-FI-6454	N/A		54	28	26	4
□	AA13-6454 FI-A	Healthy	Not Covered	192.168.156.18	UCS-FI-6454	N/A		54	28	26	4

11. Click Start.

12. Ensure the UCS Domain you want to upgrade is shown and selected and click Next.



Step 1

General

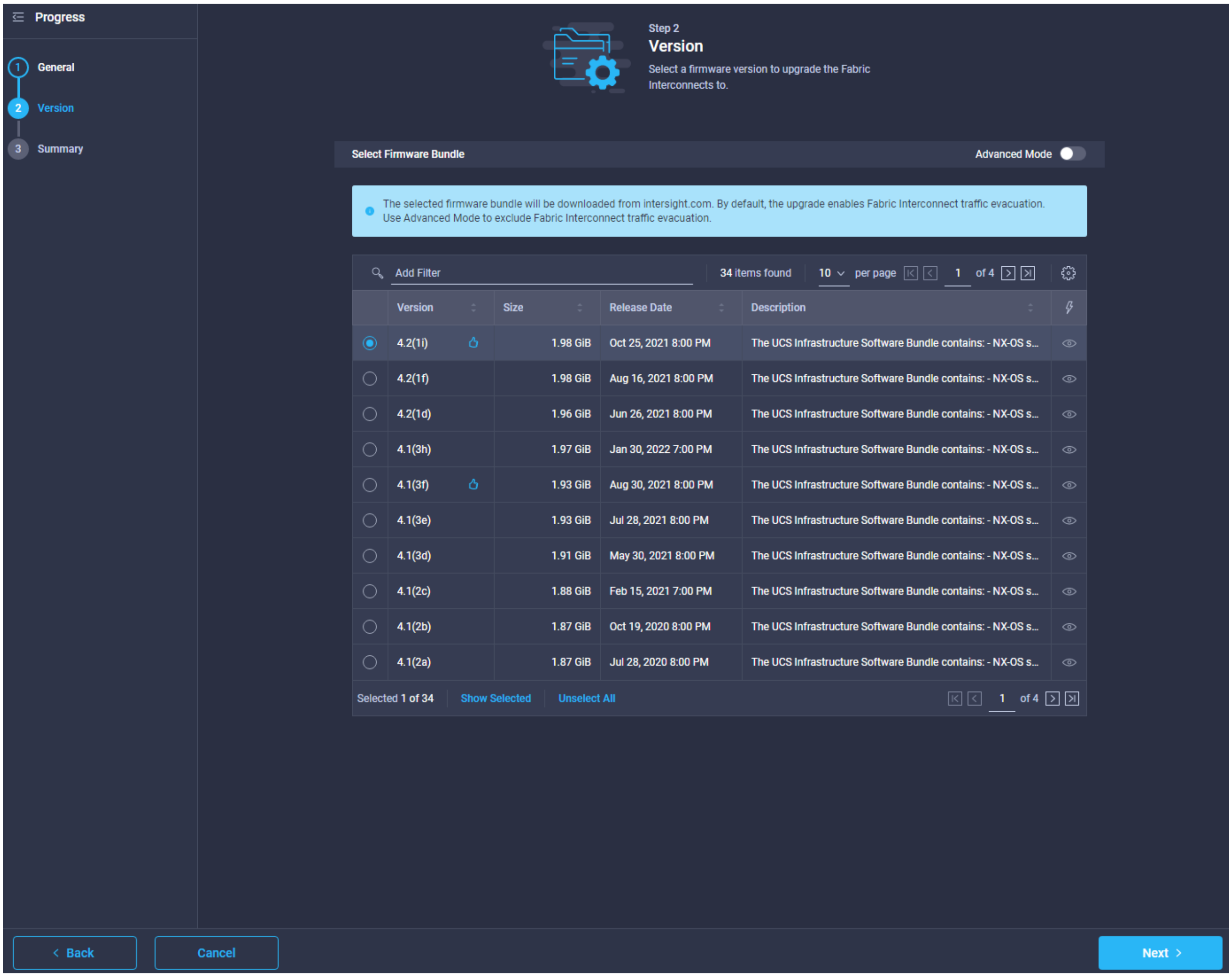
Ensure selected Fabric Interconnects meet requirements for firmware upgrade.

Confirm Fabric Interconnects Selection 1 Selected

Infrastructure firmware upgrade can be performed only on a pair of Fabric Interconnects at once

☑	Domain Name	Fabric Interconnect A			Fabric Interconnect B		
		Model	Serial	Firmware Versi...	Model	Serial	Firmware Versi...
☑	AA16-6454	UCS-FI-6454	[redacted]	4.2(1f)	UCS-FI-6454	[redacted]	4.2(1f)

13. Choose Version 4.2(1i) and click Next.



Step 2

Version

Select a firmware version to upgrade the Fabric Interconnects to.

Select Firmware Bundle   Advanced Mode

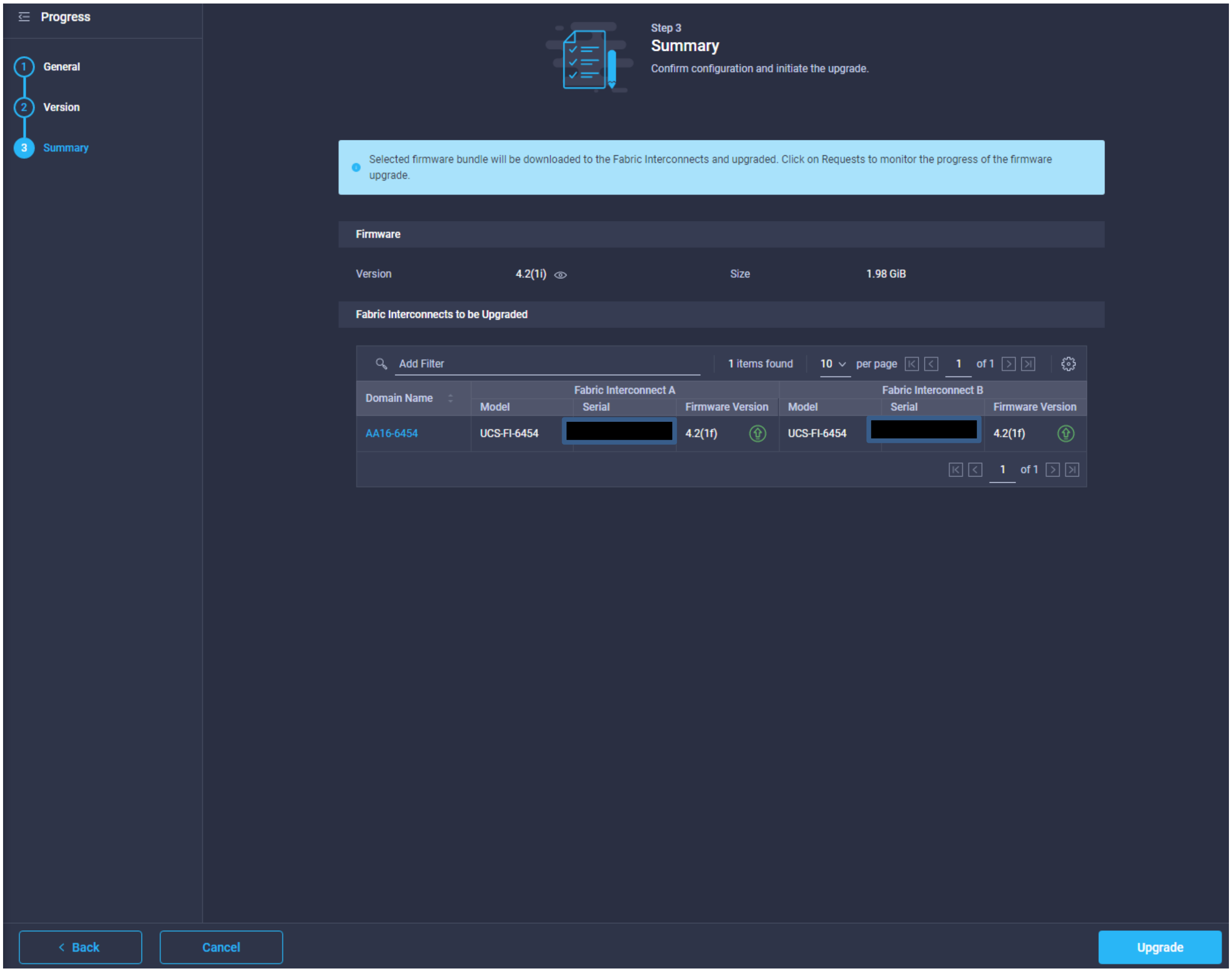
The selected firmware bundle will be downloaded from intersight.com. By default, the upgrade enables Fabric Interconnect traffic evacuation. Use Advanced Mode to exclude Fabric Interconnect traffic evacuation.

Add Filter   34 items found   10 per page   1 of 4

	Version	Size	Release Date	Description
●	4.2(1i)	1.98 GiB	Oct 25, 2021 8:00 PM	The UCS Infrastructure Software Bundle contains: - NX-OS s...
○	4.2(1f)	1.98 GiB	Aug 16, 2021 8:00 PM	The UCS Infrastructure Software Bundle contains: - NX-OS s...
○	4.2(1d)	1.96 GiB	Jun 26, 2021 8:00 PM	The UCS Infrastructure Software Bundle contains: - NX-OS s...
○	4.1(3h)	1.97 GiB	Jan 30, 2022 7:00 PM	The UCS Infrastructure Software Bundle contains: - NX-OS s...
○	4.1(3f)	1.93 GiB	Aug 30, 2021 8:00 PM	The UCS Infrastructure Software Bundle contains: - NX-OS s...
○	4.1(3e)	1.93 GiB	Jul 28, 2021 8:00 PM	The UCS Infrastructure Software Bundle contains: - NX-OS s...
○	4.1(3d)	1.91 GiB	May 30, 2021 8:00 PM	The UCS Infrastructure Software Bundle contains: - NX-OS s...
○	4.1(2c)	1.88 GiB	Feb 15, 2021 7:00 PM	The UCS Infrastructure Software Bundle contains: - NX-OS s...
○	4.1(2b)	1.87 GiB	Oct 19, 2020 8:00 PM	The UCS Infrastructure Software Bundle contains: - NX-OS s...
○	4.1(2a)	1.87 GiB	Jul 28, 2020 8:00 PM	The UCS Infrastructure Software Bundle contains: - NX-OS s...

Selected 1 of 34   Show Selected   Unselect All   1 of 4

14. Click Upgrade then click Upgrade again to bring up the window allowing you to log in to retrieve software.



Step 3

Summary

Confirm configuration and initiate the upgrade.

Selected firmware bundle will be downloaded to the Fabric Interconnects and upgraded. Click on Requests to monitor the progress of the firmware upgrade.

Firmware

Version 4.2(1i)

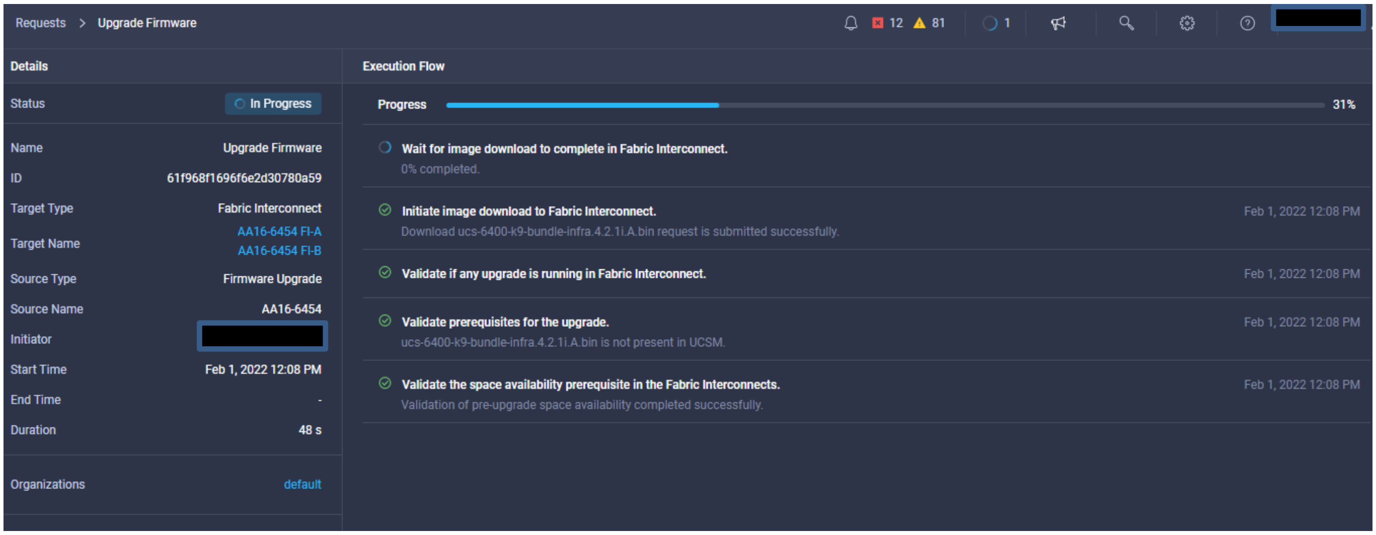
Size 1.98 GiB

Fabric Interconnects to be Upgraded

Domain Name	Fabric Interconnect A			Fabric Interconnect B		
	Model	Serial	Firmware Version	Model	Serial	Firmware Version
AA16-6454	UCS-FI-6454	[redacted]	4.2(1f)	UCS-FI-6454	[redacted]	4.2(1f)

It may be necessary to click Upgrade again to bring up the window allowing you to log in to retrieve software. Login with Cisco ID and password and click Submit.

15. Click Requests, then click the Upgrade Firmware request.



Details

Status	In Progress
Name	Upgrade Firmware
ID	61f968f1696f6e2d30780a59
Target Type	Fabric Interconnect
Target Name	AA16-6454 FI-A AA16-6454 FI-B
Source Type	Firmware Upgrade
Source Name	AA16-6454
Initiator	[redacted]
Start Time	Feb 1, 2022 12:08 PM
End Time	-
Duration	48 s
Organizations	default

Execution Flow

Progress 31%

Wait for image download to complete in Fabric Interconnect.
0% completed.

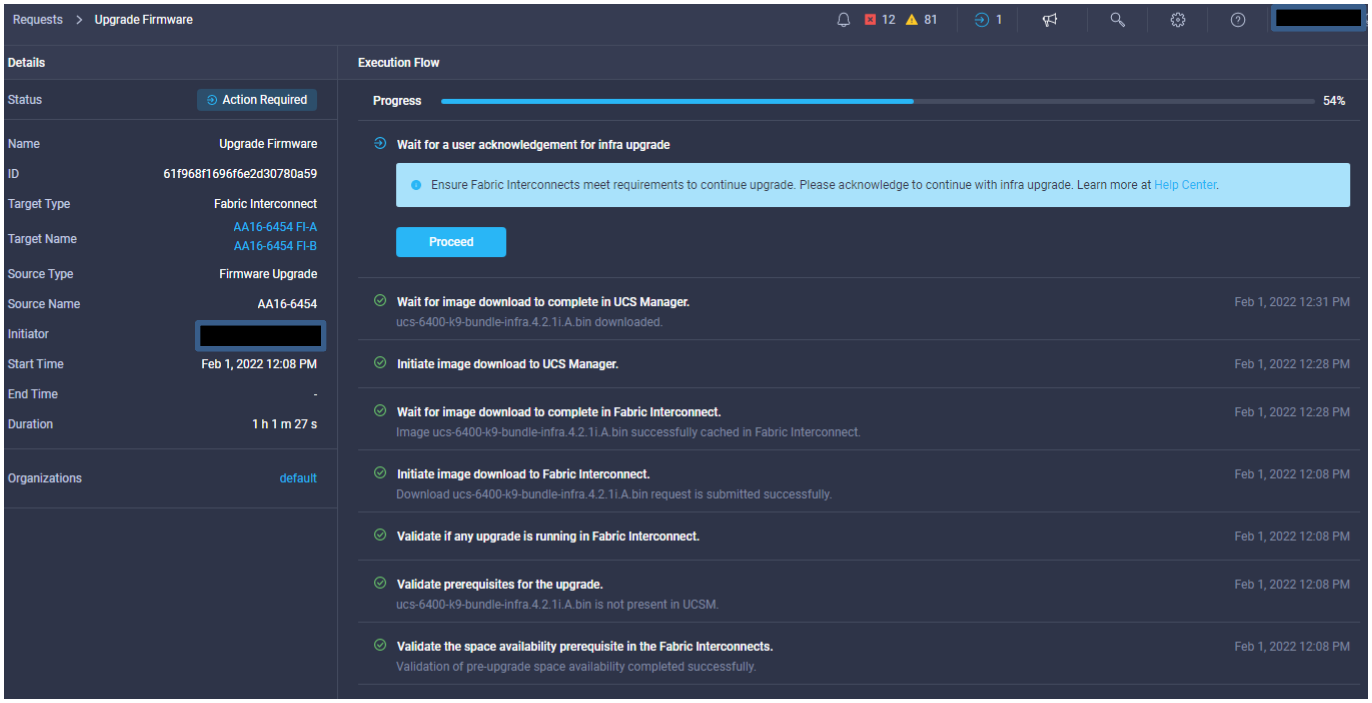
Initiate image download to Fabric Interconnect. Feb 1, 2022 12:08 PM
Download ucs-6400-k9-bundle-infra.4.2.1i.A.bin request is submitted successfully.

Validate if any upgrade is running in Fabric Interconnect. Feb 1, 2022 12:08 PM

Validate prerequisites for the upgrade. Feb 1, 2022 12:08 PM
ucs-6400-k9-bundle-infra.4.2.1i.A.bin is not present in UCSM.

Validate the space availability prerequisite in the Fabric Interconnects. Feb 1, 2022 12:08 PM
Validation of pre-upgrade space availability completed successfully.

16. While the Cisco UCS Manager and the subordinate fabric interconnect are in the process of upgrading, click Proceed and then click Proceed again to continue the upgrade. This process will be required two times.



Details

Status	Action Required
Name	Upgrade Firmware
ID	61f968f1696f6e2d30780a59
Target Type	Fabric Interconnect
Target Name	AA16-6454 FI-A AA16-6454 FI-B
Source Type	Firmware Upgrade
Source Name	AA16-6454
Initiator	[redacted]
Start Time	Feb 1, 2022 12:08 PM
End Time	-
Duration	1 h 1 m 27 s
Organizations	default

Execution Flow

Progress 54%

Wait for a user acknowledgement for infra upgrade

Ensure Fabric Interconnects meet requirements to continue upgrade. Please acknowledge to continue with infra upgrade. Learn more at Help Center.

Proceed

Wait for image download to complete in UCS Manager. Feb 1, 2022 12:31 PM
ucs-6400-k9-bundle-infra.4.2.1i.A.bin downloaded.

Initiate image download to UCS Manager. Feb 1, 2022 12:28 PM

Wait for image download to complete in Fabric Interconnect. Feb 1, 2022 12:28 PM
Image ucs-6400-k9-bundle-infra.4.2.1i.A.bin successfully cached in Fabric Interconnect.

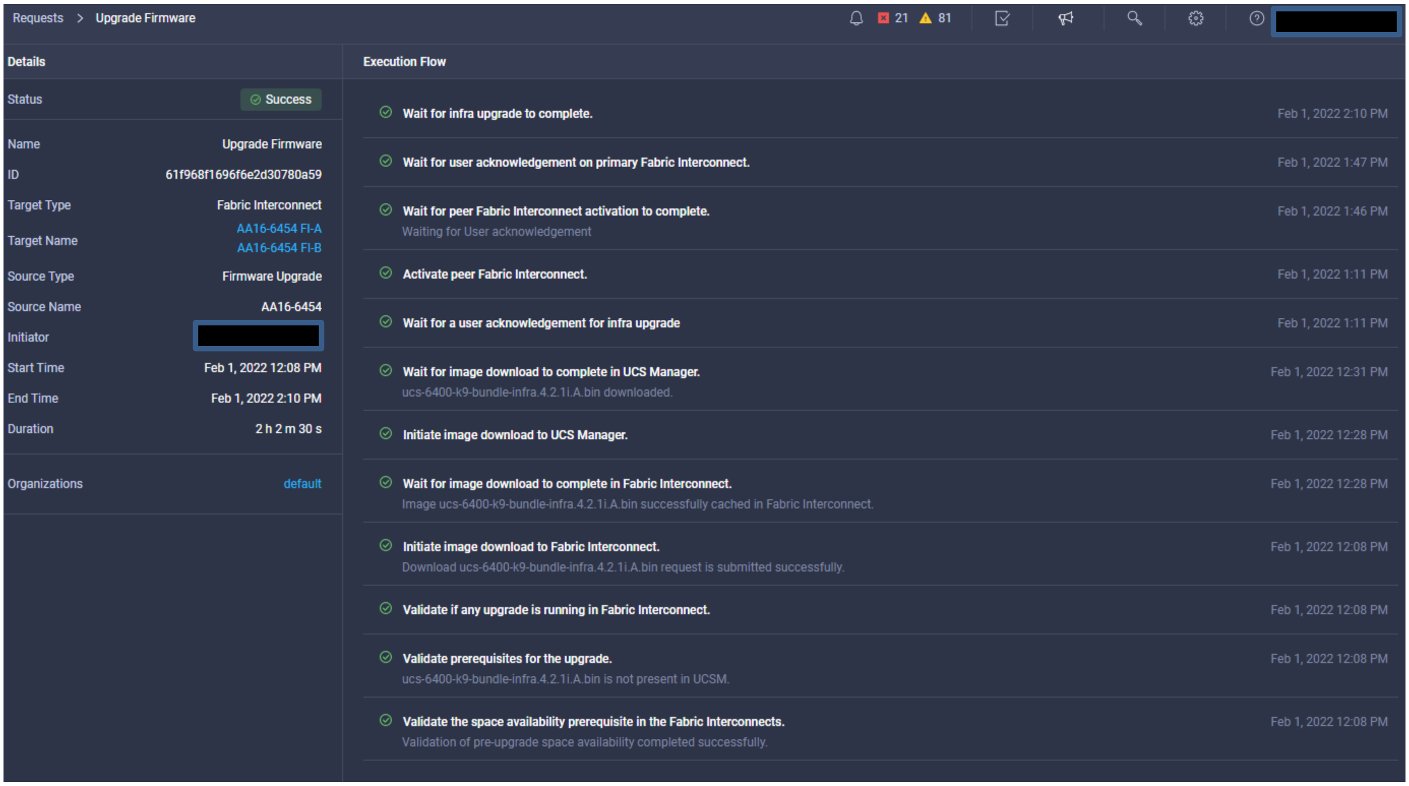
Initiate image download to Fabric Interconnect. Feb 1, 2022 12:08 PM
Download ucs-6400-k9-bundle-infra.4.2.1i.A.bin request is submitted successfully.

Validate if any upgrade is running in Fabric Interconnect. Feb 1, 2022 12:08 PM

Validate prerequisites for the upgrade. Feb 1, 2022 12:08 PM
ucs-6400-k9-bundle-infra.4.2.1i.A.bin is not present in UCSM.

Validate the space availability prerequisite in the Fabric Interconnects. Feb 1, 2022 12:08 PM
Validation of pre-upgrade space availability completed successfully.

17. When the upgrade completes, the Status will show Success. You will need to copy the B-Series and C-Series update bundles to the fabric interconnects. If this upgrade is from before UCS 4.1(1), M6 servers can now be inserted in the chassis or attached to the FIs. Other servers will be upgraded by the Host Firmware Package setting.



Details

Status	Success
Name	Upgrade Firmware
ID	61f968f1696f6e2d30780a59
Target Type	Fabric Interconnect
Target Name	AA16-6454 FI-A AA16-6454 FI-B
Source Type	Firmware Upgrade
Source Name	AA16-6454
Initiator	[redacted]
Start Time	Feb 1, 2022 12:08 PM
End Time	Feb 1, 2022 2:10 PM
Duration	2 h 2 m 30 s
Organizations	default

Execution Flow

Wait for infra upgrade to complete.	Feb 1, 2022 2:10 PM
Wait for user acknowledgement on primary Fabric Interconnect.	Feb 1, 2022 1:47 PM
Wait for peer Fabric Interconnect activation to complete. Waiting for User acknowledgement	Feb 1, 2022 1:46 PM
Activate peer Fabric Interconnect.	Feb 1, 2022 1:11 PM
Wait for a user acknowledgement for infra upgrade	Feb 1, 2022 1:11 PM
Wait for image download to complete in UCS Manager. ucs-6400-k9-bundle-infra.4.2.1i.A.bin downloaded.	Feb 1, 2022 12:31 PM
Initiate image download to UCS Manager.	Feb 1, 2022 12:28 PM
Wait for image download to complete in Fabric Interconnect. Image ucs-6400-k9-bundle-infra.4.2.1i.A.bin successfully cached in Fabric Interconnect.	Feb 1, 2022 12:28 PM
Initiate image download to Fabric Interconnect. Download ucs-6400-k9-bundle-infra.4.2.1i.A.bin request is submitted successfully.	Feb 1, 2022 12:08 PM
Validate if any upgrade is running in Fabric Interconnect.	Feb 1, 2022 12:08 PM
Validate prerequisites for the upgrade. ucs-6400-k9-bundle-infra.4.2.1i.A.bin is not present in UCSM.	Feb 1, 2022 12:08 PM
Validate the space availability prerequisite in the Fabric Interconnects. Validation of pre-upgrade space availability completed successfully.	Feb 1, 2022 12:08 PM

Cisco UCS Base Configuration

This FlexPod deployment explains the configuration steps for the Cisco UCS 6454 Fabric Interconnects (FI) in a design that will support FC SAN boot. The same base configuration should be done whether you are performing an automated or manual configuration.

If setting up a system with iSCSI boot, the sections with (FCP) in the heading can be skipped and then complete the Cisco UCS iSCSI Configuration section in the Appendix.

Perform Initial Setup of Cisco UCS 6454 Fabric Interconnects for FlexPod Environments

This section provides the detailed procedures for configuring the Cisco Unified Computing System (Cisco UCS) for use in a FlexPod environment. The steps are necessary to provision the Cisco UCS B-Series and C-Series servers and should be followed precisely to avoid improper configuration.

Cisco UCS Fabric Interconnect A

To configure the Cisco UCS for use in a FlexPod environment in ucsm managed mode, follow these steps:

1. Connect to the console port on the first Cisco UCS fabric interconnect.

```
Enter the configuration method. (console/gui) ? console
```

```
  Enter the management mode. (ucsm/intersight)? ucsm

  Enter the setup mode; setup newly or restore from backup. (setup/restore) ? setup

  You have chosen to setup a new Fabric interconnect in “ucsm” managed mode. Continue? (y/n):
y

  Enforce strong password? (y/n) [y]: Enter

  Enter the password for "admin": <password>
  Confirm the password for "admin": <password>

  Is this Fabric interconnect part of a cluster(select 'no' for standalone)? (yes/no) [n]: y

  Enter the switch fabric (A/B) []: A

  Enter the system name:  <ucs-cluster-name>

  Physical Switch Mgmt0 IP address : <ucsa-mgmt-ip>

  Physical Switch Mgmt0 IPv4 netmask : <ucsa-mgmt-mask>

  IPv4 address of the default gateway : <ucsa-mgmt-gateway>

  Cluster IPv4 address : <ucs-cluster-ip>

  Configure the DNS Server IP address? (yes/no) [n]: y

    DNS IP address : <dns-server-1-ip>

  Configure the default domain name? (yes/no) [n]: y

    Default domain name : <ad-dns-domain-name>

  Join centralized management environment (UCS Central)? (yes/no) [n]: Enter

  Apply and save the configuration (select 'no' if you want to re-enter)? (yes/no): yes
```

2. Wait for the login prompt for UCS Fabric Interconnect A before proceeding to the next section.

Cisco UCS Fabric Interconnect B

To configure the Cisco UCS for use in a FlexPod environment, follow these steps:

1. Connect to the console port on the second Cisco UCS fabric interconnect.

```
  Enter the configuration method. (console/gui) ? console


  Installer has detected the presence of a peer Fabric interconnect. This Fabric interconnect will be added to the cluster. Continue (y/n) ? y


  Enter the admin password of the peer Fabric interconnect: <password>
    Connecting to peer Fabric interconnect... done
    Retrieving config from peer Fabric interconnect... done
    Peer Fabric interconnect Mgmt0 IPv4 Address: <ucsa-mgmt-ip>
    Peer Fabric interconnect Mgmt0 IPv4 Netmask: <ucsa-mgmt-mask>
    Cluster IPv4 address          : <ucs-cluster-ip>


    Peer FI is IPv4 Cluster enabled. Please Provide Local Fabric Interconnect Mgmt0 IPv4 Address


  Physical Switch Mgmt0 IP address : <ucsb-mgmt-ip>

  Local fabric interconnect model(UCS-FI-6454)
  Peer fabric interconnect is compatible with the local fabric interconnect. Continuing with the installer...


  Apply and save the configuration (select 'no' if you want to re-enter)? (yes/no): yes
```

2. Wait for the login prompt for UCS Fabric Interconnect B before proceeding to the next section.

Cisco UCS Setup

Log into Cisco UCS Manager

To log into the Cisco Unified Computing System (Cisco UCS) environment, follow these steps:

1. Open a web browser and navigate to the Cisco UCS fabric interconnect cluster address.

You may need to wait at least 5 minutes after configuring the second fabric interconnect for Cisco UCS Manager to open.

2. Click the Launch UCS Manager link to launch Cisco UCS Manager.

3. If prompted to accept security certificates, accept as necessary.

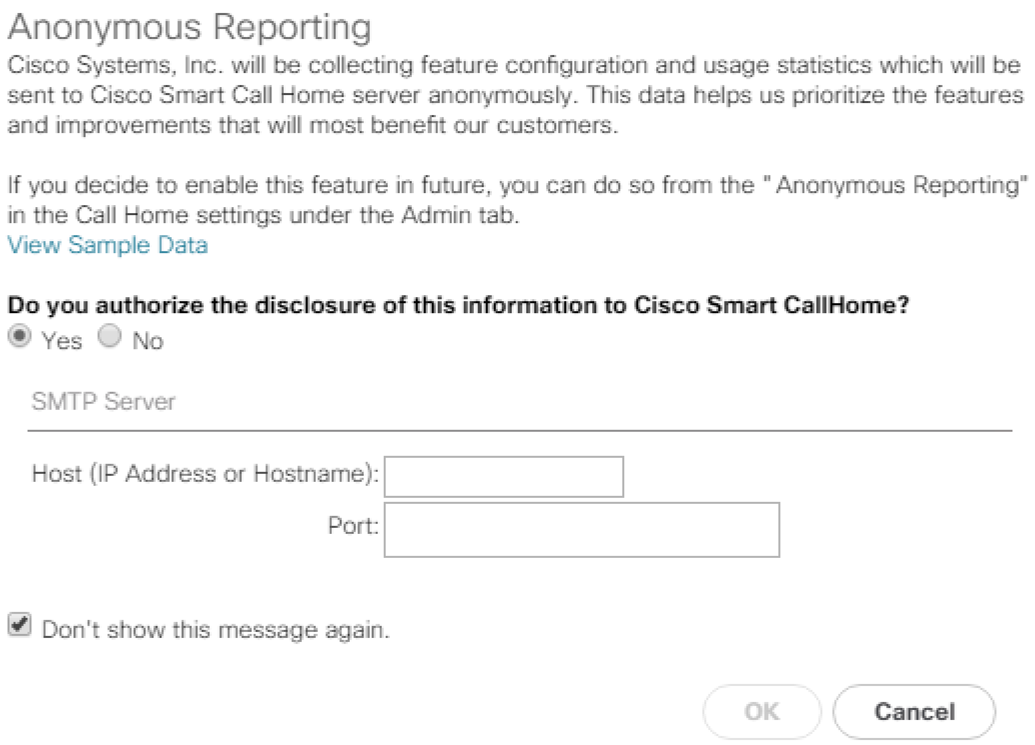
4. When prompted, enter admin as the user name and enter the administrative password.

5. Click Login to log into Cisco UCS Manager.

Anonymous Reporting

To enable anonymous reporting, follow this step:

1. In the Anonymous Reporting window, choose whether to send anonymous data to Cisco for improving future products. If you choose Yes, enter the IP address of your SMTP Server. Click OK.



Anonymous Reporting

Cisco Systems, Inc. will be collecting feature configuration and usage statistics which will be sent to Cisco Smart Call Home server anonymously. This data helps us prioritize the features and improvements that will most benefit our customers.

If you decide to enable this feature in future, you can do so from the " Anonymous Reporting" in the Call Home settings under the Admin tab.

View Sample Data

Do you authorize the disclosure of this information to Cisco Smart CallHome?

● Yes ○ No

SMTP Server

Host (IP Address or Hostname):

Port:

☑ Don't show this message again.

Upgrade Cisco UCS Manager Software to Version 4.2(1f)

This document assumes the use of Cisco UCS 4.2(1f). If you have not already upgraded, to upgrade the Cisco UCS Manager software and the Cisco UCS Fabric Interconnect software to version 4.2(1f), refer to Cisco UCS Manager Install and Upgrade Guides.

If you used Cisco Intersight to upgrade to 4.2(1f), the Cisco UCS B and C-Series 4.2(1f) bundles need to be manually downloaded to the Cisco UCS system.

Configure Cisco UCS Call Home

It is highly recommended by Cisco to configure Call Home in Cisco UCS Manager. Configuring Call Home will accelerate the resolution of support cases. To configure Call Home, follow these steps:

1. In Cisco UCS Manager, click Admin.

2. Choose All > Communication Management > Call Home.

3. Change the State to On.

4. Fill in all the fields according to your Management preferences and click Save Changes and OK to complete configuring Call Home.

Configure Unified Ports (FCP)

If you are configuring Fibre Channel in your configuration, complete this section. Fibre Channel port configurations differ between the Cisco UCS 6454, 6332-16UP and the 6248UP fabric interconnects. All fabric interconnects have a slider mechanism within the Cisco UCS Manager GUI interface, but the fibre channel port selection options for the 6454 are from the first 16 ports starting from the first port and configured in increments of 4 ports from the left. For the 6332-16UP the port selection options are from the first 16 ports starting from the first port, and configured in increments of the first 6, 12, or all 16 of the unified ports. With the 6248UP, the port selection options will start from the right of the 32 fixed ports, or the right of the 16 ports of the expansion module, going down in contiguous increments of 2. The remainder of this section shows configuration of the 6454. Modify as necessary for the 6332-16UP or 6248UP.

To enable the fibre channel ports, follow these steps for the Cisco UCS 6454:

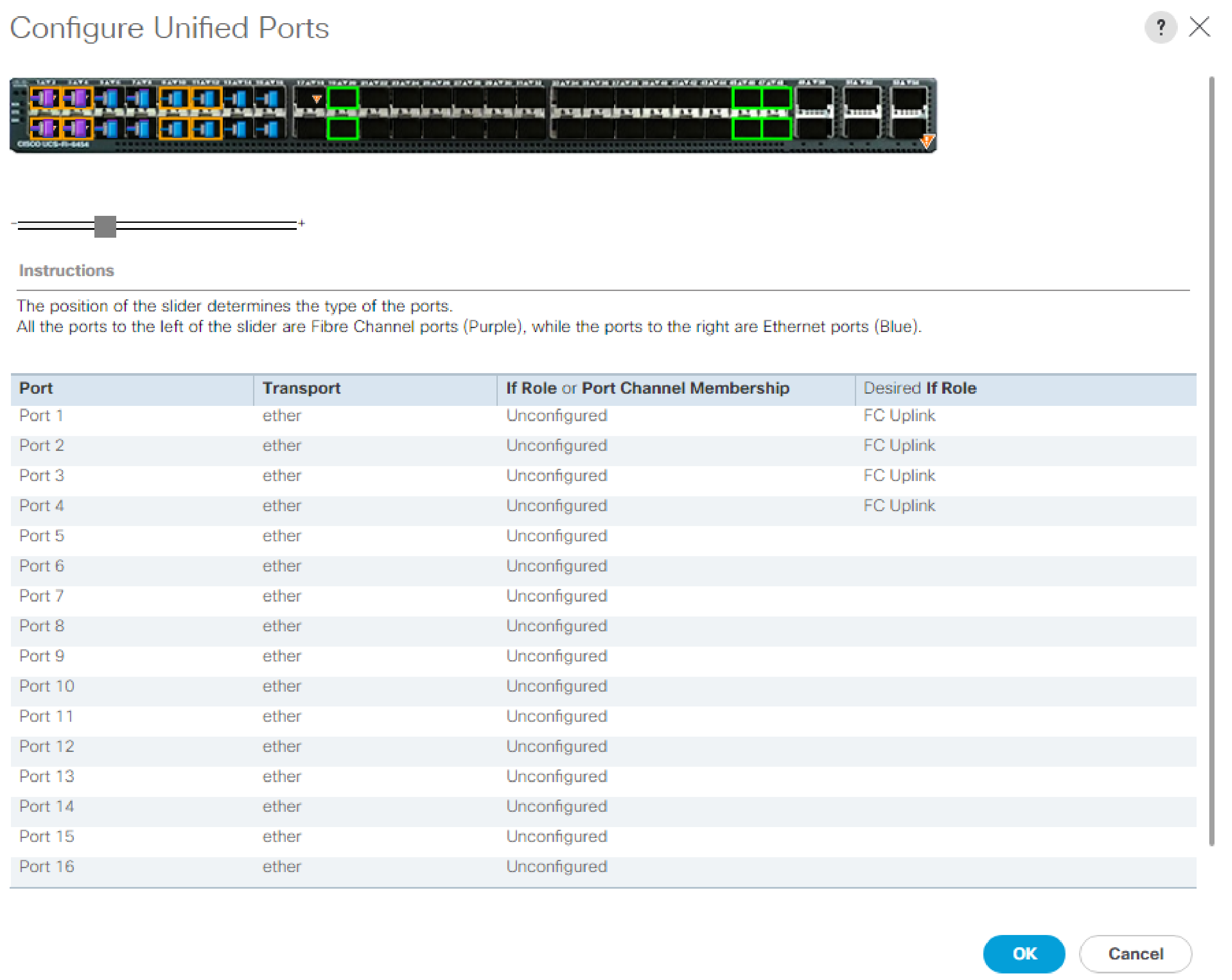
1. In Cisco UCS Manager, click Equipment.

2. Choose Equipment > Fabric Interconnects > Fabric Interconnect B (subordinate).

3. Choose Configure Unified Ports.

4. Click Yes on the pop-up window warning that changes to the fixed module will require a reboot of the fabric interconnect and changes to the expansion module will require a reboot of that module.

5. Within the Configured Fixed Ports pop-up window move the gray slider bar from the left to the right to choose either 4, 8, 12, or 16 ports to be set as FC Uplinks.



Configure Unified Ports

Instructions

The position of the slider determines the type of the ports.
All the ports to the left of the slider are Fibre Channel ports (Purple), while the ports to the right are Ethernet ports (Blue).

Port	Transport	If Role or Port Channel Membership	Desired If Role
Port 1	ether	Unconfigured	FC Uplink
Port 2	ether	Unconfigured	FC Uplink
Port 3	ether	Unconfigured	FC Uplink
Port 4	ether	Unconfigured	FC Uplink
Port 5	ether	Unconfigured	
Port 6	ether	Unconfigured	
Port 7	ether	Unconfigured	
Port 8	ether	Unconfigured	
Port 9	ether	Unconfigured	
Port 10	ether	Unconfigured	
Port 11	ether	Unconfigured	
Port 12	ether	Unconfigured	
Port 13	ether	Unconfigured	
Port 14	ether	Unconfigured	
Port 15	ether	Unconfigured	
Port 16	ether	Unconfigured	

6. Click OK, then click Yes, then click OK to continue.

7. Choose Equipment > Fabric Interconnects > Fabric Interconnect A (primary).

8. Choose Configure Unified Ports.

9. Click Yes on the pop-up window warning that changes to the fixed module will require a reboot of the fabric interconnect and changes to the expansion module will require a reboot of that module.

10. Within the Configured Fixed Ports pop-up window move the gray slider bar from the left to the right to choose either 4 or 8 ports to be set as FC Uplinks.

11. Click OK, then click Yes, then OK to continue.

12. Wait for both Fabric Interconnects to reboot.

13. Log back into Cisco UCS Manager.

Ansible Cisco UCS Configuration

To configure the Cisco UCS from the Ansible management workstation, follow these steps:

1. Edit the following variable files to ensure proper Nexus variables are entered:

   - FlexPod-M6/FlexPod-UCSM-M6/inventory
   - FlexPod-M6/FlexPod-UCSM-M6/group_vars/all.yml
   - FlexPod-M6/FlexPod-UCSM-M6/group_vars/ucs.yml
   - FlexPod-M6/FlexPod-UCSM-M6/roles/UCSequipment/defaults/main.yml
   - FlexPod-M6/FlexPod-UCSM-M6/roles/UCSadmin/defaults/main.yml
   - FlexPod-M6/FlexPod-UCSM-M6/roles/UCSlan/defaults/main.yml
   - FlexPod-M6/FlexPod-UCSM-M6/roles/UCSsan/defaults/main.yml
   - FlexPod-M6/FlexPod-UCSM-M6/roles/UCSserver/defaults/main.yml

It is critical when entering the variable files that either the FC and FC-NVMe NetApp LIF WWPNs or Infrastructure SVM iSCSI IQN be entered into the all.yml file so that UCS SAN boot and MDS device alias can be properly configured. LIF WWPNs can be queried by connecting to the NetApp cluster CLI interface and running “network interface show -vserver <Infrastructure_SVM-Name>”. If iSCSI SAN boot is being configured, the Infrastructure SVM’s iSCSI IQN can be queried by running “vserver iscsi show -vserver <Infrastructure_SVM-Name>”.

2. From FlexPod-M6/FlexPod-UCSM-M6, run the Setup_UCS.yml Ansible playbook.

```
ansible-playbook ./Setup_UCS.yml -i inventory
```

The cloning process used in section Create vMedia-Enabled Service Profile Template, can be used to create other Service Profile templates that can be modified to accommodate additional features such as Intel Datacenter Persistent Memory (DCPMem) in Memory or App-Direct Mode.

Create Service Profiles

To create service profiles from the service profile template within the FlexPod organization, follow these steps:

1. Connect to UCS Manager and click Servers.

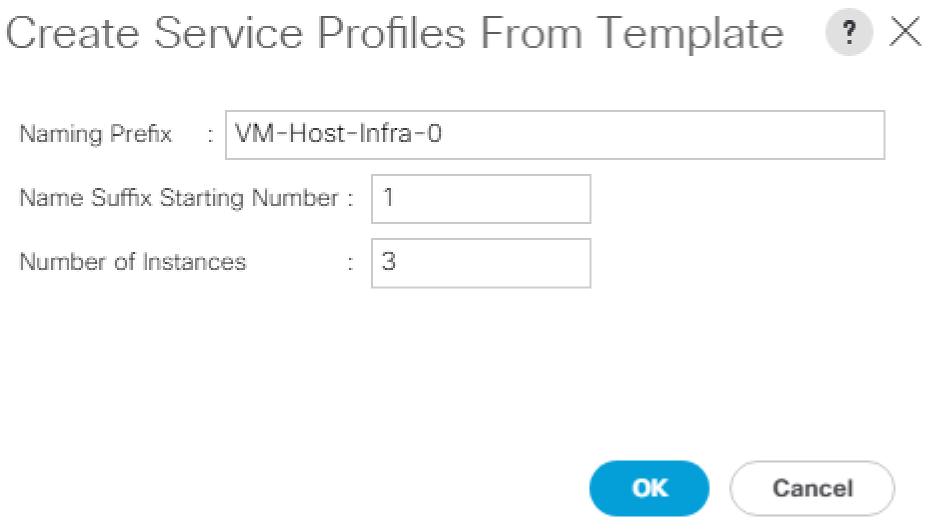
2. Expand Service Profile Templates > root > Sub-Organizations > FlexPod.

3. Right-click the appropriate vMedia-enabled template or the appropriate template and choose Create Service Profiles from Template.

4. Enter VM-Host-Infra-0 as the service profile prefix.

5. Enter `1` as “Name Suffix Starting Number.”

6. Enter `3` as the “Number of Instances.”



Create Service Profiles From Template

Naming Prefix : VM-Host-Infra-0

Name Suffix Starting Number : 1

Number of Instances : 3

7. Click OK to create the service profiles.

8. Click OK in the confirmation message.

9. When VMware ESXi 7.0U2 has been installed on the hosts, the host Service Profiles can be bound to the corresponding non-vMedia-enabled Service Profile Template to remove the vMedia Mapping from the host.

Cisco UCS Manual Configuration

Synchronize Cisco UCS to NTP

To synchronize the Cisco UCS environment to the NTP servers in the Cisco Nexus switches, follow these steps:

1. In Cisco UCS Manager, click Admin.

2. Expand All > Time Zone Management.

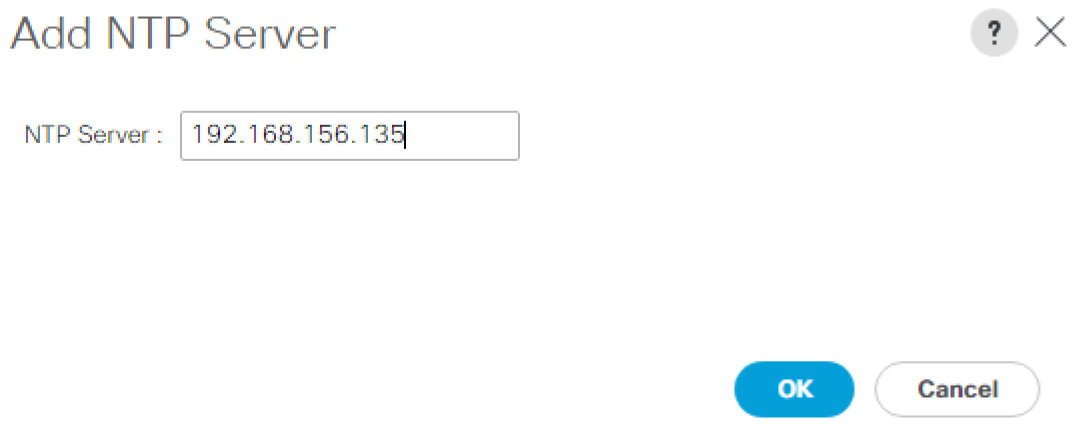
3. Choose Timezone.

4. In the Properties pane, choose the appropriate time zone in the Timezone menu.

5. Click Save Changes and then click OK.

6. Click Add NTP Server.

7. Enter <nexus-A-mgmt0-ip> and click OK. Click OK on the confirmation.



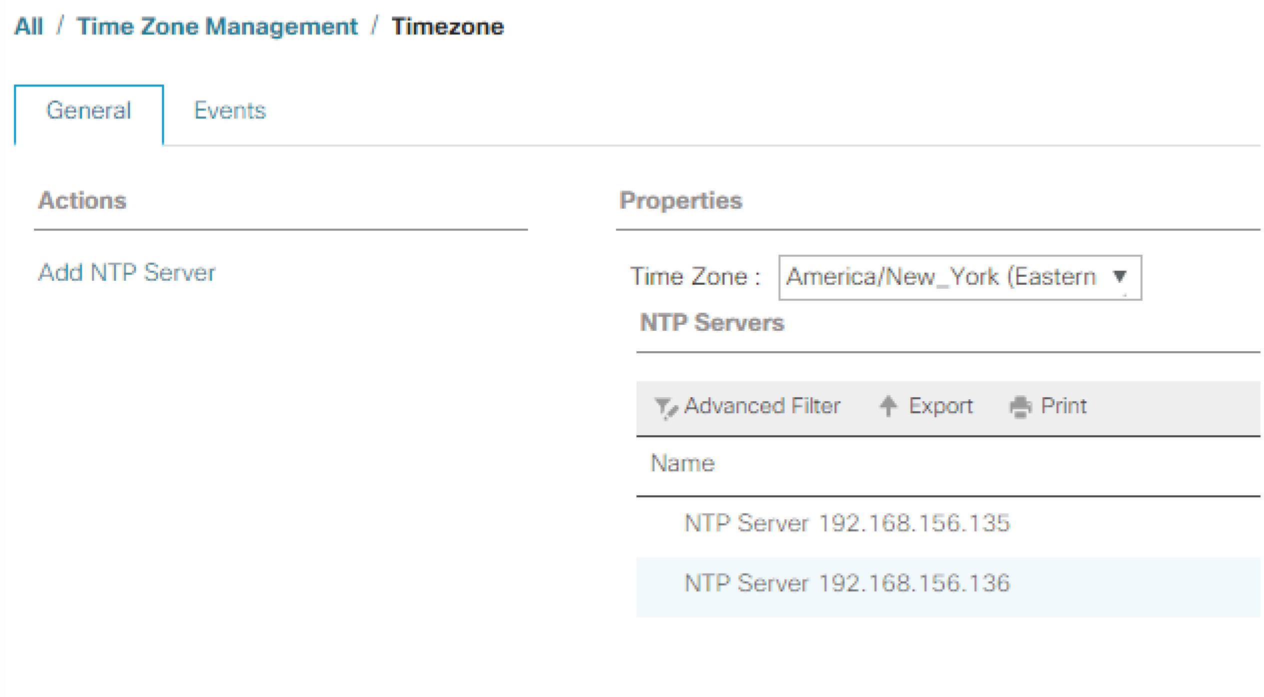
Add NTP Server

NTP Server : 192.168.156.135

We used the Cisco Nexus switch mgmt0 interface IP here because it is in the same L2 domain as the UCS mgmt0 IPs. You could also use the Nexus NTP IPs, but that traffic would then have to pass through an L3 router.

8. Click Add NTP Server.

9. Enter <nexus-B-mgmt0-ip> and click OK, then click OK again.



All / Time Zone Management / Timezone

Time Zone : America/New_York (Eastern

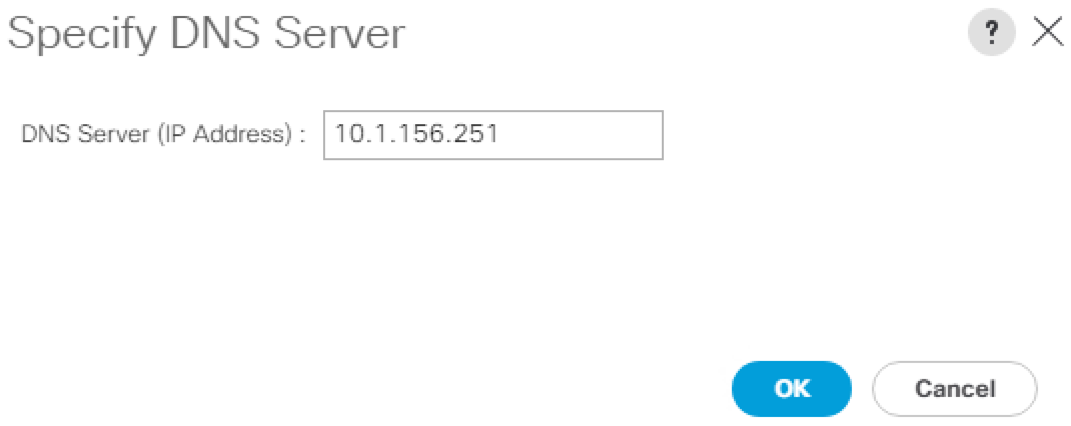
NTP Servers

Name
NTP Server 192.168.156.135
NTP Server 192.168.156.136

Add Additional DNS Server(s)

To add one or more additional DNS servers to the UCS environment, follow these steps:

1. In Cisco UCS Manager, click Admin.
2. Expand All > Communications Management.
3. Choose DNS Management.
4. In the Properties pane, choose Specify DNS Server.
5. Enter the IP address of the additional DNS server.



Specify DNS Server

DNS Server (IP Address) : 10.1.156.251

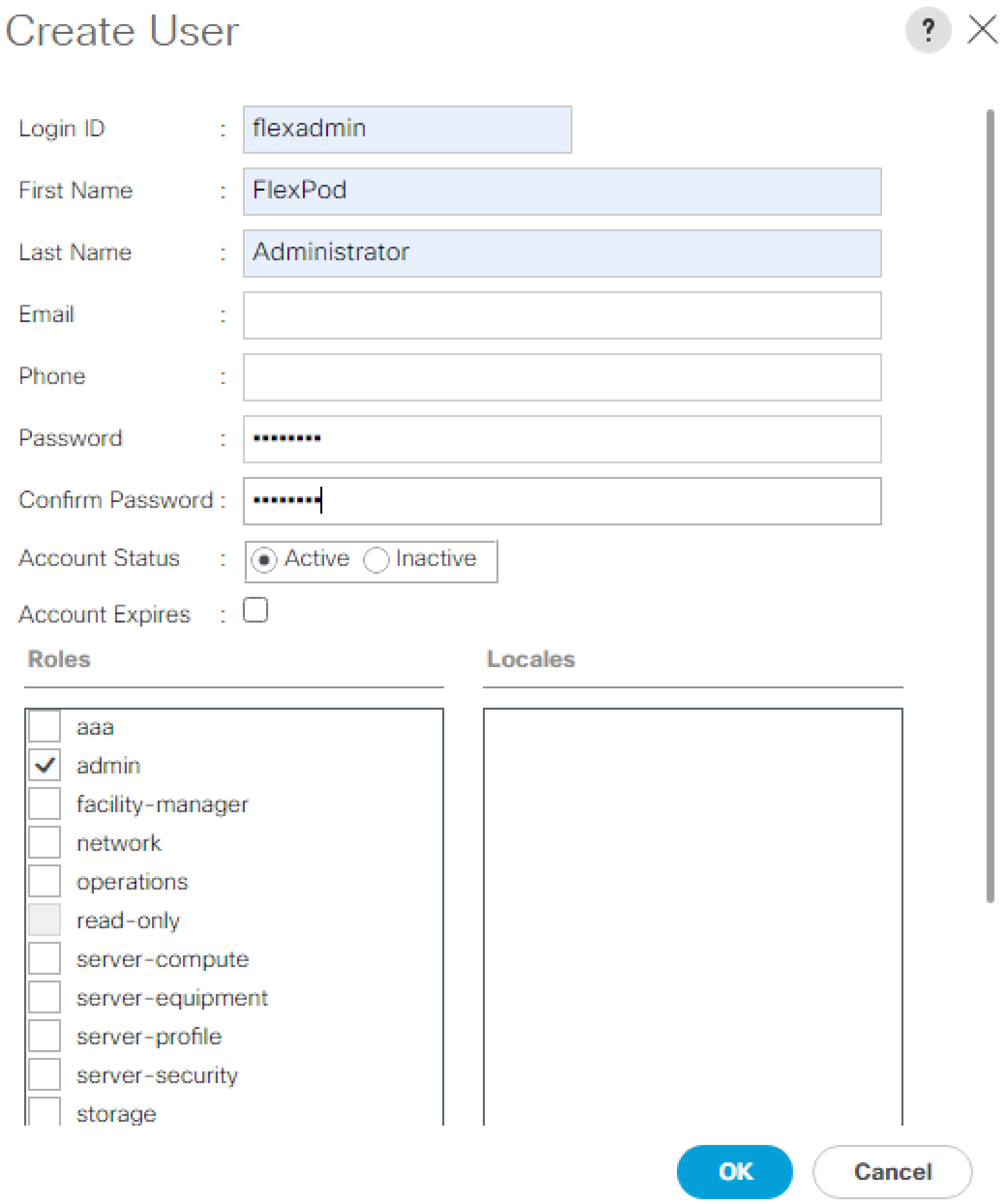
6. Click OK and then click OK again. Repeat this process for any additional DNS servers.

Add an Additional Administrative User

To add an additional locally authenticated Administrative user (flexadmin) to the Cisco UCS environment in case issues arise with the admin user, follow these steps:

1. In Cisco UCS Manager, click Admin.
2. Expand User Management > User Services > Locally Authenticated Users.
3. Right-click Locally Authenticated Users and choose Create User.
4. In the Create User fields it is only necessary to fill in the Login ID, Password, and Confirm Password fields. Fill in the Create User fields according to your local security policy.
5. Leave the Account Status field set to Active.
6. Set Account Expires according to your local security policy.
7. Under Roles, choose admin.

8. Leave Password Required selected for the SSH Type field.



Create User

Login ID : flexadmin

First Name : FlexPod

Last Name : Administrator

Email :

Phone :

Password : •••••••••

Confirm Password : •••••••••

Account Status : ● Active ○ Inactive

Account Expires : □

Roles

- □ aaa
- ☑ admin
- □ facility-manager
- □ network
- □ operations
- □ read-only
- □ server-compute
- □ server-equipment
- □ server-profile
- □ server-security
- □ storage

Locales

9. Click OK and then click OK again to complete adding the user.

Edit Chassis Discovery Policy

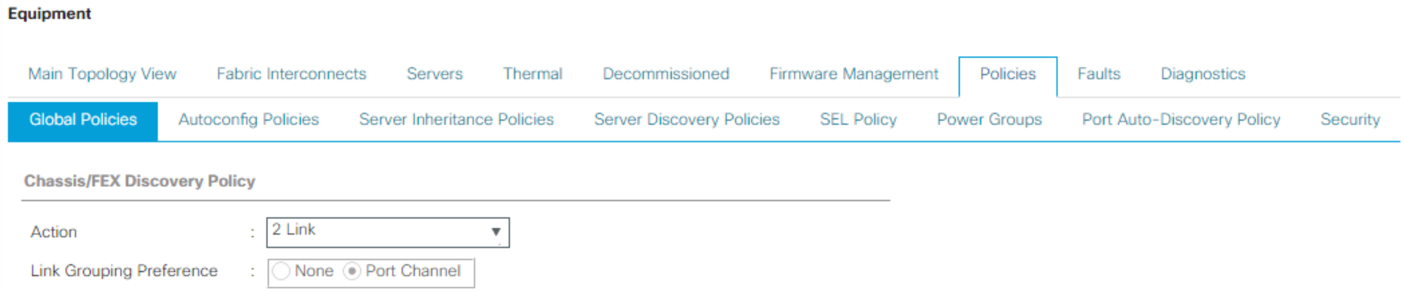
Setting the discovery policy simplifies the addition of Cisco UCS B-Series chassis and of additional fabric extenders for further Cisco UCS C-Series connectivity. To modify the chassis discovery policy, follow these steps:

1. In Cisco UCS Manager, click Equipment and choose the Policies tab.

2. Under Global Policies, set the Chassis/FEX Discovery Policy to match the minimum number of ports that are cabled between the chassis or fabric extenders (FEXes) and the fabric interconnects.

If varying numbers of links between chassis and the Fabric Interconnects will be used, set Action to 2 Link, the minimum recommended number of links for a FlexPod.

3. On the 6454 Fabric Interconnects, the Link Grouping Preference is automatically set to Port Channel and is greyed out. On a 6300 Series or 6200 Series Fabric Interconnect, set the Link Grouping Preference to Port Channel. If Backplane Speed Preference appears, leave it set at 40G.



Chassis/FEX Discovery Policy

Action : 2 Link

Link Grouping Preference : ○ None ● Port Channel

4. If any changes have been made, click Save Changes, and then click OK.

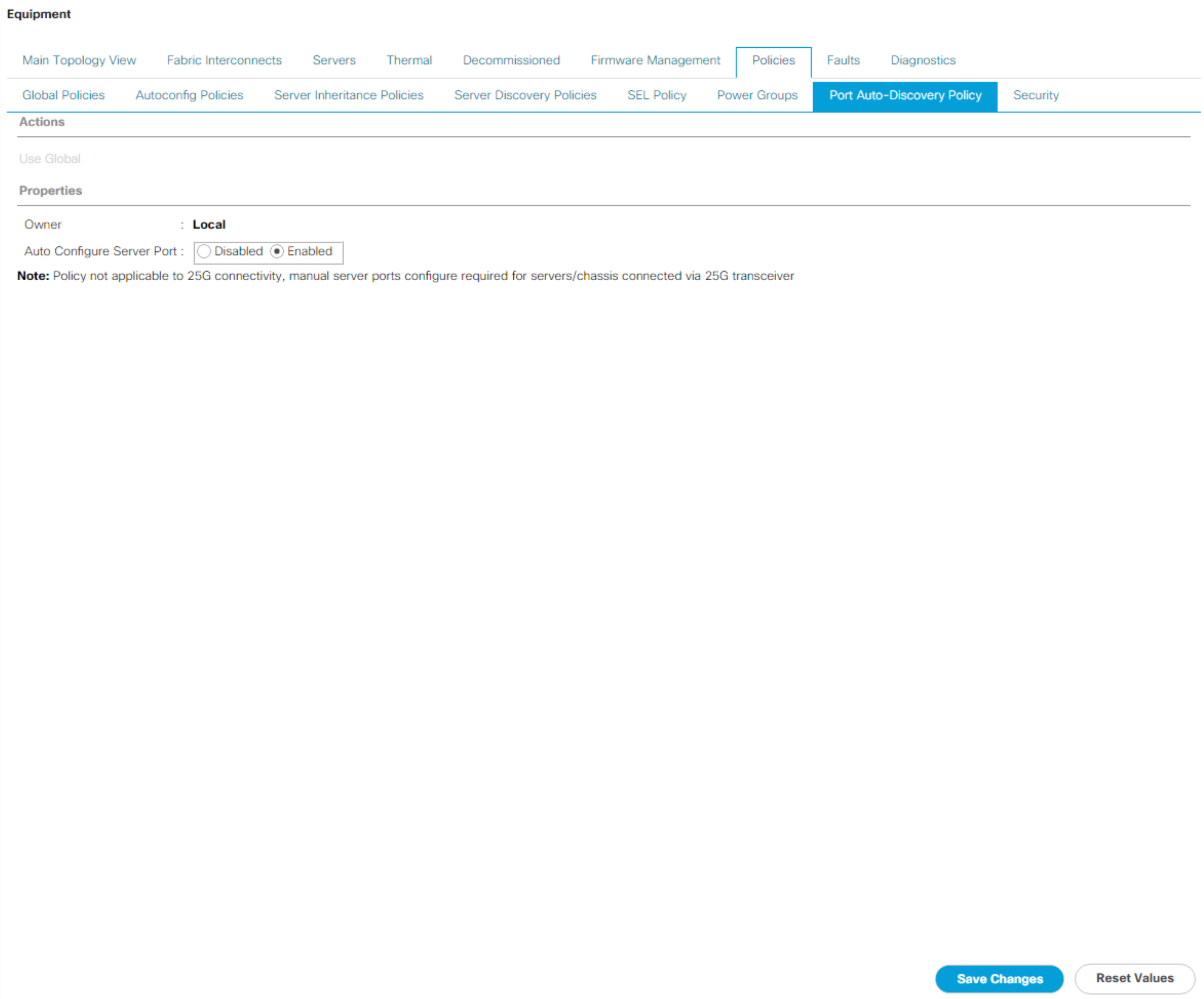
Enable Port Auto-Discovery Policy

Setting the port auto-discovery policy enables automatic discovery of Cisco UCS B-Series chassis server ports. To modify the port auto-discovery policy, follow these steps:

This policy is not applicable to 25G connectivity, manual server ports configuration is required for servers/chassis connected via 25G transceiver. This policy is left in place in case 10G ports are in use.

1. In Cisco UCS Manager, click Equipment, choose All > Equipment in the Navigation Pane, and choose the Policies tab.

2. Under Port Auto-Discovery Policy, set Auto Configure Server Port to Enabled.



Owner : **Local**

Auto Configure Server Port : ○ Disabled ● Enabled

Note: Policy not applicable to 25G connectivity, manual server ports configure required for servers/chassis connected via 25G transceiver

3. Click Save Changes and then OK.

Enable Server and Uplink Ports

To enable and verify server and uplink ports, follow these steps:

1. In Cisco UCS Manager, click Equipment.

2. Expand Equipment > Fabric Interconnects > Fabric Interconnect A (primary) > Fixed Module.

3. Expand and choose Ethernet Ports.

4. Verify that all ports connected to UCS chassis and rack mounts are configured as Server ports and have a status of Up.

5. If any rack mount ports are missing, choose the ports that are connected to Cisco FEXes and direct connect Cisco UCS C-Series servers, right-click them, and choose Configure as Server Port.

6. Click Yes to confirm server ports and click OK.

7. Verify that the ports connected to the chassis, C-series servers and Cisco FEX are now configured as server ports.

8. Choose the ports that are connected to the Cisco Nexus switches, right-click them, and choose Configure as Uplink Port.

9. Click Yes to confirm uplink ports and click OK.

10. Choose Equipment > Fabric Interconnects > Fabric Interconnect B (subordinate) > Fixed Module.

11. Expand and choose Ethernet Ports.

12. Verify that all ports connected to UCS chassis and rack mounts are configured as Server ports and have a status of Up.

13. If any rack mount ports are missing, choose the ports that are connected to Cisco FEXes and direct connect C-series servers, right-click them, and choose Configure as Server Port.

14. Click Yes to confirm server ports and click OK.

15. Verify that the ports connected to the chassis, C-series servers and Cisco FEX are now configured as server ports.

16. Choose the ports that are connected to the Cisco Nexus switches, right-click them, and choose Configure as Uplink Port.

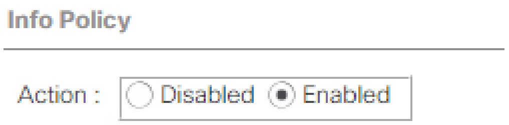
17. Click Yes to confirm the uplink ports and click OK.

Enable Info Policy for Neighbor Discovery

Enabling the info policy allows the Fabric Interconnect neighbor information to display. To modify the info policy, follow these steps:

1. In Cisco UCS Manager, click Equipment, choose All > Equipment in the Navigation Pane, and choose the Policies tab on the right.

2. Under Global Policies, scroll down to Info Policy and choose Enabled for Action.



Info Policy

Action : ○ Disabled ● Enabled

3. Click Save Changes and then click OK.

4. Under Equipment, choose Fabric Interconnect A or B. On the right, choose the Neighbors tab. CDP information is shown under the LAN tab and LLDP information is shown under the LLDP tab.

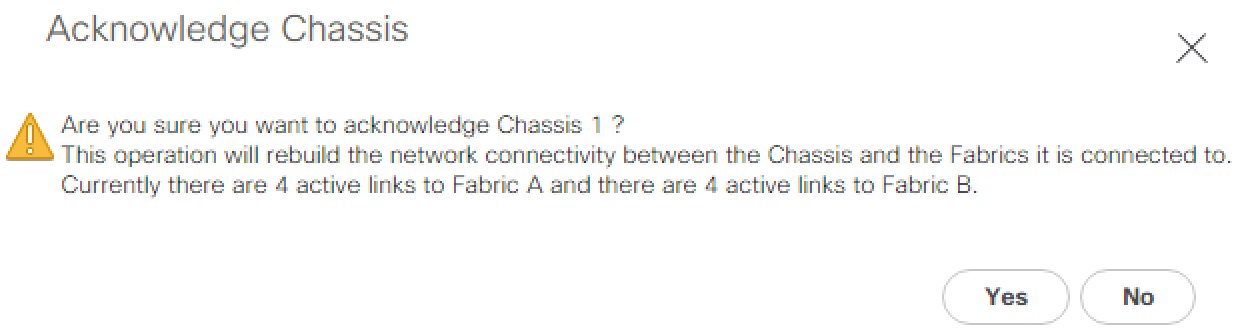
Acknowledge Cisco UCS Chassis and FEX

To acknowledge all Cisco UCS chassis and any external FEX modules, follow these steps:

1. In Cisco UCS Manager, click Equipment.

2. Expand Chassis and choose each chassis that is listed.

3. Right-click each chassis and choose Acknowledge Chassis.



Acknowledge Chassis

Are you sure you want to acknowledge Chassis 1 ?
This operation will rebuild the network connectivity between the Chassis and the Fabrics it is connected to.
Currently there are 4 active links to Fabric A and there are 4 active links to Fabric B.

4. Click Yes and then click OK to complete acknowledging the chassis.

5. If Nexus FEXes are part of the configuration, expand Rack Mounts and FEX.

6. Right-click each FEX that is listed and choose Acknowledge FEX.

7. Click Yes and then click OK to complete acknowledging the FEX.

Create an Organization

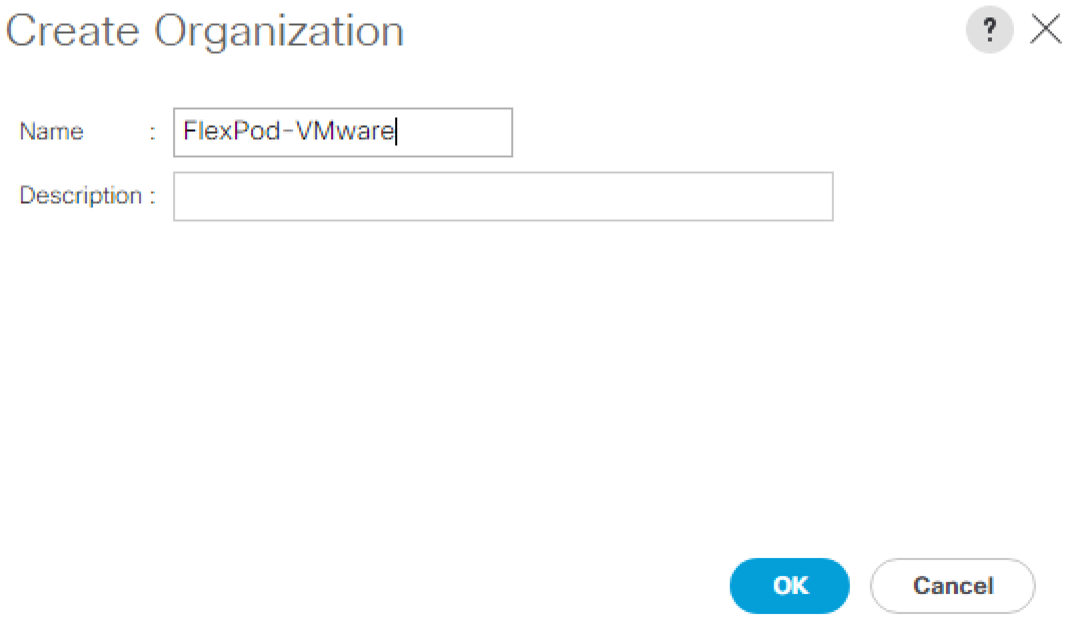
To this point in the Cisco UCS deployment, all items have been deployed at the root level in Cisco UCS Manager. To allow Cisco UCS to be shared among different projects, you need to create Cisco UCS Organizations. In this validation, the organization for this FlexPod deployment is FlexPod. To create an organization, follow these steps:

1. In Cisco UCS Manager, click Servers.

2. In the Navigation Pane, expand Servers > Service Profiles.

3. Right-click root under Service Profiles and choose Create Organization.

4. Provide a name for the Organization to indicate this FlexPod deployment and optionally provide a Description.



Create Organization

Name : FlexPod-VMware

Description :

5. Click OK then click OK again to complete creating the organization.

Create a WWNN Pool for FC Boot (FCP)

In this FlexPod implementation, a WWNN pool is created at the root organization level to avoid WWNN address pool overlaps. If your deployment plan calls for different WWNN ranges in different UCS organizations, place the WWNN pool at the organizational level. To configure the necessary WWNN pool for the Cisco UCS environment, follow these steps using Cisco UCS Manager.

1. Choose SAN.

2. Choose Pools > root.

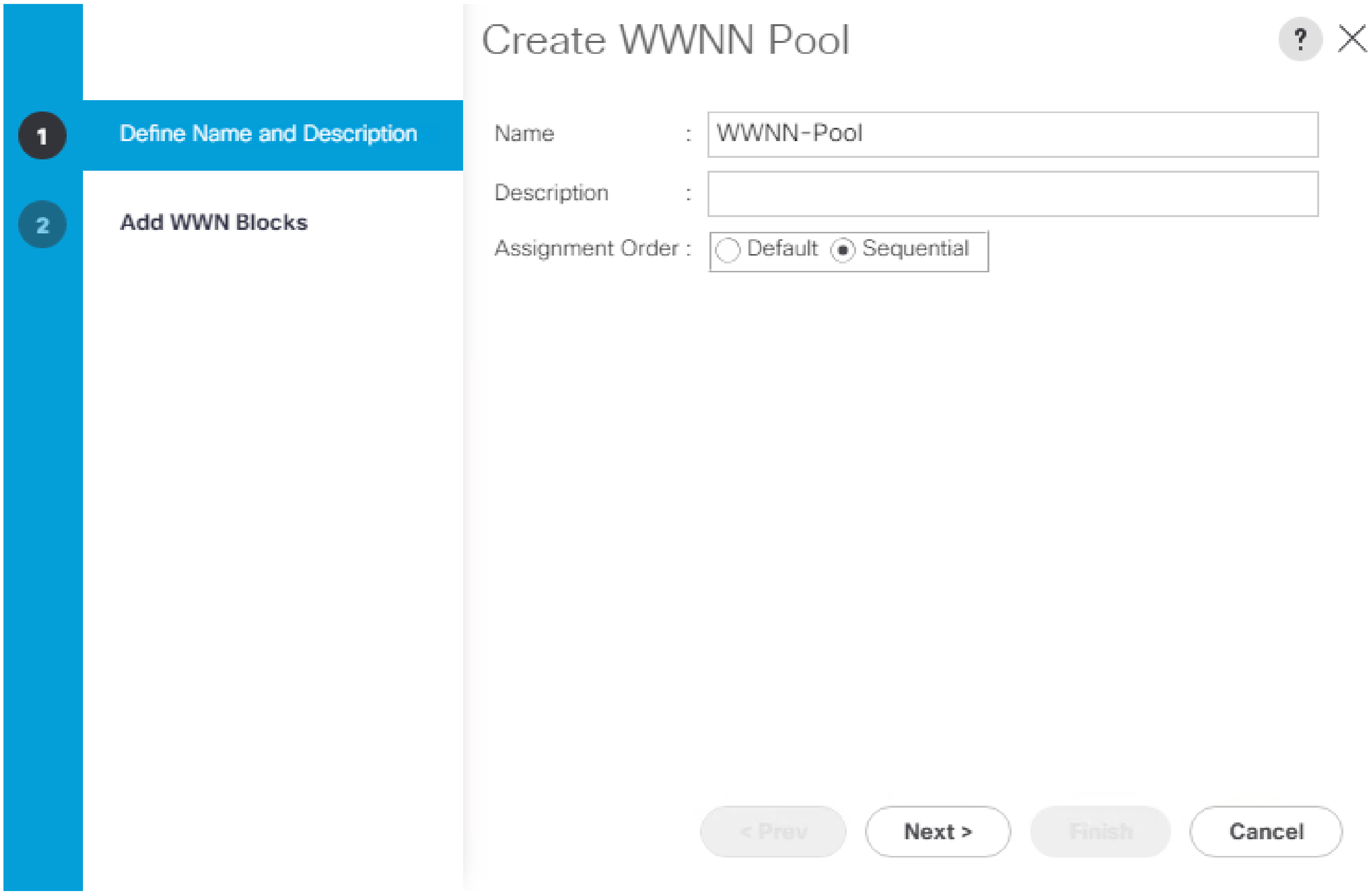
3. Right-click WWNN Pools under the root organization.

4. Choose Create WWNN Pool to create the WWNN pool.

5. Enter WWNN-Pool for the name of the WWNN pool.

6. Optional: Enter a description for the WWNN pool.

7. Choose Sequential for Assignment Order.



Create WWNN Pool

Name : WWNN-Pool

Description :

Assignment Order : ○ Default ● Sequential

8. Click Next.

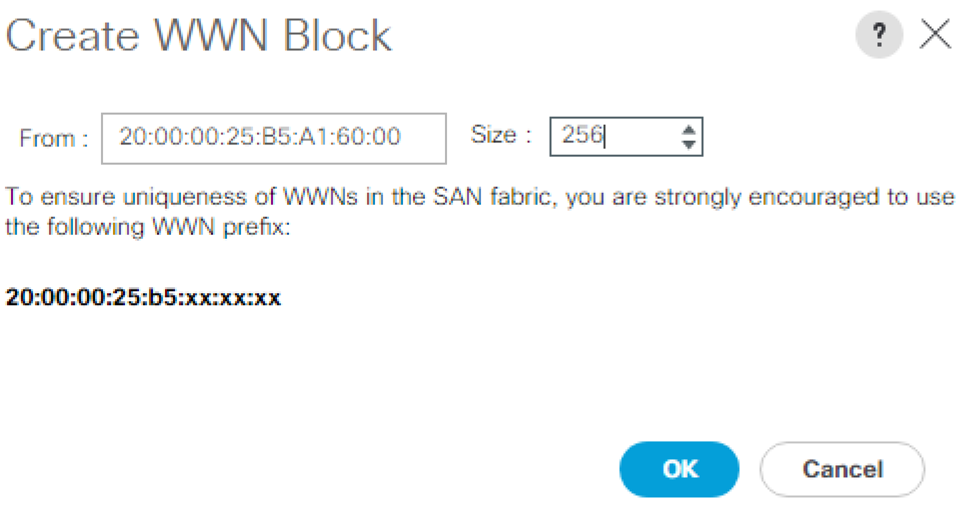
9. Click Add.

10. Modify the From field as necessary for the Cisco UCS Environment.

Modifications of the WWNN block, as well as the WWPN and MAC Addresses, can convey identifying information for the Cisco UCS domain. Within the From field in our example, the sixth and seventh octets were changed from 00:00 to A1:60 to represent these WWNNs being in the A16 cabinet.

When there are multiple UCS domains sitting in adjacency, it is important that these blocks; the WWNN, WWPN, and MAC, hold differing values between each set.

11. Specify a size of the WWNN block sufficient to support the available server resources. In this example, with the WWNN block modification, a maximum of 256 addresses are available.



Create WWN Block

From : 20:00:00:25:B5:A1:60:00 Size : 256

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 and click OK to complete creating the WWNN pool.

Create WWPN Pools (FCP)

In this FlexPod implementation, WWPN address pools are created at the root organization level to avoid WWPN address pool overlaps. If your deployment plan calls for different WWPN address ranges in different UCS organizations, place the WWPN pools at the organizational level. To configure the necessary WWPN pools for the Cisco UCS environment, follow these steps:

1. In Cisco UCS Manager, click SAN.

2. Choose Pools > root.

In this procedure, two WWPN pools are created, one for each switching fabric.

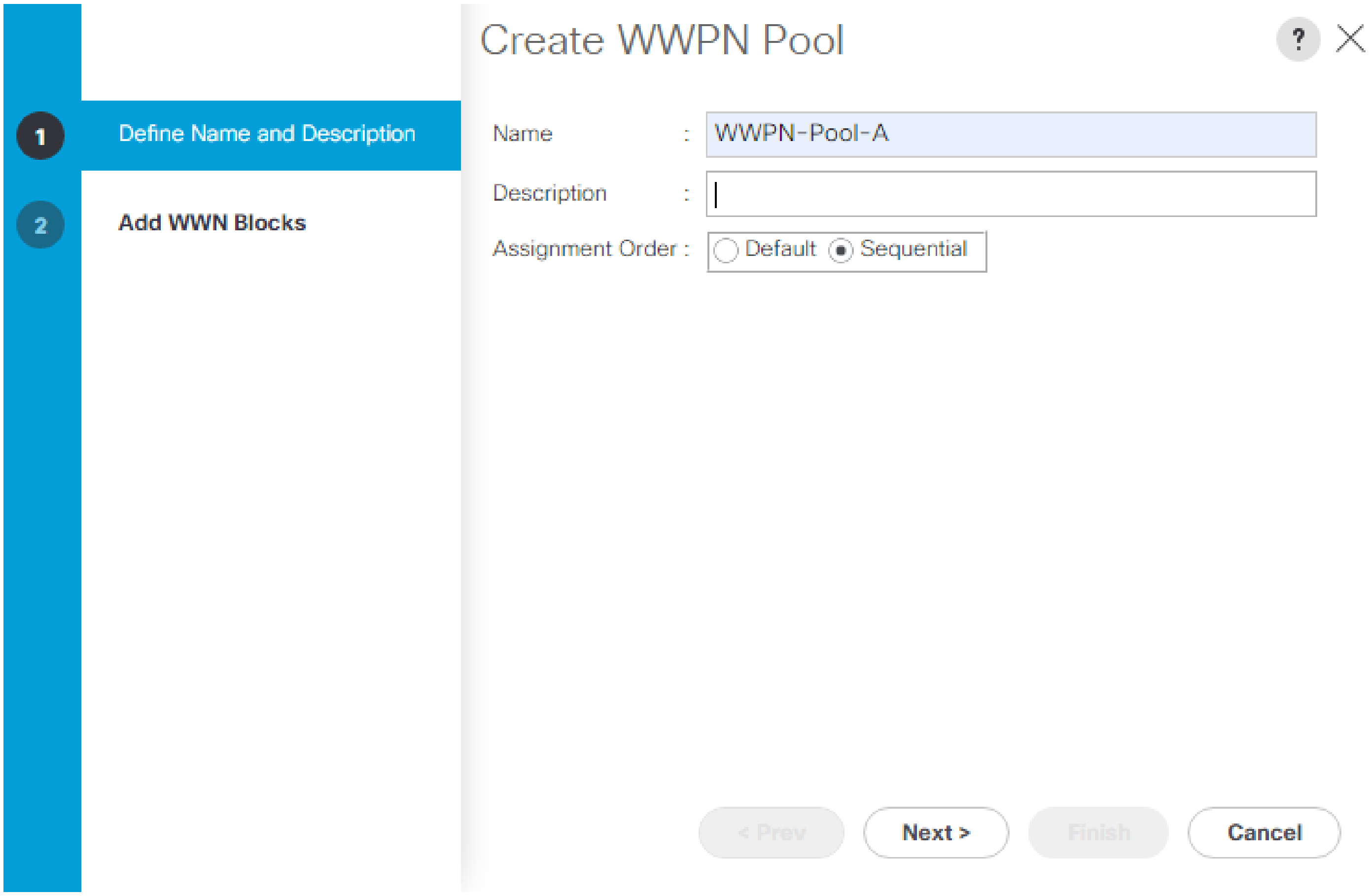
3. Right-click WWPN Pools under the root organization.

4. Choose Create WWPN Pool to create the WWPN pool.

5. Enter WWPN-Pool-A as the name of the WWPN pool.

6. Optional: Enter a description for the WWPN pool.

7. Choose Sequential for Assignment Order.



Create WWPN Pool

Name : WWPN-Pool-A

Description :

Assignment Order : ○ Default ● Sequential

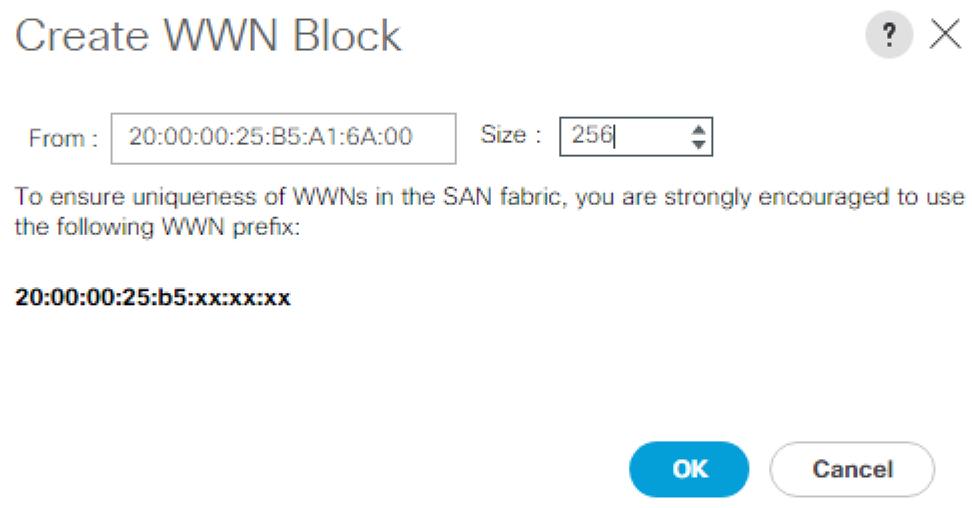
8. Click Next.

9. Click Add.

10. Specify a starting WWPN.

For the FlexPod solution, the recommendation is to place `A` in the next-to-last octet of the starting WWPN to identify all of the WWPNs as fabric A addresses. Merging this with the pattern we used for the WWNN we see a WWPN block starting with `20:00:00:25:B5:A1:6A:00`

Specify a size for the WWPN pool that is sufficient to support the available blade or server resources remembering that servers could have multiple vHBAs and unassociated service profiles could be created. In this example, with the WWPN block modification, a maximum of 256 addresses are available.



Create WWN Block

From : 20:00:00:25:B5:A1:6A:00 Size : 256

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.

13. In the confirmation message, click OK.

14. Right-click WWPN Pools under the root organization.

15. Choose Create WWPN Pool to create the WWPN pool.

16. Enter WWPN-Pool-B as the name of the WWPN pool.

17. Optional: Enter a description for the WWPN pool.

18. Choose Sequential for Assignment Order.

19. Click Next.

20. Click Add.

21. Specify a starting WWPN.

For the FlexPod solution, the recommendation is to place `B` in the next-to-last octet of the starting WWPN to identify all of the WWPNs as fabric B addresses. Merging this with the pattern we used for the WWNN we see a WWPN block starting with `20:00:00:25:B5:A1:6B:00`.

Specify a size for the WWPN address pool that is sufficient to support the available blade or server resources remembering that servers could have multiple vHBAs and unassociated service profiles could be created. In this example, with the WWPN block modification, a maximum of 256 addresses are available.

22. Click OK.

23. Click Finish.

24. In the confirmation message, click OK.

Create VSANs (FCP)

To configure the necessary virtual storage area networks (VSANs) for the FlexPod Organization in the Cisco UCS environment, follow these steps:

1. In Cisco UCS Manager, click SAN.

In this procedure, two VSANs are created, one for each SAN switching fabric.

2. Choose SAN > SAN Cloud.

3. Right-click VSANs.

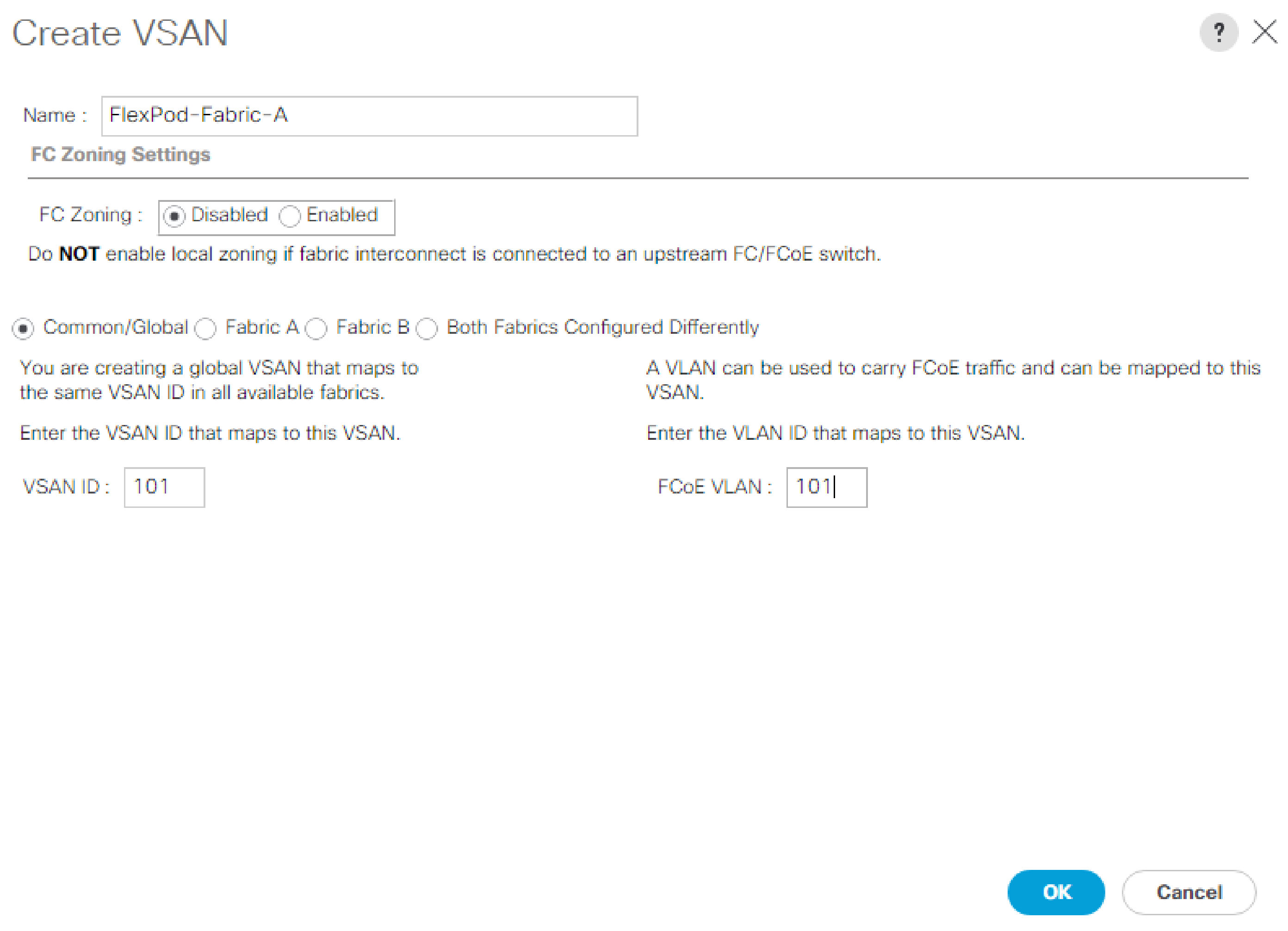
4. Choose Create VSAN.

5. Enter FlexPod-Fabric-A as the name of the VSAN to be used for Fabric A.

6. Leave FC Zoning set at Disabled.

7. Choose Fabric A.

8. Enter a unique VSAN ID and a corresponding FCoE VLAN ID that matches the configuration in the MDS switch for Fabric A. It is recommended to use the same ID for both parameters and to use something other than 1.


Create VSAN

Name : FlexPod-Fabric-A

FC Zoning Settings

FC Zoning : ● Disabled ○ Enabled

Do **NOT** enable local zoning if fabric interconnect is connected to an upstream FC/FCoE switch.

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

You are creating a global VSAN that maps to the same VSAN ID in all available fabrics.

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

9. Click OK and then click OK again.

10. Under SAN Cloud, right-click VSANs.

11. Choose Create VSAN.

12. Enter FlexPod-Fabric-B as the name of the VSAN to be used for Fabric B.

13. Leave FC Zoning set at Disabled.

14. Choose Fabric B.

15. Enter a unique VSAN ID and a corresponding FCoE VLAN ID that matches the configuration in the MDS switch for Fabric B. It is recommended use the same ID for both parameters and to use something other than 1.

16. Click OK and then click OK again.

Enable FC Uplink VSAN Trunking (FCP)

To enable VSAN trunking on the FC Uplinks in the Cisco UCS environment, follow these steps:

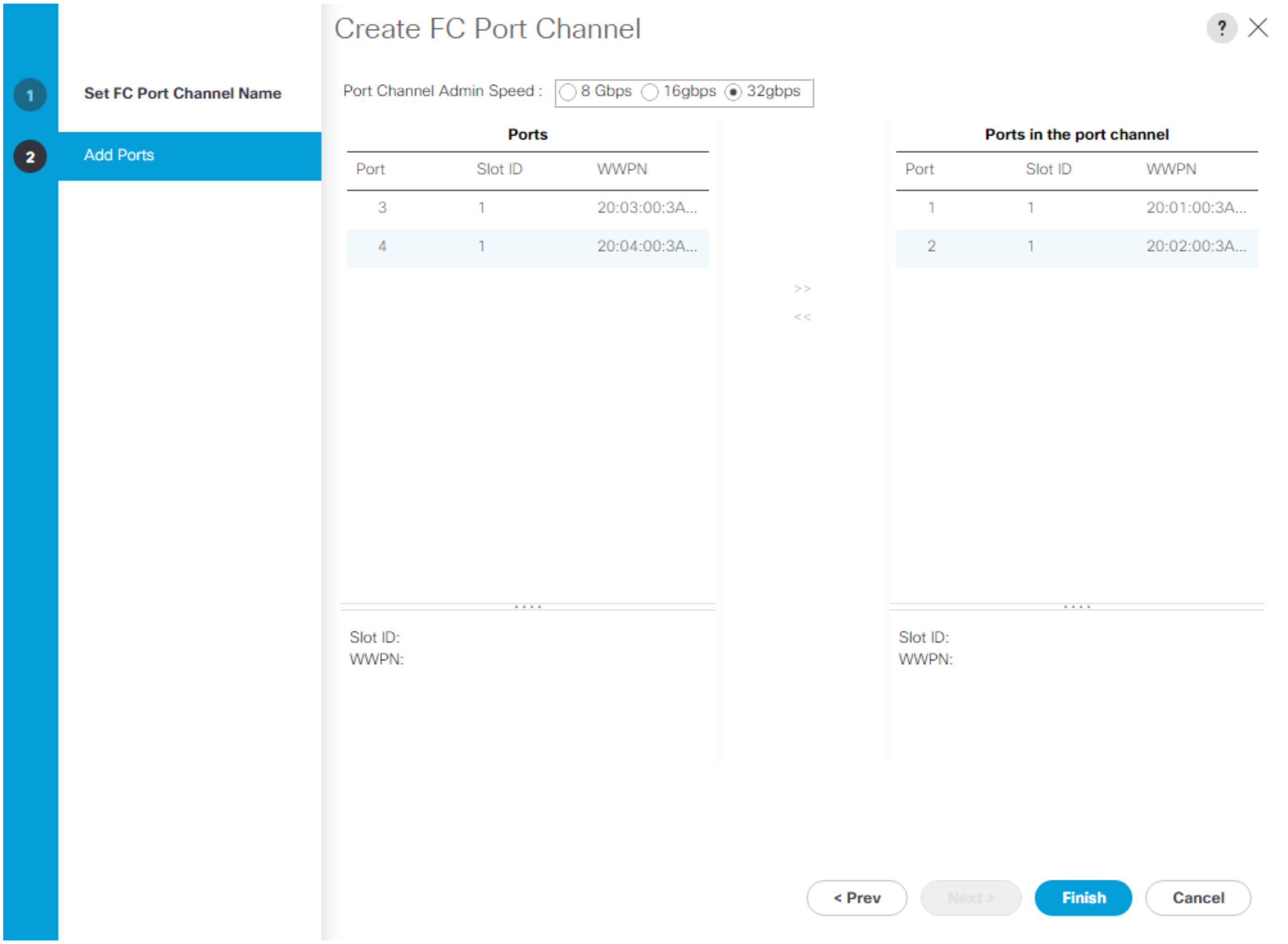
> Enabling VSAN trunking is optional. It is important that the Cisco MDS VSAN trunking configuration match the configuration set in Cisco UCS Manager or be set to auto.

1. In Cisco UCS Manager, click SAN.
2. Expand SAN > SAN Cloud.
3. Choose Fabric A and in the Actions pane choose Enable FC Uplink Trunking.
4. Click Yes on the Confirmation and Warning.
5. Click OK.
6. Choose Fabric B and in the Actions pane choose Enable FC Uplink Trunking.
7. Click Yes on the Confirmation and Warning.
8. Click OK.

Create FC Uplink Port Channels (FCP)

To create the FC Uplink Port Channels and assign the appropriate VSANs to them for the Cisco UCS environment, follow these steps:

1. In Cisco UCS Manager, click SAN.
2. Choose SAN > SAN Cloud.
3. Expand Fabric A and choose FC Port Channels.
4. Right-click FC Port Channels and choose Create FC Port Channel.
5. Set a unique ID for the port channel and provide a unique name for the port channel.
6. Click Next.
7. Choose the appropriate Port Channel Admin Speed.
8. Choose the ports connected to Cisco MDS 9132T A and use >> to add them to the port channel.



Create FC Port Channel

Port Channel Admin Speed : ○ 8 Gbps ○ 16gbps ● 32gbps

Ports

Port	Slot ID	WWPN
3	1	20:03:00:3A...
4	1	20:04:00:3A...

Slot ID:
WWPN:

Ports in the port channel

Port	Slot ID	WWPN
1	1	20:01:00:3A...
2	1	20:02:00:3A...

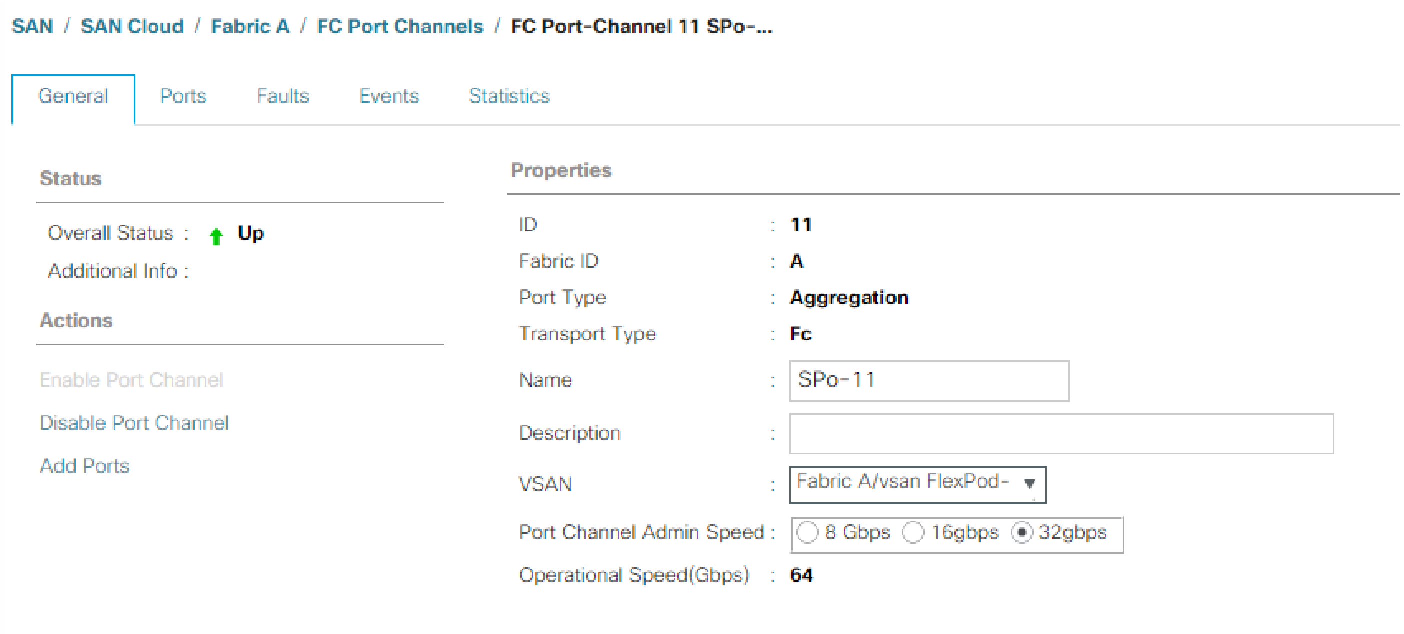
Slot ID:
WWPN:

9. Click Finish to complete creating the port channel.

10. Click OK on the confirmation.

11. Under FC Port-Channels, choose the newly created port channel.

12. From the drop-down list to choose the FlexPod-Fabric-A VSAN.



Status

Overall Status : Up

Additional Info :

Properties

ID : 11

Fabric ID : A

Port Type : Aggregation

Transport Type : Fc

Name : SPo-11

Description :

VSAN : Fabric A/vsan FlexPod-

Port Channel Admin Speed : ○ 8 Gbps ○ 16gbps ● 32gbps

Operational Speed(Gbps) : 64

13. Click Save Changes to assign the VSAN.

14. Click OK.

15. On the left under FC Port Channels, expand the newly created FC Port-Channel. Under the port-channel choose the first FC Interface. Enter a User Label to indicate the connectivity on the MDS 9132T switch, such as <mds-A-hostname>:fc1/5. Click Save Changes and OK. Repeat this process for the other FC Interface.

16. Expand Fabric B and choose FC Port Channels.

17. Right-click FC Port Channels and choose Create FC Port Channel.

18. Set a unique ID for the port channel and provide a unique name for the port channel.

19. Click Next.

20. Choose the ports connected to Cisco MDS 9132T B and use >> to add them to the port channel.

21. Click Finish to complete creating the port channel.

22. Click OK on the confirmation.

23. Under FC Port-Channels, choose the newly created port channel.

24. In the right pane, use the drop-down to choose the FlexPod-Fabric-B VSAN.

25. Click Save Changes to assign the VSAN.

26. Click OK.

27. On the left under FC Port Channels, expand the newly created FC Port-Channel. Under the FC Port-Channel choose the first FC Interface. Enter a User Label to indicate the connectivity on the MDS 9132T switch, such as <mds-B-hostname>:fc1/5. Click Save Changes and OK. Repeat this process for the other FC Interface.

Disable Unused FC Uplink Ports (FCP)

When Unified Ports were configured earlier in this procedure, on the Cisco UCS 6454 FI and the Cisco UCS 6332-16UP FI, FC ports were configured in groups. Because of this group configuration, some FC ports are unused and need to be disabled to prevent alerts. To disable the unused FC ports 1 and 2 on the Cisco UCS 6454 FIs, follow these steps:

1. In Cisco UCS Manager, click SAN.

2. In the Navigation Pane, expand SAN > SAN Cloud > Fabric A > Uplink FC Interfaces.

3. Right-click FC Interface 1/3 and choose Disable Interface.

4. Click Yes and OK to complete disabling FC Interface 1/3.

5. Repeat steps 1 – 4 to disable FC Interface 1/4.

6. In the Navigation Pane, expand SAN > SAN Cloud > Fabric B > Uplink FC Interfaces.

7. Right-click FC Interface 1/3 and choose Disable Interface.

8. Click Yes and OK to complete disabling FC Interface 1/3.

9. Repeat steps 1 – 8 to disable FC Interface 1/4.

Create vHBA Templates (FCP)

To create the necessary virtual host bus adapter (vHBA) templates for the Cisco UCS environment within the FlexPod organization, follow these steps:

1. In Cisco UCS Manager, click SAN.

2. Expand Policies > root > Sub-Organizations > FlexPod.

3. Right-click vHBA Templates under the FlexPod Organization.

4. Choose Create vHBA Template.

5. Enter vHBA-A as the vHBA template name.

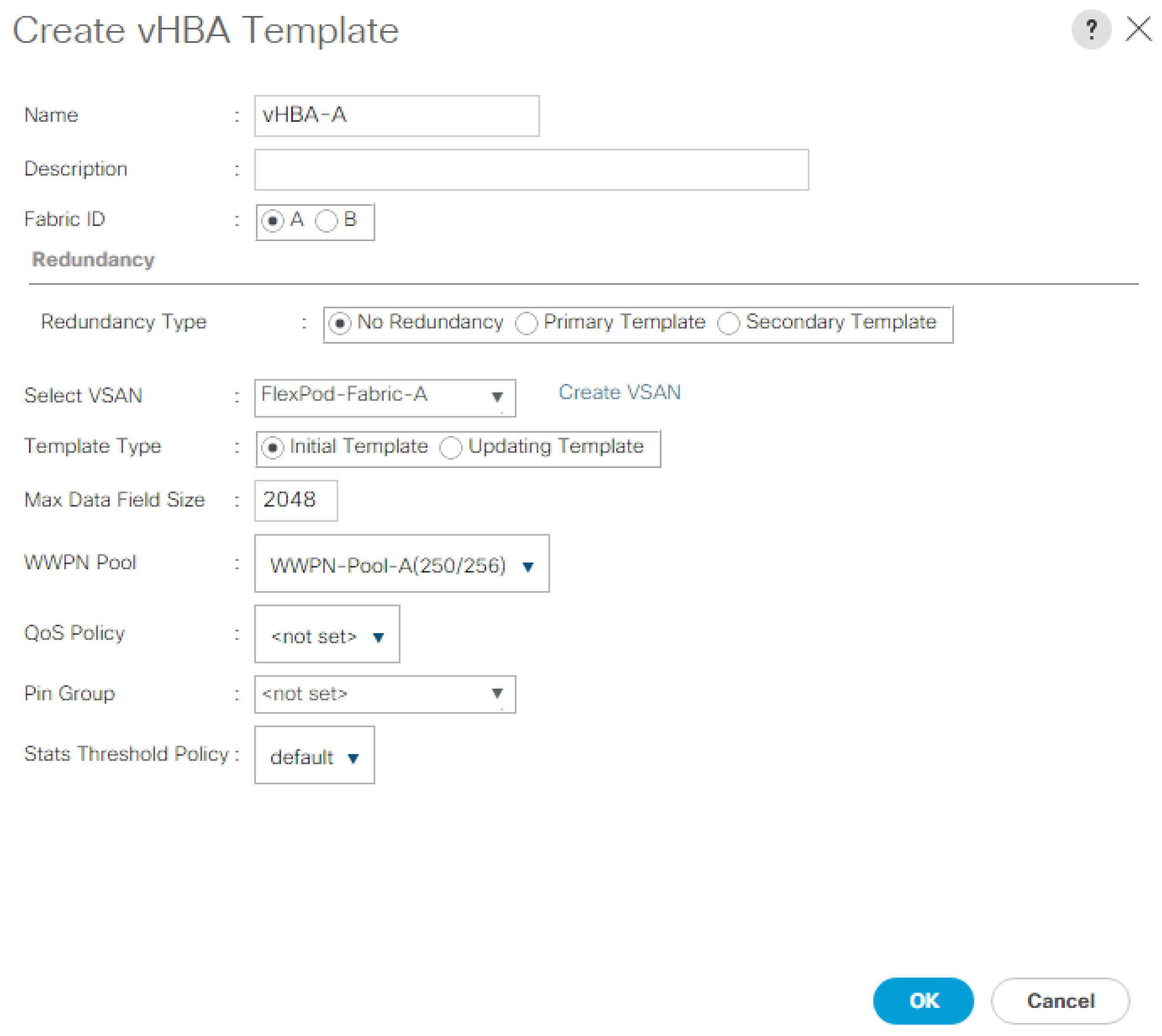
6. Keep Fabric A selected.

7. Leave Redundancy Type set to No Redundancy.

8. Choose the FlexPod-Fabric-A VSAN.

9. Leave Initial Template as the Template Type.

10. Choose WWPN-Pool-A as the WWPN Pool.



Create vHBA Template

Name : vHBA-A

Description :

Fabric ID : ● A ○ B

Redundancy

Redundancy Type : ● No Redundancy ○ Primary Template ○ Secondary Template

Select VSAN : FlexPod-Fabric-A ▼ Create VSAN

Template Type : ● Initial Template ○ Updating Template

Max Data Field Size : 2048

WWPN Pool : WWPN-Pool-A(250/256) ▼

QoS Policy : <not set> ▼

Pin Group : <not set> ▼

Stats Threshold Policy : default ▼

11. Click OK to create the vHBA template.

12. Click OK.

13. Right-click vHBA Templates under the FlexPod Organization.

14. Choose Create vHBA Template.

15. Enter vHBA-B as the vHBA template name.

16. Choose B as the Fabric ID.

17. Leave Redundancy Type set to No Redundancy.

18. Choose the FlexPod-Fabric-B VSAN.

19. Leave Initial Template as the Template Type.

20. Choose WWPN-Pool-B as the WWPN Pool.

21. Click OK to create the vHBA template.

22. Click OK.

Create SAN Connectivity Policy (FCP)

To configure the necessary Infrastructure SAN Connectivity Policy within the FlexPod organization, follow these steps:

1. In Cisco UCS Manager, click SAN.

2. Choose SAN > Policies > root > Sub-Organizations > FlexPod.

3. Right-click SAN Connectivity Policies under the FlexPod Organization.

4. Choose Create SAN Connectivity Policy.

5. Enter FC-Boot as the name of the policy.

6. Choose the previously created WWNN-Pool for the WWNN Assignment.

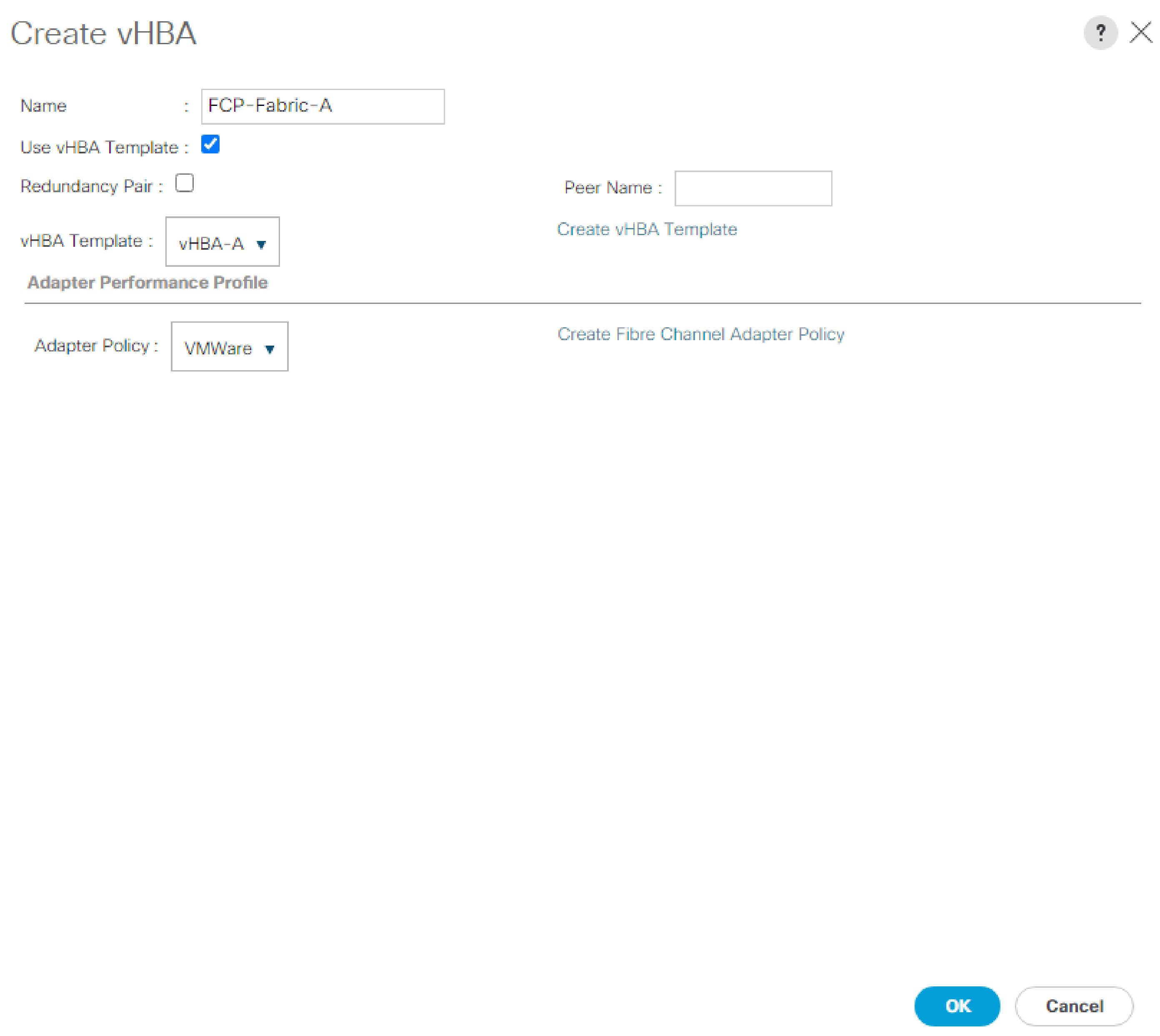
7. Click Add at the bottom to add a vHBA.

8. In the Create vHBA dialog box, enter FCP-Fabric-A as the name of the vHBA.

9. Check the box for Use vHBA Template.

10. In the vHBA Template list, choose vHBA-A.

11. In the Adapter Policy list, choose VMWare.



Name : FCP-Fabric-A

Use vHBA Template : ☑

Redundancy Pair : □

Peer Name :

vHBA Template : vHBA-A ▾

Adapter Performance Profile

Adapter Policy : VMWare ▾

12. Click OK.

13. Click Add to add a second vHBA.

14. In the Create vHBA dialog box, enter FCP-Fabric-B as the name of the vHBA.

15. Check the box for Use vHBA Template.

16. In the vHBA Template list, choose vHBA-B.

17. In the Adapter Policy list, choose VMWare.

18. Click OK.

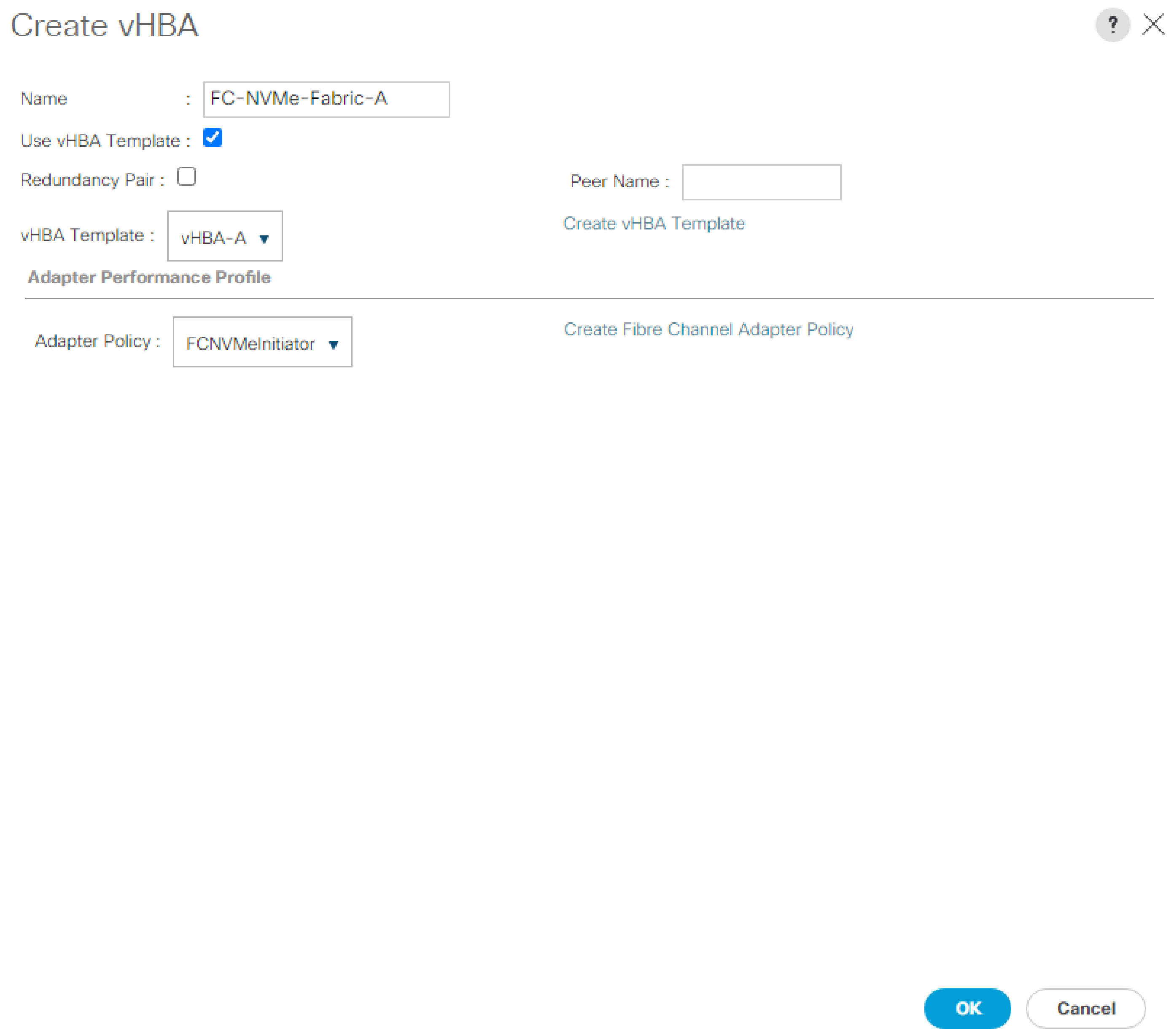
19. If configuring FC-NVMe in this FlexPod, click Add at the bottom to add an FC-NVMe vHBA.

20. In the Create vHBA dialog box, enter FC-NVMe-Fabric-A as the name of the vHBA.

21. Check the box for Use vHBA Template.

22. In the vHBA Template list, choose vHBA-A.

23. In the Adapter Policy list, choose FCNVMeInitiator.



Create vHBA

Name : FC-NVMe-Fabric-A

Use vHBA Template : ☑

Redundancy Pair : □

Peer Name :

vHBA Template : vHBA-A ▾

Adapter Performance Profile

Adapter Policy : FCNVMeInitiator ▾

24. Click OK.

25. Click Add at the bottom to add a second FC-NVMe vHBA.

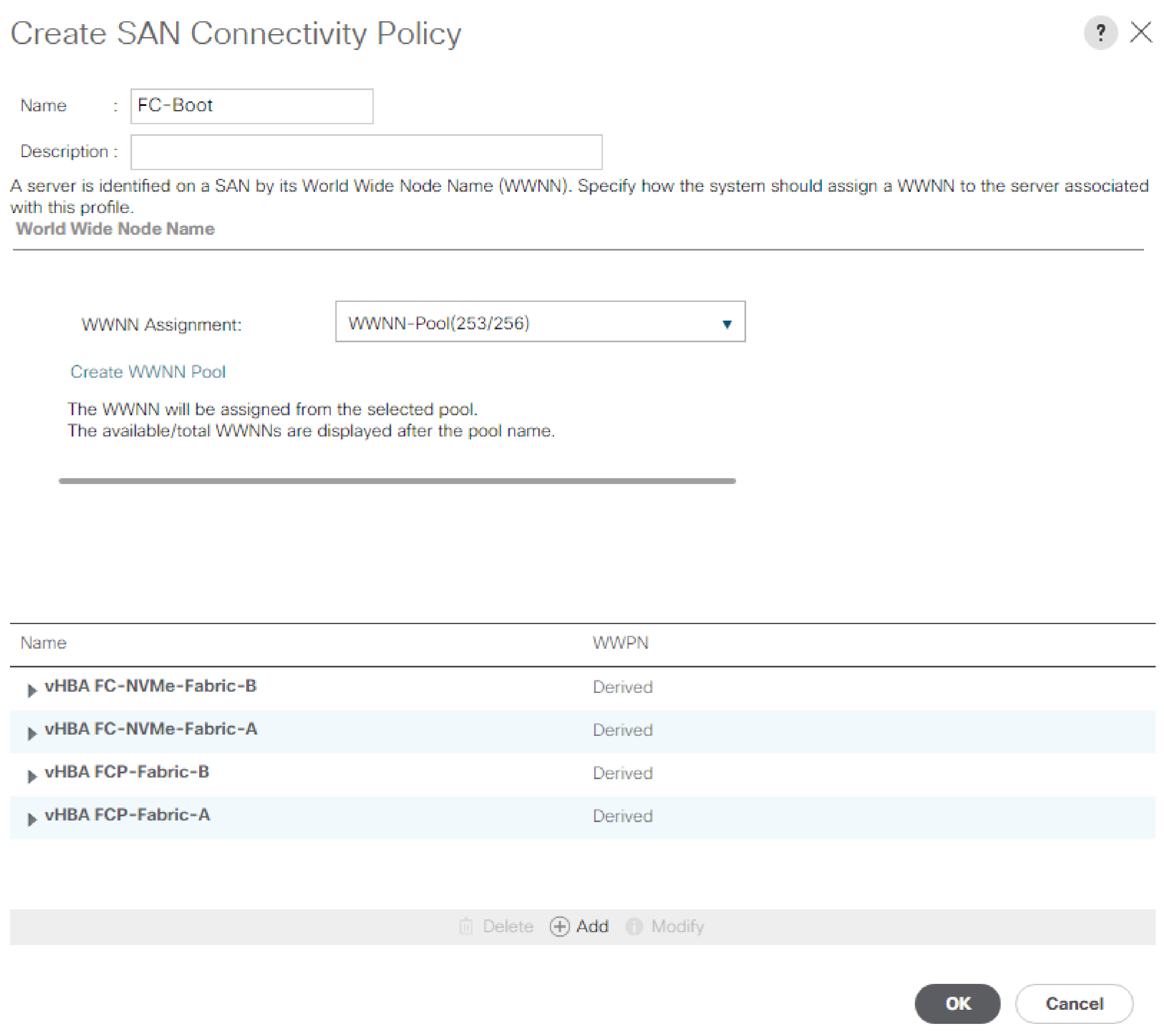
26. In the Create vHBA dialog box, enter FC-NVMe-Fabric-B as the name of the vHBA.

27. Check the box for Use vHBA Template.

28. In the vHBA Template list, choose vHBA-B.

29. In the Adapter Policy list, choose FCNVMeInitiator.

30. Click OK.



Create SAN Connectivity Policy

Name : FC-Boot

Description :

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: WWNN-Pool(253/256)

Create WWNN Pool

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

Name	WWPN
vHBA FC-NVMe-Fabric-B	Derived
vHBA FC-NVMe-Fabric-A	Derived
vHBA FCP-Fabric-B	Derived
vHBA FCP-Fabric-A	Derived

31. Click OK to create the SAN Connectivity Policy.

32. Click OK to confirm creation.

Add Block of IP Addresses for KVM Access

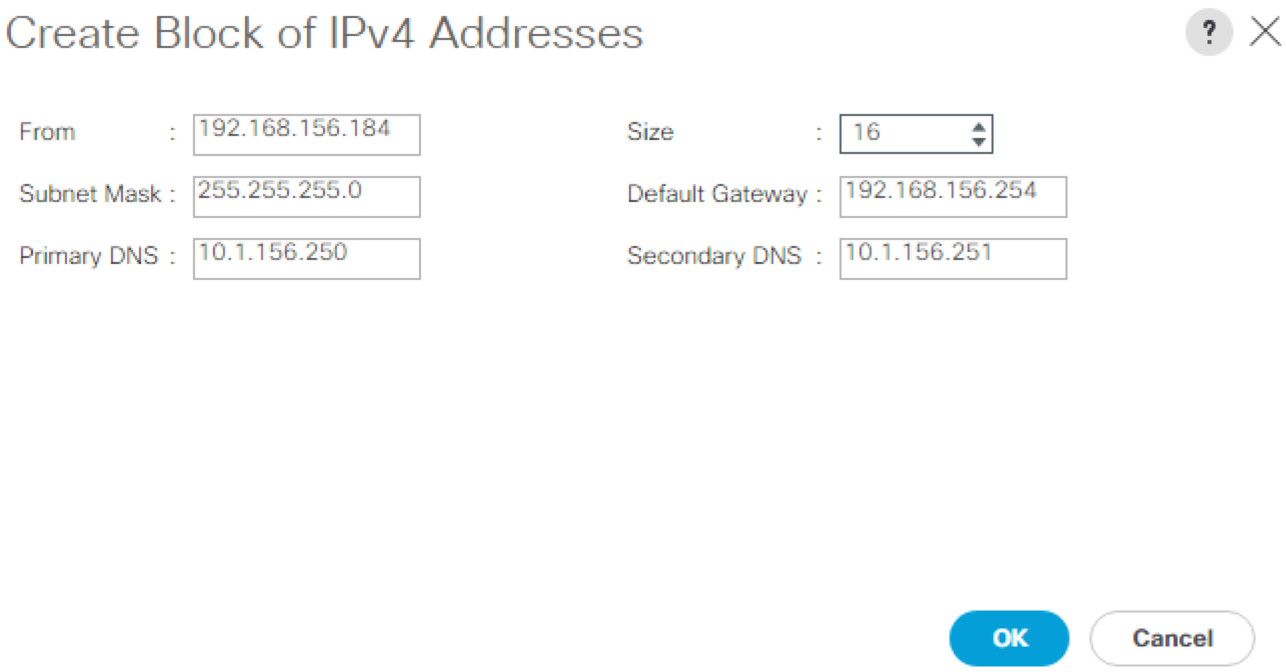
To create a block of IP addresses for in band server Keyboard, Video, Mouse (KVM) access in the Cisco UCS environment, follow these steps:

1. In Cisco UCS Manager, click LAN.

2. Expand Pools > root > IP Pools.

3. Right-click IP Pool ext-mgmt and choose Create Block of IPv4 Addresses.

4. Enter the starting IP address of the block, number of IP addresses required, and the subnet mask and gateway information. Optionally, enter the Primary and Secondary DNS server addresses.



Create Block of IPv4 Addresses

From :	192.168.156.184	Size :	16
Subnet Mask :	255.255.255.0	Default Gateway :	192.168.156.254
Primary DNS :	10.1.156.250	Secondary DNS :	10.1.156.251

5. Click OK to create the block.

6. Click OK in the confirmation message.

Create Uplink Port Channels to Cisco Nexus Switches

To configure the necessary port channels out of the Cisco UCS environment, follow these steps:

1. In Cisco UCS Manager, click LAN.

> In this procedure, two port channels are created: one from fabric A to both Cisco Nexus switches and one from fabric B to both Cisco Nexus switches.

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

3. Right-click Port Channels under Fabric A.

4. Choose Create Port Channel.

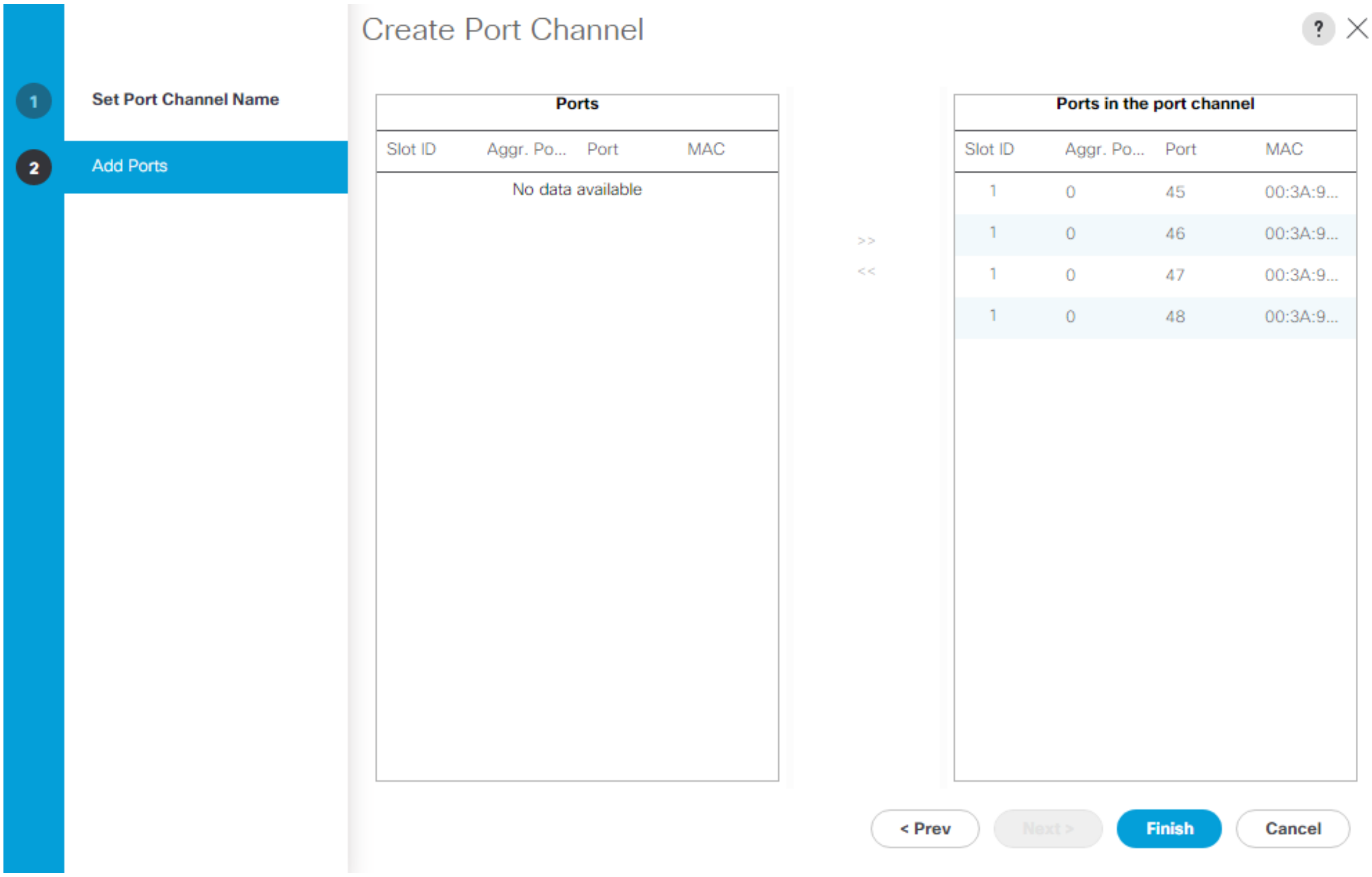
5. Enter `145` as the unique ID of the port channel.

6. Enter `Po145-Nexus` as the name of the port channel.

7. Click Next.

8. Choose the uplink ports connected to the Nexus switches to be added to the port channel.

9. Click >> to add the ports to the port channel.



Create Port Channel

Ports

Slot ID	Aggr. Po...	Port	MAC
No data available			

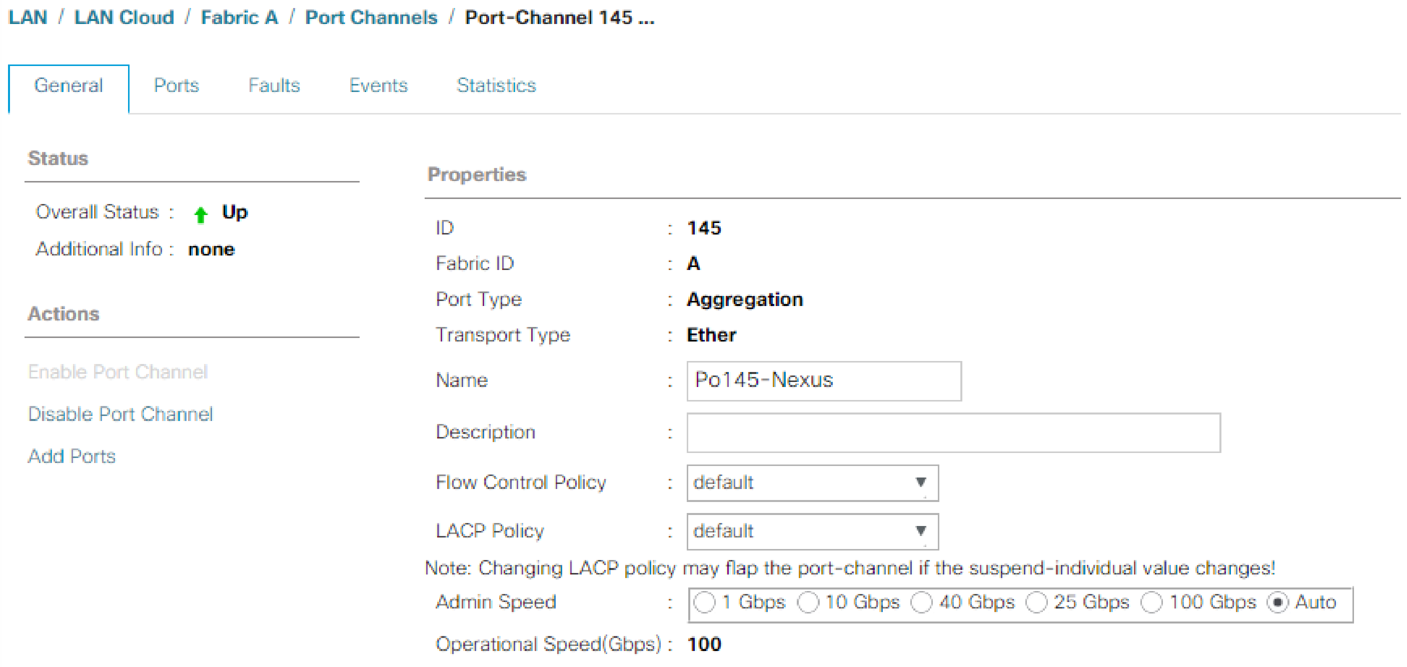
Ports in the port channel

Slot ID	Aggr. Po...	Port	MAC
1	0	45	00:3A:9...
1	0	46	00:3A:9...
1	0	47	00:3A:9...
1	0	48	00:3A:9...

10. Click Finish to create the port channel.

11. Click OK.

12. In the navigation pane, under LAN > LAN Cloud > Fabric A > Port Channels, choose Port-Channel 145. Ensure Auto is selected for the Admin Speed. After a few minutes, verify that the Overall Status is Up, and the Operational Speed is correct.



LAN / LAN Cloud / Fabric A / Port Channels / Port-Channel 145 ...

Status

Overall Status : Up

Additional Info : none

Actions

Properties

ID	: 145
Fabric ID	: A
Port Type	: Aggregation
Transport Type	: Ether
Name	: Po145-Nexus
Description	:
Flow Control Policy	: default
LACP Policy	: default

Note: Changing LACP policy may flap the port-channel if the suspend-individual value changes!

Admin Speed : ○ 1 Gbps ○ 10 Gbps ○ 40 Gbps ○ 25 Gbps ○ 100 Gbps ● Auto

Operational Speed(Gbps) : 100

13. In the navigation pane, under LAN > LAN Cloud, expand the Fabric B tree.

14. Right-click Port Channels under Fabric B.

15. Choose Create Port Channel.

16. Enter `146` as the unique ID of the port channel.

17. Enter `Po146-Nexus` as the name of the port channel.

18. Click Next.

19. Choose the ports connected to the Nexus switches to be added to the port channel:

20. Click >> to add the ports to the port channel.

21. Click Finish to create the port channel.

22. Click OK.

23. In the navigation pane, under LAN > LAN Cloud > Fabric B > Port Channels, choose Port-Channel 146. Ensure Auto is selected for the Admin Speed. After a few minutes, verify that the Overall Status is Up, and the Operational Speed is correct.

24. In the navigation pane, under LAN > LAN Cloud > Fabric A > Port Channels, expand Port-Channel 145. Under Port-Channel 145, choose Eth Interface 1/45. In the center pane under Properties, en-

ter a User Label to indicate the port connectivity, such as <nexus-a-hostname>:Eth1/21. Click Save Changes and OK. Repeat this process for the remaining seven uplink ports.

Add UDLD to Uplink Port Channels

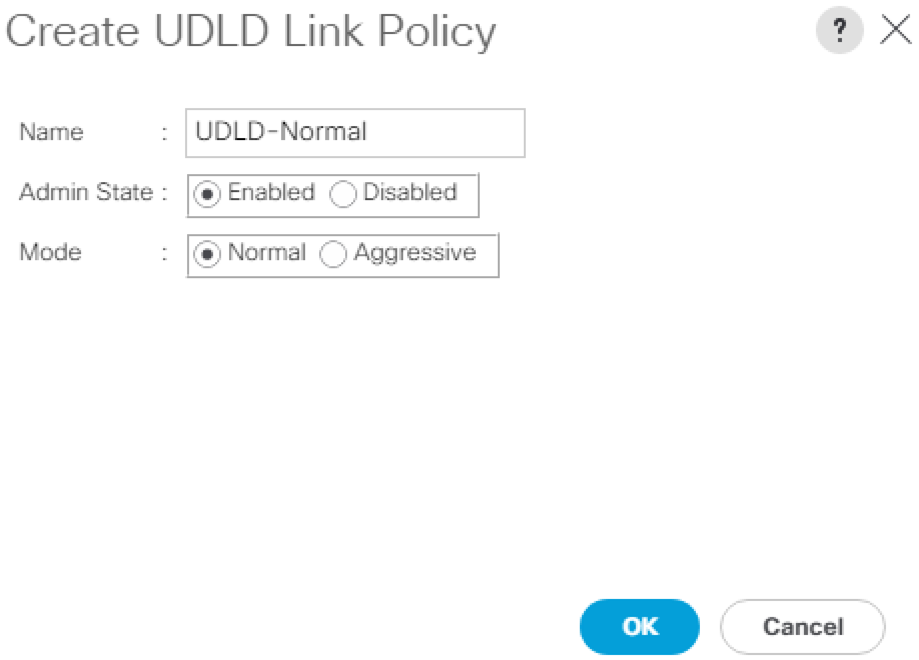
To configure the unidirectional link detection (UDLD) on the Uplink Port Channels to the Cisco Nexus switches for fibre optic connections, follow these steps:

1. In Cisco UCS Manager, click LAN.

2. Expand Policies > LAN Cloud > UDLD Link Policy.

3. Right-click UDLD Link Policy and choose Create UDLD Link Policy.

4. Name the Policy UDLD-Normal and choose Enabled for the Admin State and Normal for the Mode.



Create UDLD Link Policy

Name : UDLD-Normal

Admin State : ● Enabled ○ Disabled

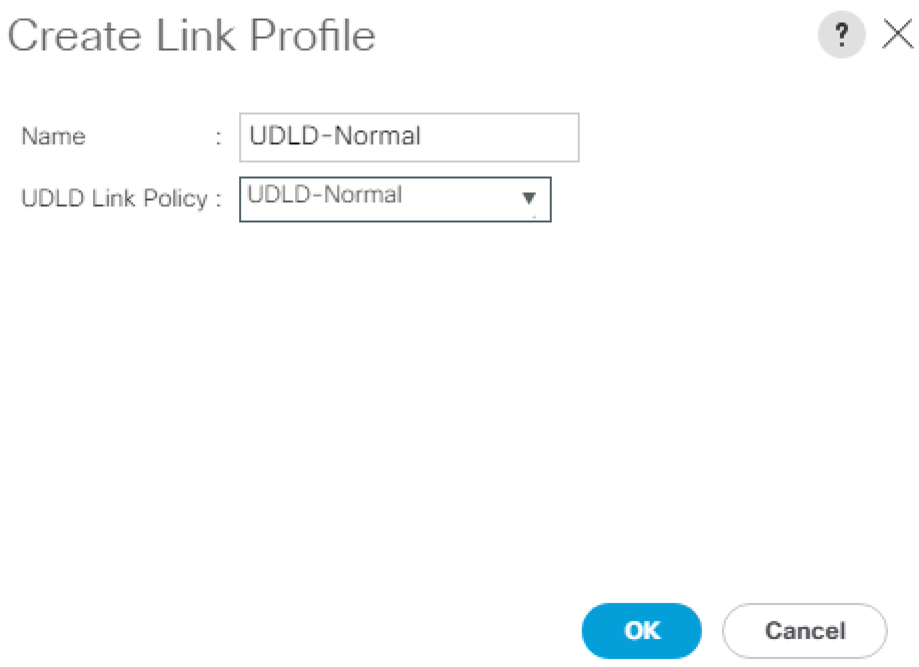
Mode : ● Normal ○ Aggressive

5. Click OK, then click OK again to complete creating the policy.

6. Expand Policies > LAN Cloud > Link Profile.

7. Right-click Link Profile and choose Create Link Profile.

8. Name the Profile UDLD-Normal and choose the UDLD-Normal Link Policy created above.



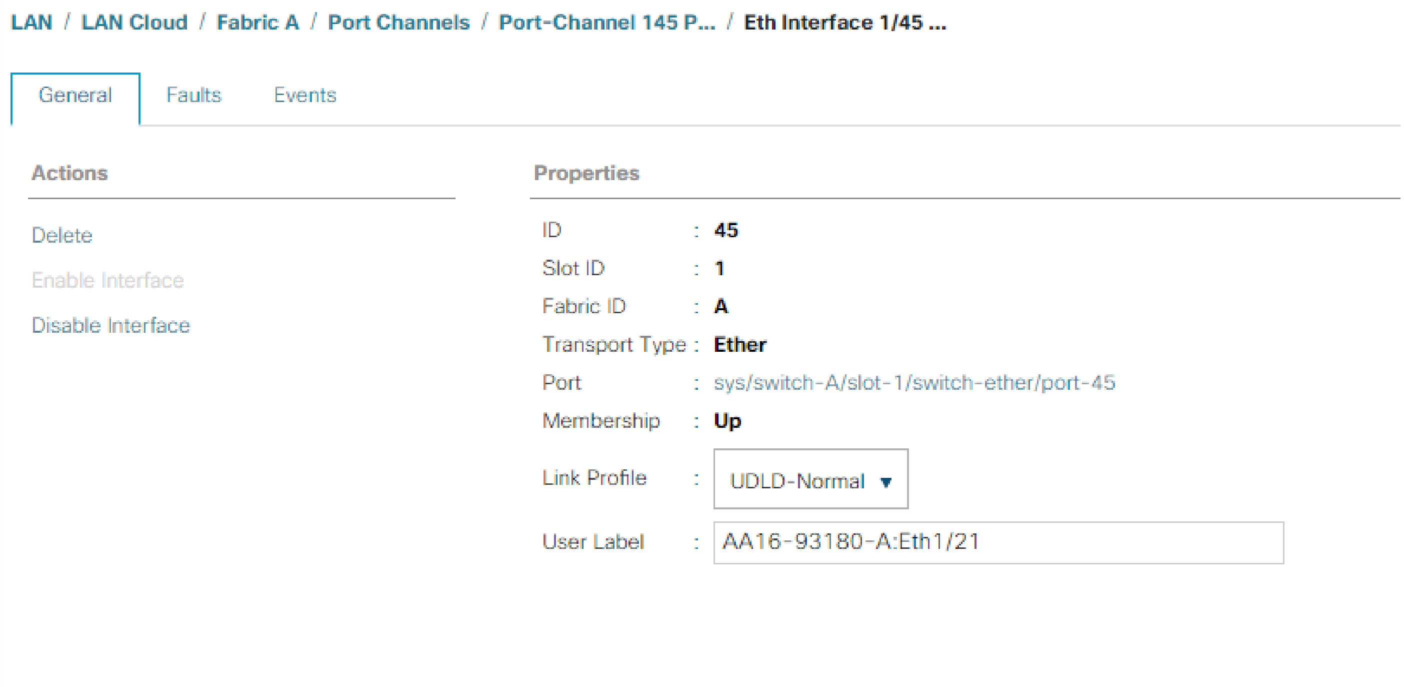
Create Link Profile

Name : UDLD-Normal

UDLD Link Policy : UDLD-Normal

9. Click OK, then click OK again to complete creating the profile.

10. In the navigation pane, under LAN > LAN Cloud > Fabric A > Port Channels, expand Port-Channel 145. Choose the first Eth Interface under Port-Channel 145. From the drop-down list, choose the UDLD-Normal Link Profile created above, click Save Changes and OK. Repeat this process for each Eth Interface under Port-Channel 145 and for each Eth Interface under Port-Channel 146 on Fabric B.

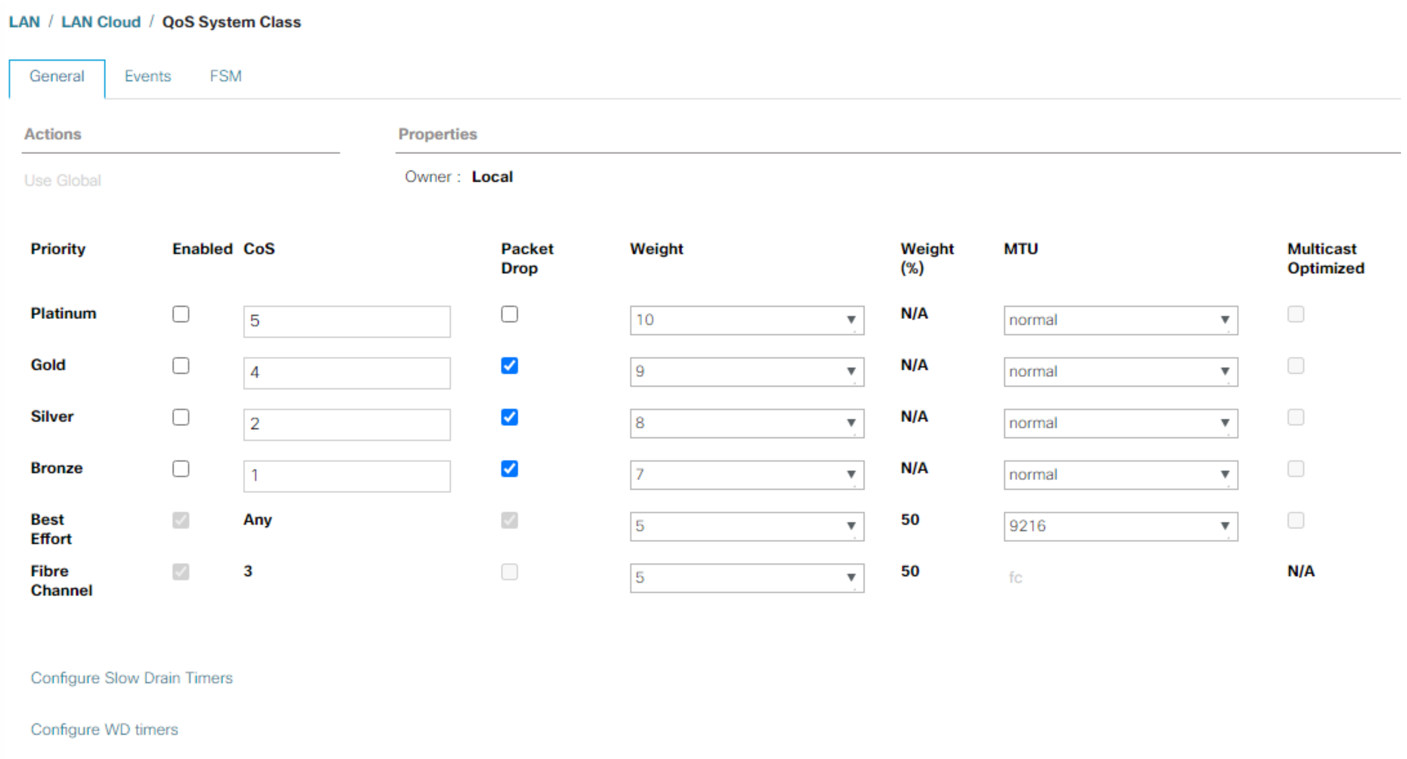

LAN / LAN Cloud / Fabric A / Port Channels / Port-Channel 145 P... / Eth Interface 1/45 ...

ID : 45
Slot ID : 1
Fabric ID : A
Transport Type : Ether
Port : sys/switch-A/slot-1/switch-ether/port-45
Membership : Up
Link Profile : UDLD-Normal
User Label : AA16-93180-A:Eth1/21

Set Jumbo Frames in Cisco UCS Fabric

Jumbo Frames are used in FlexPod for the NFS and iSCSI storage protocols. The normal best practice in FlexPod has been to set the MTU of the Best Effort QoS System Class in Cisco UCS Manager to 9216 for Jumbo Frames. In the Cisco UCS 6454 Fabric Interconnect with Cisco UCS Manager version 4.0 software the MTU for the Best Effort QoS System Class is fixed at normal and cannot be changed. With this setting of normal in the 6454, Jumbo Frames can pass through the Cisco UCS fabric without being dropped. In Cisco UCS Manager version 4.1 and above, the MTU for the Best Effort QoS System Class is again settable. To configure jumbo frames in the Cisco UCS fabric, follow these steps:

1. In Cisco UCS Manager, click LAN.
2. Expand LAN > LAN Cloud > QoS System Class.
3. In the right pane, click the General tab.
4. On the Best Effort row, enter 9216 in the box under the MTU column.
5. Click Save Changes.
6. Click OK.



LAN / LAN Cloud / QoS System Class

Owner : Local

Priority	Enabled	CoS	Packet Drop	Weight	Weight (%)	MTU	Multicast Optimized
Platinum	☐	5	☐	10	N/A	normal	☐
Gold	☐	4	☑	9	N/A	normal	☐
Silver	☐	2	☑	8	N/A	normal	☐
Bronze	☐	1	☑	7	N/A	normal	☐
Best Effort	☑	Any	☑	5	50	9216	☐
Fibre Channel	☑	3	☐	5	50	fc	N/A

Only the Fibre Channel and Best Effort QoS System Classes are enabled in this FlexPod implementation. The Cisco UCS and Cisco Nexus switches are intentionally configured this way so that all IP traffic within the FlexPod will be treated as Best Effort. Enabling the other QoS System Classes without having a comprehensive, end-to-end QoS setup in place can cause difficult to troubleshoot issues. For example, NetApp storage controllers by default mark IP-based, VLAN-tagged packets with a CoS value of 4. With the default configuration on the Nexus switches in this implementation, storage packets will pass through the switches and into the Cisco UCS Fabric Interconnects with CoS 4 set in the packet header. If the Gold QoS System Class in the Cisco UCS is enabled and the corresponding CoS value left at 4, these storage packets will be treated according to that class and if Jumbo Frames is being used for the storage protocols, but the MTU of the Gold QoS System Class is not set to Jumbo (9216), packet drops will occur. Also, if the Platinum class is enabled, the MTU must be set to 9216 to use Jumbo Frames in that class.

Create VLANs

To configure the necessary virtual local area networks (VLANs) for the Cisco UCS environment, follow these steps:

1. In Cisco UCS Manager, click LAN.

In this procedure, six unique VLANs are created. See Table2.

2. Expand LAN > LAN Cloud.

3. Right-click VLANs.

4. Choose Create VLANs.

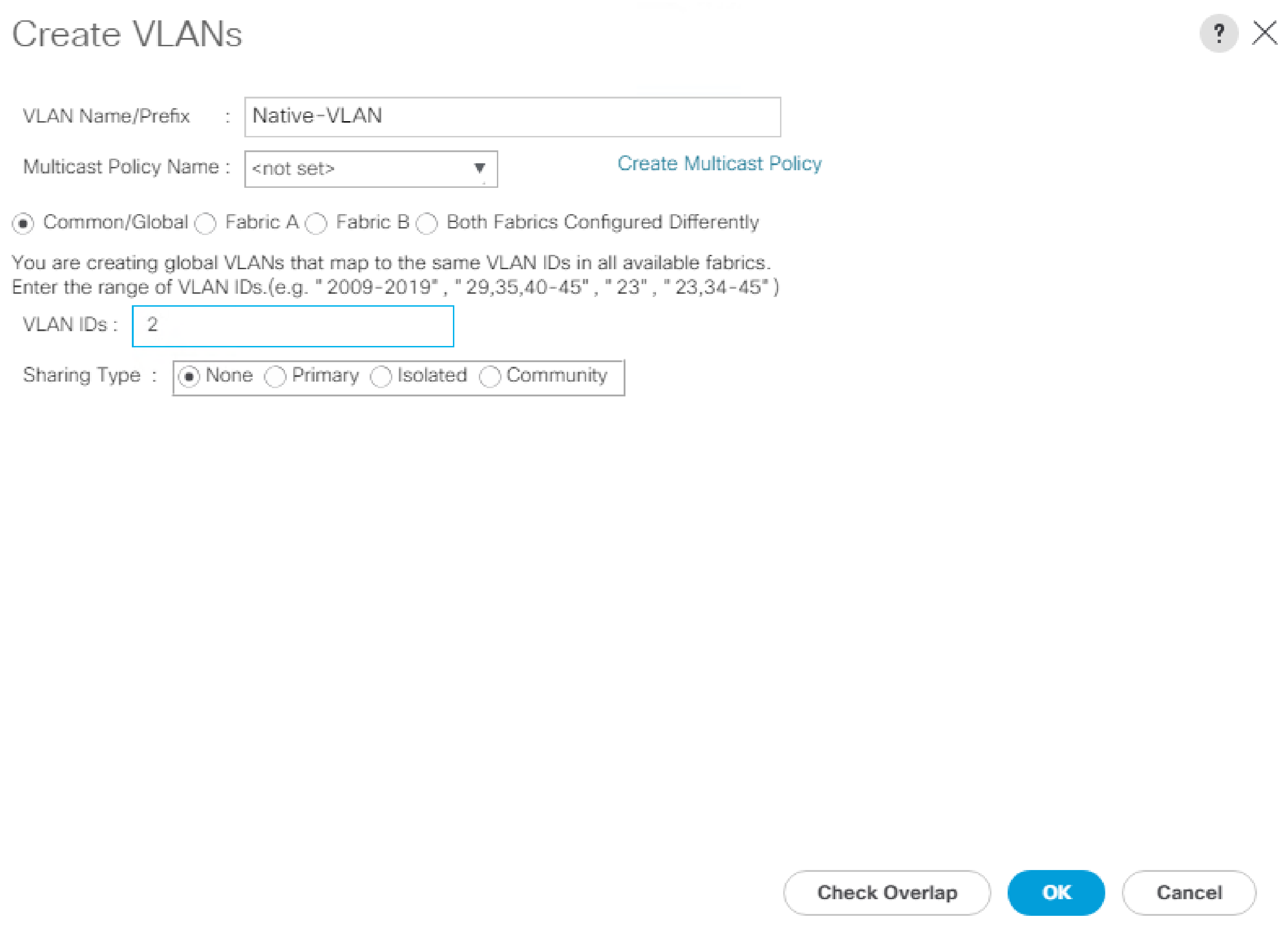
5. Enter Native-VLAN as the name of the VLAN to be used as the native VLAN.

6. Keep the Common/Global option selected for the scope of the VLAN.

7. Enter the native VLAN ID.

8. Keep the Sharing Type as None.

9. Click OK and then click OK again.



Create VLANs

VLAN Name/Prefix : Native-VLAN

Multicast Policy Name : <not set>

● 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 ○ Community

10. Expand the list of VLANs in the navigation pane, right-click the newly created Native-VLAN and choose Set as Native VLAN.

11. Click Yes and then click OK.

12. Right-click VLANs.

13. Choose Create VLANs

14. Enter IB-MGMT as the name of the VLAN to be used for management traffic.

Modify these VLAN names as necessary for your environment.

15. Keep the Common/Global option selected for the scope of the VLAN.

16. Enter the In-Band management VLAN ID.

17. Keep the Sharing Type as None.

18. Click OK, and then click OK again.

19. Right-click VLANs.

20. Choose Create VLANs.

21. Enter OOB-MGMT as the name of the VLAN to be used for Out-of-Band Management.

22. Keep the Common/Global option selected for the scope of the VLAN.

23. Enter the Infrastructure OOB-MGMT VLAN ID.

24. Keep the Sharing Type as None.

25. Click OK, and then click OK again.

26. Right-click VLANs.

27. Choose Create VLANs.

28. Enter Infra-NFS as the name of the VLAN to be used for NFS.

29. Keep the Common/Global option selected for the scope of the VLAN.

30. Enter the Infrastructure NFS VLAN ID.

31. Keep the Sharing Type as None.

32. Click OK, and then click OK again.

33. Right-click VLANs.

34. Choose Create VLANs.

35. Enter vMotion as the name of the VLAN to be used for vMotion.

36. Keep the Common/Global option selected for the scope of the VLAN.

37. Enter the vMotion VLAN ID.

38. Keep the Sharing Type as None.

39. Click OK and then click OK again.

40. Choose Create VLANs.

41. Enter VM-Traffic as the name of the VLAN to be used for VM Traffic.

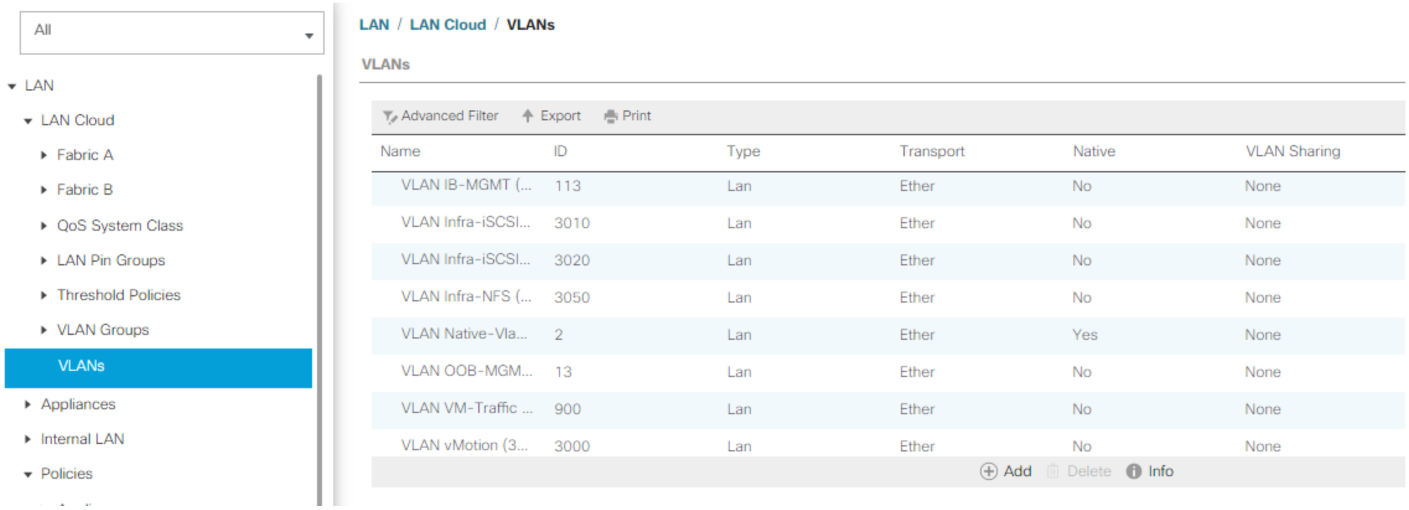
42. Keep the Common/Global option selected for the scope of the VLAN.

43. Enter the VM-Traffic VLAN ID.

44. Keep the Sharing Type as None.

45. Click OK and then click OK again.

While the Infra-iSCSI VLANs are included in the Appendix, they are also shown below.



Name	ID	Type	Transport	Native	VLAN Sharing
VLAN IB-MGMT (...	113	Lan	Ether	No	None
VLAN Infra-iSCSI...	3010	Lan	Ether	No	None
VLAN Infra-iSCSI...	3020	Lan	Ether	No	None
VLAN Infra-NFS (...	3050	Lan	Ether	No	None
VLAN Native-Vla...	2	Lan	Ether	Yes	None
VLAN OOB-MGM...	13	Lan	Ether	No	None
VLAN VM-Traffic ...	900	Lan	Ether	No	None
VLAN vMotion (3...	3000	Lan	Ether	No	None

Create MAC Address Pools

In this FlexPod implementation, MAC address pools are created at the root organization level to avoid MAC address pool overlaps. If your deployment plan calls for different MAC address ranges in different UCS organizations, place the MAC pools at the organizational level. To configure the necessary MAC address pools for the Cisco UCS environment, follow these steps:

1. In Cisco UCS Manager, click LAN.

2. Expand Pools > root.

In this procedure, two MAC address pools are created, one for each switching fabric.

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

4. Choose Create MAC Pool to create the MAC address pool.

5. Enter MAC-Pool-A as the name of the MAC pool.

6. Optional: Enter a description for the MAC pool.

7. Choose Sequential as the option for Assignment Order.

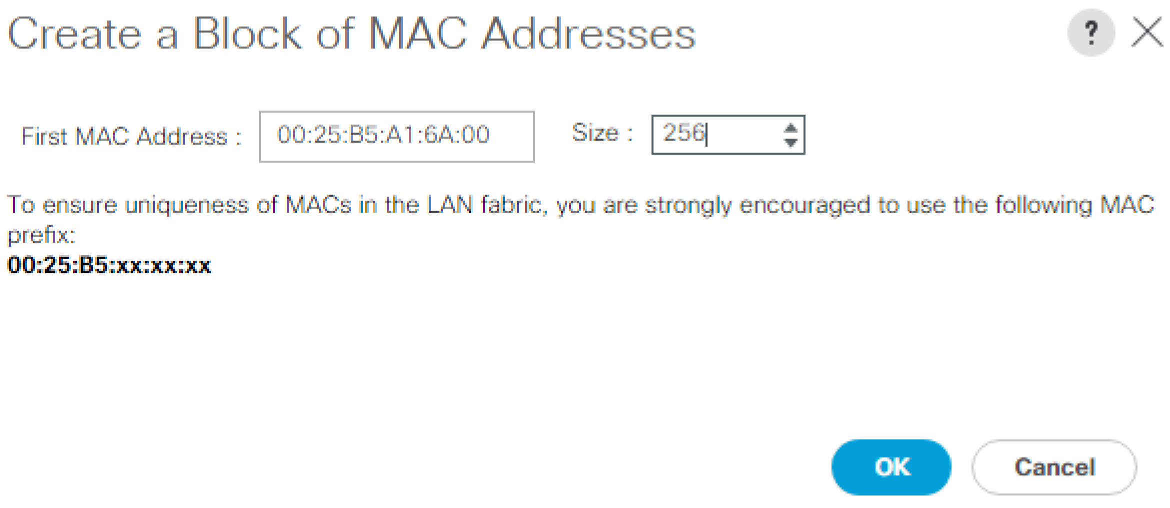
8. Click Next.

9. Click Add.

10. Specify a starting MAC address.

For the FlexPod solution, the recommendation is to place A in the next-to-last octet of the starting MAC address to identify all of the MAC addresses as fabric A addresses. In our example, we have carried forward the example of also embedding the cabinet number information giving us `00:25:B5:A1:6A:00` as our first MAC address.

11. Specify a size for the MAC address pool that is sufficient to support the available blade or server resources remembering that a server may contain multiple vNICs and that multiple unassociated Service Profiles can be created. In this example, with the MAC block modification, a maximum of 256 addresses are available.



Create a Block of MAC Addresses

First MAC Address : 00:25:B5:A1:6A:00 Size : 256

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

12. Click OK.

13. Click Finish.

14. In the confirmation message, click OK.

15. Right-click MAC Pools under the root organization.

16. Choose Create MAC Pool to create the MAC address pool.

17. Enter MAC-Pool-B as the name of the MAC pool.

18. Optional: Enter a description for the MAC pool.

19. Choose Sequential as the option for Assignment Order.

20. Click Next.

21. Click Add.

22. Specify a starting MAC address.

For the FlexPod solution, it is recommended to place B in the next to last octet of the starting MAC address to identify all the MAC addresses in this pool as fabric B addresses. Once again, we carried forward our example of also embedding the cabinet number information giving us `00:25:B5:A1:6B:00` as our first MAC address.

23. Specify a size for the MAC address pool that is sufficient to support the available blade or server resources remembering that a server may contain multiple vNICs and that multiple unassociated

Service Profiles can be created. In this example, with the MAC block modification, a maximum of 256 addresses are available.

24. Click OK.

25. Click Finish.

26. In the confirmation message, click OK.

Create Network Control Policy for Cisco Discovery Protocol (CDP) and Link Layer Discovery Protocol (LLDP)

To create a network control policy that enables CDP and LLDP on server virtual network controller (vNIC) ports, follow these steps:

1. In Cisco UCS Manager, click LAN.

2. Expand Policies > root.

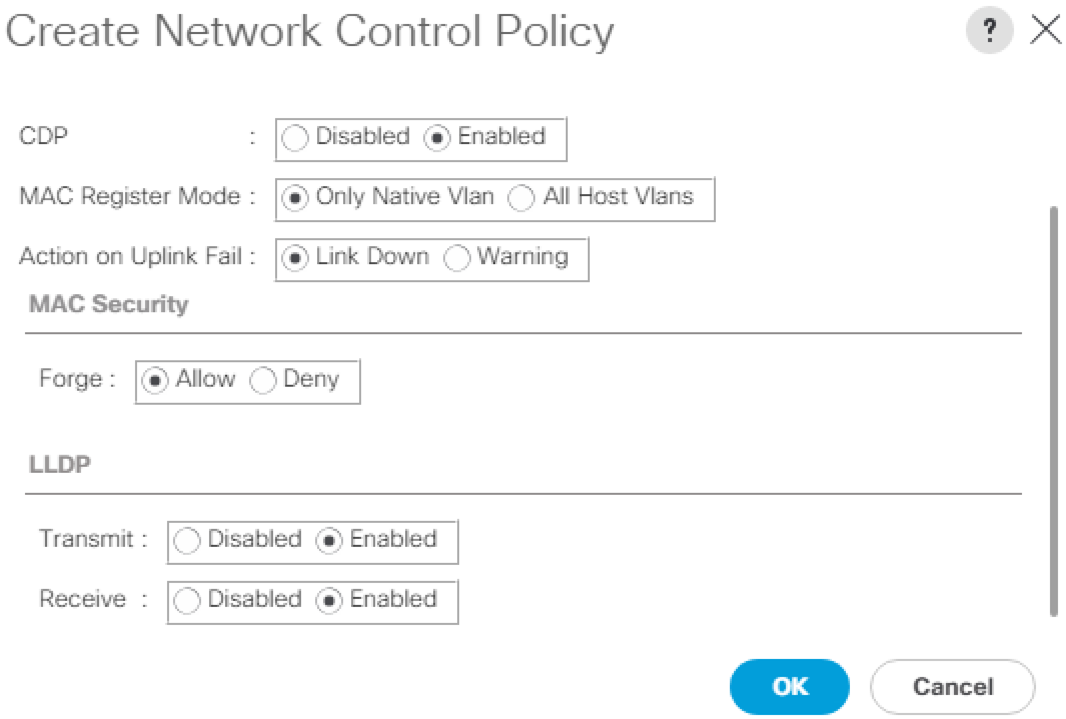
3. Right-click Network Control Policies.

4. Choose Create Network Control Policy.

5. Enter Enable-CDP-LLDP as the policy name.

6. For CDP, choose the Enabled option.

7. For LLDP, scroll down and choose Enabled for both Transmit and Receive.



Create Network Control Policy

CDP : ○ Disabled ● Enabled

MAC Register Mode : ● Only Native Vlan ○ All Host Vlans

Action on Uplink Fail : ● Link Down ○ Warning

MAC Security

Forge : ● Allow ○ Deny

LLDP

Transmit : ○ Disabled ● Enabled

Receive : ○ Disabled ● Enabled

8. Click OK to create the network control policy.

9. Click OK.

Create vNIC Templates

To create multiple virtual network interface card (vNIC) templates within the FlexPod organization, follow these steps. A total of 4 vNIC Templates will be created. Two of the vNIC templates (vSwitch0-A and vSwitch0-B) will be created for vNICs to connect to VMware ESXi vSwitch0. vSwitch0 will have port groups for the IB-MGMT, OOB-MGMT, Infra-NFS, vMotion, and VM-Traffic VLANs. The third and fourth vNIC templates (vDS0-A and vDS0-B) will be created for vNICs to connect to the VMware Virtual Distributed Switch (vDS0). The vDS will have port groups for the vMotion and VM-Traffic VLANs. The vMotion VLAN is being placed on the vDS to allow QoS marking of vMotion packets to occur within the vDS if QoS policies need to be applied to vMotion in the future, and it is also left on vSwitch0. Any tenant or application VLANs can be placed on the vDS in the future.

Create Infrastructure vNIC Templates

To create the infrastructure vNIC templates, follow these steps:

1. In Cisco UCS Manager, click LAN.

2. Expand Policies > root > Sub-Organizations > FlexPod.

3. Under the FlexPod Organization, right-click vNIC Templates.

4. Choose Create vNIC Template.

5. Enter vSwitch0-A as the vNIC template name.

6. Keep Fabric A selected.

7. Do not select the Enable Failover checkbox.

8. Choose Primary Template for Redundancy Type.

9. Leave the Peer Redundancy Template set to <not set>.

10. Under Target, make sure that only the Adapter checkbox is selected.

11. Choose Updating Template as the Template Type.

12. Under VLANs, check the boxes for IB-MGMT, OOB-MGMT, Infra-NFS and vMotion VLANs.

13. Set IB-MGMT as the native VLAN.

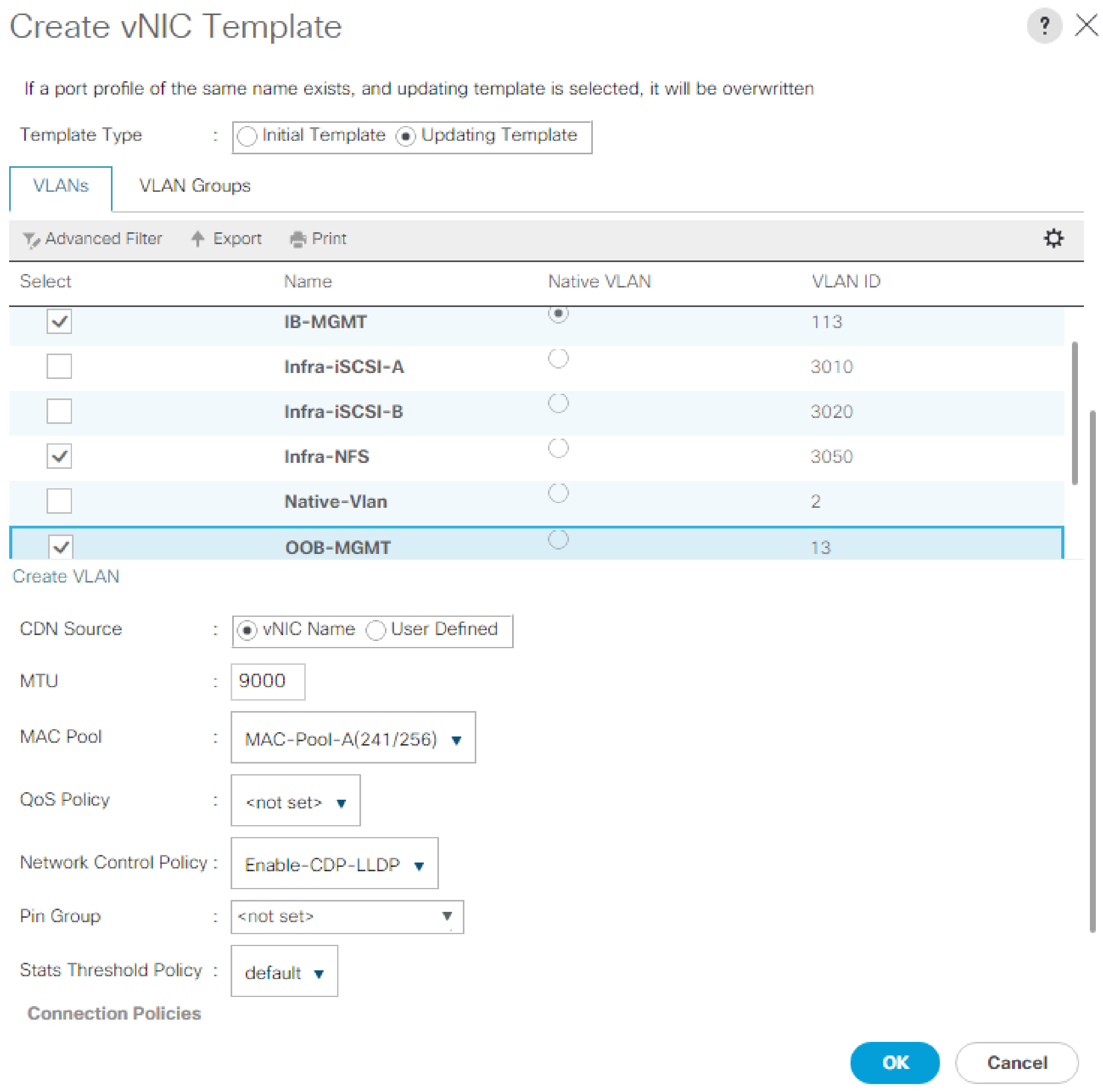
> You're setting IB-MGMT as the native VLAN here so that DHCP will work on the ESXi host without any modification. Remember to set the VLAN to 0 or not set the VLAN for any IB-MGMT port groups in VMware ESXi vSwitch0.

14. Choose vNIC Name for the CDN Source.

15. For MTU, enter 9000.

16. In the MAC Pool list, choose MAC-Pool-A.

17. In the Network Control Policy list, choose Enable-CDP-LLDP.



Create vNIC Template

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

Template Type : ○ Initial Template ● Updating Template

Select	Name	Native VLAN	VLAN ID
☑	IB-MGMT	●	113
□	Infra-iSCSI-A	○	3010
□	Infra-iSCSI-B	○	3020
☑	Infra-NFS	○	3050
□	Native-Vlan	○	2
☑	OOB-MGMT	○	13

CDN Source : ● vNIC Name ○ User Defined

MTU : 9000

MAC Pool : MAC-Pool-A(241/256) ▾

QoS Policy : <not set> ▾

Network Control Policy : Enable-CDP-LLDP ▾

Pin Group : <not set> ▾

Stats Threshold Policy : default ▾

18. Click OK to create the vNIC template.

19. Click OK.

20. Under the FlexPod organization, right-click vNIC Templates.

21. Choose Create vNIC Template.

22. Enter vSwitch0-B as the vNIC template name.

23. Choose Fabric B.

24. Do not select the Enable Failover checkbox.

25. Set Redundancy Type to Secondary Template.

26. Choose vSwitch0-A for the Peer Redundancy Template.

27. In the MAC Pool list, choose MAC-Pool-B.

> The MAC Pool is all that needs to be selected for the Secondary Template, all other values will either be propagated from the Primary Template or set at default values.

28. Click OK to create the vNIC template.

29. Click OK.

30. Under the FlexPod Organization, right-click vNIC Templates.

31. Choose Create vNIC Template.

32. Enter vDS0-A as the vNIC template name.

33. Keep Fabric A selected.

34. Do not select the Enable Failover checkbox.

35. Choose Primary Template for Redundancy Type.

36. Leave the Peer Redundancy Template set to <not set>.

37. Under Target, make sure that only the Adapter checkbox is selected.

38. Choose Updating Template as the Template Type.

39. Under VLANs, choose the checkboxes for vMotion, VM-Traffic, and Native-VLAN VLANs.

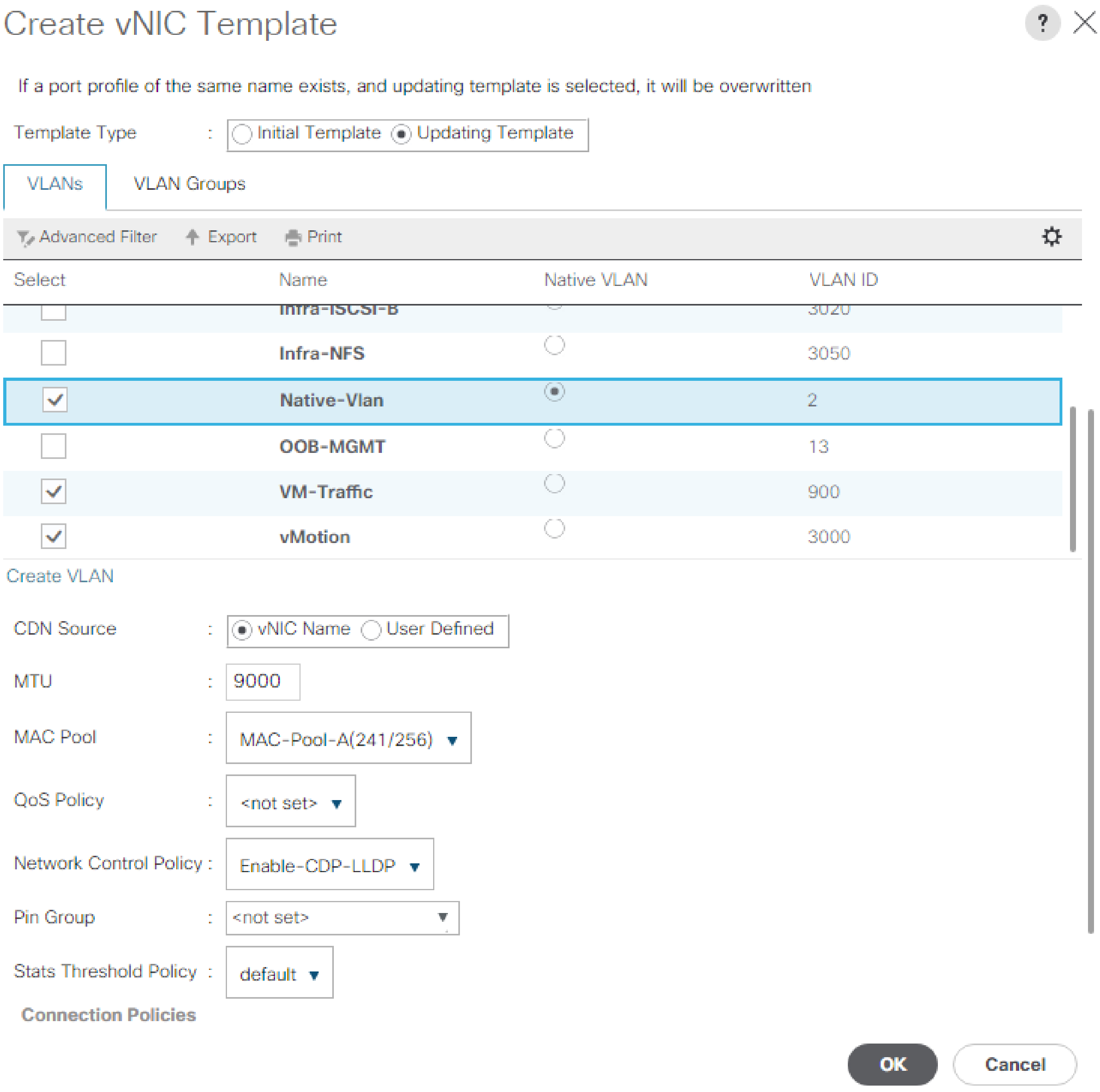
40. Set Native-VLAN as the native VLAN.

41. Choose vNIC Name for the CDN Source.

42. For MTU, enter 9000.

43. In the MAC Pool list, choose MAC-Pool-A.

44. In the Network Control Policy list, choose Enable-CDP-LLDP.



Create vNIC Template

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

Template Type : ○ Initial Template ● Updating Template

Select	Name	Native VLAN	VLAN ID
□	Infra-iSCSI-B	○	3020
□	Infra-NFS	○	3050
☑	Native-Vlan	●	2
□	OOB-MGMT	○	13
☑	VM-Traffic	○	900
☑	vMotion	○	3000

CDN Source : ● vNIC Name ○ User Defined

MTU : 9000

MAC Pool : MAC-Pool-A(241/256)

QoS Policy : <not set>

Network Control Policy : Enable-CDP-LLDP

Pin Group : <not set>

Stats Threshold Policy : default

45. Click OK to create the vNIC template.

46. Click OK.

47. Under the FlexPod organization, right-click vNIC Templates.

48. Choose Create vNIC Template.

49. Enter vDS0-B as the vNIC template name.

50. Choose Fabric B.

51. Do not select the Enable Failover checkbox.

52. Set Redundancy Type to Secondary Template.

53. Choose vDS0-A for the Peer Redundancy Template.

54. In the MAC Pool list, choose MAC-Pool-B.

The MAC Pool is all that needs to be selected for the Secondary Template, all other values will either be propagated from the Primary Template or set at default values.

55. Click OK to create the vNIC template.

56. Click OK.

Create High Traffic VMware Adapter Policy

To create the optional VMware-High-Traffic Ethernet Adapter policy to provide higher vNIC performance, follow these steps:

This Ethernet Adapter policy can be attached to vNICs when creating the LAN Connectivity policy for vNICs that have large amounts of traffic on multiple flows or TCP sessions. This policy provides more hardware receive queues handled by multiple CPUs to the vNIC.

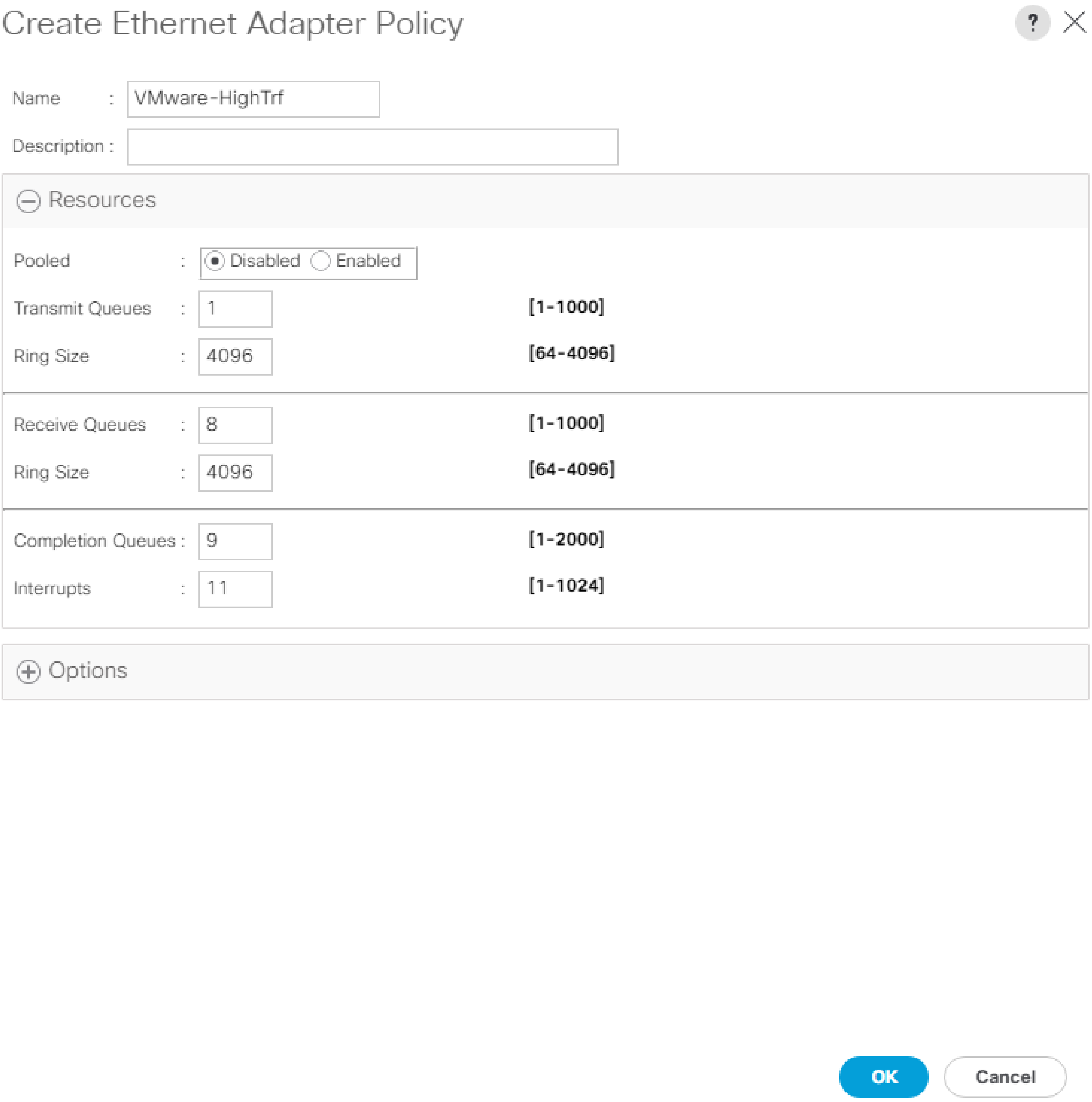
1. In Cisco UCS Manager, click Servers.

2. Expand Policies > root.

3. Right-click Adapter Policies and choose Create Ethernet Adapter Policy.

4. Name the policy VMware-HighTrf.

5. Expand Resources and set the values as shown below.



Create Ethernet Adapter Policy

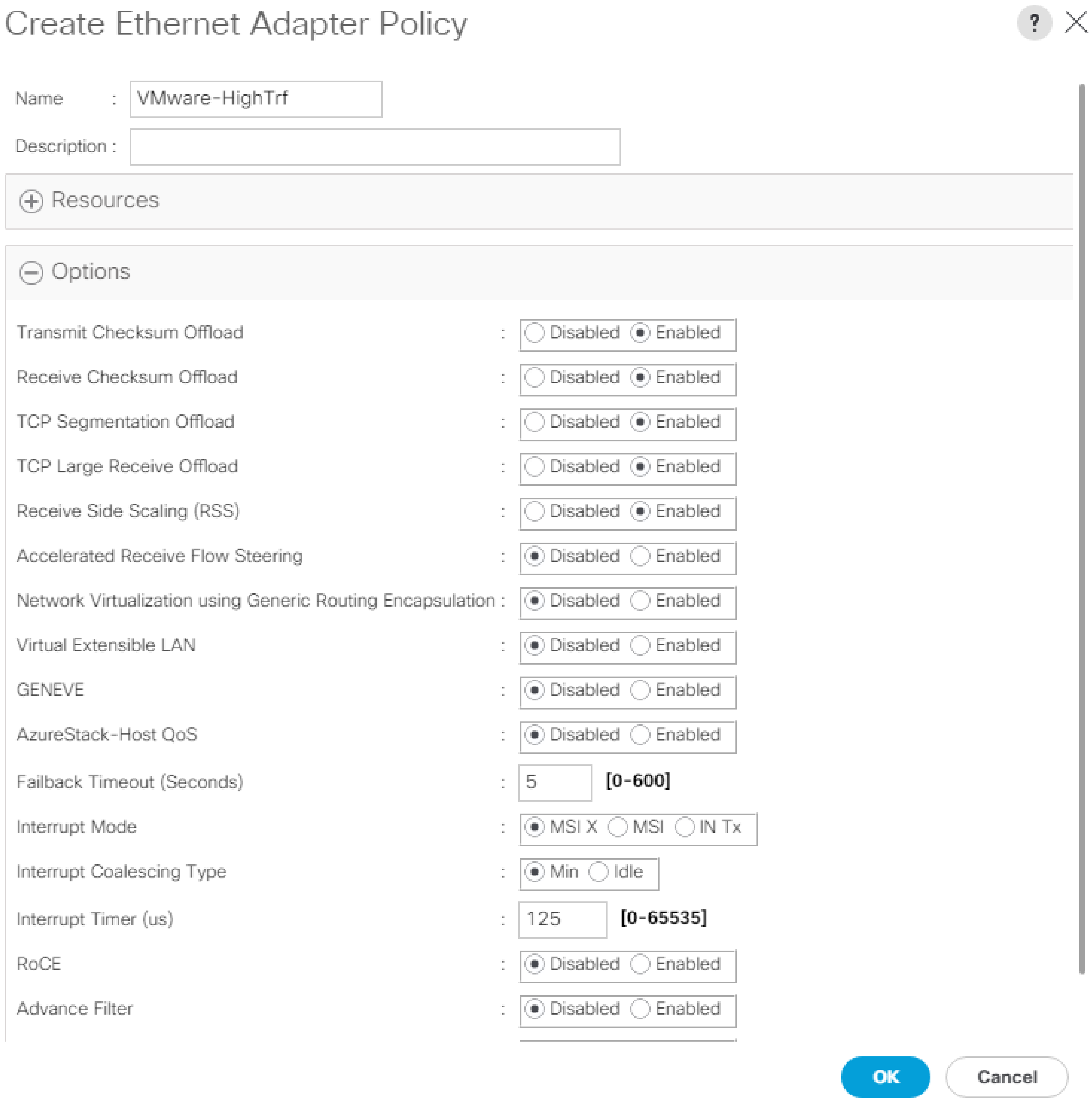
Name	VMware-HighTrf	
Description		

Resources

Pooled	● Disabled ○ Enabled	
Transmit Queues	1	[1-1000]
Ring Size	4096	[64-4096]
Receive Queues	8	[1-1000]
Ring Size	4096	[64-4096]
Completion Queues	9	[1-2000]
Interrupts	11	[1-1024]

In this policy, Receive Queues can be set to 1-16. Completion Queues = Transmit Queues + Receive Queues. Interrupts = Completion Queues + 2. For more information, see: https://www.cisco.com/c/en/us/products/collateral/interfaces-modules/unified-computing-system-adapters/white-paper-c11-744754.html.

6. Expand Options and choose Enabled for Receive Side Scaling (RSS).



Create Ethernet Adapter Policy

Name : VMware-HighTrf

Description :

⊕ Resources

⊖ Options

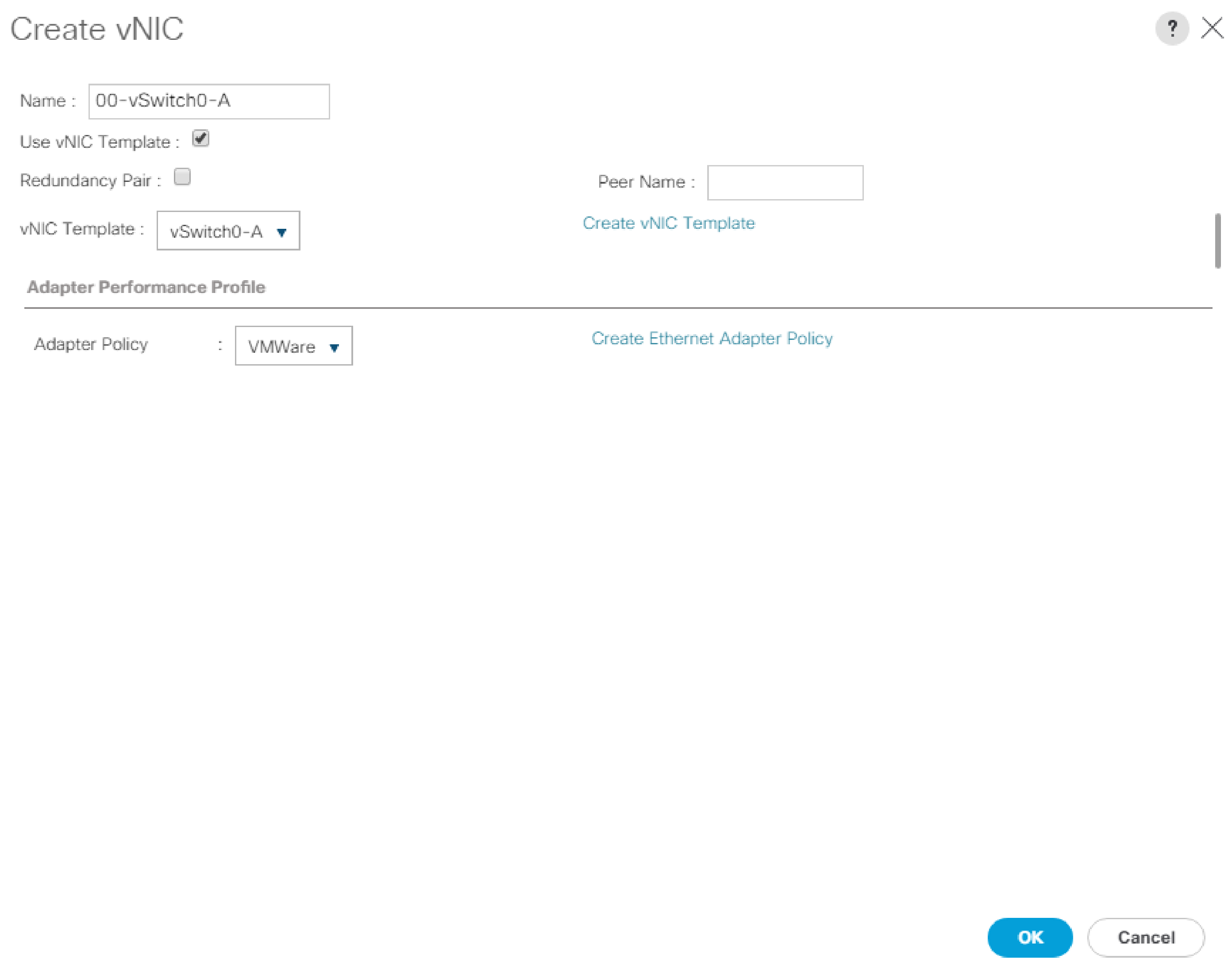
Transmit Checksum Offload :	○ Disabled ● Enabled
Receive Checksum Offload :	○ Disabled ● Enabled
TCP Segmentation Offload :	○ Disabled ● Enabled
TCP Large Receive Offload :	○ Disabled ● Enabled
Receive Side Scaling (RSS) :	○ Disabled ● Enabled
Accelerated Receive Flow Steering :	● Disabled ○ Enabled
Network Virtualization using Generic Routing Encapsulation :	● Disabled ○ Enabled
Virtual Extensible LAN :	● Disabled ○ Enabled
GENEVE :	● Disabled ○ Enabled
AzureStack-Host QoS :	● Disabled ○ Enabled
Failback Timeout (Seconds) :	5 [0-600]
Interrupt Mode :	● MSI X ○ MSI ○ IN Tx
Interrupt Coalescing Type :	● Min ○ Idle
Interrupt Timer (us) :	125 [0-65535]
RoCE :	● Disabled ○ Enabled
Advance Filter :	● Disabled ○ Enabled

7. Click OK, then click OK again to complete creating the Ethernet Adapter Policy.

Create LAN Connectivity Policy for FC Boot (FCP)

To configure the necessary Infrastructure LAN Connectivity Policy within the FlexPod organization, follow these steps:

1. In Cisco UCS Manager, click LAN.
2. Expand LAN > Policies > root > Sub-Organizations > FlexPod.
3. Under the FlexPod Organization, right-click LAN Connectivity Policies.
4. Choose Create LAN Connectivity Policy.
5. Enter FCP-Boot as the name of the policy.
6. Click Add to add a vNIC.
7. In the Create vNIC dialog box, enter 00-vSwitch0-A as the name of the vNIC.
8. Check the box for Use vNIC Template.
9. In the vNIC Template list, choose vSwitch0-A.
10. In the Adapter Policy list, choose VMWare.



Create vNIC

Name : 00-vSwitch0-A

Use vNIC Template : ☑

Redundancy Pair : □

Peer Name :

vNIC Template : vSwitch0-A ▼

Adapter Performance Profile

Adapter Policy : VMWare ▼

11. Click OK to add this vNIC to the policy.

12. Click Add to add another vNIC to the policy.

13. In the Create vNIC box, enter 01-vSwitch0-B as the name of the vNIC.

14. Check the box for the Use vNIC Template.

15. In the vNIC Template list, choose vSwitch0-B.

16. In the Adapter Policy list, choose VMWare.

17. Click OK to add the vNIC to the policy.

18. Click Add to add another vNIC to the policy.

19. In the Create vNIC dialog box, enter 02-vDS0-A as the name of the vNIC.

20. Check the box for Use vNIC Template.

21. In the vNIC Template list, choose vDS0-A.

22. In the Adapter Policy list, choose VMWare-HighTrf.

The VMware Adapter Policy can also be selected for this vNIC.

23. Click OK to add this vNIC to the policy.

24. Click Add to add another vNIC to the policy.

25. In the Create vNIC box, enter 03-vDS0-B as the name of the vNIC.

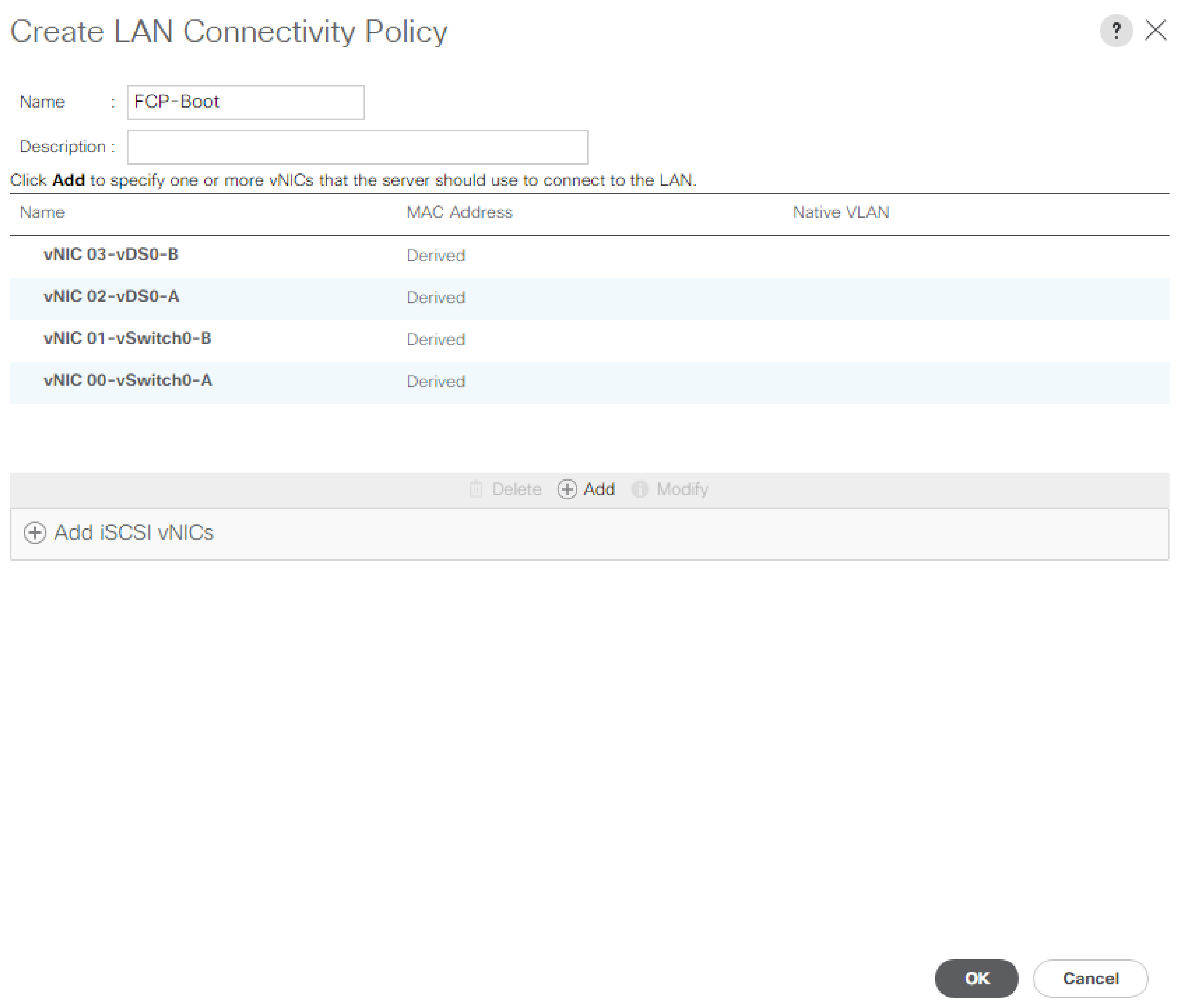
26. Check the box for Use vNIC Template.

27. In the vNIC Template list, choose vDS0-B.

28. In the Adapter Policy list, choose VMWare-HighTrf.

Choose the same Adapter Policy that was selected for 02-Infra-vDS-A.

29. Click OK to add this vNIC to the policy.



Create LAN Connectivity Policy

Name : FCP-Boot

Description :

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

Name	MAC Address	Native VLAN
vNIC 03-vDS0-B	Derived	
vNIC 02-vDS0-A	Derived	
vNIC 01-vSwitch0-B	Derived	
vNIC 00-vSwitch0-A	Derived	

30. Click OK, then click OK again to create the LAN Connectivity Policy.

Create Server Pool

To configure the necessary server pool for the Cisco UCS environment in the FlexPod Organization, follow these steps:

> Consider creating unique server pools to achieve the granularity that is required in your environment.

1. In Cisco UCS Manager, click Servers.

2. Expand Pools > root > Sub-Organizations > FlexPod.

3. Right-click Server Pools under the FlexPod Organization.

4. Choose Create Server Pool.

5. Enter Infra-Pool as the name of the server pool.

6. Optional: Enter a description for the server pool.

7. Click Next.

8. Choose three (or more) servers to be used for the VMware management cluster and click >> to add them to the Infra-Pool server pool.

Although the VMware minimum host cluster size is two, in most use cases three servers are recommended.

9. Click Finish.

10. Click OK.

Create UUID Suffix Pool

To configure the necessary universally unique identifier (UUID) suffix pool for the Cisco UCS environment, follow these steps:

1. In Cisco UCS Manager, click Servers.

2. Expand Pools > root.

3. Right-click UUID Suffix Pools.

4. Choose Create UUID Suffix Pool.

5. Enter UUID-Pool as the name of the UUID suffix pool.

6. Optional: Enter a description for the UUID suffix pool.

7. Keep the prefix at the derived option.

8. Choose Sequential for the Assignment Order.

9. Click Next.

10. Click Add to add a block of UUIDs.

11. Keep the From field at the default setting.

12. Specify a size for the UUID block that is sufficient to support the available blade or server resources and the number of Service Profiles that will be created.

13. Click OK.

14. Click Finish.

15. Click OK.

Modify Default Host Firmware Package

Firmware management policies allow the administrator to choose the corresponding packages for a given server configuration. These policies often include packages for adapter, BIOS, board controller, FC adapters, host bus adapter (HBA) option ROM, and storage controller properties.

To modify the default firmware management policy in the Cisco UCS environment, follow these steps:

1. In Cisco UCS Manager, click Servers.

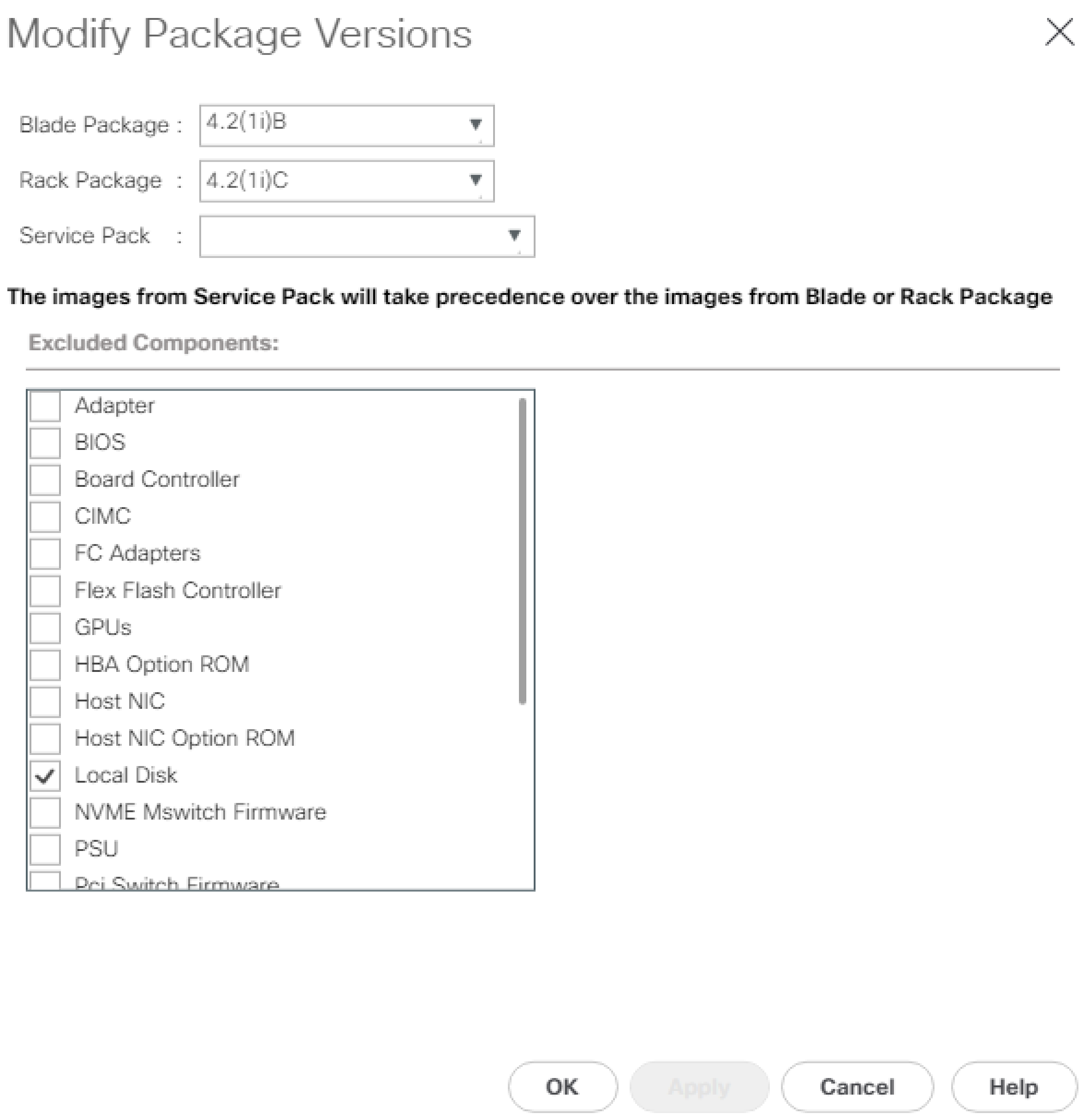
2. Expand Policies > root.

3. Expand Host Firmware Packages.

4. Choose default.

5. In the Actions pane, choose Modify Package Versions.

6. Choose version 4.2(1i) for both the Blade and Rack Packages.


Modify Package Versions

Blade Package : 4.2(1i)B

Rack Package : 4.2(1i)C

Service Pack :

The images from Service Pack will take precedence over the images from Blade or Rack Package

Excluded Components:

- □ Adapter
- □ BIOS
- □ Board Controller
- □ CIMC
- □ FC Adapters
- □ Flex Flash Controller
- □ GPUs
- □ HBA Option ROM
- □ Host NIC
- □ Host NIC Option ROM
- ☑ Local Disk
- □ NVME Mswitch Firmware
- □ PSU
- □ Pci Switch Firmware

7. Click OK, then click OK again to modify the host firmware package.

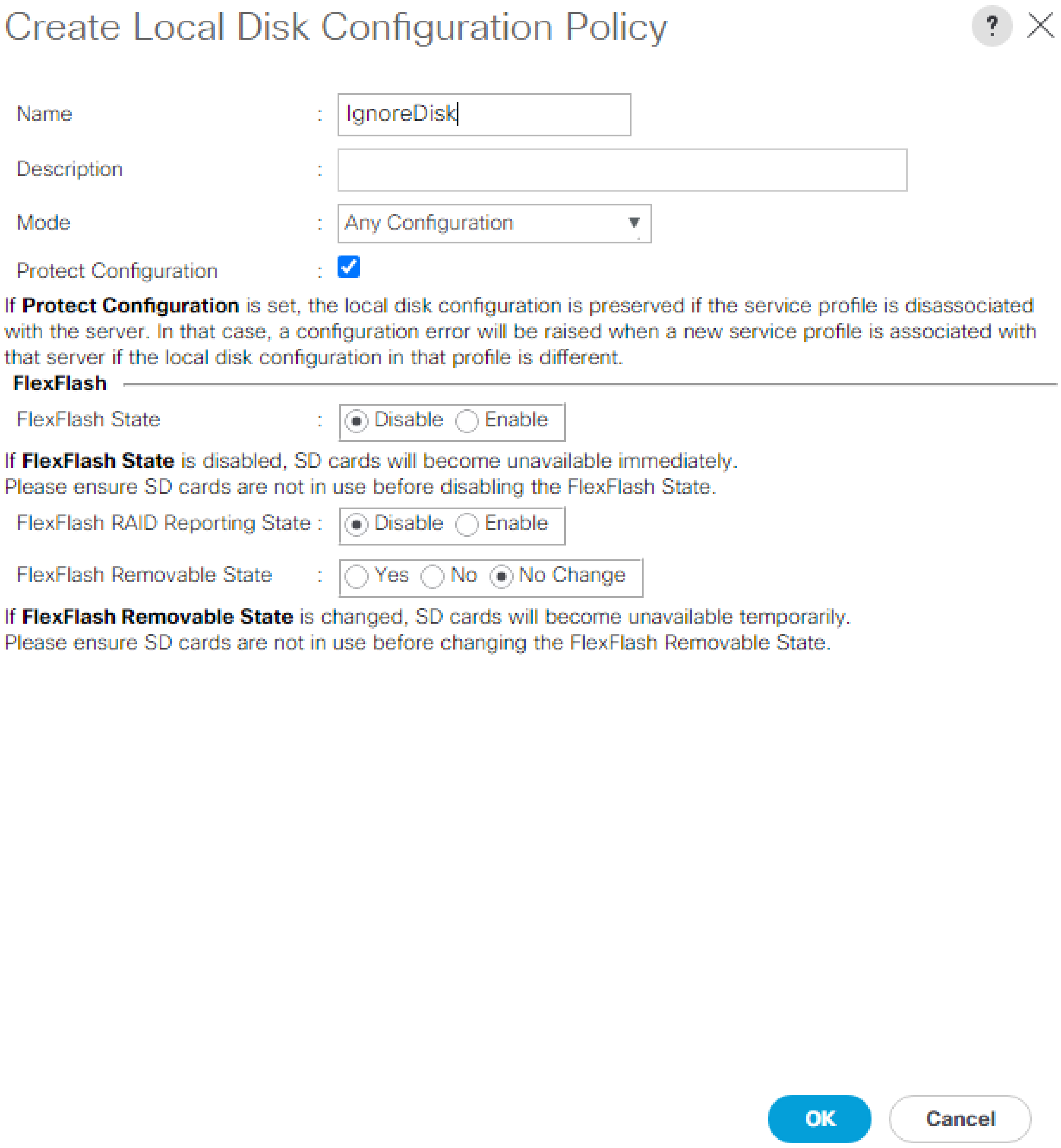
Create Local Disk Configuration Policy (Optional)

A local disk configuration specifying no local disks for the Cisco UCS environment can be used to ensure that servers with no local disks are used for SAN Boot.

> This policy should not be used on servers that contain local disks.

To create a local disk configuration policy, follow these steps:

1. In Cisco UCS Manager, click Servers.
2. Expand Policies > root.
3. Right-click Local Disk Config Policies.
4. Choose Create Local Disk Configuration Policy.
5. Enter IgnoreDisk as the local disk configuration policy name.
6. Change the mode to Any Configuration.



Create Local Disk Configuration Policy

Name : IgnoreDisk

Description :

Mode : Any Configuration

Protect Configuration : ☑

If **Protect Configuration** is set, the local disk configuration is preserved if the service profile is disassociated with the server. In that case, a configuration error will be raised when a new service profile is associated with that server if the local disk configuration in that profile is different.

FlexFlash

FlexFlash State : ● Disable ○ Enable

If **FlexFlash State** is disabled, SD cards will become unavailable immediately. Please ensure SD cards are not in use before disabling the FlexFlash State.

FlexFlash RAID Reporting State : ● Disable ○ Enable

FlexFlash Removable State : ○ Yes ○ No ● No Change

If **FlexFlash Removable State** is changed, SD cards will become unavailable temporarily. Please ensure SD cards are not in use before changing the FlexFlash Removable State.

7. Click OK to create the local disk configuration policy.

8. Click OK.

Create Power Control Policy

To create a power control policy for the Cisco UCS environment, follow these steps:

1. In Cisco UCS Manager, click Servers.

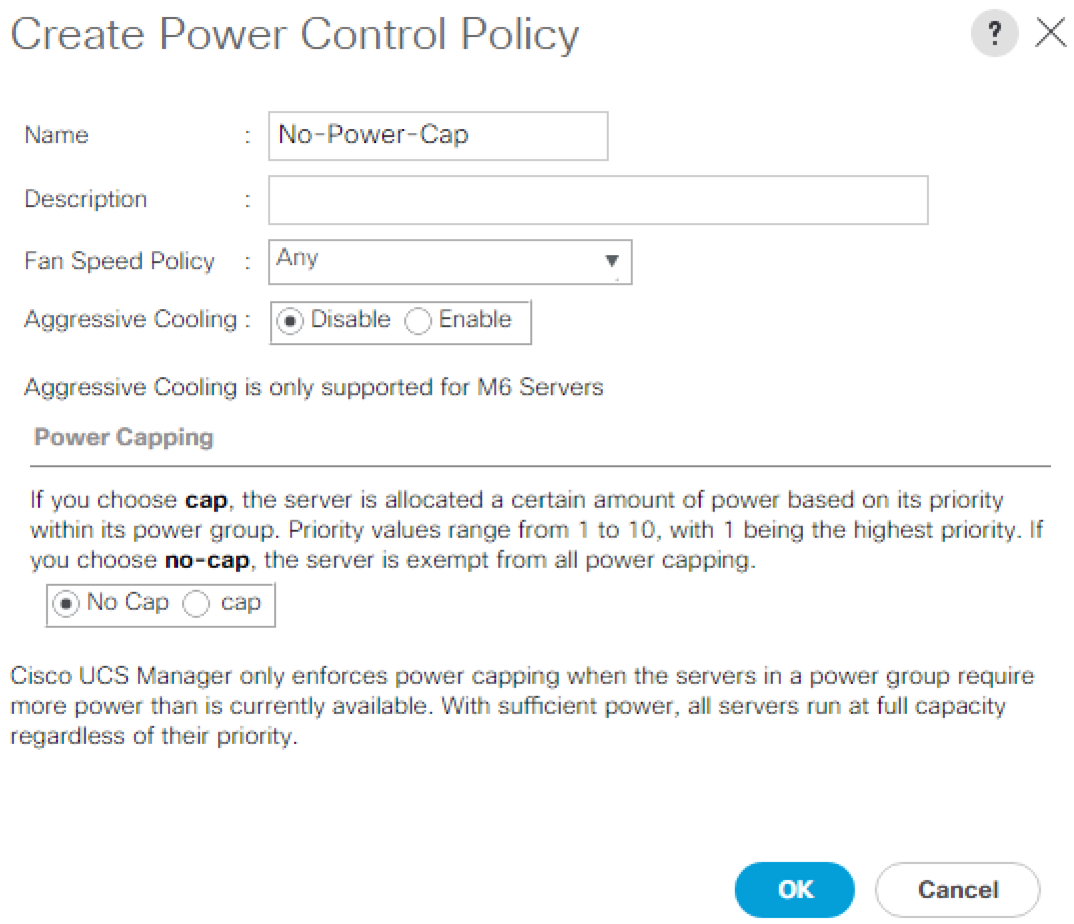
2. Expand Policies > root.

3. Right-click Power Control Policies.

4. Choose Create Power Control Policy.

5. Enter No-Power-Cap as the power control policy name.

6. Change the power capping setting to No Cap.



Create Power Control Policy

Name : No-Power-Cap

Description :

Fan Speed Policy : Any

Aggressive Cooling : ● Disable ○ Enable

Aggressive Cooling is only supported for M6 Servers

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.

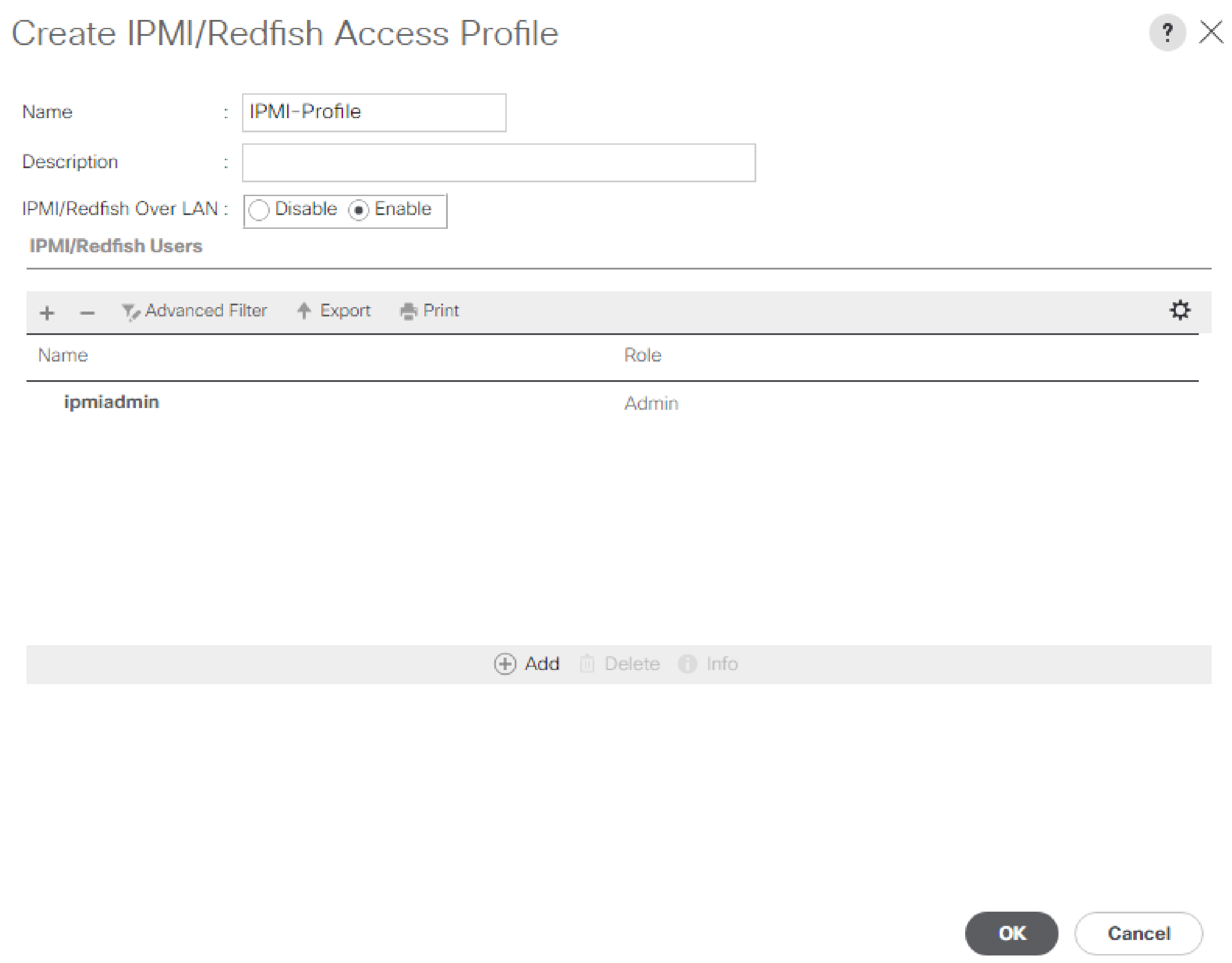
7. Click OK to create the power control policy.

8. Click OK.

Create IPMI Access Profile (Optional)

Intelligent Platform Management Interface (IPMI) is an open standard technology that defines how administrators monitor system hardware and sensors, control system components and retrieve logs of important system events to conduct remote management and recovery. IPMI runs on the BMC (Baseboard Management Controller) of the server and operates independently of the operating system. This profile will assign an IPMI user id and password to the server's CIMC and will allow the VMware Distributed Power Management (DPM) feature to power on and off ESXi hosts. This feature does typically assign a second IP from the external management or KVM management IP pool to the server. To create an IPMI Access Profile for the Cisco UCS environment, follow these steps:

1. In Cisco UCS Manager, click Servers.
2. Expand Policies > root.
3. Right-click IPMI/Redfish Access Profiles.
4. Choose Create IPMI/Redfish Access Profile.
5. Enter IPMI-Profile as the profile name.
6. Leave IPMI/Redfish Over LAN set to Enable.
7. Click Add to add an IPMI User.
8. Enter ipmiadmin as the user name.
9. Enter and confirm the ipmiadmin password.
10. Set the role to Admin and optionally enter a description for the user.
11. Click OK to add the user.



Create IPMI/Redfish Access Profile

Name : IPMI-Profile

Description :

IPMI/Redfish Over LAN : ○ Disable ● Enable

IPMI/Redfish Users

Name	Role
ipmiadmin	Admin

12. Click OK to create the profile.

13. Click OK.

Create Server Pool Qualification Policy (Optional)

To create an optional server pool qualification policy for the Cisco UCS environment, follow these steps:

This example creates a policy for Cisco UCS B200 M6 servers for a server pool.

1. In Cisco UCS Manager, click Servers.

2. Expand Policies > root.

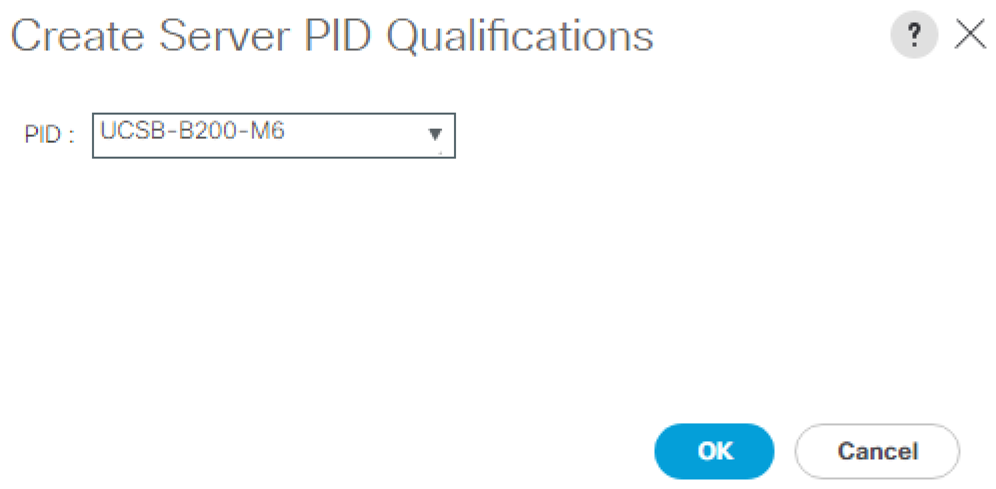
3. Right-click Server Pool Policy Qualifications.

4. Choose Create Server Pool Policy Qualification.

5. Name the policy UCS-B200M6.

6. Choose Create Server PID Qualifications.

7. Choose UCSB-B200-M6 from the PID drop-down list.



Create Server PID Qualifications

PID : UCSB-B200-M6

8. Click OK

9. Optionally, choose additional qualifications to refine server selection parameters for the server pool.

10. Click OK to create the policy then OK for the confirmation.

Update the Default Maintenance Policy

To update the default Maintenance Policy to either require user acknowledgement before server boot when service profiles change or to make the changes on the next server reboot, follow these steps:

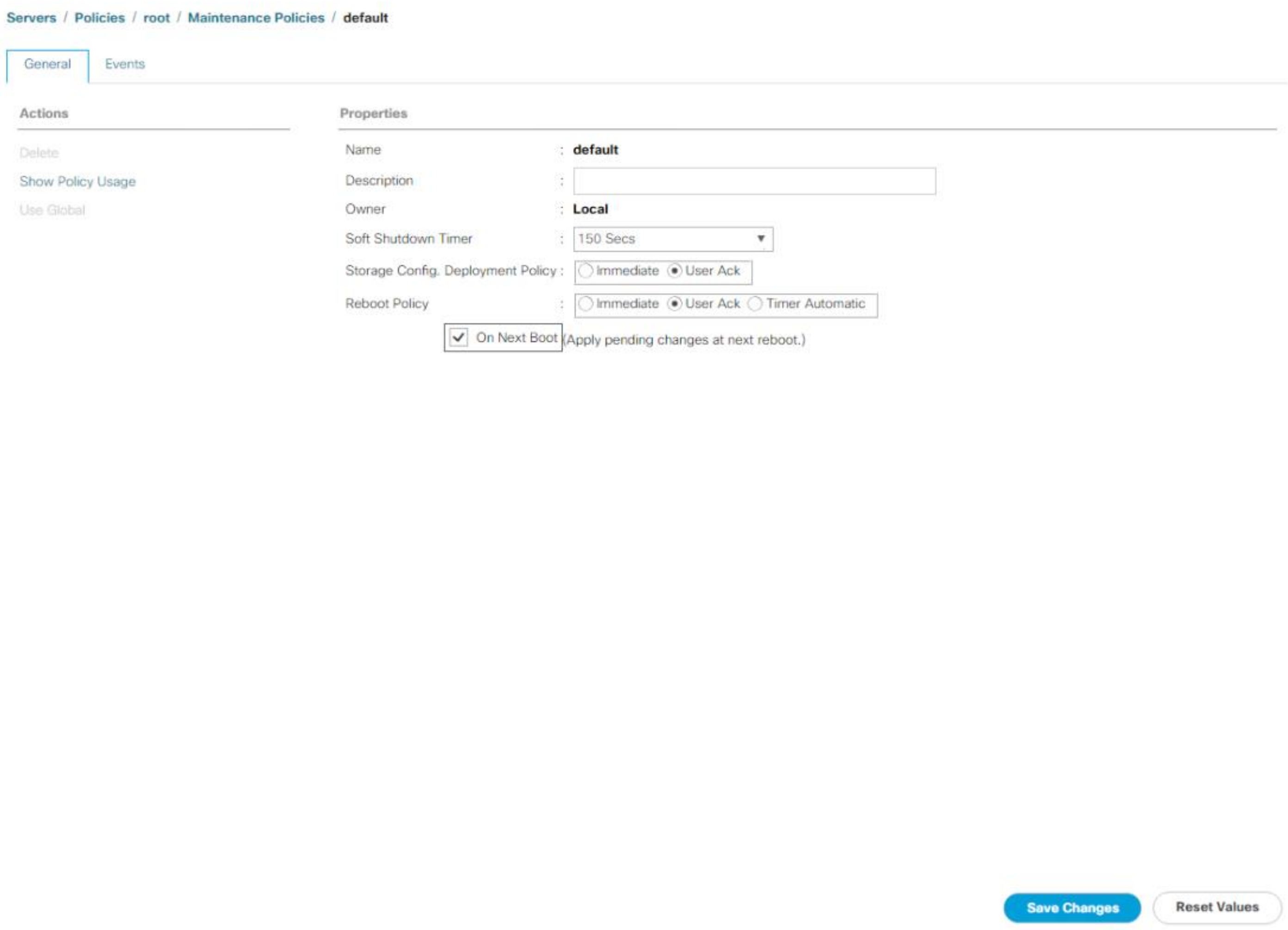
1. In Cisco UCS Manager, click Servers.

2. Expand Policies > root.

3. Choose Maintenance Policies > default.

4. Change the Reboot Policy to User Ack.

5. Choose “On Next Boot” to delegate maintenance windows to server administrators.



Name : default

Description :

Owner : Local

Soft Shutdown Timer : 150 Secs

Storage Config. Deployment Policy : ○ Immediate ● User Ack

Reboot Policy : ○ Immediate ● User Ack ○ Timer Automatic

☑ On Next Boot (Apply pending changes at next reboot.)

6. Click Save Changes.

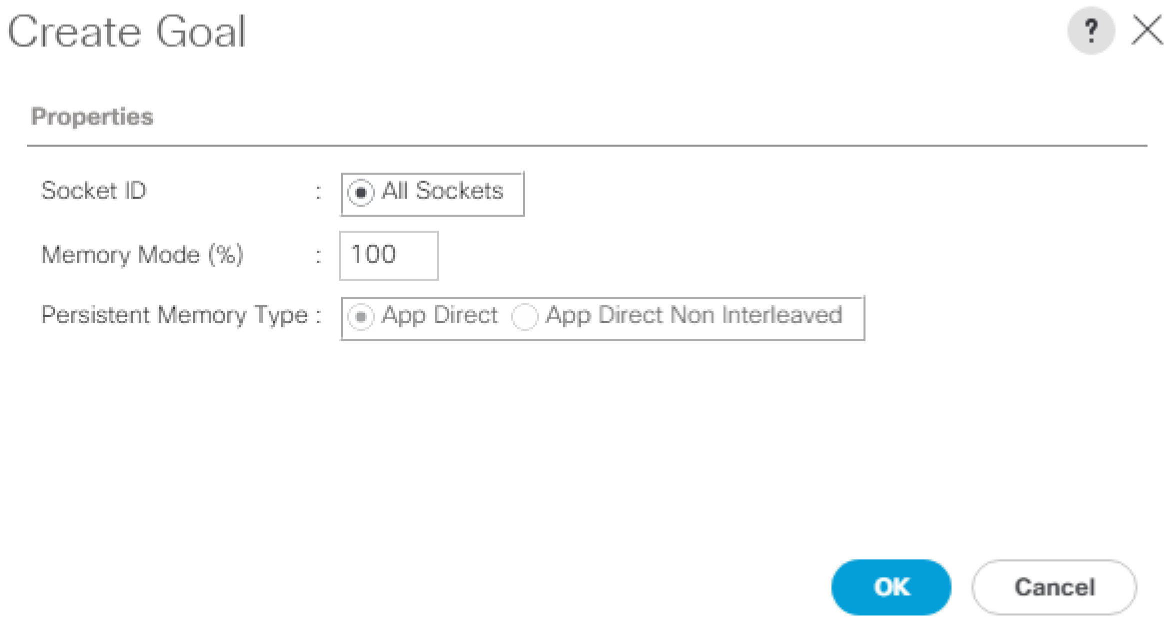
7. Click OK to accept the changes.

Create Memory Mode Persistent Memory Policy (Optional)

If any servers in your environment are equipped with Intel Optane DC Persistent Memory (PMEM), a Persistent Memory Policy should be used. Intel Optane DC PMEM can be used in App Direct Mode or Memory Mode with VMware vSphere 7.0 Update 2. In a Cisco UCS server that is equipped with Intel Optane DC PMEM, if a Persistent Memory Policy is not assigned, 100 percent of the Intel Optane DC PMEM will be used in Memory Mode and the standard DIMMs in the server will be used as cache and the DIMM capacity will not be visible. In VMware vSphere 7.0 Update 2, usage of Intel Optane DC PMEM in Memory Mode is supported with certain configurations identified in vSphere Support for Intel's Optane Persistent Memory (PMEM) (67645). If you have Intel Optane DC PMEM installed in any of your servers in a configuration identified in the KB, Memory Mode is supported with VMware vSphere 7.0 Update 2. If you have Intel Optane DC PMEM installed in a server, but not in one of the supported configurations, you should use App Direct Mode.

To create a memory mode persistent memory policy, follow these steps:

1. In Cisco UCS Manager, choose Servers.
2. Expand Policies > root.
3. Right-click Persistent Memory Policy.
4. Choose Create Persistent Memory Policy.
5. Name the policy Memory-Mode.
6. Under Goals, click Add.
7. Set Memory Mode (%) to 100 and set Persistent Memory Type to App Direct.



Create Goal

Properties

Socket ID : ● All Sockets

Memory Mode (%) : 100

Persistent Memory Type : ● App Direct ○ App Direct Non Interleaved

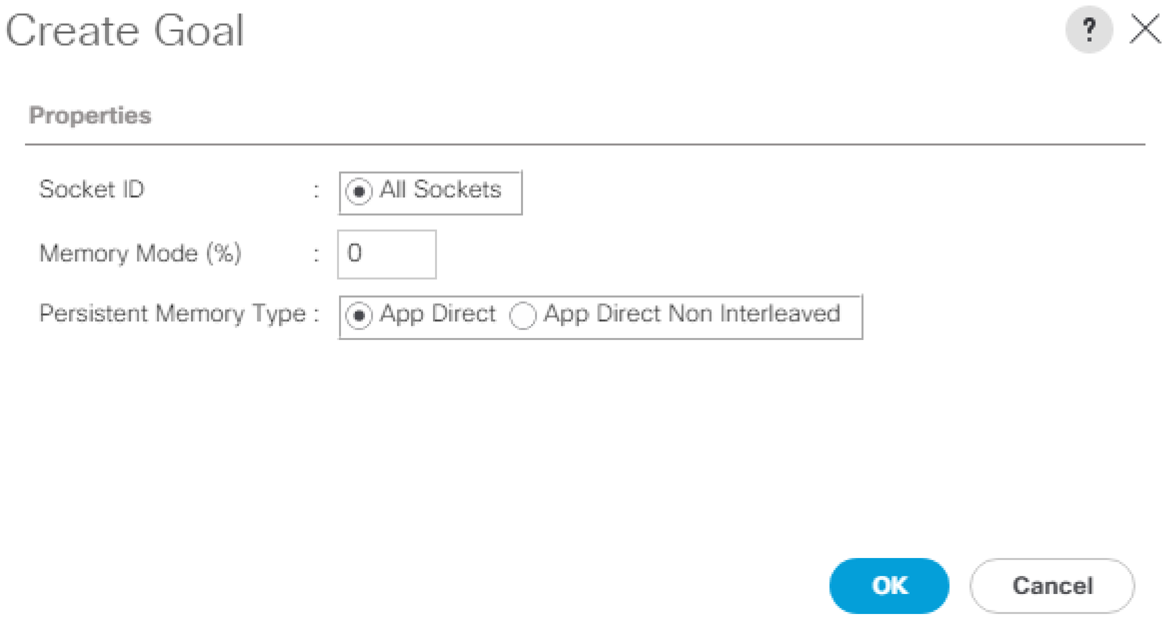
8. Click OK to complete creating the Goal.
9. Click OK to complete creating the policy and click OK on the confirmation.

Create App Direct Mode Persistent Memory Policy (Optional)

If you have Intel Optane DC PMEM installed in a server, but not in one of the supported configurations for Memory Mode, you should use App Direct Mode. You can also use App Direct Mode with any 3rd party application that supports it.

To create an app direct mode persistent memory policy, follow these steps:

1. In Cisco UCS Manager, choose Servers.
2. Expand Policies > root.
3. Right-click Persistent Memory Policy.
4. Choose Create Persistent Memory Policy.
5. Name the policy App-Direct-Mode.
6. Under Goals, click Add.
7. Leave Memory Mode (%) set to zero and Persistent Memory Type set to App Direct.



Create Goal

Properties

Socket ID : ● All Sockets

Memory Mode (%) : 0

Persistent Memory Type : ● App Direct ○ App Direct Non Interleaved

8. Click OK to complete creating the Goal.
9. Click OK to complete creating the policy and click OK on the confirmation.

VMware does not support mixed mode (partially Memory Mode and partially App Direct Mode) persistent memory policies.

Create vMedia Policy for VMware ESXi 7.0 ISO Install Boot

In the NetApp ONTAP setup steps, an HTTP web server is required, which is used for hosting ONTAP as well as VMware software. The vMedia Policy created will map the Cisco Custom Image for ESXi 7.0 U2 Install CD to the Cisco UCS server in order to boot the ESXi installation. To create this policy, follow these steps:

1. In Cisco UCS Manager, choose Servers.

2. Expand Policies > root.

3. Right-click vMedia Policies.

4. Choose Create vMedia Policy.

5. Name the policy ESXi-7U2-CC-HTTP.

6. Enter "Mounts Cisco Custom ISO for ESXi7.0U2" in the Description field.

7. Click Add to add a vMedia Mount.

8. Name the mount ESXi-7U2-CC-HTTP.

9. Choose the CDD Device Type.

10. Choose the HTTP Protocol.

11. Enter the IP Address of the web server.

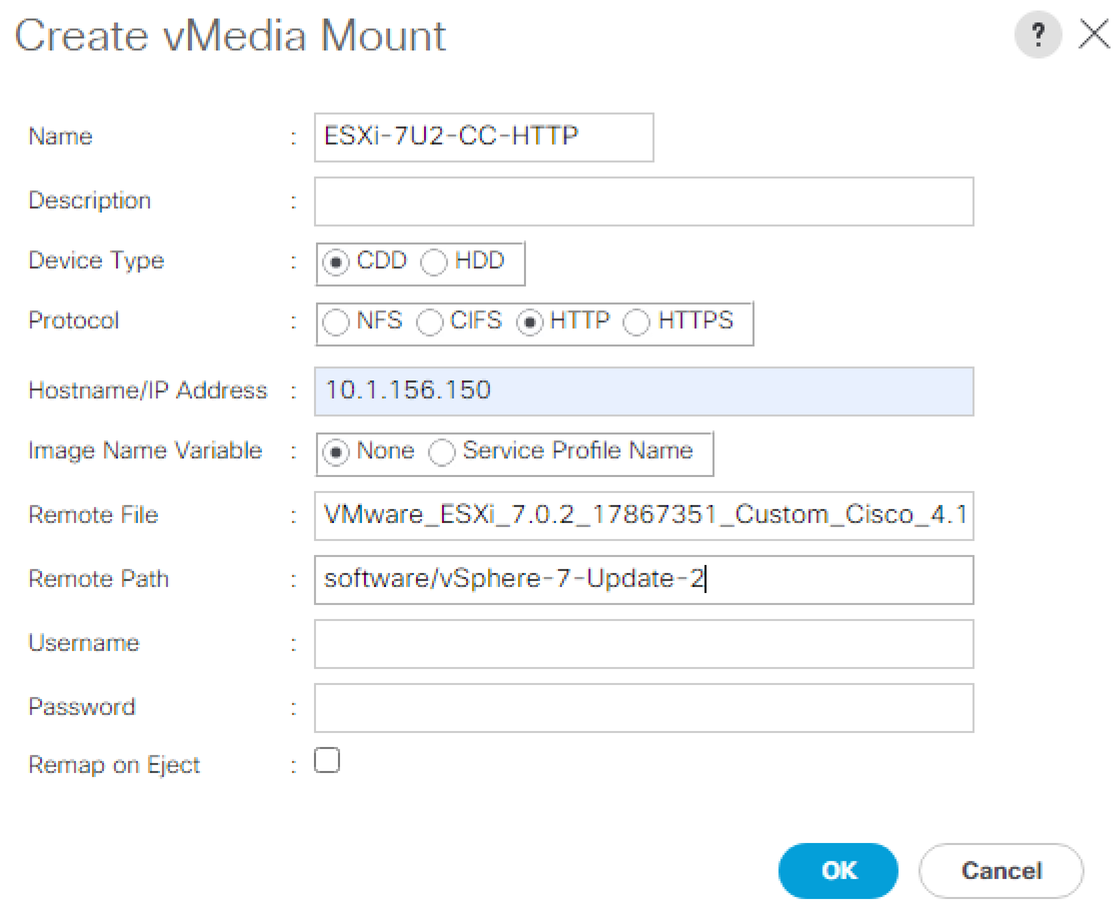
To avoid any DNS lookup issues, enter the IP of the web server instead of the hostname.

12. Enter VMware_ESXi_7.0.2_17867351_Custom_Cisco_4.1.3_a.iso as the Remote File name.

This VMware ESXi 7.0U2 Cisco Custom ISO can be downloaded from VMware Downloads.

If a working vCenter 7.0U2 installation is already in your environment, a FlexPod custom ISO for installing ESXi 7.0U2 with all necessary drivers for this FlexPod deployment can be created. Please see Create a FlexPod ESXi Custom ISO using VMware vCenter for a procedure for building this custom ISO.

13. Enter the web server path to the ISO file in the Remote Path field.



Create vMedia Mount

Name :	ESXi-7U2-CC-HTTP
Description :	
Device Type :	● CDD ○ HDD
Protocol :	○ NFS ○ CIFS ● HTTP ○ HTTPS
Hostname/IP Address :	10.1.156.150
Image Name Variable :	● None ○ Service Profile Name
Remote File :	VMware_ESXi_7.0.2_17867351_Custom_Cisco_4.1
Remote Path :	software/vSphere-7-Update-2
Username :	
Password :	
Remap on Eject :	□

14. Click OK to create the vMedia Mount.

15. Click OK then click OK again to complete creating the vMedia Policy.

For any new servers added to the Cisco UCS environment the vMedia service profile template can be used to install the ESXi host. On first boot the host will boot into the ESXi installer since the SAN mounted disk is empty. After ESXi is installed, the vMedia will not be referenced as long as the boot disk is accessible.

Create Server BIOS Policies

To create server BIOS policies for VMware ESXi hosts within the FlexPod organization, follow these steps:

In this lab validation, the Cisco UCS B200 M6 servers had TPM2.0 modules installed. To utilize TPM2.0 functionality with VMware vSphere 7.0U2, the TPM module must be enabled, and Trusted Execution Technology (TXT) disabled in BIOS. According to the Cisco UCS Server BIOS Tokens, Release 4.1 document, which is referenced from Cisco UCS Server BIOS Tokens, Release 4.2, these settings are the default or Platform Default settings for all M5 and M6 servers. Because of this, these settings do not have to be added to this BIOS policy. Three BIOS policies will be created.

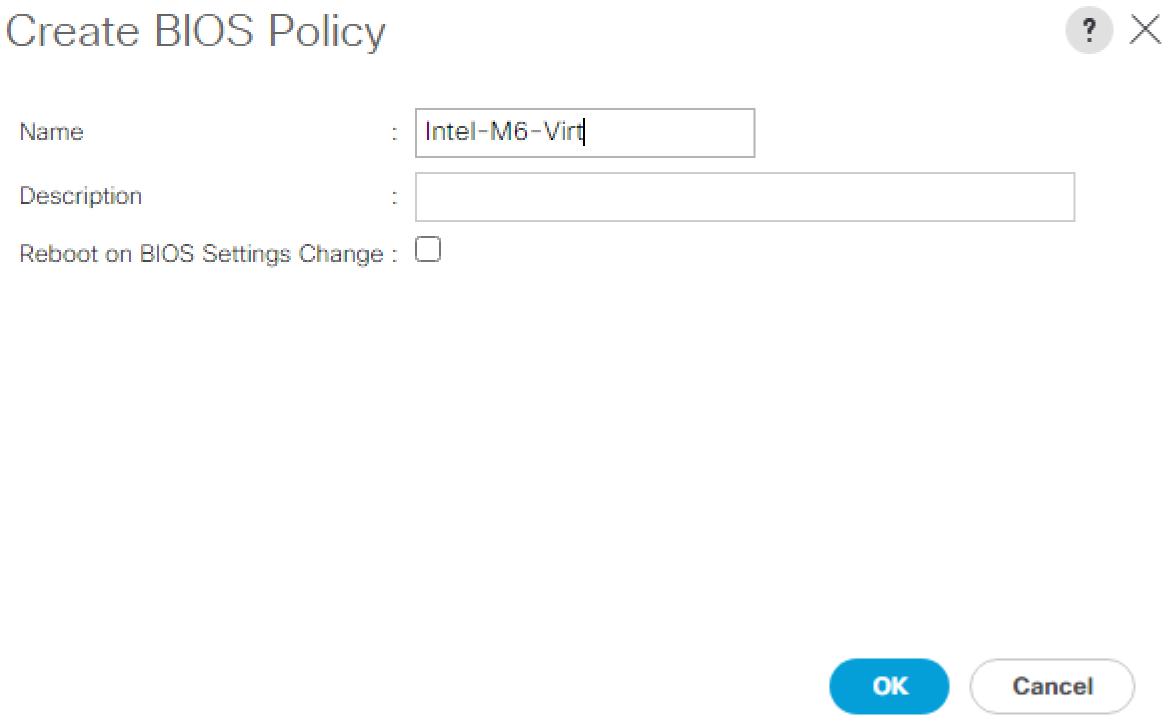
1. In Cisco UCS Manager, click Servers.

2. Expand Policies > root.

3. Right-click BIOS Policies under the root Organization.

4. Choose Create BIOS Policy.

5. Enter Intel-M6-Virt as the BIOS policy name.



Create BIOS Policy

Name : Intel-M6-Virt

Description :

Reboot on BIOS Settings Change : ☐

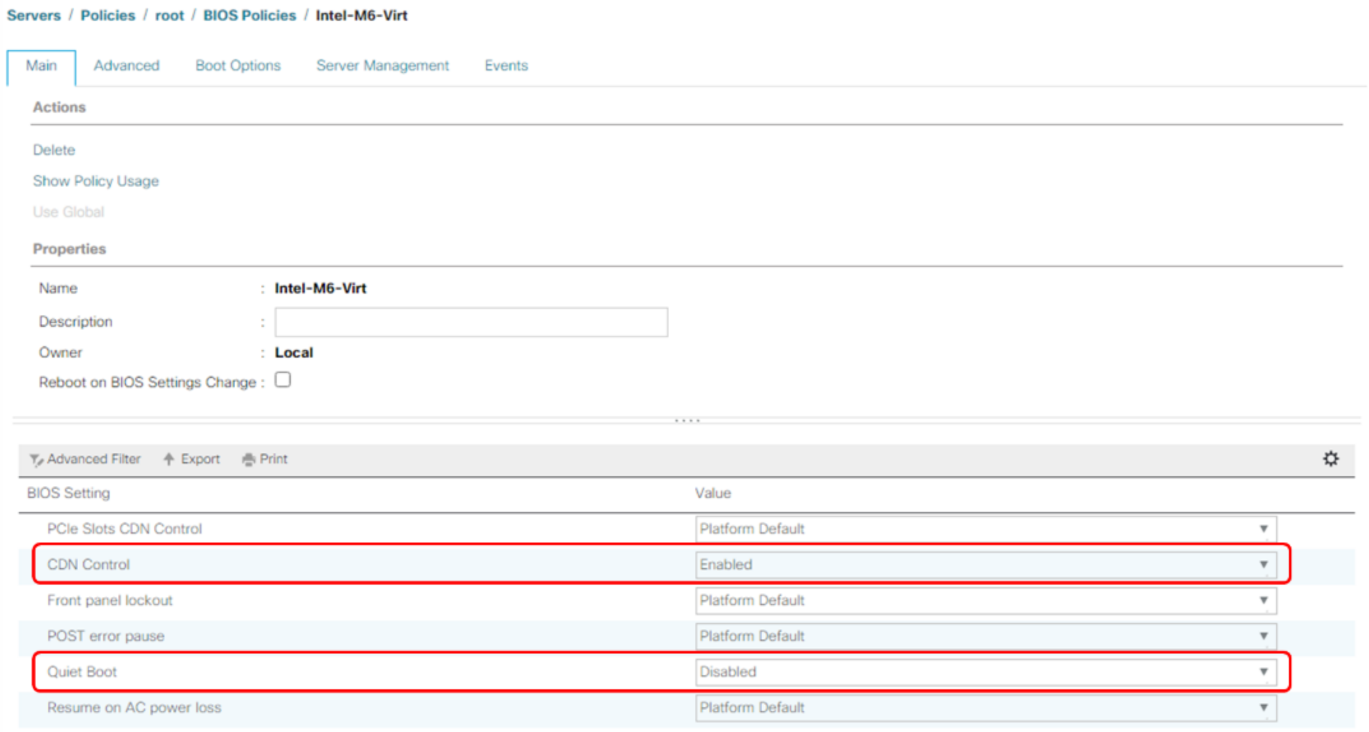
6. Click OK, then click OK again to create the BIOS Policy.

The Intel-M6-Virt BIOS Policy is derived from the virtualization policy in Performance Tuning Guide for Cisco UCS M6 Servers with the addition of CDN Control and NVM Performance Setting.

7. Under the FlexPod Organization, expand BIOS Policies and choose the newly created BIOS Policy. Within the Main tab of the Policy, set the following:

   a. CDN Control > Enabled

b. Quiet Boot > Disabled



Servers / Policies / root / BIOS Policies / Intel-M6-Virt

Actions

Delete
Show Policy Usage
Use Global

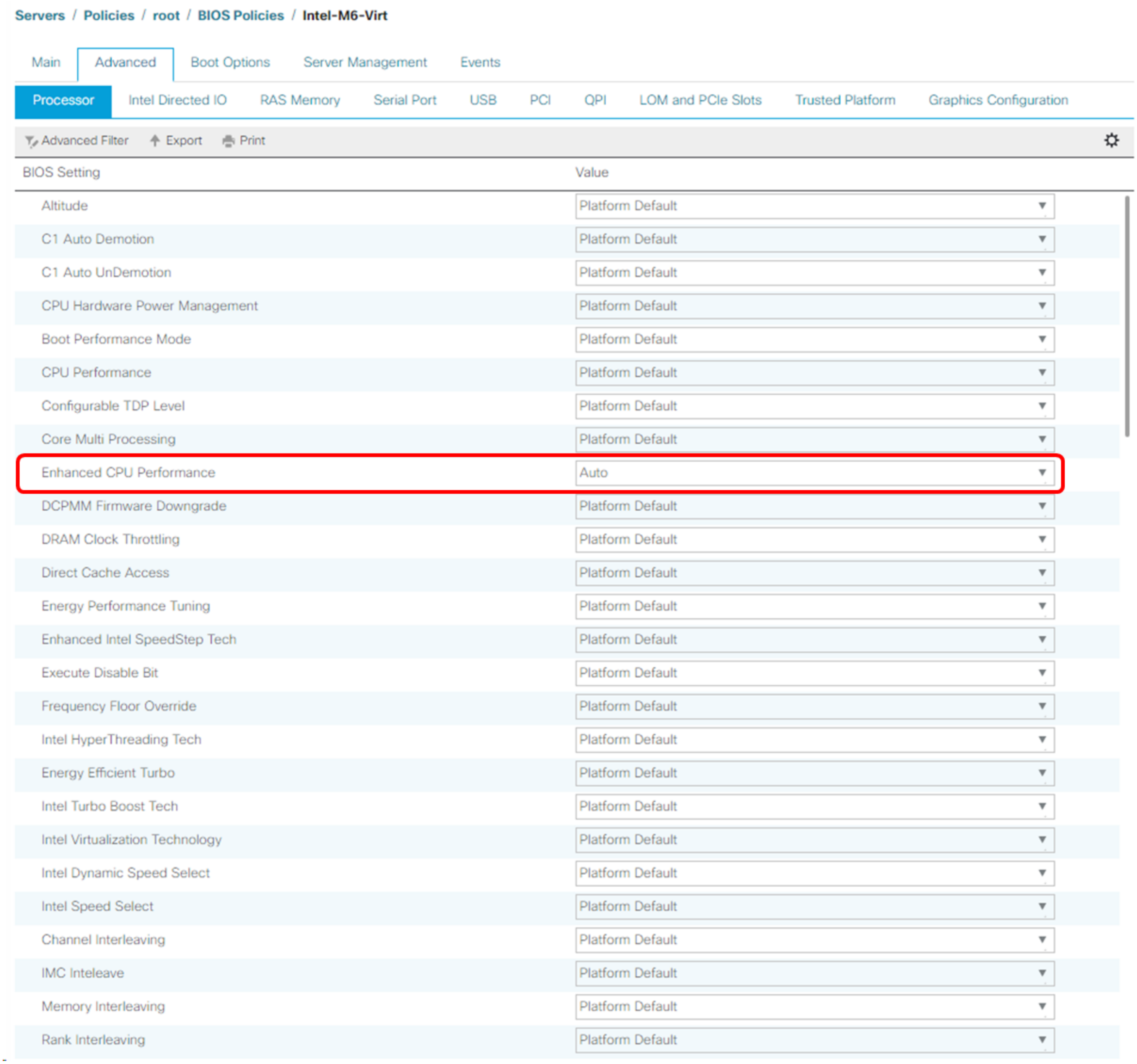
Properties

Name : Intel-M6-Virt
Description :
Owner : Local
Reboot on BIOS Settings Change : □

BIOS Setting	Value
PCIe Slots CDN Control	Platform Default
CDN Control	Enabled
Front panel lockout	Platform Default
POST error pause	Platform Default
Quiet Boot	Disabled
Resume on AC power loss	Platform Default

8. Click the Advanced tab, leaving the Processor tab selected within the Advanced tab. Within the Processor tab, set the following:

   a. Enhanced CPU Performance > Auto



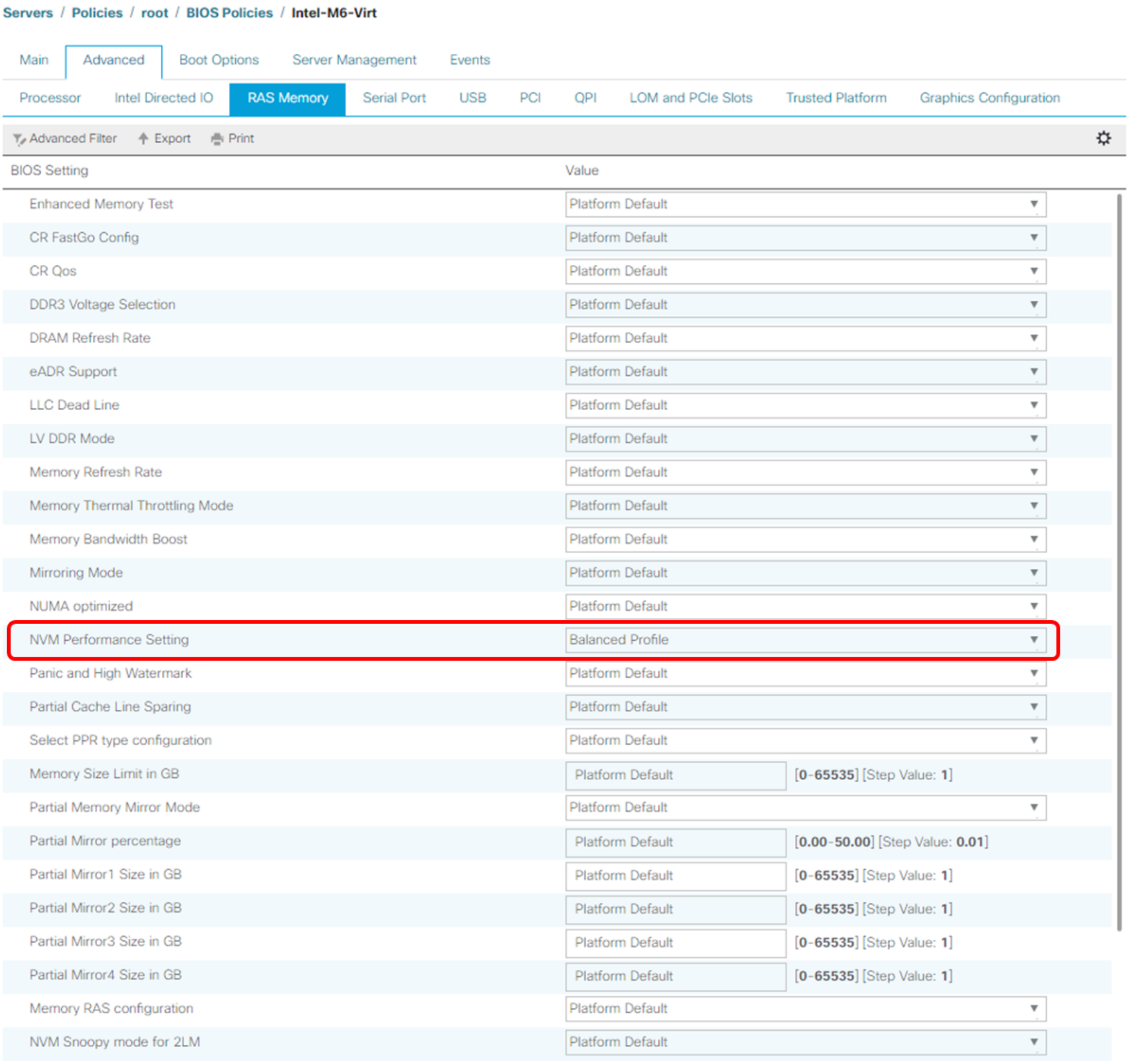
BIOS Setting	Value
Altitude	Platform Default
C1 Auto Demotion	Platform Default
C1 Auto UnDemotion	Platform Default
CPU Hardware Power Management	Platform Default
Boot Performance Mode	Platform Default
CPU Performance	Platform Default
Configurable TDP Level	Platform Default
Core Multi Processing	Platform Default
Enhanced CPU Performance	Auto
DCPMM Firmware Downgrade	Platform Default
DRAM Clock Throttling	Platform Default
Direct Cache Access	Platform Default
Energy Performance Tuning	Platform Default
Enhanced Intel SpeedStep Tech	Platform Default
Execute Disable Bit	Platform Default
Frequency Floor Override	Platform Default
Intel HyperThreading Tech	Platform Default
Energy Efficient Turbo	Platform Default
Intel Turbo Boost Tech	Platform Default
Intel Virtualization Technology	Platform Default
Intel Dynamic Speed Select	Platform Default
Intel Speed Select	Platform Default
Channel Interleaving	Platform Default
IMC Inteleave	Platform Default
Memory Interleaving	Platform Default
Rank Interleaving	Platform Default

9. Click Save Changes.

10. Click OK.

11. Click the RAS Memory tab within the Advanced tab. Within the RAS Memory tab, set the following:

    a. NVM Performance Setting > Balanced Profile



BIOS Setting	Value
Enhanced Memory Test	Platform Default
CR FastGo Config	Platform Default
CR Qos	Platform Default
DDR3 Voltage Selection	Platform Default
DRAM Refresh Rate	Platform Default
eADR Support	Platform Default
LLC Dead Line	Platform Default
LV DDR Mode	Platform Default
Memory Refresh Rate	Platform Default
Memory Thermal Throttling Mode	Platform Default
Memory Bandwidth Boost	Platform Default
Mirroring Mode	Platform Default
NUMA optimized	Platform Default
NVM Performance Setting	Balanced Profile
Panic and High Watermark	Platform Default
Partial Cache Line Sparing	Platform Default
Select PPR type configuration	Platform Default
Memory Size Limit in GB	Platform Default [0-65535] [Step Value: 1]
Partial Memory Mirror Mode	Platform Default
Partial Mirror percentage	Platform Default [0.00-50.00] [Step Value: 0.01]
Partial Mirror1 Size in GB	Platform Default [0-65535] [Step Value: 1]
Partial Mirror2 Size in GB	Platform Default [0-65535] [Step Value: 1]
Partial Mirror3 Size in GB	Platform Default [0-65535] [Step Value: 1]
Partial Mirror4 Size in GB	Platform Default [0-65535] [Step Value: 1]
Memory RAS configuration	Platform Default
NVM Snoopy mode for 2LM	Platform Default

12. Click Save Changes.

13. Click OK.

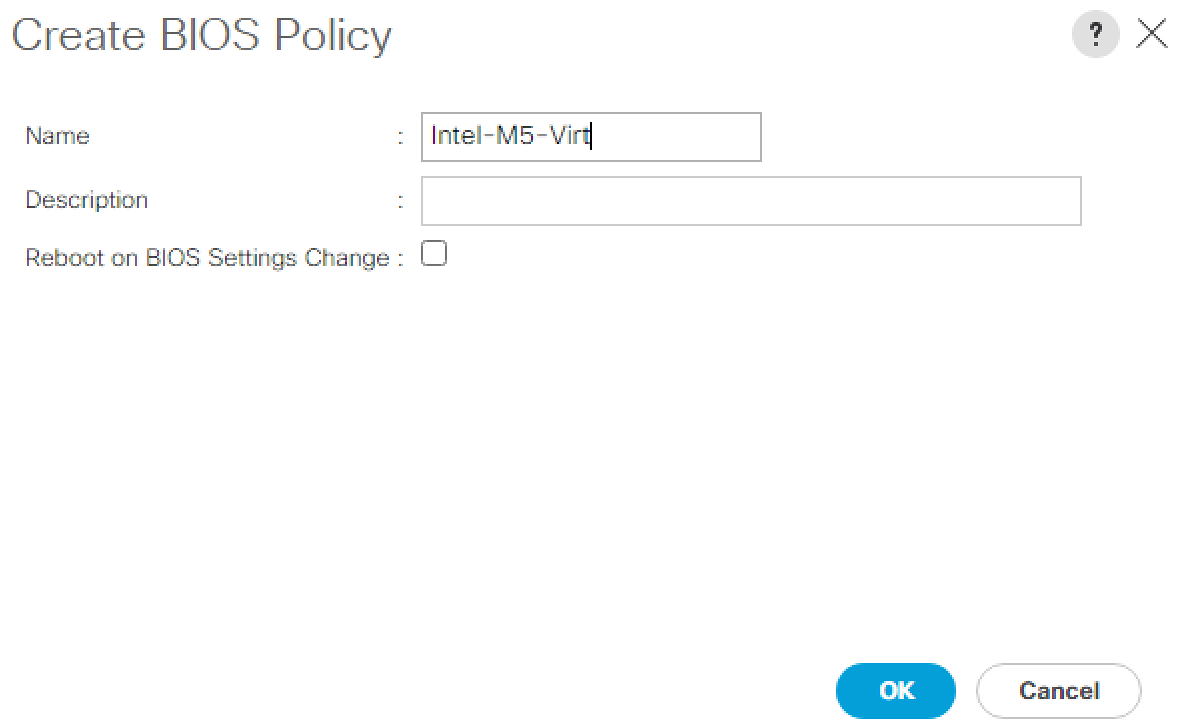
14. In Cisco UCS Manager, click Servers.

15. Expand Policies > root.

16. Right-click BIOS Policies under the root Organization.

17. Choose Create BIOS Policy.

18. Enter Intel-M5-Virt as the BIOS policy name.



Create BIOS Policy

Name : Intel-M5-Virt

Description :

Reboot on BIOS Settings Change : □

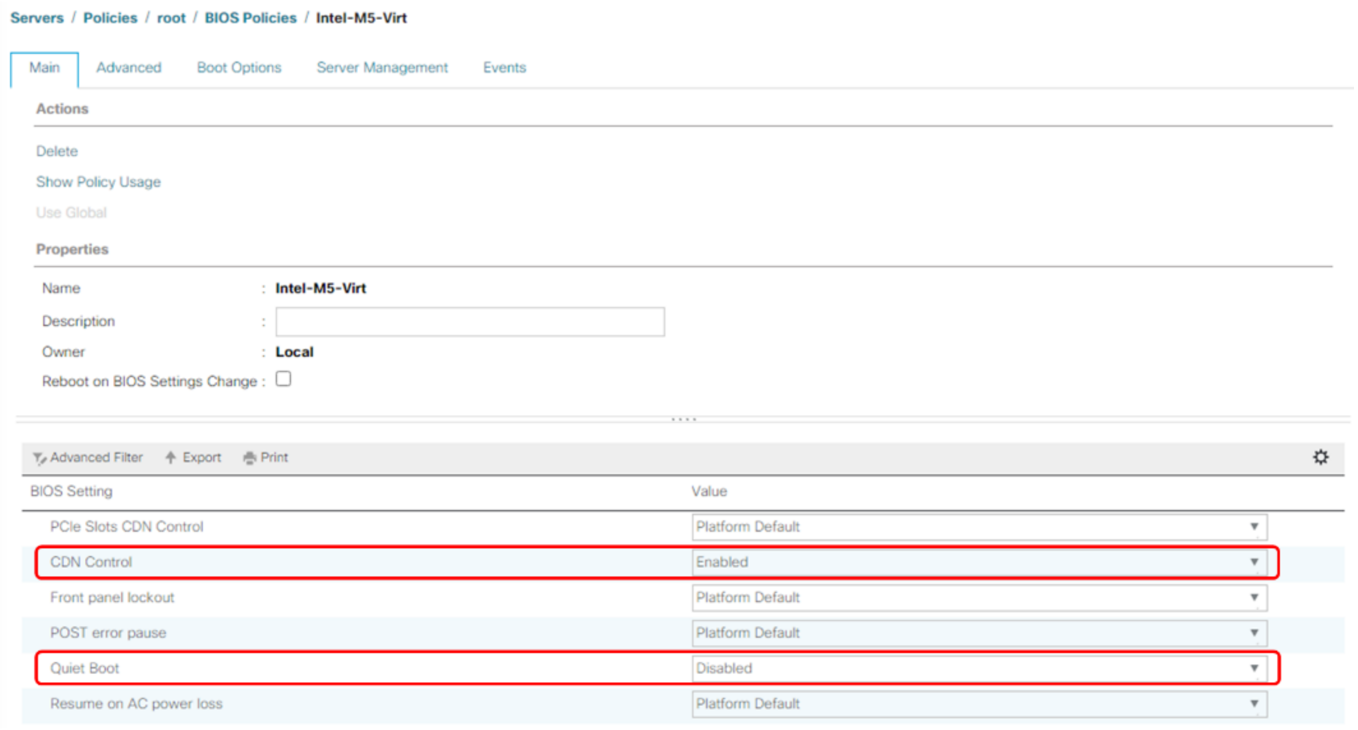
19. Click OK, then click OK again to create the BIOS Policy.

The Intel-M5-Virt BIOS Policy is derived from the virtualization policy in Performance Tuning Guide for Cisco UCS M5 Servers White Paper with the addition of CDN Control and NVM Performance Setting.

20. Under the FlexPod Organization, expand BIOS Policies and choose the newly created BIOS Policy. Within the Main tab of the Policy, set the following:

    a. CDN Control > Enabled

    b. Quiet Boot > Disabled



Servers / Policies / root / BIOS Policies / Intel-M5-Virt

Name : Intel-M5-Virt

Description :

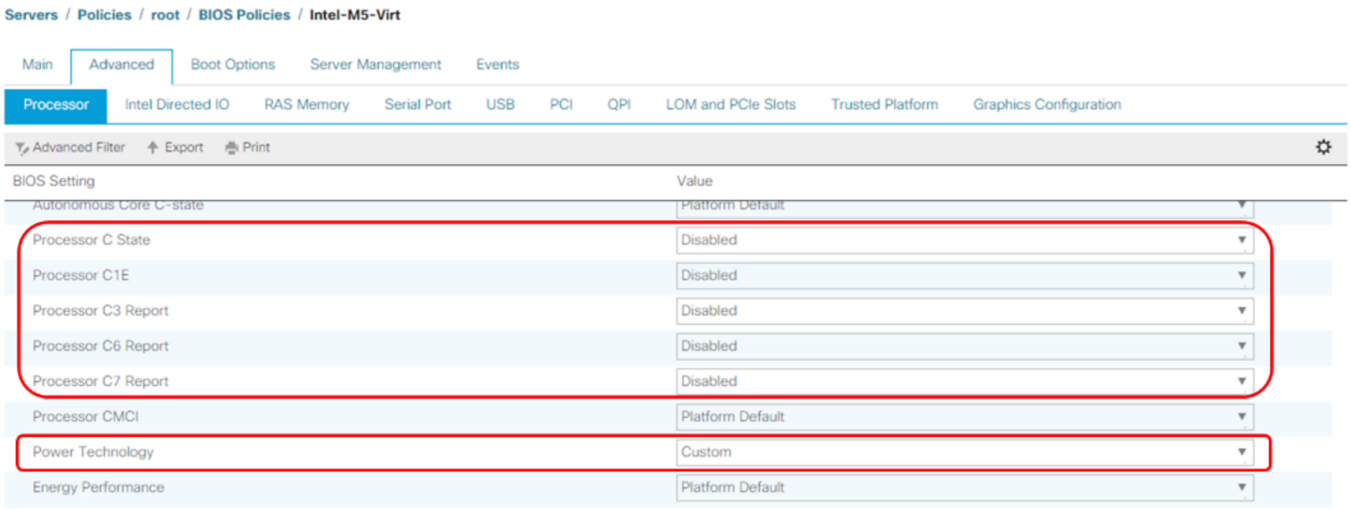
Owner : Local

Reboot on BIOS Settings Change : □

BIOS Setting	Value
PCIe Slots CDN Control	Platform Default
CDN Control	Enabled
Front panel lockout	Platform Default
POST error pause	Platform Default
Quiet Boot	Disabled
Resume on AC power loss	Platform Default

21. Click the Advanced tab, leaving the Processor tab selected within the Advanced tab. Within the Processor tab, set the following:

    a. Processor C State > Disabled
    b. Processor C1E > Disabled
    c. Processor C3 Report > Disabled
    d. Processor C6 Report > Disabled
    e. Processor C7 Report > Disabled
    f. Power Technology > Custom



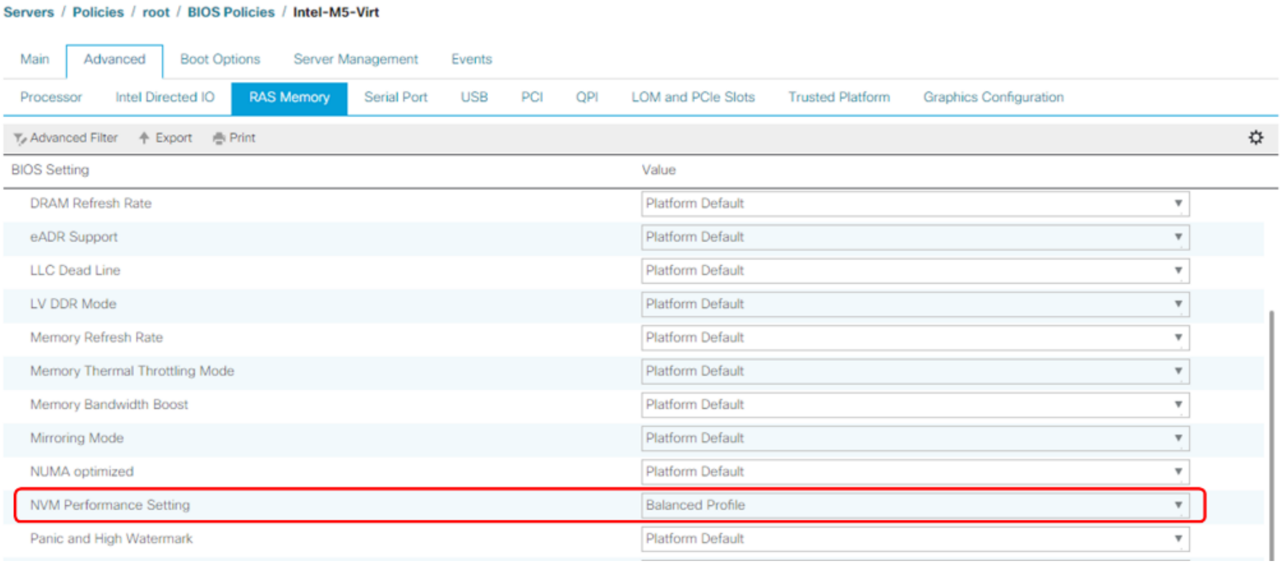
BIOS Setting	Value
Autonomous Core C-state	Platform Default
Processor C State	Disabled
Processor C1E	Disabled
Processor C3 Report	Disabled
Processor C6 Report	Disabled
Processor C7 Report	Disabled
Processor CMCI	Platform Default
Power Technology	Custom
Energy Performance	Platform Default

22. Click Save Changes.

23. Click OK.

24. Click the RAS Memory tab within the Advanced tab. Within the RAS Memory tab, set the following:

    a. NVM Performance Setting > Balanced Profile



BIOS Setting	Value
DRAM Refresh Rate	Platform Default
eADR Support	Platform Default
LLC Dead Line	Platform Default
LV DDR Mode	Platform Default
Memory Refresh Rate	Platform Default
Memory Thermal Throttling Mode	Platform Default
Memory Bandwidth Boost	Platform Default
Mirroring Mode	Platform Default
NUMA optimized	Platform Default
NVM Performance Setting	Balanced Profile
Panic and High Watermark	Platform Default

25. Click Save Changes.

26. Click OK.

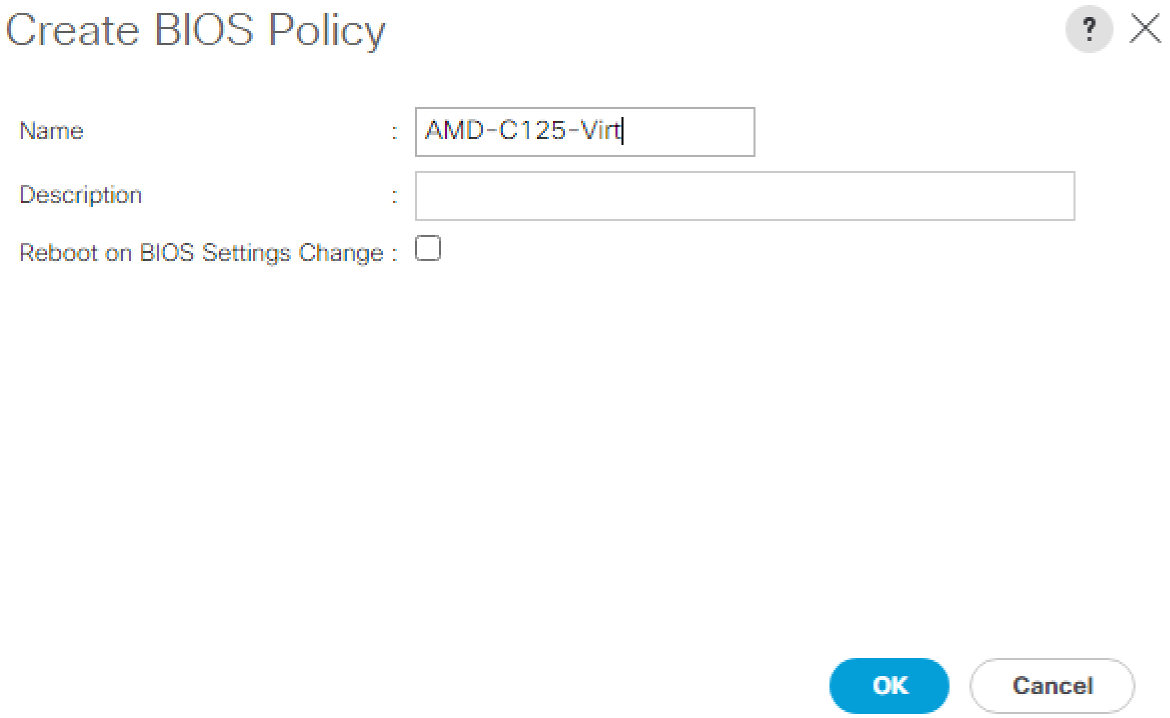
27. In Cisco UCS Manager, click Servers.

28. Expand Policies > root.

29. Right-click BIOS Policies under the root Organization.

30. Choose Create BIOS Policy.

31. Enter AMD-C125-Virt as the BIOS policy name.



Create BIOS Policy

Name : AMD-C125-Virt

Description :

Reboot on BIOS Settings Change : □

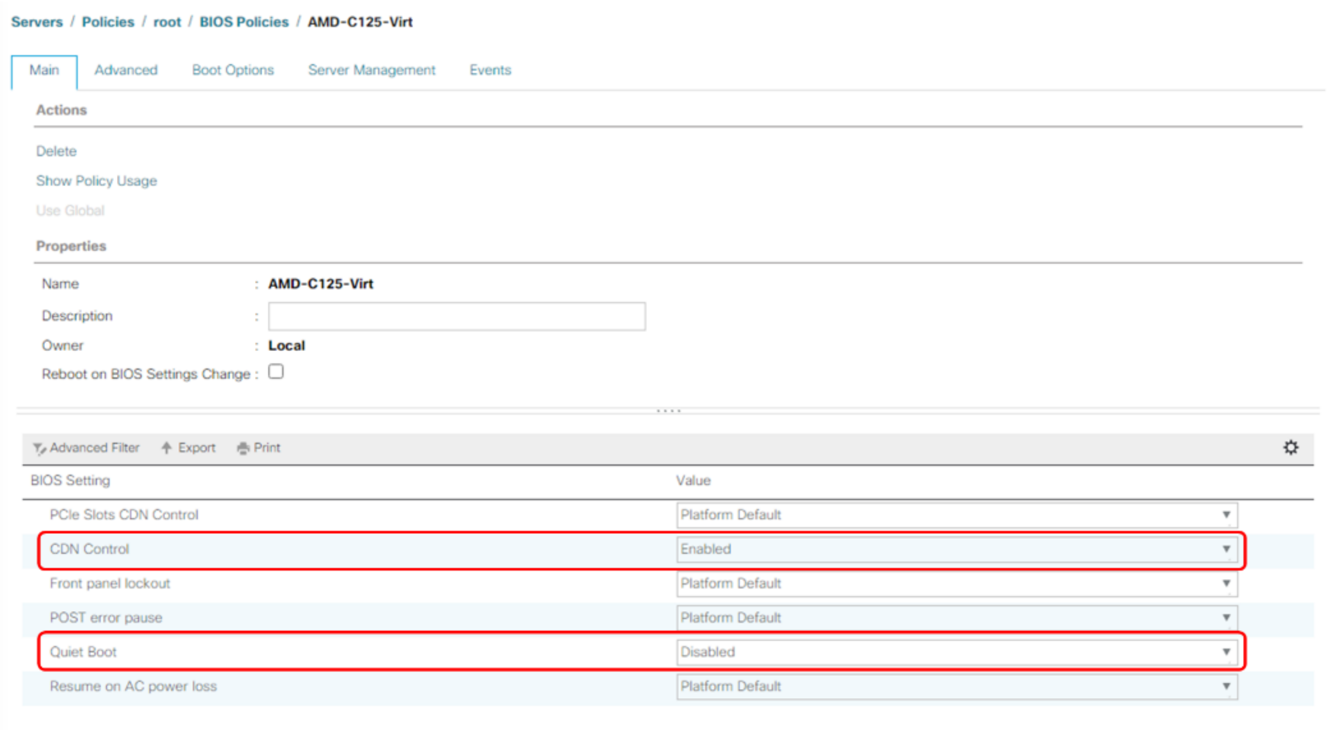
32. Click OK, then click OK again to create the BIOS Policy.

The AMD-C125-Virt BIOS Policy is derived from the virtualization policy in Performance Tuning for Cisco UCS C125 Rack Server Nodes with AMD Processors (White Paper) with the addition of CDN Control.

33. Under the FlexPod Organization, expand BIOS Policies and choose the newly created BIOS Policy. Within the Main tab of the Policy, set the following:

    a. CDN Control > Enabled

    b. Quiet Boot > Disabled



Servers / Policies / root / BIOS Policies / AMD-C125-Virt

Name : AMD-C125-Virt

Description :

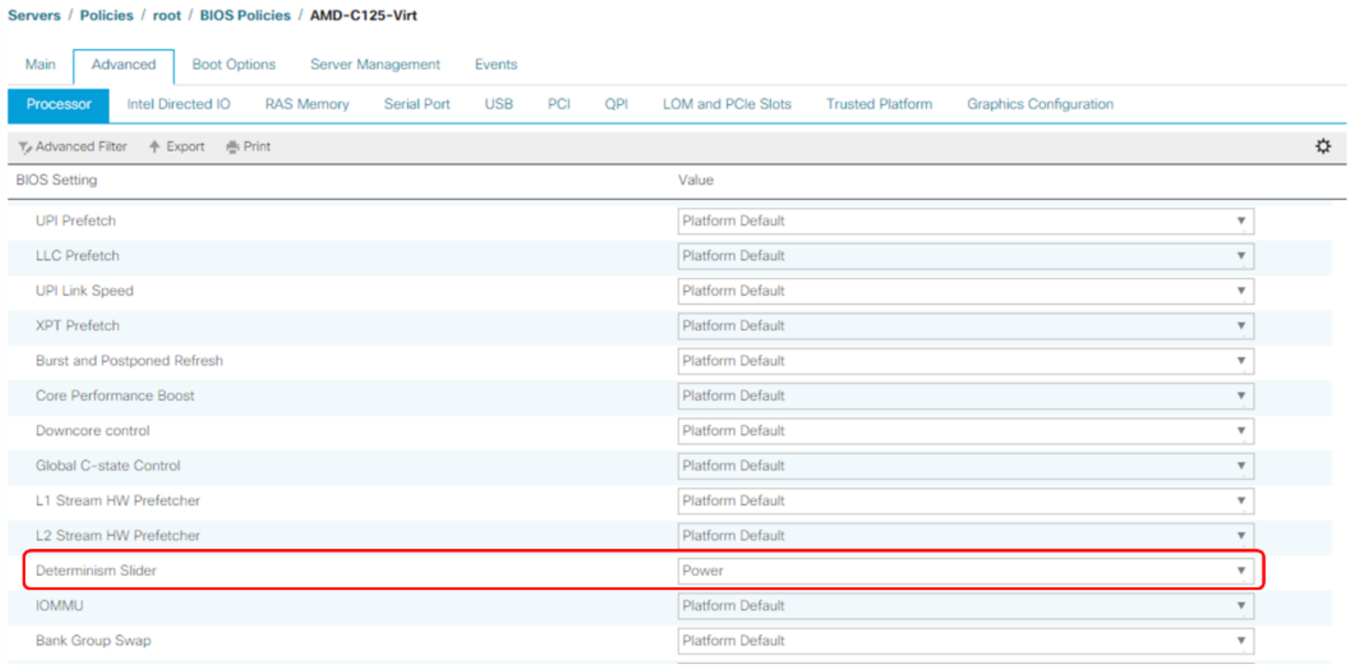
Owner : Local

Reboot on BIOS Settings Change : □

BIOS Setting	Value
PCIe Slots CDN Control	Platform Default
CDN Control	Enabled
Front panel lockout	Platform Default
POST error pause	Platform Default
Quiet Boot	Disabled
Resume on AC power loss	Platform Default

34. Click the Advanced tab, leaving the Processor tab selected within the Advanced tab. Within the Processor tab, set the following:

    a. Determinism Slider > Power



Servers / Policies / root / BIOS Policies / AMD-C125-Virt

BIOS Setting	Value
UPI Prefetch	Platform Default
LLC Prefetch	Platform Default
UPI Link Speed	Platform Default
XPT Prefetch	Platform Default
Burst and Postponed Refresh	Platform Default
Core Performance Boost	Platform Default
Downcore control	Platform Default
Global C-state Control	Platform Default
L1 Stream HW Prefetcher	Platform Default
L2 Stream HW Prefetcher	Platform Default
Determinism Slider	Power
IOMMU	Platform Default
Bank Group Swap	Platform Default

35. Click Save Changes.

36. Click OK.

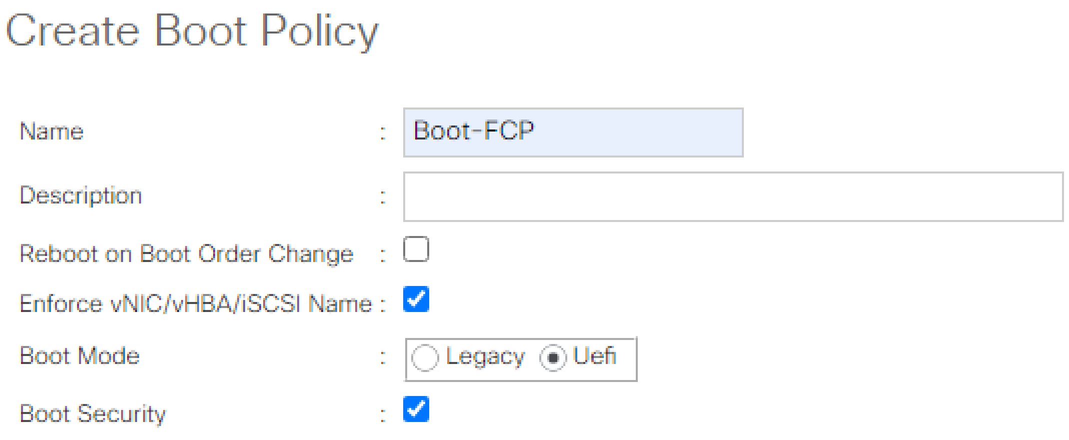
Create FC Boot Policy (FCP)

This procedure applies to a Cisco UCS environment in which two Fibre Channel logical interfaces (LIFs) are on cluster node 1 (fcp-lif-01a and fcp-lif-01b) and two Fibre Channel LIFs are on cluster node 2 (fcp-lif-02a and fcp-lif-02b). Also, it is assumed that the A LIFs are connected to switching Fabric A and the B LIFs are connected to switching Fabric B.

> One boot policy is configured in this procedure. The policy configures the primary target to be fcp-lif-01a.

To create a boot policy for the within the FlexPod organization, follow these steps:

1. In Cisco UCS Manager, click Servers.
2. Expand Policies > root > Sub-Organizations > FlexPod.
3. Under the FlexPod Organization, right-click Boot Policies.
4. Choose Create Boot Policy.
5. Enter Boot-FCP as the name of the boot policy.
6. Optional: Enter a description for the boot policy.
7. Do not select the Reboot on Boot Order Change checkbox.
8. Choose the Uefi Boot Mode.
9. Check the box for Boot Security.



Create Boot Policy

Name : Boot-FCP

Description :

Reboot on Boot Order Change : □

Enforce vNIC/vHBA/iSCSI Name : ☑

Boot Mode : ○ Legacy ● Uefi

Boot Security : ☑

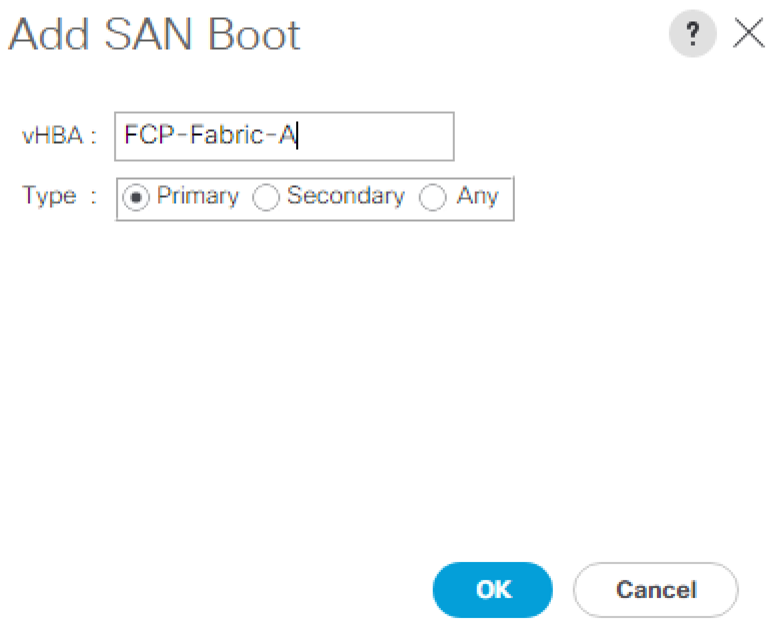
UEFI Secure Boot can be used to boot VMware ESXi 7.0 with or without a TPM 2.0 module in the UCS server.

10. Expand Local Devices and choose Add Remote CD/DVD.

11. Expand vHBAs and choose Add SAN Boot.

12. Choose Primary in the Type field.

13. Enter FCP-Fabric-A in the vHBA field.



vHBA : FCP-Fabric-A

Type : ● Primary ○ Secondary ○ Any

14. Click OK.

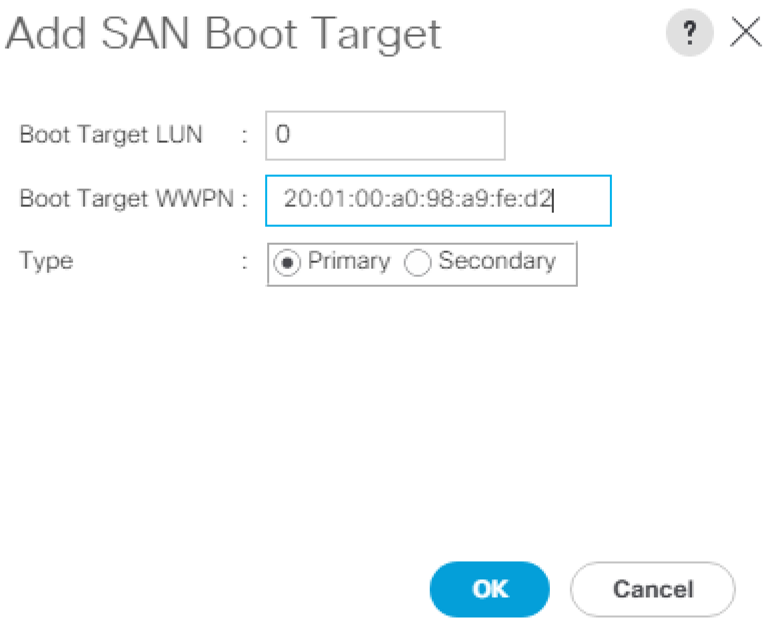
15. From vHBAs, choose Add SAN Boot Target.

16. Keep 0 as the value for Boot Target LUN.

17. Enter the WWPN for fcp-lif-01a.

To obtain this information, log in to the storage cluster and run the `network interface show -vserver Infra-SVM` command.

18. Choose Primary for the SAN boot target type.



Add SAN Boot Target

Boot Target LUN : 0

Boot Target WWPN : 20:01:00:a0:98:a9:fe:d2

Type : ● Primary ○ Secondary

19. Click OK to add the SAN boot target.

20. From vHBAs, choose Add SAN Boot Target.

21. Enter 0 as the value for Boot Target LUN.

22. Enter the WWPN for fcp-lif-02a.

23. Click OK to add the SAN boot target.

24. From vHBAs, choose Add SAN Boot.

25. In the Add SAN Boot dialog box, enter FCP-Fabric-B in the vHBA box.

26. The SAN boot type should automatically be set to Secondary.

27. Click OK.

28. From vHBAs, choose Add SAN Boot Target.

29. Keep 0 as the value for Boot Target LUN.

30. Enter the WWPN for fcp-lif-01b.

31. Choose Primary for the SAN boot target type.

32. Click OK to add the SAN boot target.

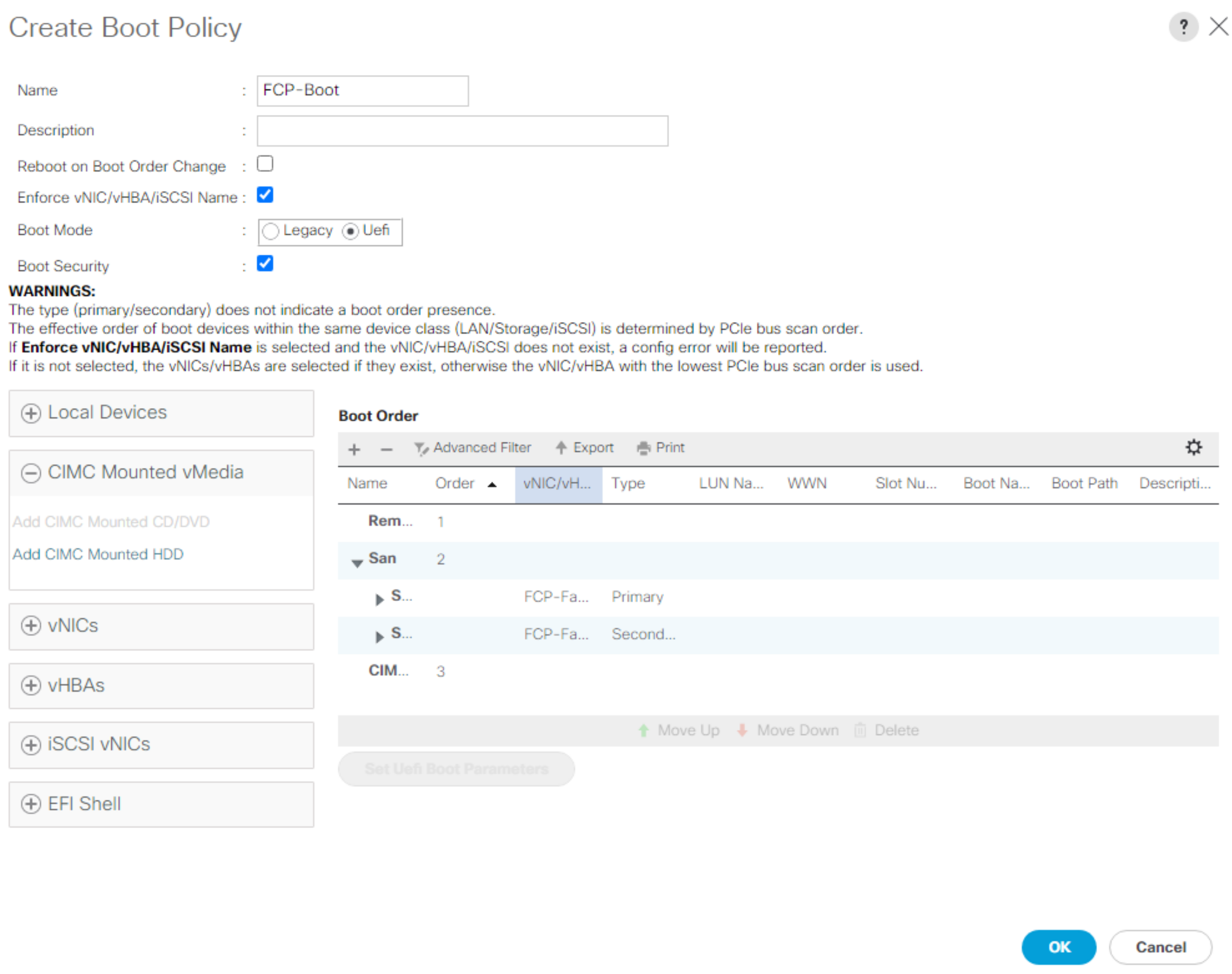
33. From vHBAs, choose Add SAN Boot Target.

34. Keep 0 as the value for Boot Target LUN.

35. Enter the WWPN for fcp-lif-02b.

36. Click OK to add the SAN boot target.

37. Expand CIMC Mounted Media and choose Add CIMC Mounted CD/DVD.



Create Boot Policy

Name :	FCP-Boot
Description :	
Reboot on Boot Order Change :	☐
Enforce vNIC/vHBA/iSCSI Name :	☑
Boot Mode :	○ Legacy ● Uefi
Boot Security :	☑

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 are selected if they exist, otherwise the vNIC/vHBA with the lowest PCIe bus scan order is used.

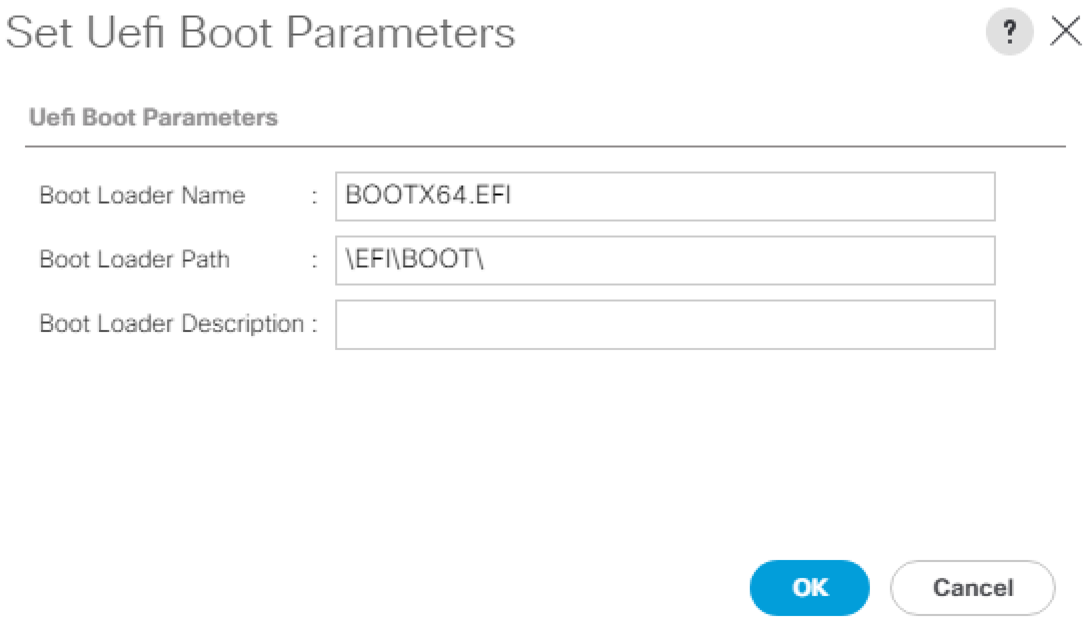
Boot Order

Name	Order	vNIC/vH...	Type	LUN Na...	WWN	Slot Nu...	Boot Na...	Boot Path	Descripti...
Rem...	1								
San	2								
S...		FCP-Fa...	Primary						
S...		FCP-Fa...	Second...						
CIM...	3								

38. Expand San > SAN Primary and select SAN Target Primary. Select Set Uefi Boot Parameters.

For Cisco UCS M6 and M5 servers it is not necessary to set the Uefi Boot Parameters. These servers will boot properly with or without these parameters set. However, for M4 and earlier servers, VMware ESXi 7.0 and above will not boot with Uefi Secure Boot unless these parameters are set exactly as shown.

39. Enter the Set Uefi Boot Parameters exactly as shown in the following screenshot:



Set Uefi Boot Parameters

Uefi Boot Parameters

Boot Loader Name : BOOTX64.EFI

Boot Loader Path : \EFI\BOOT\

Boot Loader Description :

40. Click OK to complete setting the Uefi Boot Parameters for the SAN Boot Target and click OK for the confirmation.

41. Repeat steps 1 - 10 to set Uefi Boot Parameters for each of the 4 SAN Boot Targets.

42. Click OK, then click OK again to create the boot policy.

Create Service Profile Template (FCP)

In this procedure, one service profile template for Infrastructure ESXi hosts is created for Fabric A boot within the FlexPod organization. To create the service profile template, follow these steps:

1. In Cisco UCS Manager, click Servers.

2. Expand Service Profile Templates > root > Sub-Organizations > FlexPod.

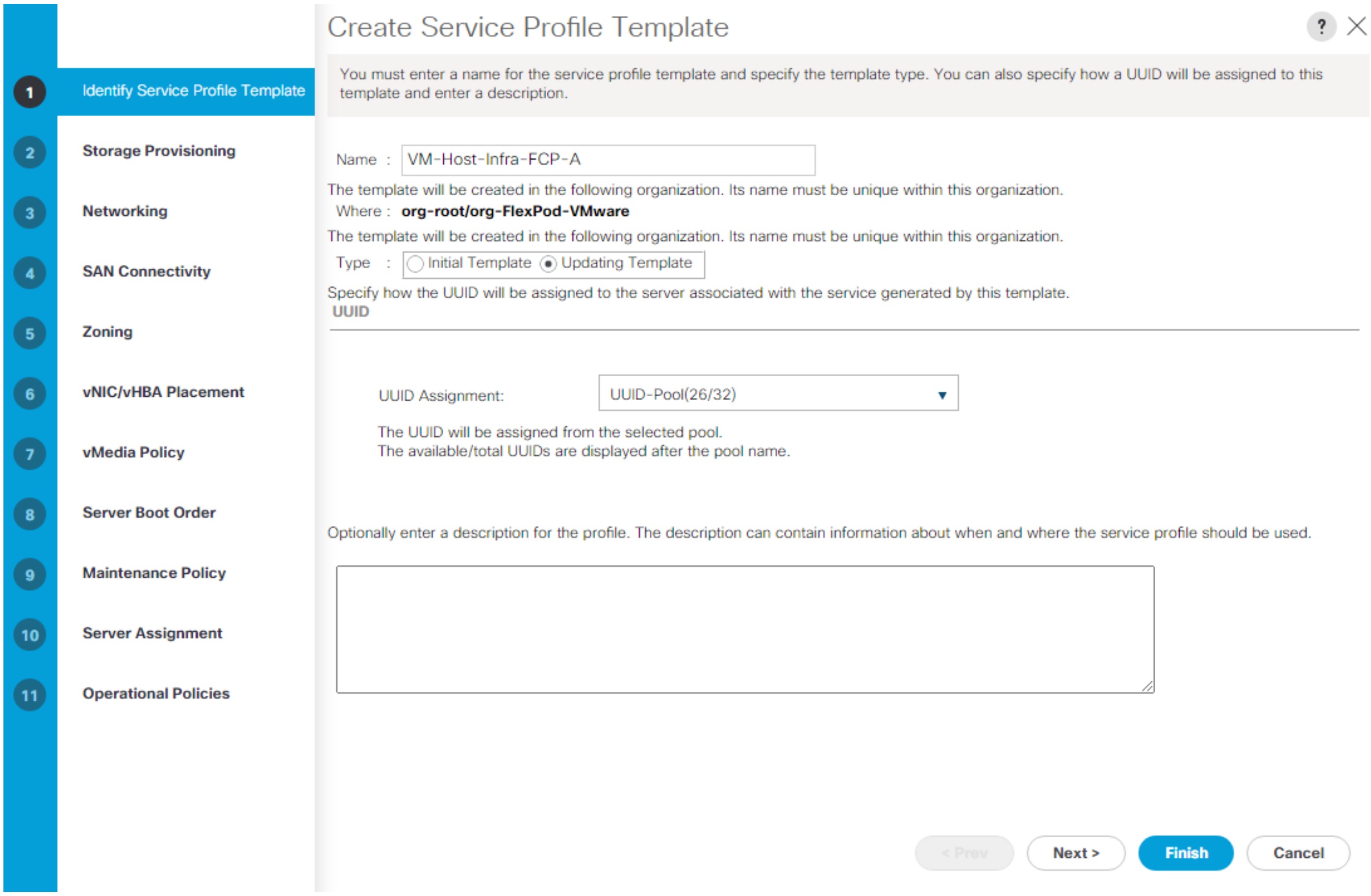
3. Right-click the FlexPod Organization.

4. Choose Create Service Profile Template to open the Create Service Profile Template wizard.

5. Enter VM-Host-Infra-FCP as the name of the service profile template.

6. Choose the Updating Template option.

7. Under UUID, choose UUID_Pool as the UUID pool.



Create 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-FCP-A

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

Where : **org-root/org-FlexPod-VMware**

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: UUID-Pool(26/32) ▾

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.

8. Click Next.

Configure Storage Provisioning

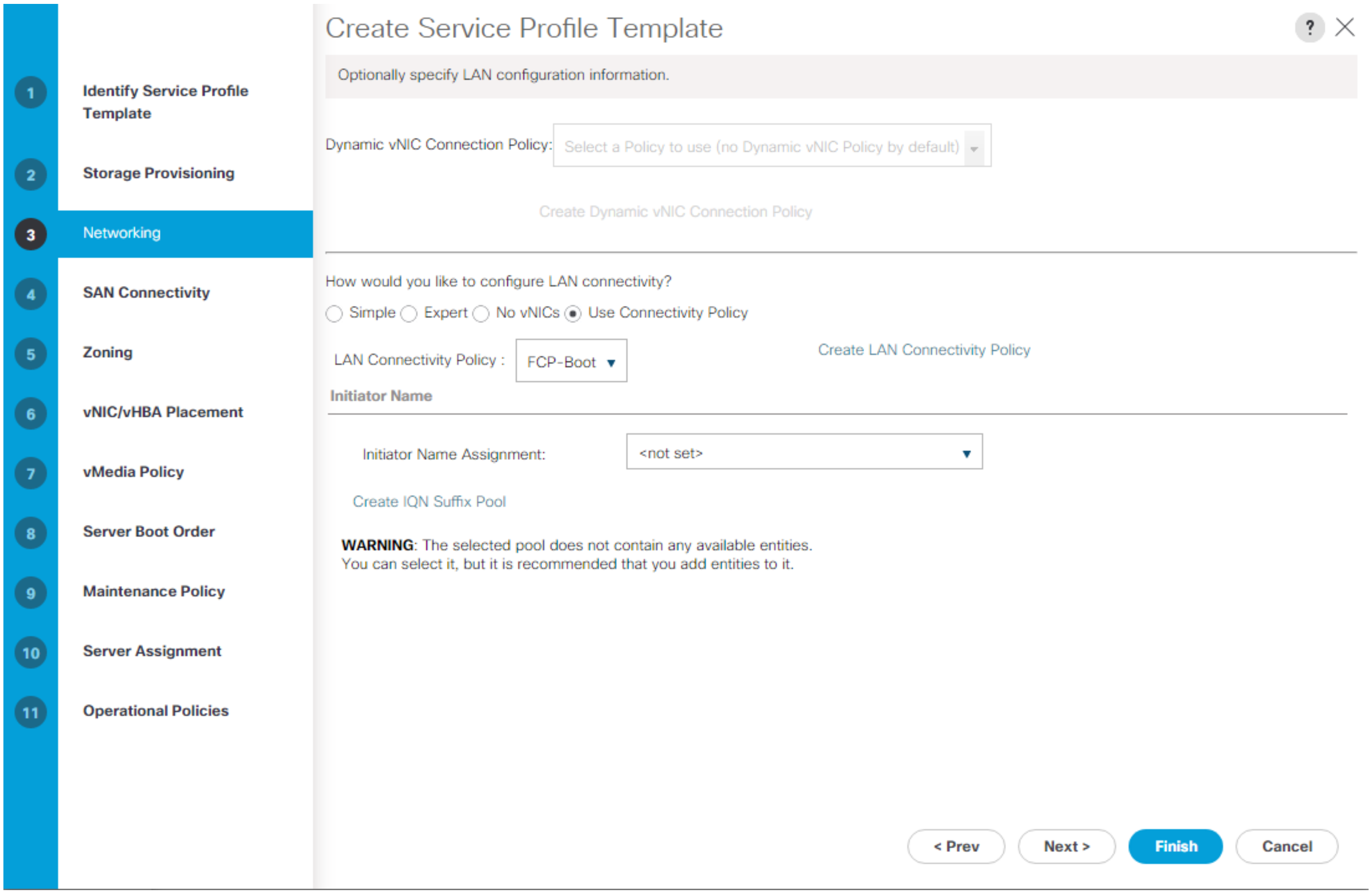
To configure storage provisioning, follow these steps:

1. Under the Local Disk Configuration Policy tab choose the IgnoreDisk Local Storage Policy.
2. Click Next.

Configure Networking

To configure networking, follow these steps:

1. Choose the “Use Connectivity Policy” option to configure the LAN connectivity.
2. Choose FCP-Boot from the LAN Connectivity Policy drop-down list.
3. Leave Initiator Name Assignment at <not set>.



Create Service Profile Template

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 ● Use Connectivity Policy

LAN Connectivity Policy : FCP-Boot

Initiator Name

Initiator Name Assignment: <not set>

WARNING: The selected pool does not contain any available entities.
You can select it, but it is recommended that you add entities to it.

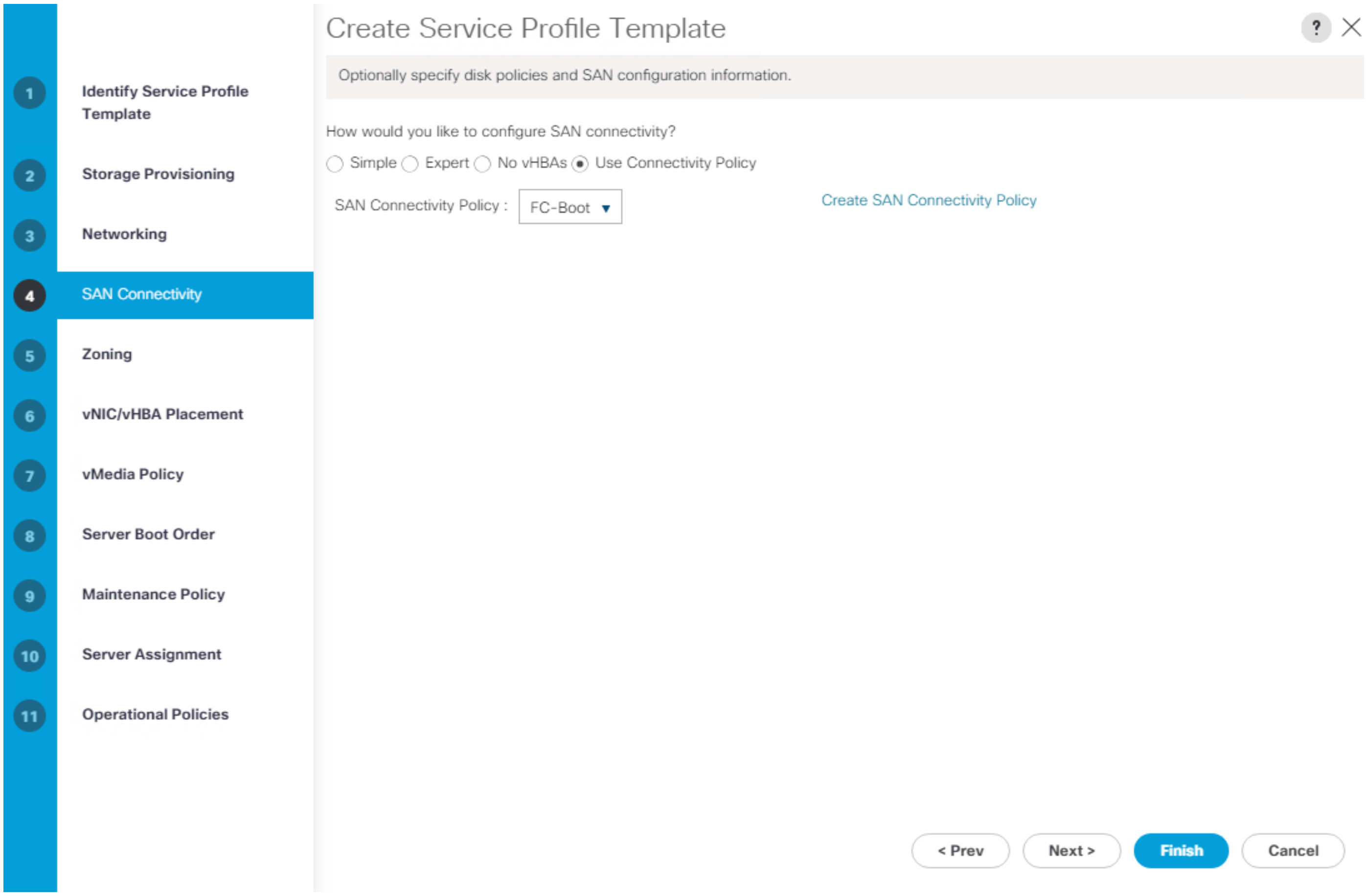
4. Click Next.

Configure SAN Connectivity

To configure SAN connectivity, follow these steps:

1. Choose the Use Connectivity Policy option for the “How would you like to configure SAN connectivity?” field.

2. Choose the FC-Boot option from the SAN Connectivity Policy drop-down list.



Create Service Profile Template

Optionally specify disk policies and SAN configuration information.

How would you like to configure SAN connectivity?

○ Simple ○ Expert ○ No vHBAs ● Use Connectivity Policy

SAN Connectivity Policy : FC-Boot ▾

Create SAN Connectivity Policy

3. Click Next.

Configure Zoning

To configure zoning, follow this step:

1. Set no zoning options and click Next.

Set no zoning options here since the fabric interconnects are in end host (NPV) mode and zoning is being done in the upstream SAN switch.

Configure vNIC/HBA Placement

To configure vNIC/HBA placement, follow these steps:

1. In the Select Placement list, retain the placement policy as Let System Perform Placement.

2. Click Next.

Configure vMedia Policy

To configure the vMedia policy, follow these steps:

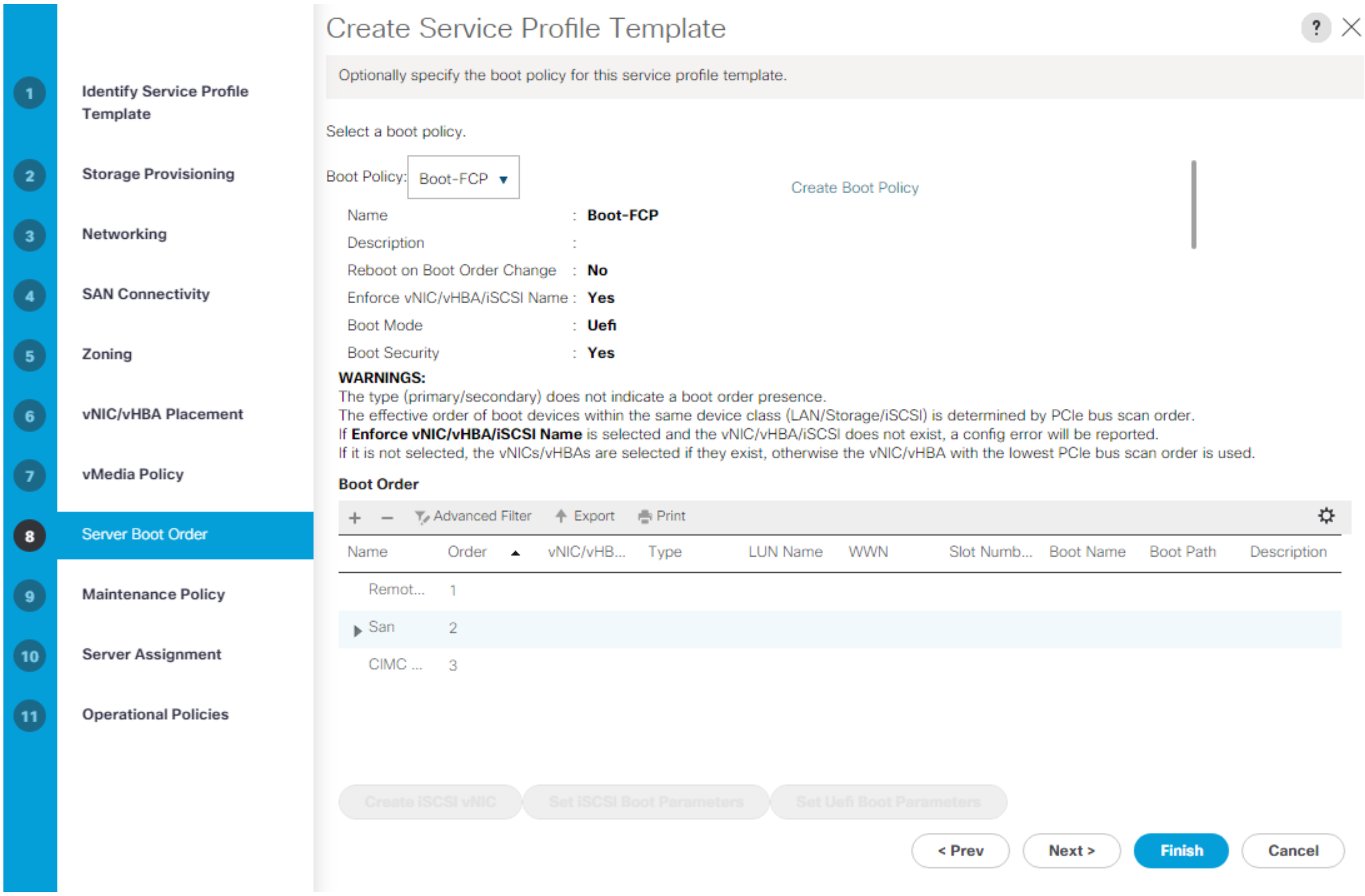
1. Do not select a vMedia Policy.

2. Click Next.

Configure Server Boot Order

To configure the server boot order, follow these steps:

1. Choose Boot-FCP for Boot Policy.



Create Service Profile Template

Optionally specify the boot policy for this service profile template.

Select a boot policy.

Boot Policy: Boot-FCP ▼

Name : **Boot-FCP**
Description :
Reboot on Boot Order Change : **No**
Enforce vNIC/vHBA/iSCSI Name : **Yes**
Boot Mode : **Uefi**
Boot Security : **Yes**

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 are selected if they exist, otherwise the vNIC/vHBA with the lowest PCIe bus scan order is used.

Boot Order

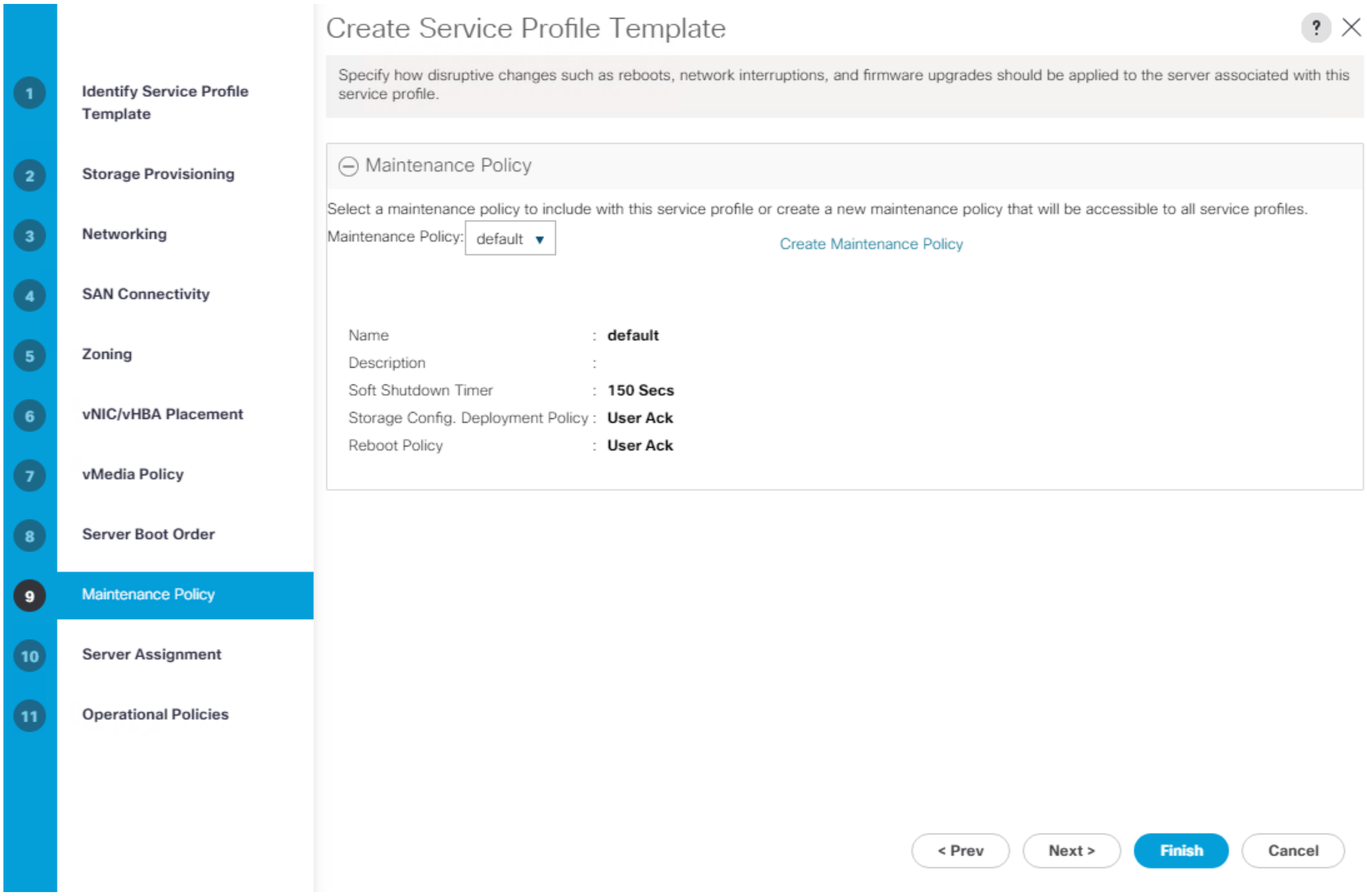
Name	Order ▲	vNIC/vHB...	Type	LUN Name	WWN	Slot Numb...	Boot Name	Boot Path	Description
Remot...	1								
▶ San	2								
CIMC ...	3								

2. Click Next.

Configure Maintenance Policy

To configure the maintenance policy, follow these steps:

1. Change the Maintenance Policy to default.



Specify how disruptive changes such as reboots, network interruptions, and firmware upgrades should be applied to the server associated with this service profile.

⊖ Maintenance Policy

Select a maintenance policy to include with this service profile or create a new maintenance policy that will be accessible to all service profiles.

Maintenance Policy: default ▾ Create Maintenance Policy

Name	:	default
Description	:	
Soft Shutdown Timer	:	150 Secs
Storage Config. Deployment Policy	:	User Ack
Reboot Policy	:	User Ack

2. Click Next.

Configure Server Assignment

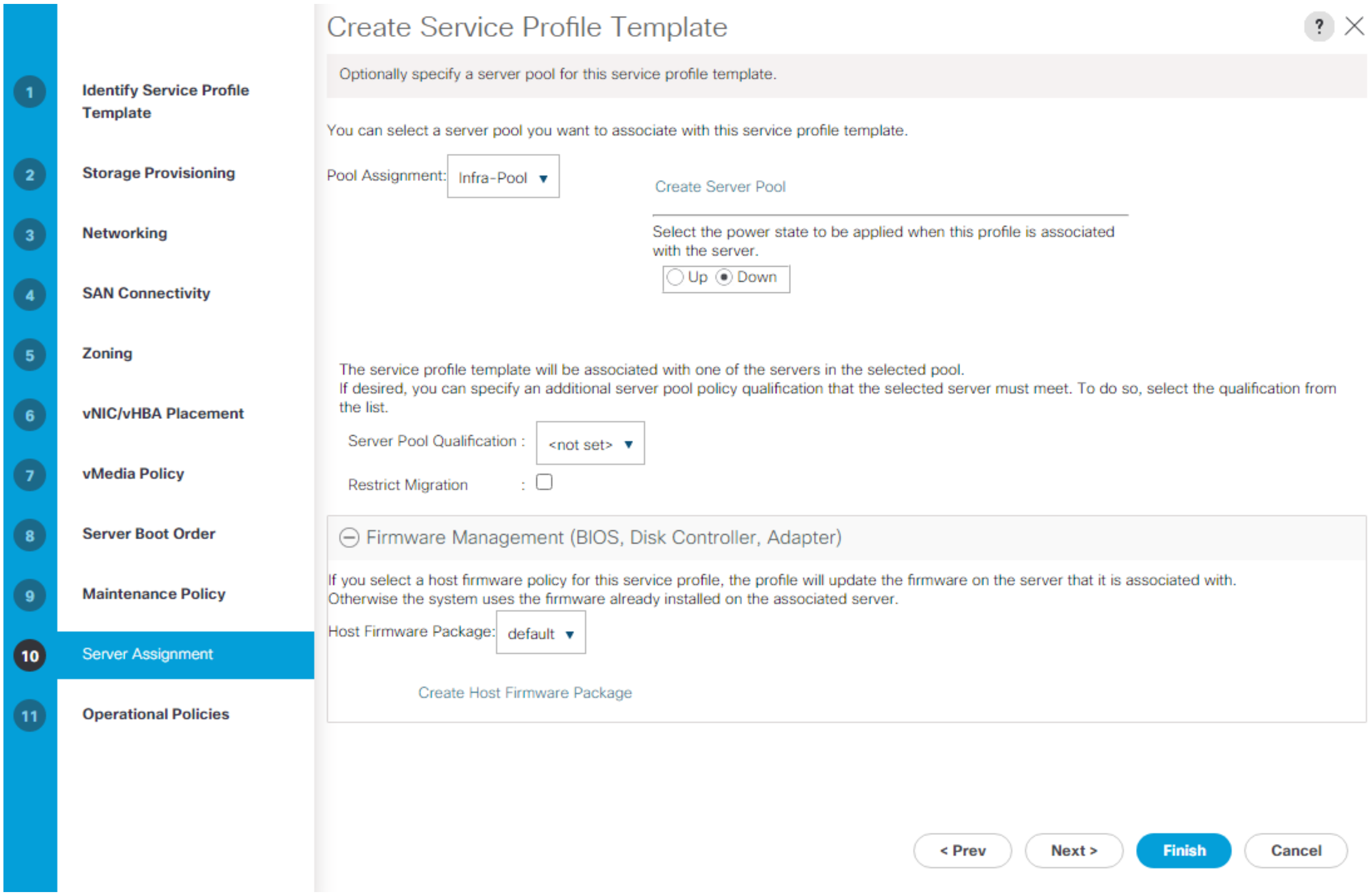
To configure server assignment, follow these steps:

1. In the Pool Assignment list, choose Infra-Pool.

2. Choose Down as the power state to be applied when the profile is associated with the server.

3. Optional: Choose “UCS-B200M6” for the Server Pool Qualification to choose only UCS B200M6 servers in the pool.

4. Expand Firmware Management and choose the default Host Firmware Package.



Create Service Profile Template

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: Infra-Pool ▾

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 : <not set> ▾

Restrict Migration : □

⊖ Firmware Management (BIOS, Disk Controller, Adapter)

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

Host Firmware Package: default ▾

5. Click Next.

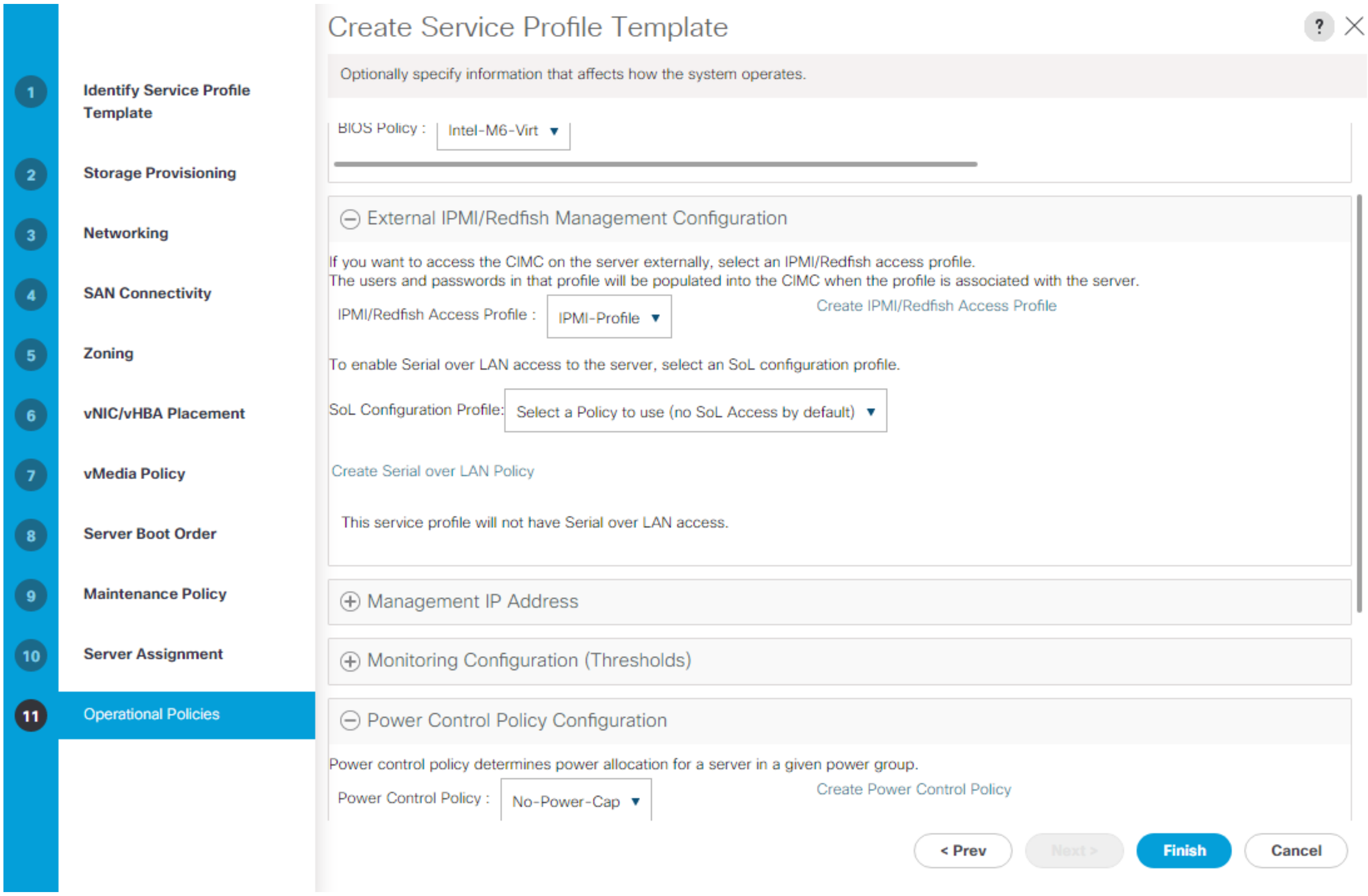
Configure Operational Policies

To configure the operational policies, follow these steps:

1. In the BIOS Policy list, choose the appropriate BIOS policy for the servers you have.

2. Expand External IPMI/Redfish Management Configuration and select IPMI-Profile for the IPMI/Redfish Access Profile.

3. Expand Power Control Policy Configuration and choose No-Power-Cap in the Power Control Policy list.



Create Service Profile Template

Optionally specify information that affects how the system operates.

BIOS Policy : Intel-M6-Virt

External IPMI/Redfish Management Configuration

If you want to access the CIMC on the server externally, select an IPMI/Redfish access profile.
The users and passwords in that profile will be populated into the CIMC when the profile is associated with the server.

IPMI/Redfish Access Profile : IPMI-Profile

To enable Serial over LAN access to the server, select an SoL configuration profile.

SoL Configuration Profile: Select a Policy to use (no SoL Access by default)

This service profile will not have Serial over LAN access.

Power Control Policy Configuration

Power control policy determines power allocation for a server in a given power group.

Power Control Policy : No-Power-Cap

4. Click Finish to create the service profile template.

5. Click OK in the confirmation message.

Create vMedia-Enabled Service Profile Template

To create a service profile template with vMedia enabled, follow these steps:

1. Connect to UCS Manager and click Servers.

2. Choose Service Profile Templates > root > Sub-Organizations > FlexPod > Service Template VM-Host-Infra-FCP.

3. Right-click VM-Host-Infra-FCP and choose Create a Clone.

4. Name the clone VM-Host-Infra-FCP -vM.

5. Click OK then click OK again to create the Service Profile Template clone.

6. Choose the newly created VM-Host-Infra-FCP -vM and choose the vMedia Policy tab.

7. Click Modify vMedia Policy.

8. Choose the ESXi-7U2-CC-HTTP vMedia Policy and click OK.

9. Click OK to confirm.

This same cloning process can be used to create other Service Profile templates that can be modified to accommodate additional features such as Intel Datacenter Persistent Memory (DCPMem) in Memory or App-Direct Mode.

Create Service Profiles

To create service profiles from the service profile template within the FlexPod organization, follow these steps:

1. Connect to Cisco UCS Manager and click Servers.

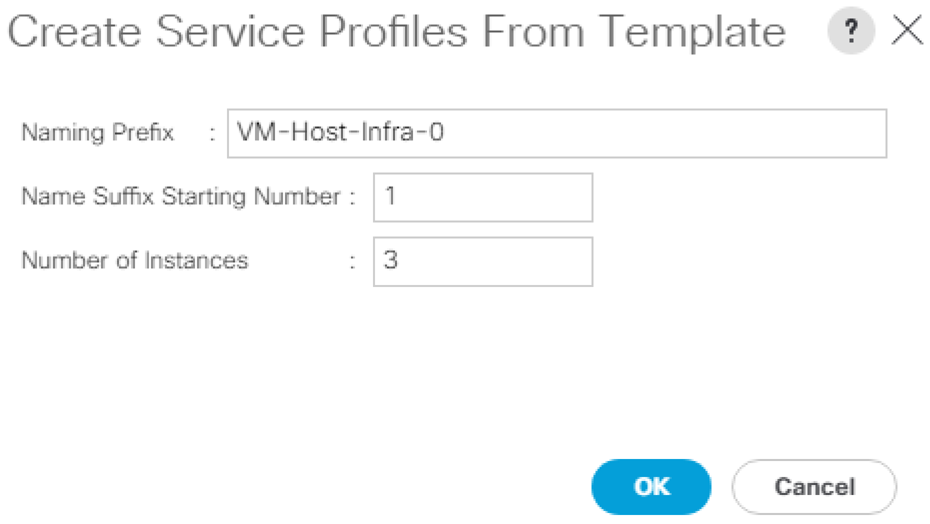
2. Expand Service Profile Templates > root > Sub-Organizations > FlexPod.

3. Right-click the appropriate vMedia-enabled template or the appropriate template and choose Create Service Profiles from Template.

4. Enter VM-Host-Infra-0 as the service profile prefix.

5. Enter `1` as "Name Suffix Starting Number."

6. Enter `3` as the "Number of Instances."



Create Service Profiles From Template

Naming Prefix : VM-Host-Infra-0

Name Suffix Starting Number : 1

Number of Instances : 3

7. Click OK to create the service profiles.

8. Click OK in the confirmation message.

9. When VMware ESXi 7.0U2 has been installed on the hosts, the host Service Profiles can be bound to the corresponding non-vMedia-enabled Service Profile Template to remove the vMedia Mapping from the host.

Add More Servers to FlexPod Unit

Additional server pools, service profile templates, and service profiles can be created in the respective organizations to add more servers to the FlexPod unit. All pools and policies created at the organizational level will need to be recreated within other organizations.

Gather Necessary Information

After the Cisco UCS service profiles have been created, each infrastructure server in the environment will have a unique configuration. To proceed with the FlexPod deployment, specific information must be gathered from each Cisco UCS server and from the NetApp controllers.

Table 6. WWPNs from NetApp Storage

SVM	Adapter	MDS Switch	Target: WWPN
Infra_SVM	fcp-lif-01a	Fabric A	<fcp-lif-01a-wwpn>
	fcp-lif-01b	Fabric B	<fcp-lif-01b-wwpn>
	fcp-lif-02a	Fabric A	<fcp-lif-02a-wwpn>
	fcp-lif-02b	Fabric B	<fcp-lif-02b-wwpn>

To obtain the FC WWPNs, run the `network interface show` command on the storage cluster management interface.

Table 7. WWPNs for Cisco UCS Service Profiles

Cisco UCS Service Profile Name	MDS Switch	Initiator WWPN
VM-Host-Infra-01	Fabric A	<vm-host-infra-01-wwpna>
	Fabric B	<vm-host-infra-01-wwpnb>
VM-Host-Infra-02	Fabric A	<vm-host-infra-02-wwpna>
	Fabric B	<vm-host-infra-02-wwpnb>

Cisco UCS Service Profile Name	MDS Switch	Initiator WWPN
VM-Host-Infra-03	Fabric A	<vm-host-infra-03-wwpna>
	Fabric B	<vm-host-infra-03-wwpnb>

To obtain the FC vHBA WWPN information in Cisco UCS Manager GUI, go to Servers > Service Profiles > root > Sub-Organizations > Organization. Expand each service profile and then expand vHBAs. Select each vHBA. The WWPN is shown under Properties.

SAN Switch Configuration

This section explains how to configure the Cisco MDS 9000s for use in a FlexPod environment. Follow the steps precisely because failure to do so could result in an improper configuration.

If using the Cisco Nexus 93180YC-FX for both LAN and SAN switching, please refer to FlexPod with Nexus 93180YC-FX SAN Switching Configuration – Part 2 in the Appendix.

If directly connecting storage to the Cisco UCS fabric interconnects or using iSCSI as the boot protocol, skip this section.

Physical Connectivity

Follow the physical connectivity guidelines for FlexPod as explained in section FlexPod Cabling.

FlexPod Cisco MDS Base

The following procedures describe how to configure the Cisco Nexus switches for use in a base FlexPod environment. This procedure assumes you are using the Cisco MDS 9132T with NX-OS 8.4(2c).

Cisco MDS 9132T A

To set up the initial configuration for the Cisco MDS A switch, <mds-A-hostname>, follow these steps:

On initial boot and connection to the serial or console port of the switch, the NX-OS setup should automatically start and attempt to enter Power on Auto Provisioning. Enter y to get to the System Admin Account Setup.

1. Configure the switch using the command line.

```
         ---- System Admin Account Setup ----



Do you want to enforce secure password standard (yes/no) [y]: Enter


Enter the password for "admin": <password>

Confirm the password for "admin": <password>


Would you like to enter the basic configuration dialog (yes/no): yes


Create another login account (yes/no) [n]: Enter
```

```
Configure read-only SNMP community string (yes/no) [n]: Enter

Configure read-write SNMP community string (yes/no) [n]: Enter

Enter the switch name : <mds-A-hostname>

Continue with Out-of-band (mgmt0) management configuration? (yes/no) [y]: Enter

Mgmt0 IPv4 address : <mds-A-mgmt0-ip>

Mgmt0 IPv4 netmask : <mds-A-mgmt0-netmask>

Configure the default gateway? (yes/no) [y]: Enter

IPv4 address of the default gateway : <mds-A-mgmt0-gw>

Configure advanced IP options? (yes/no) [n]: Enter

Enable the ssh service? (yes/no) [y]: Enter

Type of ssh key you would like to generate (dsa/rsa) [rsa]: Enter

Number of rsa key bits <1024-2048> [1024]: Enter

Enable the telnet service? (yes/no) [n]: Enter

Configure congestion/no_credit drop for fc interfaces? (yes/no)     [y]: Enter

Enter the type of drop to configure congestion/no_credit drop? (con/no) [c]: Enter

Enter milliseconds in multiples of 10 for congestion-drop for logical-type edge
in range (<200-500>/default), where default is 500.  [d]: Enter

Enable the http-server? (yes/no) [y]: Enter

Configure clock? (yes/no) [n]: Enter

Configure timezone? (yes/no) [n]: Enter
Configure summertime? (yes/no) [n]: Enter


Configure the ntp server? (yes/no) [n]: Enter


Configure default switchport interface state (shut/noshut) [shut]: Enter


Configure default switchport trunk mode (on/off/auto) [on]: auto


Configure default switchport port mode F (yes/no) [n]: yes


Configure default zone policy (permit/deny) [deny]: Enter


Enable full zoneset distribution? (yes/no) [n]: Enter


Configure default zone mode (basic/enhanced) [basic]: Enter
```

2. Review the configuration.

```
Would you like to edit the configuration? (yes/no) [n]: Enter
Use this configuration and save it? (yes/no) [y]: Enter
```

Cisco MDS 9132T B

To set up the initial configuration for the Cisco MDS B switch, <mds-B-hostname>, follow these steps:

On initial boot and connection to the serial or console port of the switch, the NX-OS setup should automatically start and attempt to enter Power on Auto Provisioning. Enter y to get to the System Admin Account Setup.

1. Configure the switch using the command line.

```
         ---- System Admin Account Setup ----



Do you want to enforce secure password standard (yes/no) [y]: Enter


Enter the password for "admin": <password>
Confirm the password for "admin": <password>


Would you like to enter the basic configuration dialog (yes/no): yes


Create another login account (yes/no) [n]: Enter
```

```
Configure read-only SNMP community string (yes/no) [n]: Enter

Configure read-write SNMP community string (yes/no) [n]: Enter

Enter the switch name : <mds-B-hostname>

Continue with Out-of-band (mgmt0) management configuration? (yes/no) [y]: Enter

Mgmt0 IPv4 address : <mds-B-mgmt0-ip>

Mgmt0 IPv4 netmask : <mds-B-mgmt0-netmask>

Configure the default gateway? (yes/no) [y]: Enter

IPv4 address of the default gateway : <mds-B-mgmt0-gw>

Configure advanced IP options? (yes/no) [n]: Enter

Enable the ssh service? (yes/no) [y]: Enter

Type of ssh key you would like to generate (dsa/rsa) [rsa]: Enter

Number of rsa key bits <1024-2048> [1024]: Enter

Enable the telnet service? (yes/no) [n]: Enter

Configure congestion/no_credit drop for fc interfaces? (yes/no)     [y]: Enter

Enter the type of drop to configure congestion/no_credit drop? (con/no) [c]: Enter

Enter milliseconds in multiples of 10 for congestion-drop for logical-type edge
in range (<200-500>/default), where default is 500.  [d]: Enter

Enable the http-server? (yes/no) [y]: Enter

Configure clock? (yes/no) [n]: Enter

Configure timezone? (yes/no) [n]: Enter
Configure summertime? (yes/no) [n]: Enter

Configure the ntp server? (yes/no) [n]: Enter

Configure default switchport interface state (shut/noshut) [shut]: Enter

Configure default switchport trunk mode (on/off/auto) [on]: auto

Configure default switchport port mode F (yes/no) [n]: yes

Configure default zone policy (permit/deny) [deny]: Enter

Enable full zoneset distribution? (yes/no) [n]: Enter

Configure default zone mode (basic/enhanced) [basic]: Enter
```

2. Review the configuration.

```
Would you like to edit the configuration? (yes/no) [n]: Enter
Use this configuration and save it? (yes/no) [y]: Enter
```

FlexPod Cisco MDS Ansible Switch Configuration

The following procedure can be used to configure the Cisco MDS switches from the management workstation.

1. Add MDS switch ssh keys to /root/.ssh/known_hosts. Adjust known_hosts as necessary if errors occur.

```
ssh admin@<mds-A-mgmt0-ip>
exit
ssh admin@<mds-B-mgmt0-ip>
exit
```

2. Edit the following variable files to ensure proper MDS variables are entered:

   - FlexPod-M6/FlexPod-UCSM-M6/inventory
   - FlexPod-M6/FlexPod-UCSM-M6/group_vars/all.yml
   - FlexPod-M6/FlexPod-UCSM-M6/host_vars/mdsA.yml
   - FlexPod-M6/FlexPod-UCSM-M6/host_vars/mdsB.yml
   - FlexPod-M6/FlexPod-UCSM-M6/roles/MDSconfig/defaults/main.yml

> The FC and FC-NVMe NetApp LIF WWPNs should have already been entered into the all.yml file so that MDS device alias can be properly configured. The Cisco UCS server initiator WWPNs for both FC and FC-NVMe should also be entered into all.yml. To query these WWPNs, log into the Cisco UCS Manager web interface and select each of the 3 server service profiles by going to “Servers > Service Profiles > root > Sub-Organizations > FlexPod Organization” and expanding the service profile. The needed WWPNs can be found by expanding vHBAs and selecting each vHBA.

3. From /root/ FlexPod-M6/FlexPod-UCSM-M6, run the Setup_MDS.yml Ansible playbook.

```
ansible-playbook ./Setup_MDS.yml -i inventory
```

4. Once the Ansible playbook has been run and configured both switches, it is important to configure the local time so that logging time alignment and any backup schedules are correct. For more information on configuring the timezone and daylight savings time or summertime, please see Cisco MDS 9000 Series Fundamentals Configuration Guide, Release 8.x. Sample clock commands for the United States Eastern timezone are:

```
clock timezone EST -5 0

clock summer-time EDT 2 Sunday March 02:00 1 Sunday November 02:00 60
```

5. ssh into each switch and execute the following commands

```
clock timezone <timezone> <hour-offset> <minute-offset>

clock summer-time <timezone> <start-week> <start-day> <start-month> <start-time> <end-week>
<end-day> <end-month> <end-time> <offset-minutes>
```

FlexPod Cisco MDS Switch Manual Configuration

Enable Licenses

Cisco MDS 9132T A and Cisco MDS 9132T B

To enable the correct features on the Cisco MDS switches, follow these steps:

1. Log in as admin.

2. Run the following commands:

```
configure terminal
feature npiv
feature fport-channel-trunk
```

Add NTP Servers and Local Time Configuration

Cisco MDS 9132T A and Cisco MDS 9132T B

To configure the second NTP server and add local time configuration, follow this step:

1. From the global configuration mode, run the following command:

```
ntp server <nexus-A-mgmt0-ip>
ntp server <nexus-B-mgmt0-ip>
clock timezone <timezone> <hour-offset> <minute-offset>
clock summer-time <timezone> <start-week> <start-day> <start-month> <start-time> <end-week>
<end-day> <end-month> <end-time> <offset-minutes>
```

> It is important to configure the local time so that logging time alignment, any backup schedules, and SAN Analytics forwarding are correct. For more information on configuring the timezone and daylight savings time or summer time, please see Cisco MDS 9000 Series Fundamentals Configuration Guide, Release 8.x. Sample clock commands for the United States Eastern timezone are:
> clock timezone EST -5 0
> clock summer-time EDT 2 Sunday March 02:00 1 Sunday November 02:00 60

Configure Individual Ports

Cisco MDS 9132T A

To configure individual ports and port-channels for switch A, follow this step:

1. From the global configuration mode, run the following commands:

```
interface fc1/1
switchport description <st-clustername>-1:5a
switchport speed 32000
switchport trunk mode off
no shutdown
exit

interface fc1/2
switchport description <st-clustername>-2:5a
switchport speed 32000
switchport trunk mode off
no shutdown
exit

interface fc1/5
switchport description <ucs-clustername>-a:1/1
channel-group 15
no shutdown
exit
```

```
interface fc1/6
switchport description <ucs-clustername>-a:1/2
channel-group 15
no shutdown
exit

interface port-channel15
channel mode active
switchport trunk allowed vsan <vsan-a-id>
switchport description <ucs-clustername>-a
switchport speed 32000
no shutdown
exit
```

If VSAN trunking is not being used between the Cisco UCS Fabric Interconnects and the MDS switches, do not enter "switchport trunk allowed vsan <vsan-a-id>" for interface port-channel15. Also, the default setting of the switchport trunk mode auto is being used for the port channel.

Cisco MDS 9132T B

To configure individual ports and port-channels for switch B, follow this step:

1. From the global configuration mode, run the following commands:

```
interface fc1/1
switchport description <st-clustername>-1:5b
switchport speed 32000
switchport trunk mode off
no shutdown
exit

interface fc1/2
switchport description <st-clustername>-2:5b
switchport speed 32000
switchport trunk mode off
no shutdown
exit

interface fc1/5
switchport description <ucs-clustername>-b:1/1
channel-group 15
```

```
no shutdown
exit

interface fc1/6
switchport description <ucs-clustername>-b:1/2
channel-group 15
no shutdown
exit

interface port-channel15
channel mode active
switchport trunk allowed vsan <vsan-b-id>
switchport description <ucs-clustername>-b
switchport speed 32000
no shutdown
exit
```

If VSAN trunking is not being used between the Cisco UCS Fabric Interconnects and the MDS switches, do not enter “switchport trunk allowed vsan <vsan-b-id>” for interface port-channel15. Also, the default setting of the switchport trunk mode auto is being used for the port channel.

Create VSANs

Cisco MDS 9132T A

To create the necessary VSANs for fabric A and add ports to them, follow this step:

1. From the global configuration mode, run the following commands:

```
vsan database
vsan <vsan-a-id>
vsan <vsan-a-id> name Fabric-A
exit
zone smart-zoning enable vsan <vsan-a-id>
vsan database
vsan <vsan-a-id> interface fc1/1
vsan <vsan-a-id> interface fc1/2
vsan <vsan-a-id> interface port-channel15
exit
```

Cisco MDS 9132T B

To create the necessary VSANs for fabric B and add ports to them, follow this step:

From the global configuration mode, run the following commands:

```
vsan database
vsan <vsan-b-id>
vsan <vsan-b-id> name Fabric-B
exit
zone smart-zoning enable vsan <vsan-b-id>
vsan database
vsan <vsan-b-id> interface fc1/1
vsan <vsan-b-id> interface fc1/2
vsan <vsan-b-id> interface port-channel15
exit
```

At this point, it may be necessary to go into Cisco UCS Manager and disable and enable the FC port-channel interfaces to get the port-channels to come up.

Create Device Aliases

Cisco MDS 9132T A

To create device aliases for Fabric A that will be used to create zones, follow these steps:

1. From the global configuration mode, run the following commands:

```
device-alias mode enhanced
device-alias database
device-alias name Infra_SVM-fcp-lif-01a pwwn <fcp-lif-01a-wwpn>
device-alias name Infra_SVM-fcp-lif-02a pwwn <fcp-lif-02a-wwpn>
device-alias name Infra_SVM-fc-nvme-lif-01a pwwn <fc-nvme-lif-01a-wwpn>
device-alias name Infra_SVM-fc-nvme-lif-02a pwwn <fc-nvme-lif-02a-wwpn>
device-alias name VM-Host-Infra-FCP-01-A pwwn <vm-host-infra-fcp-01-wwpna>
device-alias name VM-Host-Infra-FCP-02-A pwwn <vm-host-infra-fcp-02-wwpna>
device-alias name VM-Host-Infra-FCP-03-A pwwn <vm-host-infra-fcp-03-wwpna>
device-alias name VM-Host-Infra-FC-NVMe-01-A pwwn <vm-host-infra-fc-nvme-01-wwpna>
device-alias name VM-Host-Infra-FC-NVMe-02-A pwwn <vm-host-infra-fc-nvme-02-wwpna>
device-alias name VM-Host-Infra-FC-NVMe-03-A pwwn <vm-host-infra-fc-nvme-03-wwpna>
device-alias commit
```

Cisco MDS 9132T B

To create device aliases for Fabric B that will be used to create zones, follow these steps:

1. From the global configuration mode, run the following commands:

```
device-alias mode enhanced
```

```
device-alias database
device-alias name Infra_SVM-fcp-lif-01b pwwn <fcp-lif-01b-wwpn>
device-alias name Infra_SVM-fcp-lif-02b pwwn <fcp-lif-02b-wwpn>
device-alias name Infra_SVM-fc-nvme-lif-01b pwwn <fc-nvme-lif-01b-wwpn>
device-alias name Infra_SVM-fc-nvme-lif-02b pwwn <fc-nvme-lif-02b-wwpn>
device-alias name VM-Host-Infra-FCP-01-B pwwn <vm-host-infra-fcp-01-wwpnb>
device-alias name VM-Host-Infra-FCP-02-B pwwn <vm-host-infra-fcp-02-wwpnb>
device-alias name VM-Host-Infra-FCP-03-B pwwn <vm-host-infra-fcp-03-wwpnb>
device-alias name VM-Host-Infra-FC-NVMe-01-B pwwn <vm-host-infra-fc-nvme-01-wwpnb>
device-alias name VM-Host-Infra-FC-NVMe-02-B pwwn <vm-host-infra-fc-nvme-02-wwpnb>
device-alias name VM-Host-Infra-FC-NVMe-03-B pwwn <vm-host-infra-fc-nvme-03-wwpnb>
device-alias commit
```

Create Zones and Zoneset

Cisco MDS 9132T A

1. To create the required zones and zoneset on Fabric A, run the following commands:

```
configure terminal
zone name FCP-Infra_SVM-Fabric-A vsan <vsan-a-id>
member device-alias VM-Host-Infra-FCP-01-A init
member device-alias VM-Host-Infra-FCP-02-A init
member device-alias VM-Host-Infra-FCP-03-A init
member device-alias Infra_SVM-fcp-lif-01a target
member device-alias Infra_SVM-fcp-lif-02a target
exit
zone name FC-NVMe-Infra_SVM-Fabric-A vsan <vsan-a-id>
member device-alias VM-Host-Infra-FC-NVMe-01-A init
member device-alias VM-Host-Infra-FC-NVMe-02-A init
member device-alias VM-Host-Infra-FC-NVMe-03-A init
member device-alias Infra_SVM-fc-nvme-lif-01a target
member device-alias Infra_SVM-fc-nvme-lif-02a target
exit
zoneset name FlexPod-Fabric-A vsan <vsan-a-id>
member FCP-Infra_SVM-Fabric-A
member FC-NVMe-Infra_SVM-Fabric-A
exit
zoneset activate name FlexPod-Fabric-A vsan <vsan-a-id>
show zoneset active
copy r s
```

Since Smart Zoning is enabled, a single zone for each storage protocol (FCP and FC-NVMe) is created with all host initiators and targets for the Infra_SVM instead of creating separate zones for each host with the host initiator and targets. If a new host is added, its initiator can simply be added to each single zone in each MDS switch and then the zoneset reactivated. If another SVM is added to the FlexPod with FC and/or FC-NVMe targets, new zones can be added for that SVM.

Cisco MDS 9132T B

1. To create the required zones and zoneset on Fabric B, run the following commands:

```
configure terminal
zone name FCP-Infra_SVM-Fabric-B vsan <vsan-b-id>
member device-alias VM-Host-Infra-FCP-01-B init
member device-alias VM-Host-Infra-FCP-02-B init
member device-alias VM-Host-Infra-FCP-03-B init
member device-alias Infra_SVM-fcp-lif-01b target
member device-alias Infra_SVM-fcp-lif-02b target
exit
zone name FC-NVMe-Infra_SVM-Fabric-B vsan <vsan-b-id>
member device-alias VM-Host-Infra-FC-NVMe-01-B init
member device-alias VM-Host-Infra-FC-NVMe-02-B init
member device-alias VM-Host-Infra-FC-NVMe-03-B init
member device-alias Infra_SVM-fc-nvme-lif-01b target
member device-alias Infra_SVM-fc-nvme-lif-02b target
exit
zoneset name FlexPod-Fabric-B vsan <vsan-b-id>
member FCP-Infra_SVM-Fabric-B
member FC-NVMe-Infra_SVM-Fabric-B
exit
zoneset activate name FlexPod-Fabric-B vsan <vsan-b-id>
show zoneset active
copy r s
```

Storage Configuration – ONTAP Boot Storage Setup

Ansible Configuration

This section details the Ansible Scripts used to configure storage.

To configure the storage for ONTAP Boot, follow these steps:

1. Edit the following variable file and update the fcp_igroups variables:

```
FlexPod-M6/FlexPod-UCSM-M6/vars/ontap_main.yml
```

Update the initiator WWPNs for FC iGroups.

2. From /root/ FlexPod-M6/FlexPod-UCSM-M6, invoke the ansible scripts for this section using the following command:

```
ansible-playbook -i inventory Setup_ONTAP.yml -t ontap_config_part_2
```

Use the -vvv tag to see detailed execution output log.

Manual Configuration

Create Boot LUNs

To create three boot LUNs, run the following commands:

```
lun create -vserver Infra-SVM -path /vol/esxi_boot/VM-Host-Infra-01 -size 32GB -ostype vmware
-space-reserve disabled

lun create -vserver Infra-SVM -path /vol/esxi_boot/VM-Host-Infra-02 -size 32GB -ostype vmware
-space-reserve disabled

lun create -vserver Infra-SVM -path /vol/esxi_boot/VM-Host-Infra-03 -size 32GB -ostype vmware
-space-reserve disabled
```

Create igroups

Create initiator groups (igroups) by entering the following commands from the storage cluster management node Secure Shell (SSH) connection:

```
lun igroup create –vserver Infra-SVM –igroup VM-Host-Infra-01 –protocol fcp –ostype vmware –
initiator <vm-host-infra-01-wwpna>, <vm-host-infra-01-wwpnb>


lun igroup create –vserver Infra-SVM –igroup VM-Host-Infra-02 –protocol fcp –ostype vmware –
initiator <vm-host-infra-02-wwpna>, <vm-host-infra-02-wwpnb>

lun igroup create –vserver Infra-SVM –igroup VM-Host-Infra-03 –protocol fcp –ostype vmware –
initiator <vm-host-infra-03-wwpna>, <vm-host-infra-03-wwpnb>
```

```
lun igroup create -vserver Infra-SVM -igroup MGMT-Hosts -protocol fcp -ostype vmware -
initiator <vm-host-infra-01-wwpna>, <vm-host-infra-01-wwpnb>, <vm-host-infra-02-wwpna>, <vm-
host-infra-02-wwpnb>, <vm-host-infra-03-wwpna>, <vm-host-infra-03-wwpnb>
```

Use the values listed in Table 6 and Table 7 for the WWPN information.

To view the three igroups just created, use the command `lun igroup show`:

```
lun igroup show -protocol fcp
```

Map Boot LUNs to igroups

To map the boot LUNs to igroups, from the storage cluster management SSH connection, enter the following commands:

```
lun mapping create -vserver Infra-SVM -path /vol/esxi_boot/VM-Host-Infra-01 -igroup VM-Host-
Infra-01 -lun-id 0

lun mapping create -vserver Infra-SVM -path /vol/esxi_boot/VM-Host-Infra-02 -igroup VM-Host-
Infra-02 -lun-id 0

lun mapping create -vserver Infra-SVM -path /vol/esxi_boot/VM-Host-Infra-03 -igroup VM-Host-
Infra-03 -lun-id 0
```

VMware vSphere 7.0U2 Setup

VMware ESXi 7.0U2

This section provides detailed instructions for installing VMware ESXi 7.0 in a FlexPod environment. After the procedures are completed, three booted ESXi hosts will be provisioned.

Several methods exist for installing ESXi in a VMware environment. These procedures focus on how to use the built-in keyboard, video, mouse (KVM) console and virtual media features in Cisco UCS Manager to map remote installation media to individual servers and connect to their boot logical unit numbers (LUNs).

Download ESXi 7.0U2 from VMware

If the VMware ESXi ISO has not already been downloaded, follow these steps:

1. Click the following link: Cisco Custom Image for ESXi 7.0 U2 Install ISO.

2. You will need a user id and password on vmware.com to download this software.

3. Download the .iso file.

Log into Cisco UCS 6454 Fabric Interconnect

Cisco UCS Manager

The Cisco UCS IP KVM enables the administrator to begin the installation of the operating system (OS) through remote media. It is necessary to log into the Cisco UCS environment to run the IP KVM.

To log into the Cisco UCS environment, follow these steps:

1. Open a web browser and enter the IP address for the Cisco UCS cluster address. This step launches the Cisco UCS Manager application.

2. Click the Launch UCS Manager link to launch the HTML 5 UCS Manager GUI.

3. If prompted to accept security certificates, accept as necessary.

4. When prompted, enter admin as the user name and enter the administrative password.

5. To log in to Cisco UCS Manager, click Login.

6. From the main menu, click Servers.

7. Choose Servers > Service Profiles > root > Sub-Organizations > FlexPod Organization > VM-Host-Infra-01.

8. In the Actions pane, click KVM Console.

9. Follow the prompts to launch the HTML5 KVM console.

10. Choose Servers > Service Profiles > root > Sub-Organizations > FlexPod Organization > VM-Host-Infra-02.

11. In the Actions pane, click KVM Console.

12. Follow the prompts to launch the HTML5 KVM console.

13. Choose Servers > Service Profiles > root > Sub-Organizations > FlexPod Organization > VM-Host-Infra-03.

14. In the Actions pane, click KVM Console.

15. Follow the prompts to launch the HTML5 KVM console.

Set Up VMware ESXi Installation

ESXi Hosts VM-Host-Infra-01, VM-Host-Infra-02, and VM-Host-Infra-03

Skip this section if you’re using vMedia policies; the ISO file will already be connected to the KVM.

To prepare the server for the OS installation, follow these steps on each ESXi host:

1. In the KVM window, click Virtual Media.

2. Choose Activate Virtual Devices.

3. If prompted to accept an Unencrypted KVM session, accept as necessary.

4. Click Virtual Media and choose Map CD/DVD.

5. Browse to the ESXi installer ISO image file and click Open.

6. Click Map Device.

7. Click the KVM Console tab to monitor the server boot.

Install ESXi

ESXi Hosts VM-Host-Infra-01, VM-Host-Infra-02, and VM-Host-Infra-03

To install VMware ESXi to the bootable LUN of the hosts, follow these steps on each host:

1. Boot the server by selecting Boot Server in the KVM and click OK, then click OK again.

2. On boot, the machine detects the presence of the ESXi installation media and loads the ESXi installer.

If the ESXi installer fails to load because the software certificates cannot be validated, reset the server, and when prompted, press F2 to go into BIOS and set the system time and date to current. The ESXi installer should load properly.

3. After the installer is finished loading, press Enter to continue with the installation.

4. Read and accept the end-user license agreement (EULA). Press F11 to accept and continue.

It may be necessary to map function keys as User Defined Macros under the Macros menu in the Cisco UCS KVM console.

5. Choose the LUN that was previously set up as the installation disk for ESXi and press Enter to continue with the installation.

6. Choose the appropriate keyboard layout and press Enter.

7. Enter and confirm the root password and press Enter.

8. The installer issues a warning that the selected disk will be repartitioned. Press F11 to continue with the installation.

9. After the installation is complete, press Enter to reboot the server.

The ESXi installation image will be automatically unmapped in the KVM when Enter is pressed.

10. In Cisco UCS Manager, bind the current service profile to the non-vMedia service profile template to prevent mounting the ESXi installation iso over HTTP.

Set Up Management Networking for ESXi Hosts

Adding a management network for each VMware host is necessary for managing the host.

ESXi Host VM-Host-Infra-01, VM-Host-Infra-02, and VM-Host-Infra-03

To configure each ESXi host with access to the management network, follow these steps:

1. After the server has finished rebooting, in the UCS KVM console, press F2 to customize VMware ESXi.

2. Log in as root, enter the corresponding password, and press Enter to log in.

3. Use the down arrow key to choose Troubleshooting Options and press Enter.

4. Choose Enable ESXi Shell and press Enter.

5. Choose Enable SSH and press Enter.

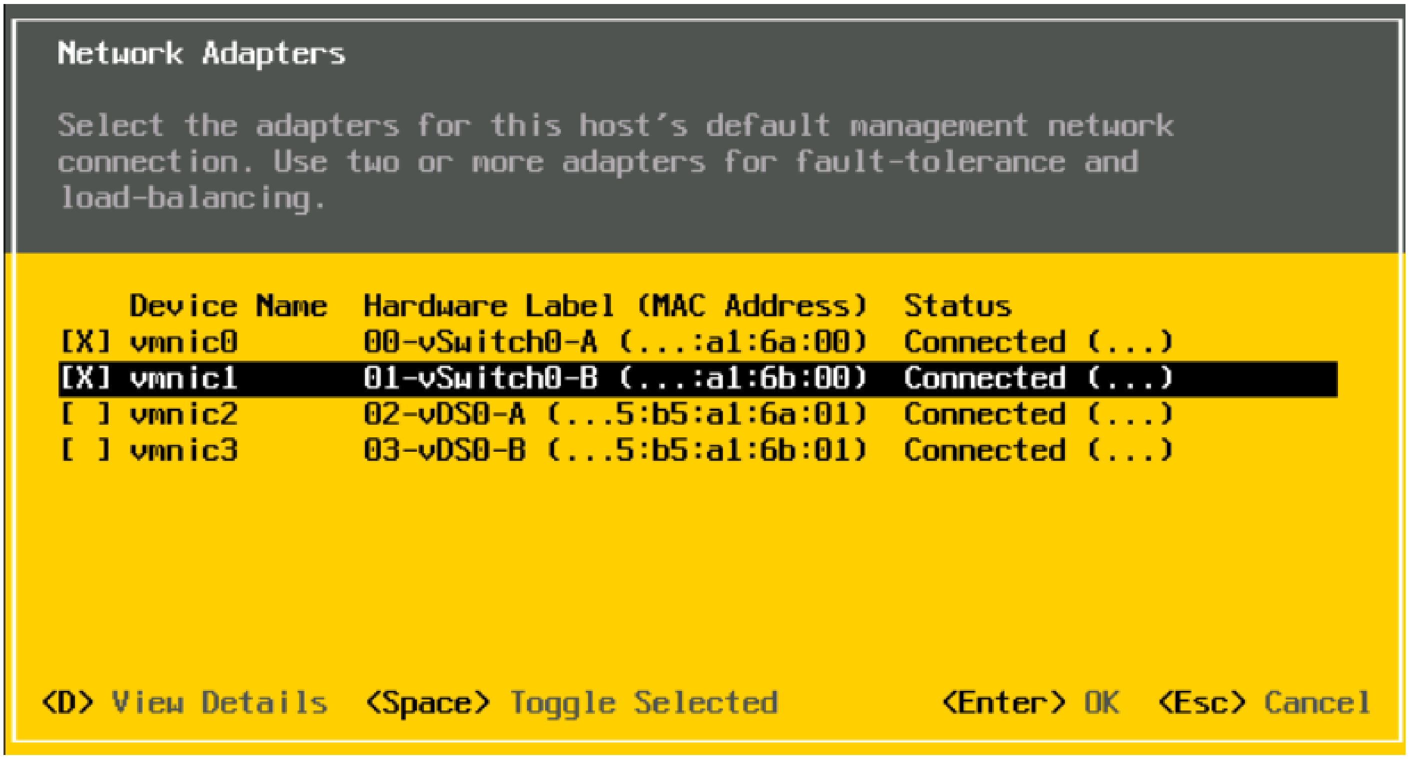
6. Press Esc to exit the Troubleshooting Options menu.

7. Choose the Configure Management Network option and press Enter.

8. Choose Network Adapters and press Enter.

9. Verify that the numbers in the Hardware Label field match the numbers in the Device Name field. If the numbers do not match, note the mapping of vmnic ports to vNIC ports for later use.

10. Using the spacebar, choose vmnic1.



```
Network Adapters

Select the adapters for this host's default management network
connection. Use two or more adapters for fault-tolerance and
load-balancing.

    Device Name  Hardware Label (MAC Address)  Status
[X] vmnic0       00-vSwitch0-A (...:a1:6a:00)  Connected (...)
[X] vmnic1       01-vSwitch0-B (...:a1:6b:00)  Connected (...)
[ ] vmnic2       02-vDS0-A (...5:b5:a1:6a:01)  Connected (...)
[ ] vmnic3       03-vDS0-B (...5:b5:a1:6b:01)  Connected (...)

<D> View Details  <Space> Toggle Selected        <Enter> OK  <Esc> Cancel
```

In lab testing, examples have been seen where the vmnic and device ordering do not match. If this is the case, use the Consistent Device Naming (CDN) to note which vmnics are mapped to which vNICs and adjust the upcoming procedure accordingly.

11. Press Enter.

Set the IB-MGMT VLAN as the native VLAN on the vSwitch0-A and vSwitch0-B vNICs which allows untagged VLAN packets from this interface to go into the IB-MGMT VLAN. Because of this, do not set a VLAN on this interface.

12. Choose IPv4 Configuration and press Enter.

If you are using DHCP to set the ESXi host networking configuration, alter this process as needed.

13. Choose the “Set static IPv4 address and network configuration” option by using the arrow keys and space bar.

14. Move to the IPv4 Address field and enter the IP address for managing the ESXi host.

15. Move to the Subnet Mask field and enter the subnet mask for the ESXi host.

16. Move to the Default Gateway field and enter the default gateway for the ESXi host.

17. Press Enter to accept the changes to the IP configuration.

18. Choose the IPv6 Configuration option and press Enter.

19. Using the spacebar, choose Disable IPv6 (restart required) and press Enter.

20. Choose the DNS Configuration option and press Enter.

Since the IP address is assigned manually, the DNS information must also be entered manually.

21. Using the spacebar, choose “Use the following DNS server addresses and hostname:”

22. Move to the Primary DNS Server field and enter the IP address of the primary DNS server.

23. Optional: Move to the Alternate DNS Server field and enter the IP address of the secondary DNS server.

24. Move to the Hostname field and enter the fully qualified domain name (FQDN) for the ESXi host.

25. Press Enter to accept the changes to the DNS configuration.

26. Press Esc to exit the Configure Management Network submenu.

27. Press Y to confirm the changes and reboot the ESXi host.

Reset VMware ESXi Host VMkernel Port vmk0 MAC Address (Optional)

ESXi Host VM-Host-Infra-01, VM-Host-Infra-02, and VM-Host-Infra-03

By default, the MAC address of the management VMkernel port vmk0 is the same as the MAC address of the Ethernet port it is placed on. If the ESXi host’s boot LUN is remapped to a different server with different MAC addresses, a MAC address conflict will exist because vmk0 will retain the assigned

MAC address unless the ESXi System Configuration is reset. To reset the MAC address of vmk0 to a random VMware-assigned MAC address, follow these steps:

1. From the ESXi console menu main screen, type Ctrl-Alt-F1 to access the VMware console command line interface. In the UCSM KVM, Ctrl-Alt-F1 appears in the list of Static Macros.

2. Log in as root.

3. Type `esxcfg-vmknic –l` to get a detailed listing of interface vmk0. vmk0 should be a part of the "Management Network" port group. Note the IP address and netmask of vmk0.

4. To remove vmk0, type `esxcfg-vmknic –d "Management Network"`.

5. To re-add vmk0 with a random MAC address, type `esxcfg-vmknic –a –i <vmk0-ip> -n <vmk0-netmask> "Management Network"`.

6. Verify vmk0 has been re-added with a random MAC address by typing `esxcfg-vmknic –l`.

7. Tag vmk0 as the management interface by typing `esxcli network ip interface tag add -i vmk0 -t Management`.

8. When vmk0 was re-added, if a message popped up saying vmk1 was marked as the management interface, type `esxcli network ip interface tag remove -i vmk1 -t Management`.

9. If this VMware ESXi host is iSCSI booted, the vmk1, iScsiBootPG-A interface's MAC address can also be reset to a random, VMware-assigned MAC address.

   a. Type esxcfg-vmknic –l to get a detailed listing of interface vmk1. vmk1 should be a part of the "iScsiBootPG-A" port group and should have a MAC address from the UCS MAC Pool. Note the IP address and netmask of vmk1.

10. To remove vmk1, type esxcfg-vmknic –d "iScsiBootPG-A."

11. To re-add vmk1 with a random MAC address, type esxcfg-vmknic –a –i <vmk1-ip> -n <vmk1-netmask> -m 9000 "iScsiBootPG-A."

12. Verify vmk1 has been re-added with a random MAC address by typing esxcfg-vmknic –l.

13. Type `exit` to log out of the command line interface.

14. Type Ctrl-Alt-F2 to return to the ESXi console menu interface.

FlexPod VMware ESXi Ansible Configuration

The following procedure can be used to configure the three VMware ESXi hosts from the management workstation.

1. Edit the following variable files to ensure proper Nexus variables are entered:

- FlexPod-M6/FlexPod-UCSM-M6/inventory
- FlexPod-M6/FlexPod-UCSM-M6/group_vars/all.yml
- FlexPod-M6/FlexPod-UCSM-M6/roles/ESXIhosts/defaults/main.yml
- FlexPod-M6/FlexPod-UCSM-M6/roles/ESXIiscsi/defaults/main.yml (If using iSCSI boot)

2. From /root/ FlexPod-M6/FlexPod-UCSM-M6, run the Setup_ESXi.yml Ansible playbook:

```
ansible-playbook ./Setup_ESXi.yml -i inventory
```

FlexPod VMware ESXi Manual Configuration

Although the VMware ESXi Ansible configuration configures all three ESXi hosts, the manual configuration, after the installation of necessary drivers, configures only the first host using the ESXi web interface then adds the second and third hosts after vCenter is installed.

Install VMware and Cisco VIC Drivers for the ESXi Host

Download the offline bundle for the Cisco VIC nfnic driver, Cisco UCS Tools Component and the NetApp NFS Plug-in for VMware VAAI to the Management workstation: https://customerconnect.vmware.com/downloads/details?downloadGroup=DT-ESXI70-CISCO-NFNIC-50015&productId=974 (Cisco-nfnic_5.0.0.15-1OEM.700.1.0.15843807_18697950.zip)

Cisco UCS Tools Component for ESXi 7.0 1.2.1 (ucs-tool-esxi_1.2.1-1OEM.zip)

NetApp NFS Plug-in for VMware VAAI 2.0 (NetAppNasPluginV2.0.zip)

This document is using the driver versions shown above along with Cisco VIC nenic version 1.0.35.0 (already included in the Cisco Custom ISO) along with VMware vSphere version 7.0.2, Cisco UCS version 4.2(1i), and the latest patch of NetApp ONTAP 9.9.1. These were the versions validated and supported at the time this document was published. This document can be used as a guide for configuring future versions of software. Consult the Cisco UCS Hardware Compatibility List and the NetApp Interoperability Matrix Tool to determine supported combinations of firmware and software.

ESXi Hosts VM-Host-Infra-01, VM-Host-Infra-02, and VM-Host-Infra-03

To install VMware VIC Drivers, the UCS Tool, and the NetApp NFS Plug-in for VMware VAAI on the ESXi host VM-Host-Infra-01 and VM-Host-Infra-02, follow these steps:

1. Using an SCP program such as WinSCP, copy the three offline bundles referenced above to the /tmp directory on each ESXi host.

2. Using a ssh tool such as PuTTY, ssh to each VMware ESXi host. Log in as root with the root password.

3. Type `cd /tmp`.

4. Run the following commands on each host:

```
esxcli software component apply -d /tmp/Cisco-nfnic_5.0.0.15-
1OEM.700.1.0.15843807_1869750.zip

esxcli software component apply -d /tmp/ucs-tool-esxi_1.2.1-1OEM.zip

esxcli software vib install -d /tmp/NetAppNasPluginV2.0.zip

reboot
```

5. After reboot, log back into each host and run the following commands and ensure the correct version is installed:

```
esxcli software vib list | grep nenic

esxcli software component list | grep nfnic


esxcli software component list | grep ucs

esxcli software vib list | grep NetApp
```

Log into the First VMware ESXi Host by Using VMware Host Client

ESXi Host VM-Host-Infra-01

To log into the VM-Host-Infra-01 ESXi host by using the VMware Host Client, follow these steps:

1. Open a web browser on the management workstation and navigate to the VM-Host-Infra-01 management IP address.

2. Enter root for the User name.

3. Enter the root password.

4. Click Login to connect.

5. Decide whether to join the VMware Customer Experience Improvement Program and click OK.

Set Up VMkernel Ports and Virtual Switch

ESXi Host VM-Host-Infra-01

To set up the VMkernel ports and the virtual switches on the first ESXi host, follow these steps:

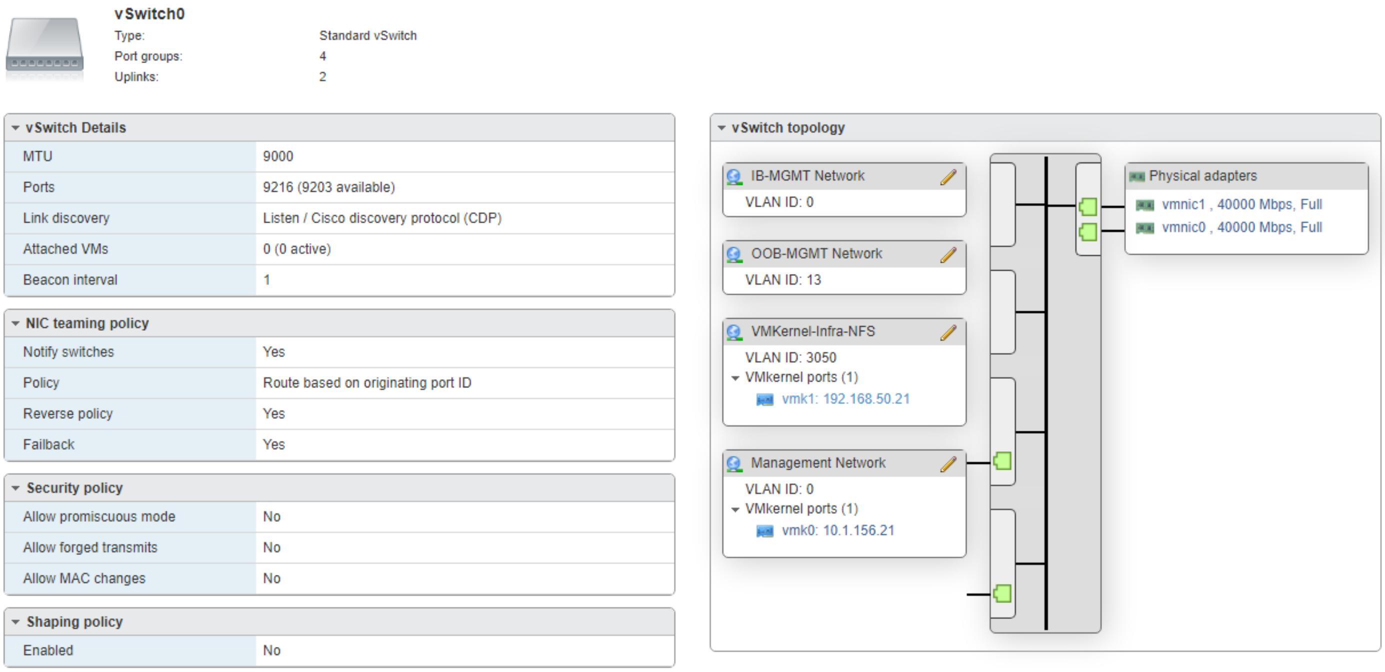
In this procedure, you’re only setting up the first ESXi host. The second and third hosts will be added to vCenter and setup from the vCenter HTML5 Interface.

1. From the Host Client Navigator, choose Networking.

2. In the center pane, choose the Virtual switches tab.
3. Highlight the vSwitch0 line.
4. Choose Edit settings.
5. Change the MTU to 9000.
6. Expand NIC teaming.
7. In the Failover order section, choose vmnic1 and click Mark active.
8. Verify that vmnic1 now has a status of Active.
9. Click Save.
10. Choose Networking, then choose the Port groups tab.
11. In the center pane, right-click VM Network and choose Edit settings.
12. Name the port group IB-MGMT Network. Leave the VLAN ID set at 0.
13. Click Save to finalize the edits for the IB-MGMT Network port group.
14. Click Add port group.
15. Name the port group OOB-MGMT Network and enter the <OOB-MGMT-vlan-id> for the VLAN ID.
16. Click Add to finalize the edits for the OOB-MGMT port group.
17. At the top, choose the VMkernel NICs tab.
18. Click Add VMkernel NIC.
19. For New port group, enter VMkernel-Infra-NFS.
20. For Virtual switch, choose vSwitch0.
21. Enter <infra-nfs-vlan-id> for the VLAN ID.
22. Change the MTU to 9000.
23. Choose Static IPv4 settings and expand IPv4 settings.
24. Enter the ESXi host Infrastructure NFS IP address and netmask.
25. Leave TCP/IP stack set at Default TCP/IP stack and do not choose any of the Services.

26. Click Create.

27. Choose the Virtual Switches tab, then vSwitch0. The properties for vSwitch0 VMkernel NICs should be similar to the following example:



vSwitch0

Type:	Standard vSwitch
Port groups:	4
Uplinks:	2

vSwitch Details

MTU	9000
Ports	9216 (9203 available)
Link discovery	Listen / Cisco discovery protocol (CDP)
Attached VMs	0 (0 active)
Beacon interval	1

NIC teaming policy

Notify switches	Yes
Policy	Route based on originating port ID
Reverse policy	Yes
Failback	Yes

Security policy

Allow promiscuous mode	No
Allow forged transmits	No
Allow MAC changes	No

Shaping policy

Enabled	No

vSwitch topology

IB-MGMT Network
VLAN ID: 0

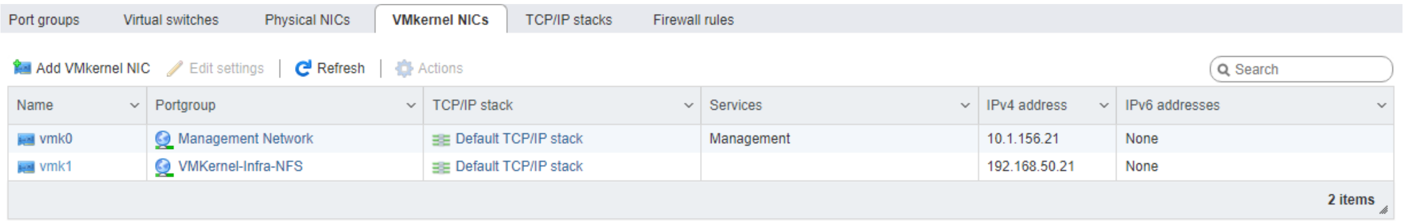
OOB-MGMT Network
VLAN ID: 13

VMKernel-Infra-NFS
VLAN ID: 3050
VMkernel ports (1)
vmk1: 192.168.50.21

Management Network
VLAN ID: 0
VMkernel ports (1)
vmk0: 10.1.156.21

Physical adapters
vmnic1 , 40000 Mbps, Full
vmnic0 , 40000 Mbps, Full

28. Choose Networking and the VMkernel NICs tab to confirm configured virtual adapters. The adapters listed should be similar to the following example:



Name	Portgroup	TCP/IP stack	Services	IPv4 address	IPv6 addresses
vmk0	Management Network	Default TCP/IP stack	Management	10.1.156.21	None
vmk1	VMKernel-Infra-NFS	Default TCP/IP stack		192.168.50.21	None

2 items

Mount Required Datastores

ESXi Host VM-Host-Infra-01

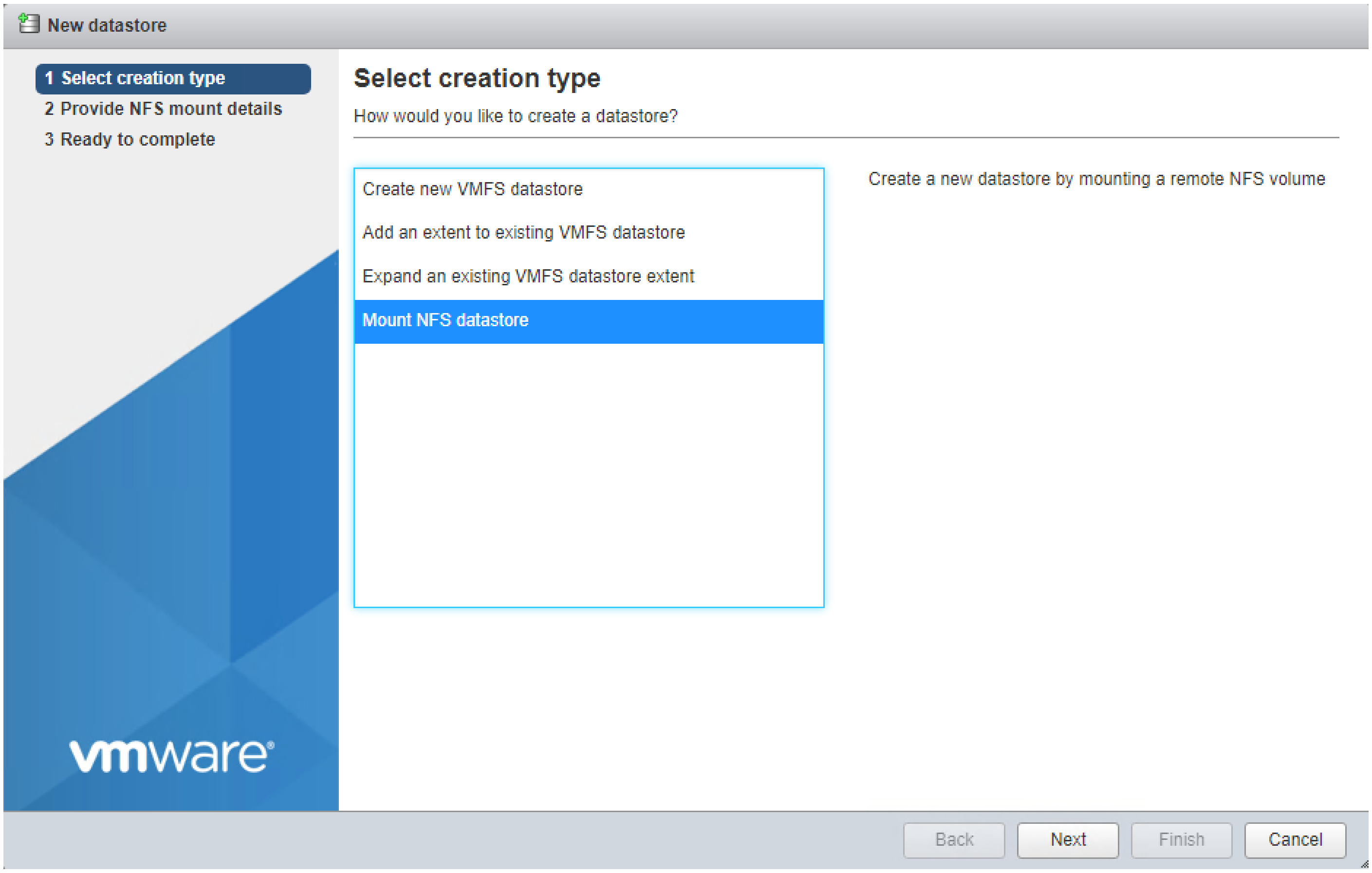
To mount the required datastores, follow these steps on the first ESXi host:

1. From the Host Client, choose Storage.

2. In the center pane, choose the Datastores tab.

3. In the center pane, choose New Datastore to add a new datastore.

4. In the New datastore popup, choose Mount NFS datastore and click Next.



New datastore

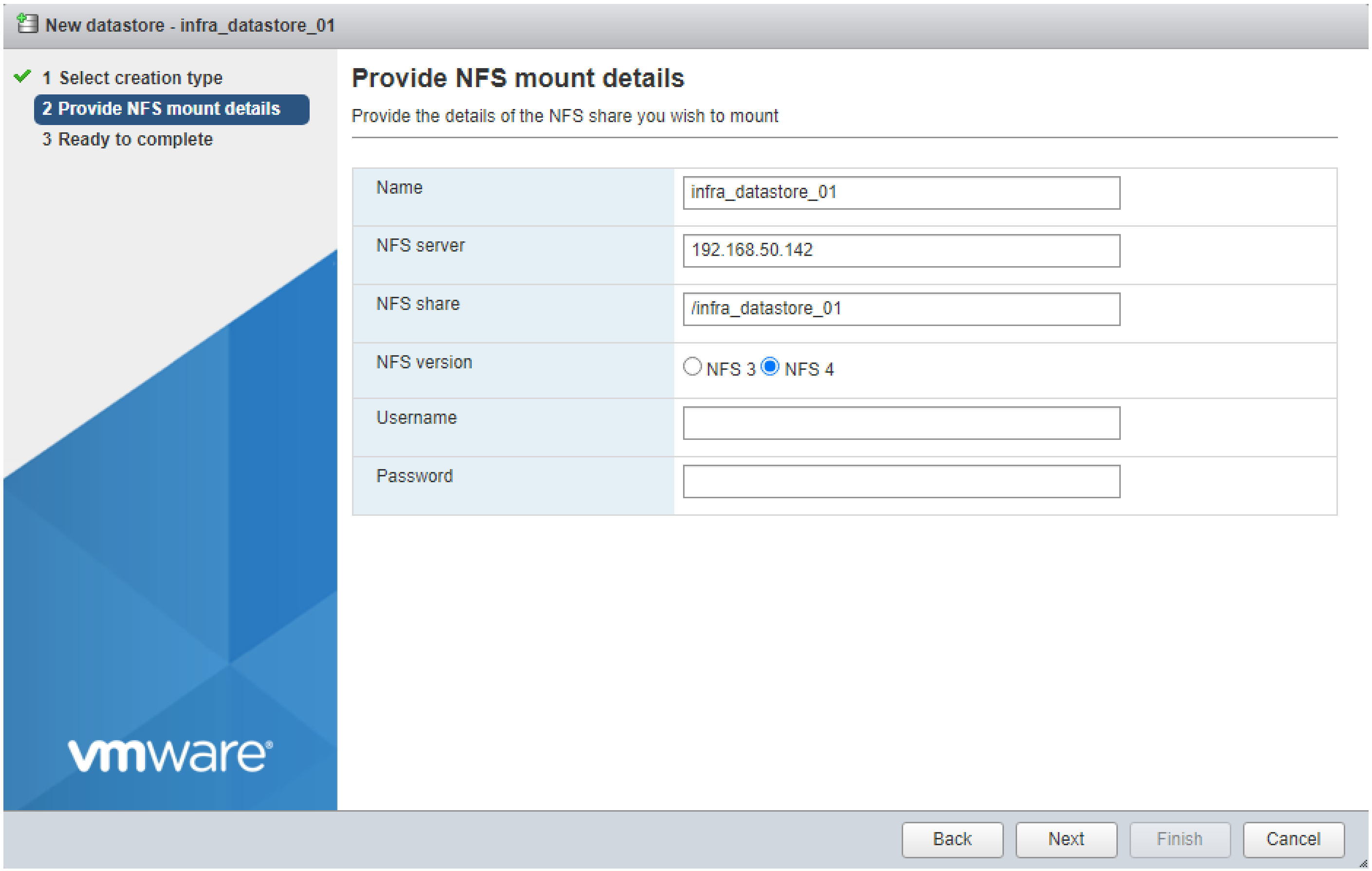
Select creation type

How would you like to create a datastore?

- Create new VMFS datastore
- Add an extent to existing VMFS datastore
- Expand an existing VMFS datastore extent
- Mount NFS datastore

Create a new datastore by mounting a remote NFS volume

5. Input infra_datastore_01 for the datastore name. Input the IP address for the nfs-lif-01 LIF for the NFS server. Input /infra_datastore_01 for the NFS share. Set the NFS version to NFS 4. Click Next.



New datastore - infra_datastore_01
✓ 1 Select creation type
2 Provide NFS mount details
3 Ready to complete
vmware

Provide NFS mount details

Provide the details of the NFS share you wish to mount

Name	infra_datastore_01
NFS server	192.168.50.142
NFS share	/infra_datastore_01
NFS version	○ NFS 3 ● NFS 4
Username	
Password	

6. Click Finish. The datastore should now appear in the datastore list.

7. In the center pane, choose New Datastore to add a new datastore.

8. In the New datastore popup, choose Mount NFS datastore and click Next.

9. Input infra_datastore_02 for the datastore name. Input the IP address for the nfs-lif-02 LIF for the NFS server. Input /infra_datastore_02 for the NFS share. Set the NFS version to NFS 4. Click Next.

10. Click Finish. The datastore should now appear in the datastore list.

11. In the center pane, choose New Datastore to add a new datastore.

12. In the New datastore popup, choose Mount NFS datastore and click Next.

13. Input infra_swap for the datastore name. Input the IP address for the nfs-lif-01 LIF for the NFS server. Input /infra_swap for the NFS share. Set the NFS version to NFS 4. Click Next.

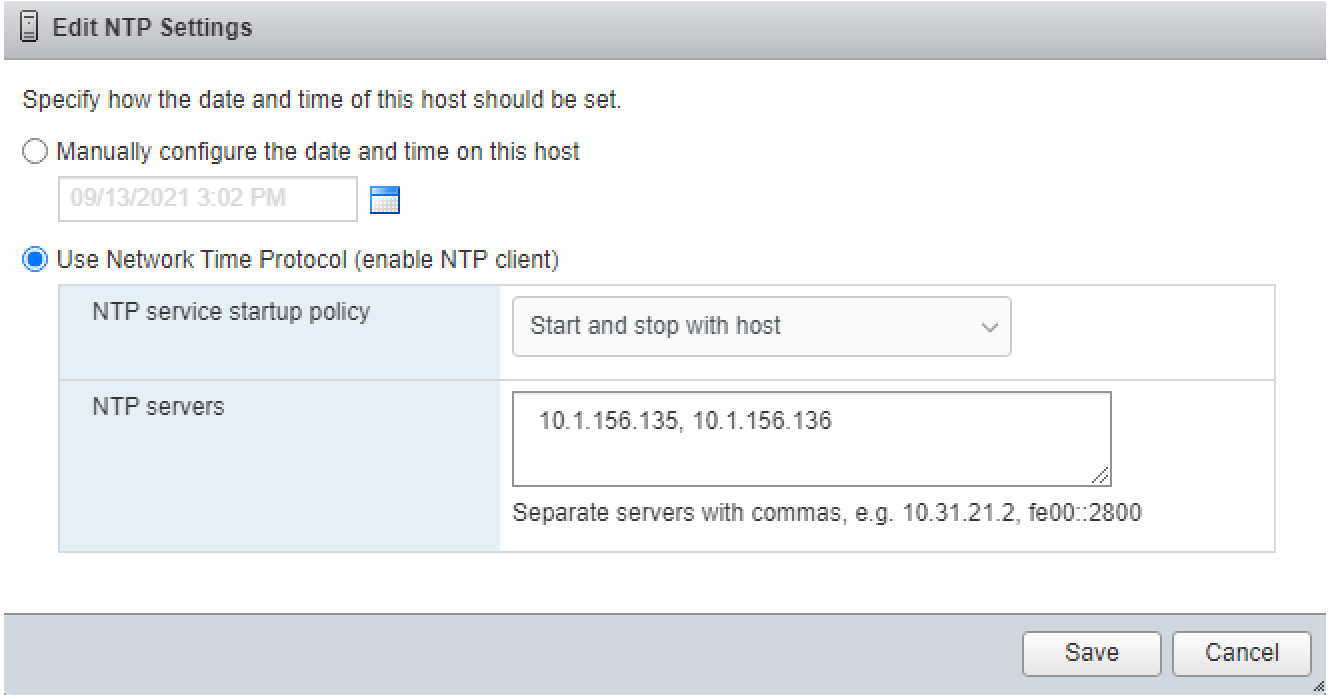
14. Click Finish. The datastore should now appear in the datastore list.

Configure NTP on First ESXi Host

ESXi Host VM-Host-Infra-01

To configure Network Time Protocol (NTP) on the first ESXi host, follow these steps:

1. From the Host Client, choose Manage.
2. In the center pane, choose System > Time & date.
3. Click Edit NTP settings.
4. Make sure “Manually configure the date and time on this host and enter the approximate date and time.
5. Select Use Network Time Protocol (enable NTP client).
6. Use the drop-down list to choose Start and stop with host.
7. Enter the two Nexus switch NTP addresses in the NTP servers box separated by a comma.



Edit NTP Settings

Specify how the date and time of this host should be set.

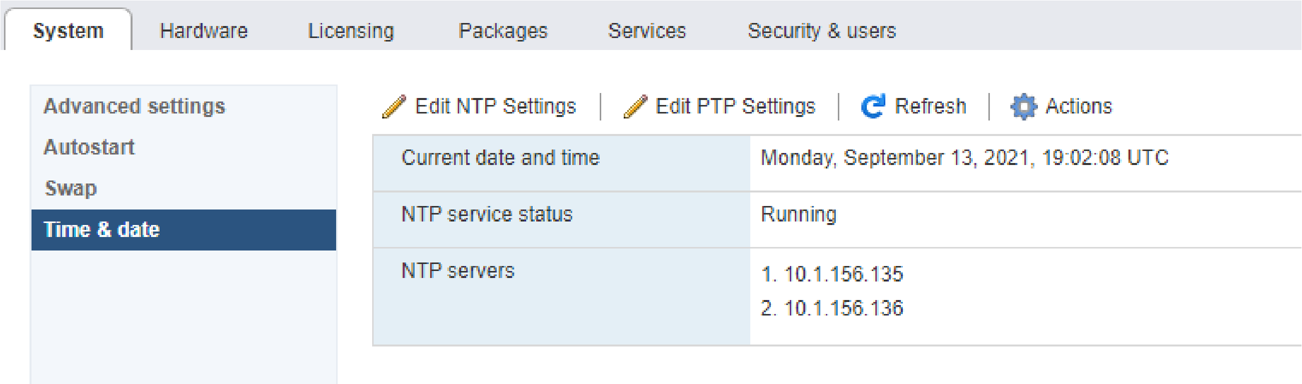
○ Manually configure the date and time on this host

09/13/2021 3:02 PM

● Use Network Time Protocol (enable NTP client)

NTP service startup policy	Start and stop with host
NTP servers	10.1.156.135, 10.1.156.136 Separate servers with commas, e.g. 10.31.21.2, fe00::2800

8. Click Save to save the configuration changes.
9. Select the Services tab.
10. Right-click ntpd and choose Start.
11. System > Time & date should now show Running for the NTP service status.



Current date and time	Monday, September 13, 2021, 19:02:08 UTC
NTP service status	Running
NTP servers	1. 10.1.156.135 2. 10.1.156.136

Configure ESXi Host Swap

ESXi Host VM-Host-Infra-01

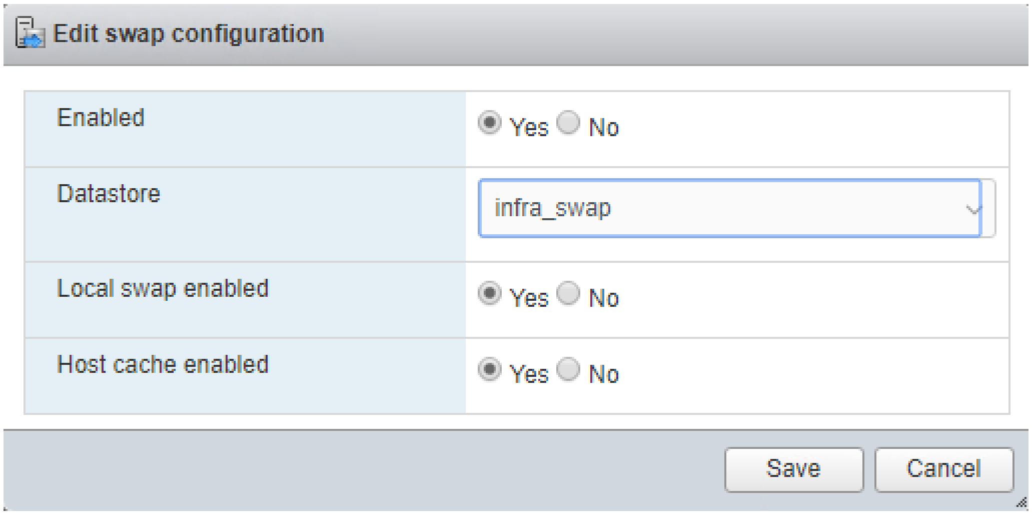
To configure host swap on the first ESXi host, follow these steps on the host:

1. From the Host Client, choose Manage.

2. In the center pane, choose System > Swap.

3. Click Edit settings.

4. Use the drop-down list to choose infra_swap. Leave all other settings unchanged.



Enabled	● Yes ○ No
Datastore	infra_swap
Local swap enabled	● Yes ○ No
Host cache enabled	● Yes ○ No

5. Click Save to save the configuration changes.

Configure Host Power Policy

ESXi Host VM-Host-Infra-01

To configure the host power policy on the first ESXi host, follow these steps on the host:

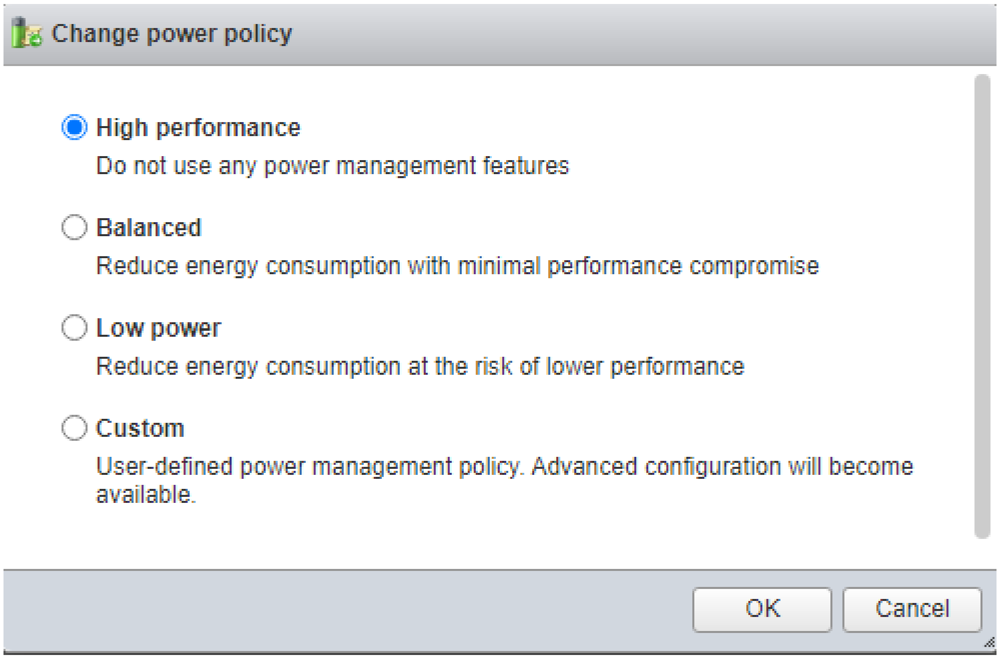
Implementation of this policy is recommended in https://www.cisco.com/c/en/us/products/collateral/servers-unified-computing/ucs-b-series-blade-servers/performance-tuning-guide-ucs-m6-servers.html for maximum VMware ESXi performance. If your organization has specific power policies, please set this policy accordingly.

1. From the Host Client, choose Manage.

2. In the center pane, choose Hardware > Power Management.

3. Choose Change policy.

4. Choose High performance and click OK.



Change power policy

● High performance
Do not use any power management features

○ Balanced
Reduce energy consumption with minimal performance compromise

○ Low power
Reduce energy consumption at the risk of lower performance

○ Custom
User-defined power management policy. Advanced configuration will become available.

5. If you are implementing iSCSI boot, execute the VMware ESXi setup scripts in the FlexPod iSCSI Addition section.

VMware vCenter 7.0U2B

The procedures in the following subsections provide detailed instructions for installing the VMware vCenter 7.0U2B Server Appliance in a FlexPod environment. After the procedures are completed, a VMware vCenter Server will be configured.

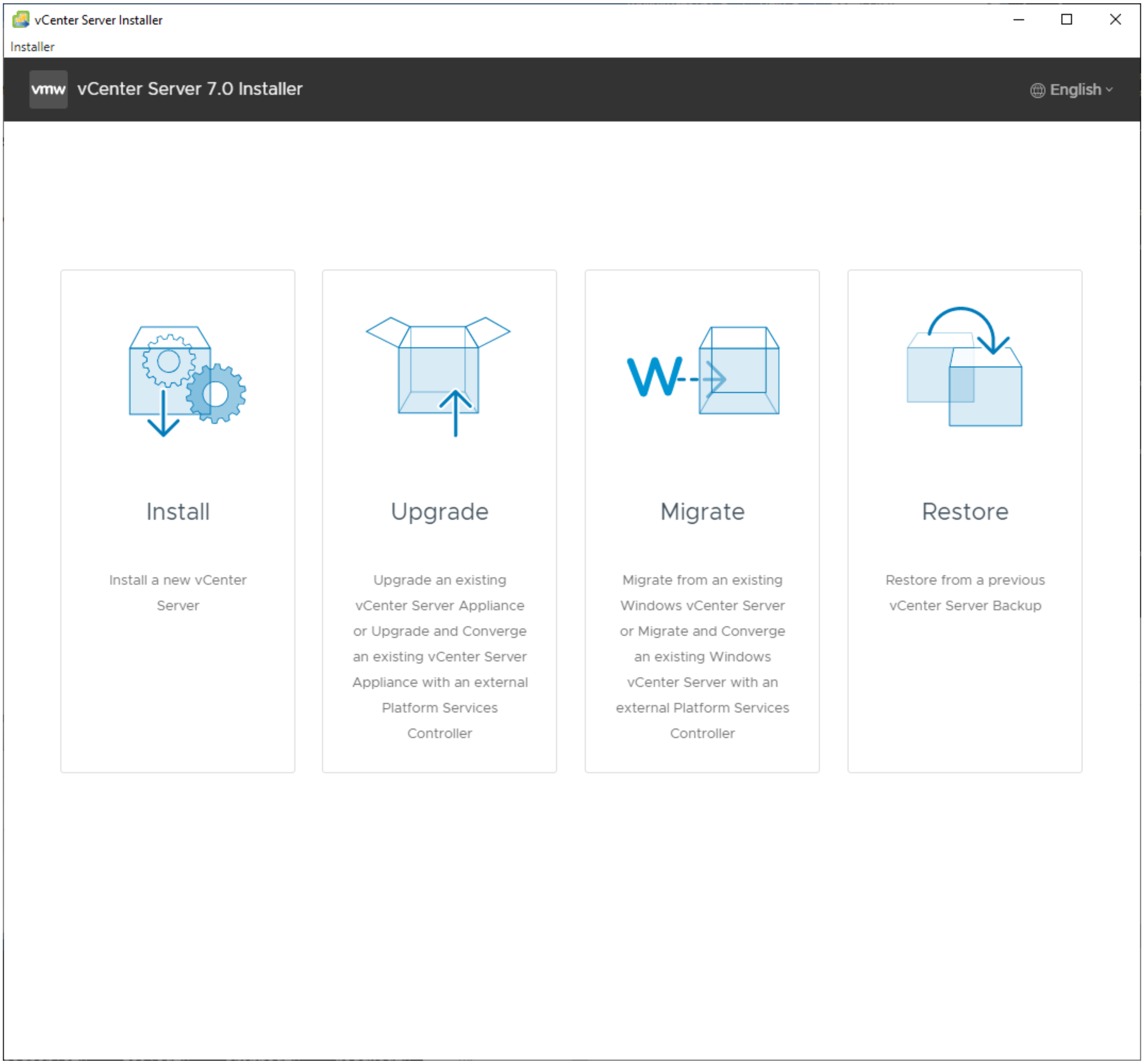
Build the VMware vCenter Server Appliance

The VCSA deployment consists of 2 stages: installation and configuration. To build the VMware vCenter virtual machine, follow these steps:

1. Locate and copy the VMware-VCSA-all-7.0.2-17958471.iso file to the desktop of the management workstation. This ISO is for the VMware vSphere 7.0 U2 vCenter Server Appliance.

2. Using ISO mounting software, mount the ISO image as a disk on the management workstation. (For example, with the Mount command in Windows Server 2012 and above).

3. In the mounted disk directory, navigate to the vcsa-ui-installer > win32 directory and double-click `installer.exe`. The vCenter Server Appliance Installer wizard appears.

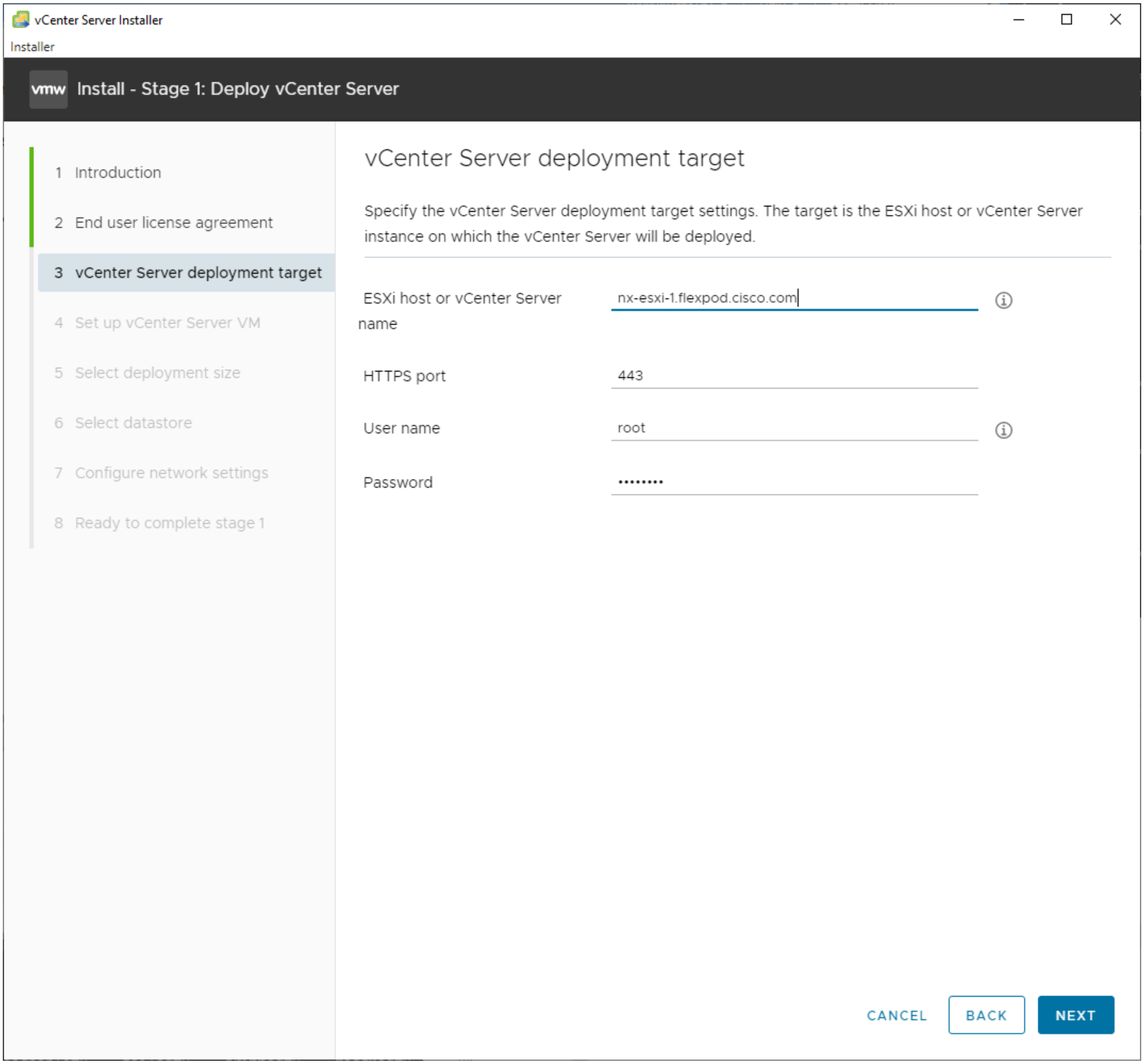

vCenter Server Installer
Installer
vmw
vCenter Server 7.0 Installer
English
Install
Install a new vCenter Server
Upgrade
Upgrade an existing vCenter Server Appliance or Upgrade and Converge an existing vCenter Server Appliance with an external Platform Services Controller
Migrate
Migrate from an existing Windows vCenter Server or Migrate and Converge an existing Windows vCenter Server with an external Platform Services Controller
Restore
Restore from a previous vCenter Server Backup

4. Click Install to start the vCenter Server Appliance deployment wizard.

5. Click NEXT in the Introduction section.

6. Read and accept the license agreement and click NEXT.

7. In the “vCenter Server deployment target” window, enter the FQDN or IP address of the first ESXi host, User name (root) and Password. Click NEXT.



vCenter Server Installer

Installer

Install - Stage 1: Deploy vCenter Server

vmw
1 Introduction
2 End user license agreement
3 vCenter Server deployment target
4 Set up vCenter Server VM
5 Select deployment size
6 Select datastore
7 Configure network settings
8 Ready to complete stage 1

vCenter Server deployment target

Specify the vCenter Server deployment target settings. The target is the ESXi host or vCenter Server instance on which the vCenter Server will be deployed.

ESXi host or vCenter Server name: nx-esxi-1.flexpod.cisco.com

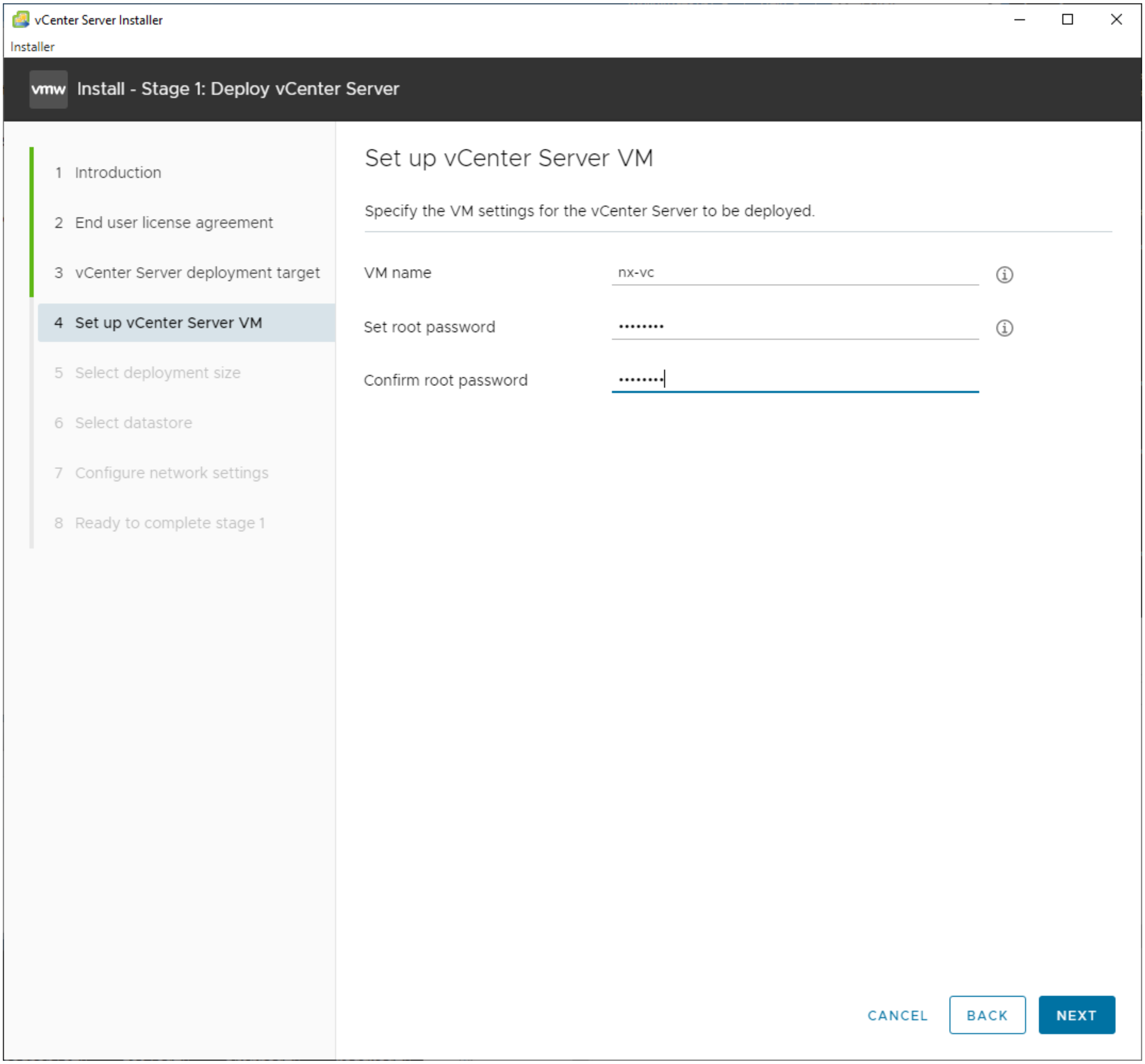
HTTPS port: 443

User name: root

Password: •••••••••

8. Click YES to accept the certificate.

9. Enter the Appliance VM name and password details shown in the “Set up vCenter Server VM” section. Click NEXT.



vCenter Server Installer
Installer
vmw Install - Stage 1: Deploy vCenter Server
1 Introduction
2 End user license agreement
3 vCenter Server deployment target
4 Set up vCenter Server VM
5 Select deployment size
6 Select datastore
7 Configure network settings
8 Ready to complete stage 1
CANCEL
BACK
NEXT

Set up vCenter Server VM

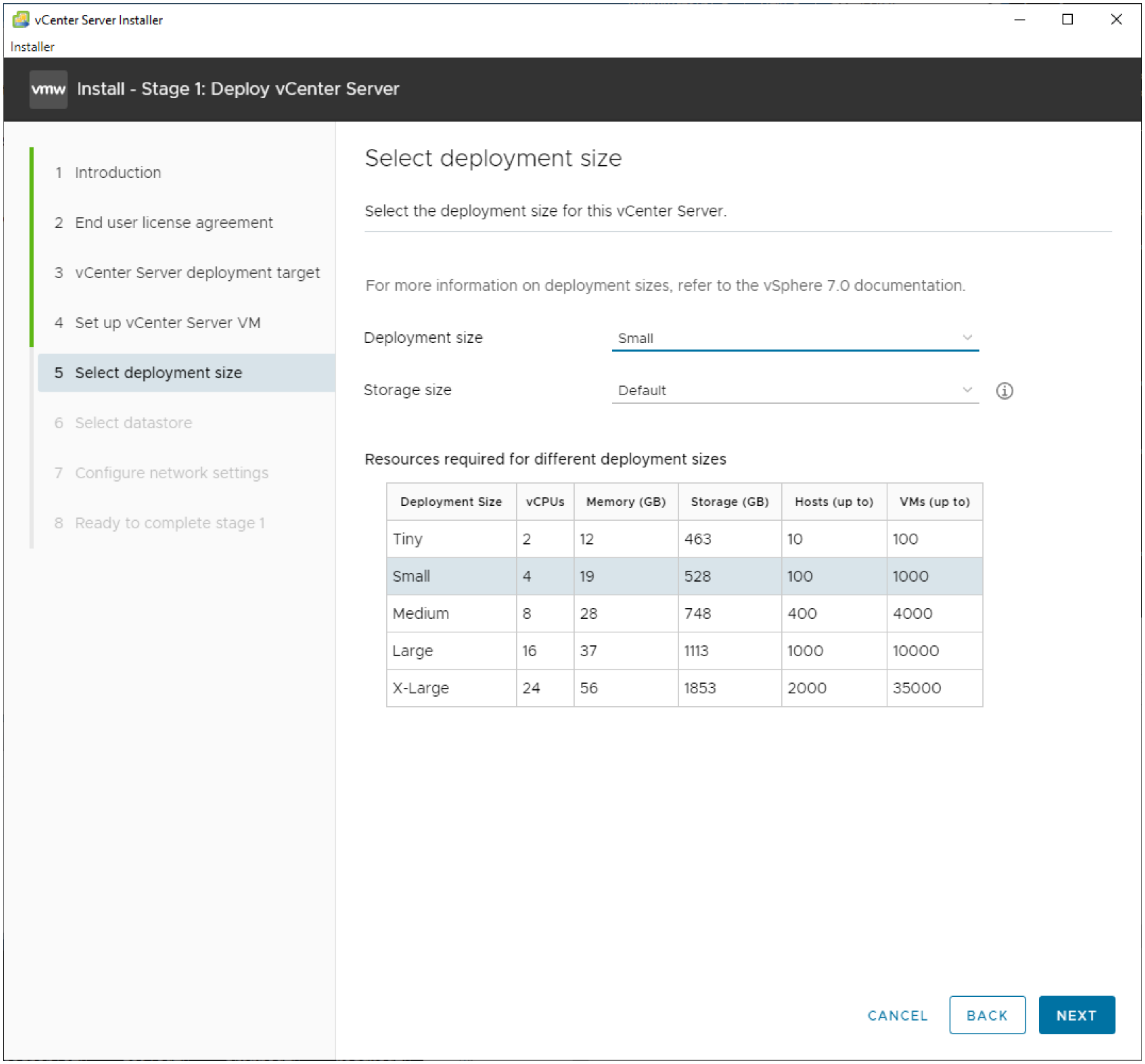
Specify the VM settings for the vCenter Server to be deployed.

VM name: nx-vc

Set root password: ••••••••

Confirm root password: ••••••••

10. In the “Select deployment size” section, choose the Deployment size and Storage size. For example, choose “Small” and “Default.” Click NEXT.



vCenter Server Installer
Installer
vmw Install - Stage 1: Deploy vCenter Server
1 Introduction
2 End user license agreement
3 vCenter Server deployment target
4 Set up vCenter Server VM
5 Select deployment size
6 Select datastore
7 Configure network settings
8 Ready to complete stage 1
CANCEL
BACK
NEXT

Select deployment size

Select the deployment size for this vCenter Server.

For more information on deployment sizes, refer to the vSphere 7.0 documentation.

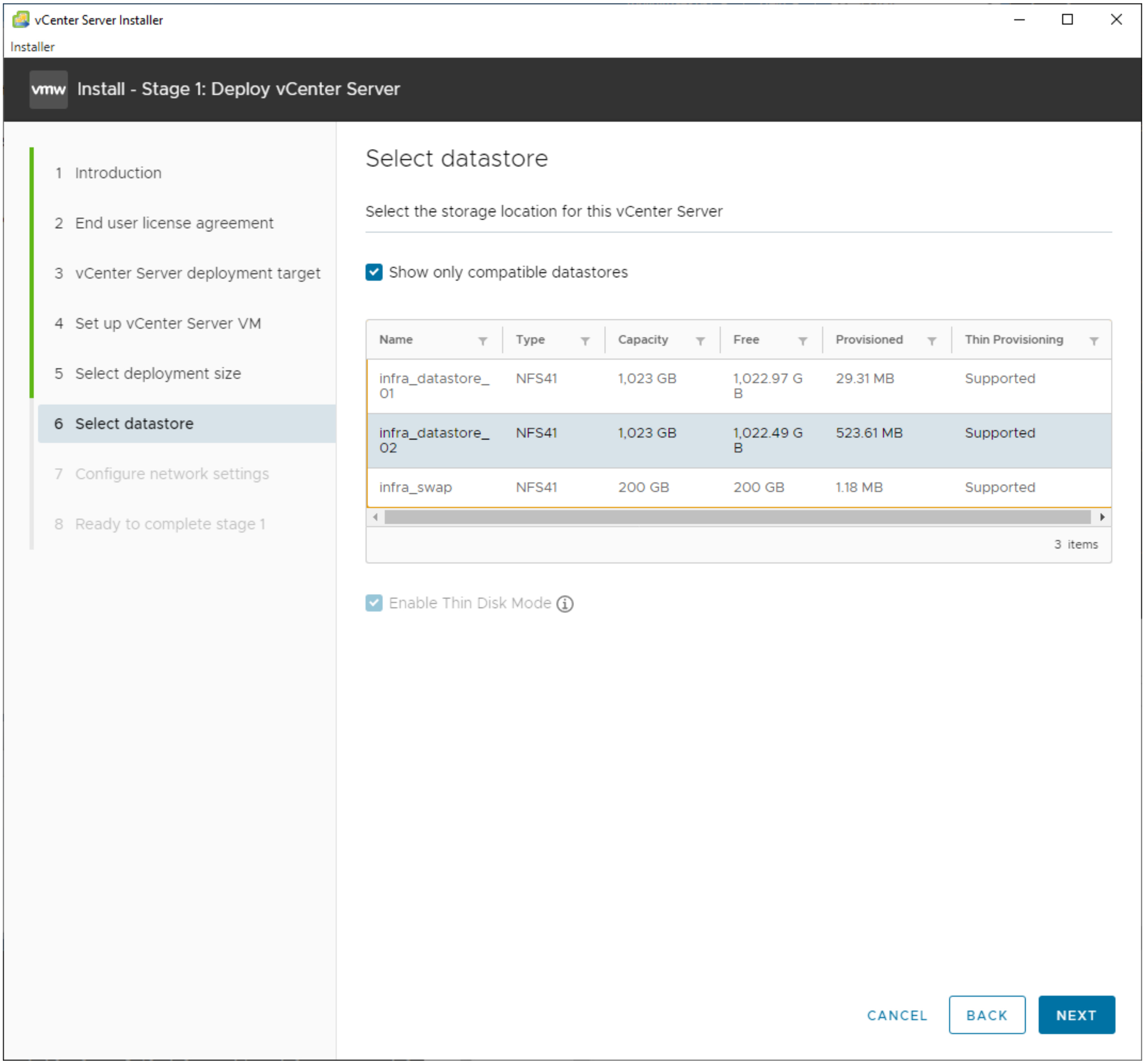
Deployment size: Small

Storage size: Default

Resources required for different deployment sizes

Deployment Size	vCPUs	Memory (GB)	Storage (GB)	Hosts (up to)	VMs (up to)
Tiny	2	12	463	10	100
Small	4	19	528	100	1000
Medium	8	28	748	400	4000
Large	16	37	1113	1000	10000
X-Large	24	56	1853	2000	35000

11. Choose infra_datastore_02 for storage. Click NEXT.



vCenter Server Installer

Installer

Install - Stage 1: Deploy vCenter Server

1 Introduction
2 End user license agreement
3 vCenter Server deployment target
4 Set up vCenter Server VM
5 Select deployment size
6 Select datastore
7 Configure network settings
8 Ready to complete stage 1

Select datastore

Select the storage location for this vCenter Server

☑ Show only compatible datastores

Name	Type	Capacity	Free	Provisioned	Thin Provisioning
infra_datastore_01	NFS41	1,023 GB	1,022.97 GB	29.31 MB	Supported
infra_datastore_02	NFS41	1,023 GB	1,022.49 GB	523.61 MB	Supported
infra_swap	NFS41	200 GB	200 GB	1.18 MB	Supported

3 items

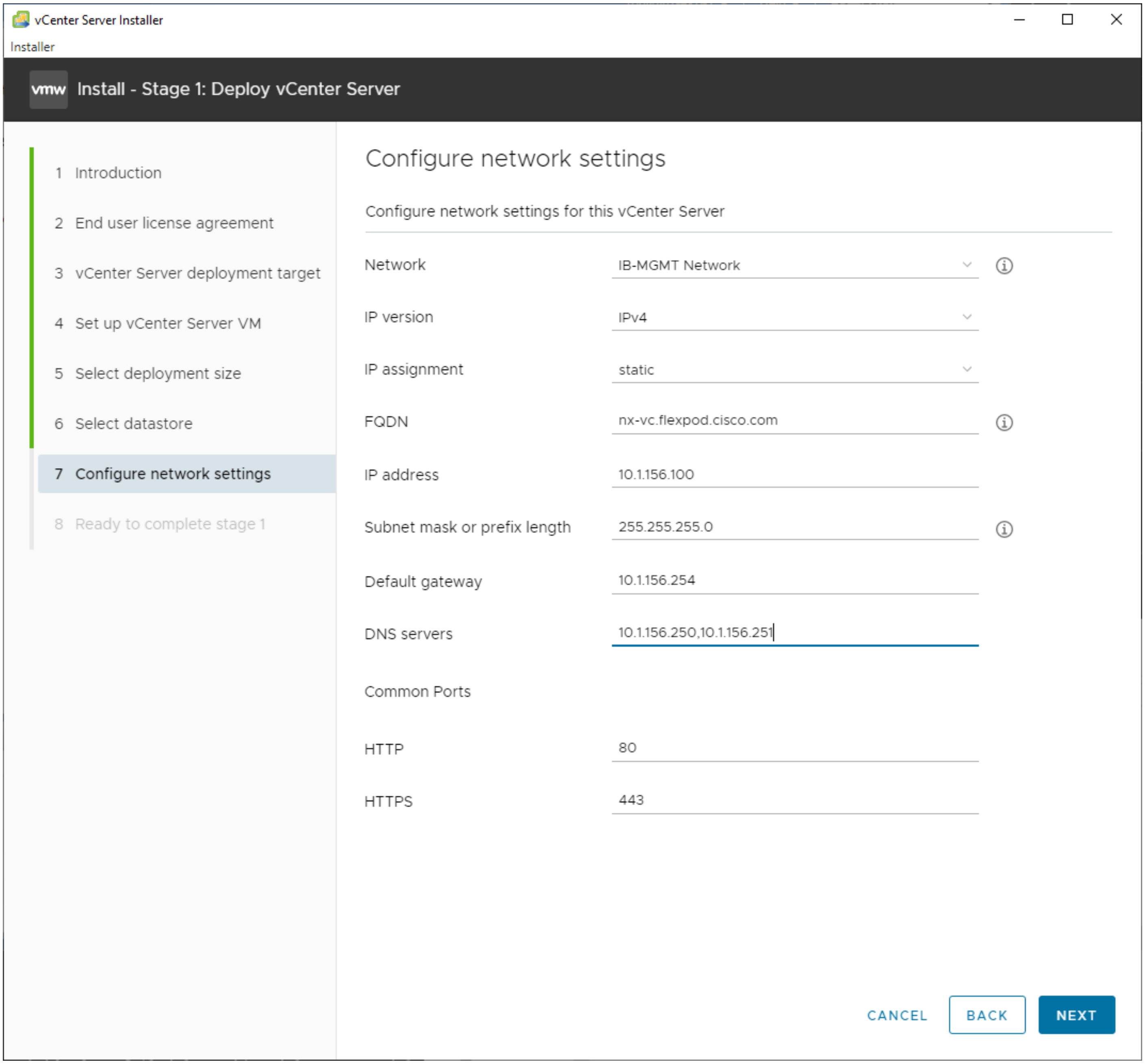
☑ Enable Thin Disk Mode

12. In the “Network Settings” section, configure the following settings:

    a. Choose a Network: IB-MGMT Network

It is important that the vCenter VM stay on the IB-MGMT Network on vSwitch0 and that it not get moved to a vDS. If vCenter is moved to a vDS and the virtual environment is completely shut down and then brought back up, and it is attempted to bring up vCenter on a different host than the one it was running on before the shutdown, vCenter will not have a functional network connection. With the vDS, for a virtual machine to move from one host to another, vCenter must be up and running to coordinate the move of the virtual ports on the vDS. If vCenter is down, the port move on the vDS cannot occur correctly. Moving vCenter to a different host on vSwitch0 to be brought up always occurs correctly without requiring vCenter to already be up and running.

b. IP version: IPV4
c. IP assignment: static
d. FQDN: <vcenter-fqdn>
e. IP address: <vcenter-ip>
f. Subnet mask or prefix length: <vcenter-subnet-mask>
g. Default gateway: <vcenter-gateway>
h. DNS Servers: <dns-server1>,<dns-server2>



vCenter Server Installer

Installer

Install - Stage 1: Deploy vCenter Server

1 Introduction
2 End user license agreement
3 vCenter Server deployment target
4 Set up vCenter Server VM
5 Select deployment size
6 Select datastore
7 Configure network settings
8 Ready to complete stage 1

Configure network settings

Configure network settings for this vCenter Server

Network	IB-MGMT Network
IP version	IPv4
IP assignment	static
FQDN	nx-vc.flexpod.cisco.com
IP address	10.1.156.100
Subnet mask or prefix length	255.255.255.0
Default gateway	10.1.156.254
DNS servers	10.1.156.250,10.1.156.251

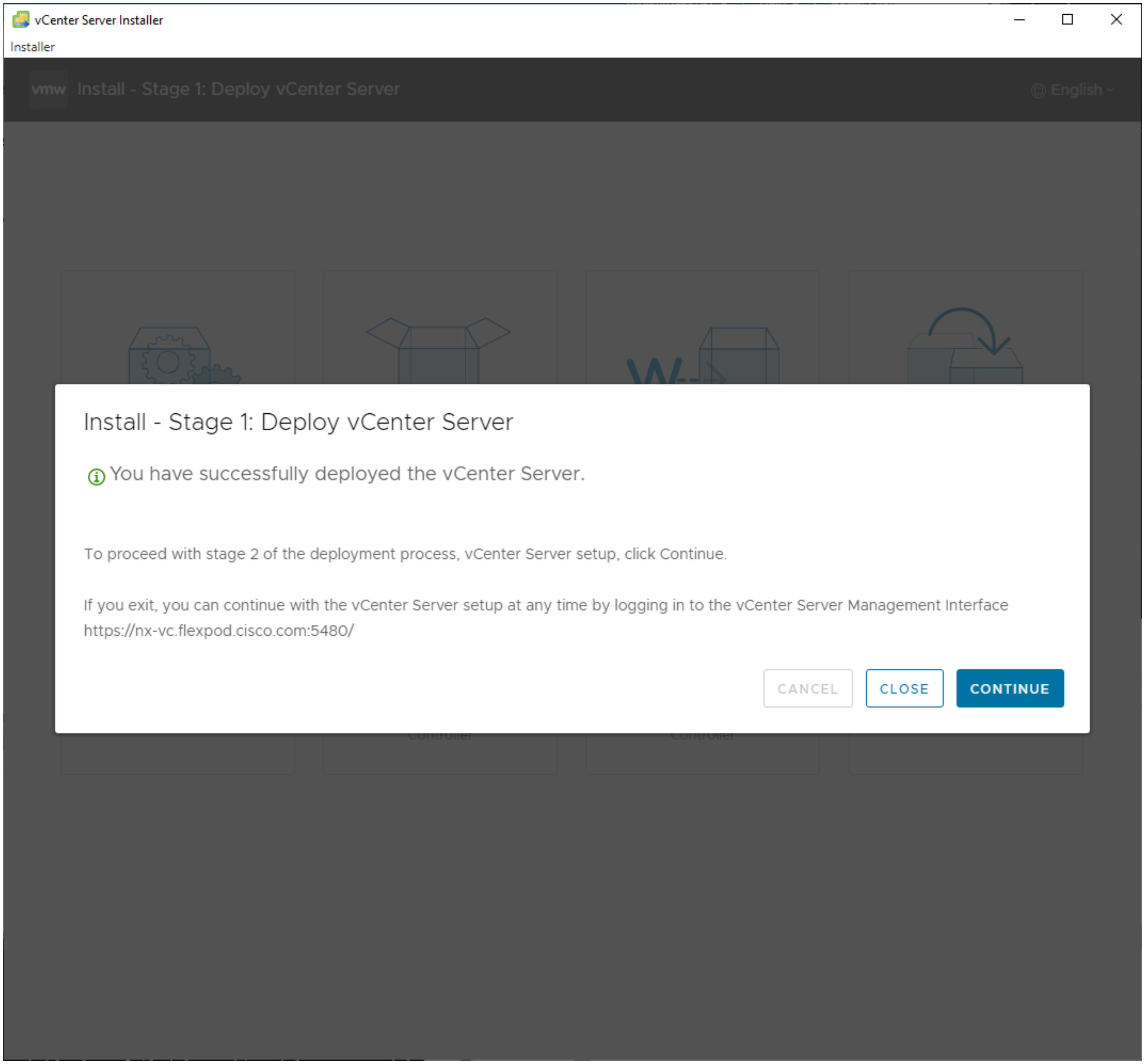
Common Ports

HTTP	80
HTTPS	443

13. Click NEXT.

14. Review all values and click FINISH to complete the installation.

The vCenter Server appliance installation will take a few minutes to complete.



Install - Stage 1: Deploy vCenter Server

You have successfully deployed the vCenter Server.

To proceed with stage 2 of the deployment process, vCenter Server setup, click Continue.

If you exit, you can continue with the vCenter Server setup at any time by logging in to the vCenter Server Management Interface https://nx-vc.flexpod.cisco.com:5480/

15. Click CONTINUE to proceed with stage 2 configuration.

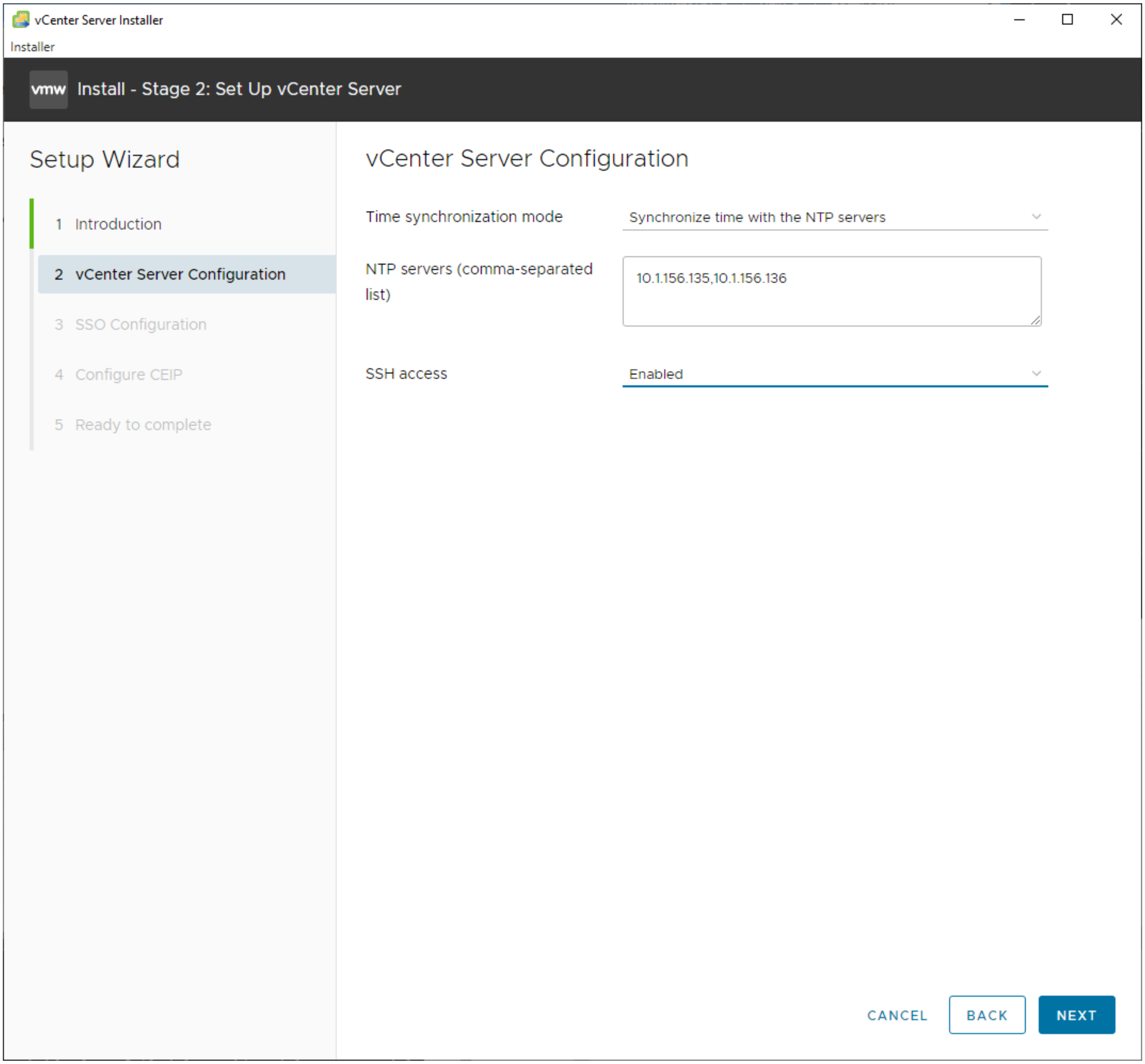
16. Click NEXT.

17. In the vCenter Server configuration window, configure these settings:

    a. Time Synchronization Mode: Synchronize time with NTP servers

    b. NTP Servers: <nexus-a-ntp-ip>,<nexus-b-ntp-ip>

c. SSH access: Enabled



vCenter Server Installer

Installer

Install - Stage 2: Set Up vCenter Server

vCenter Server Configuration

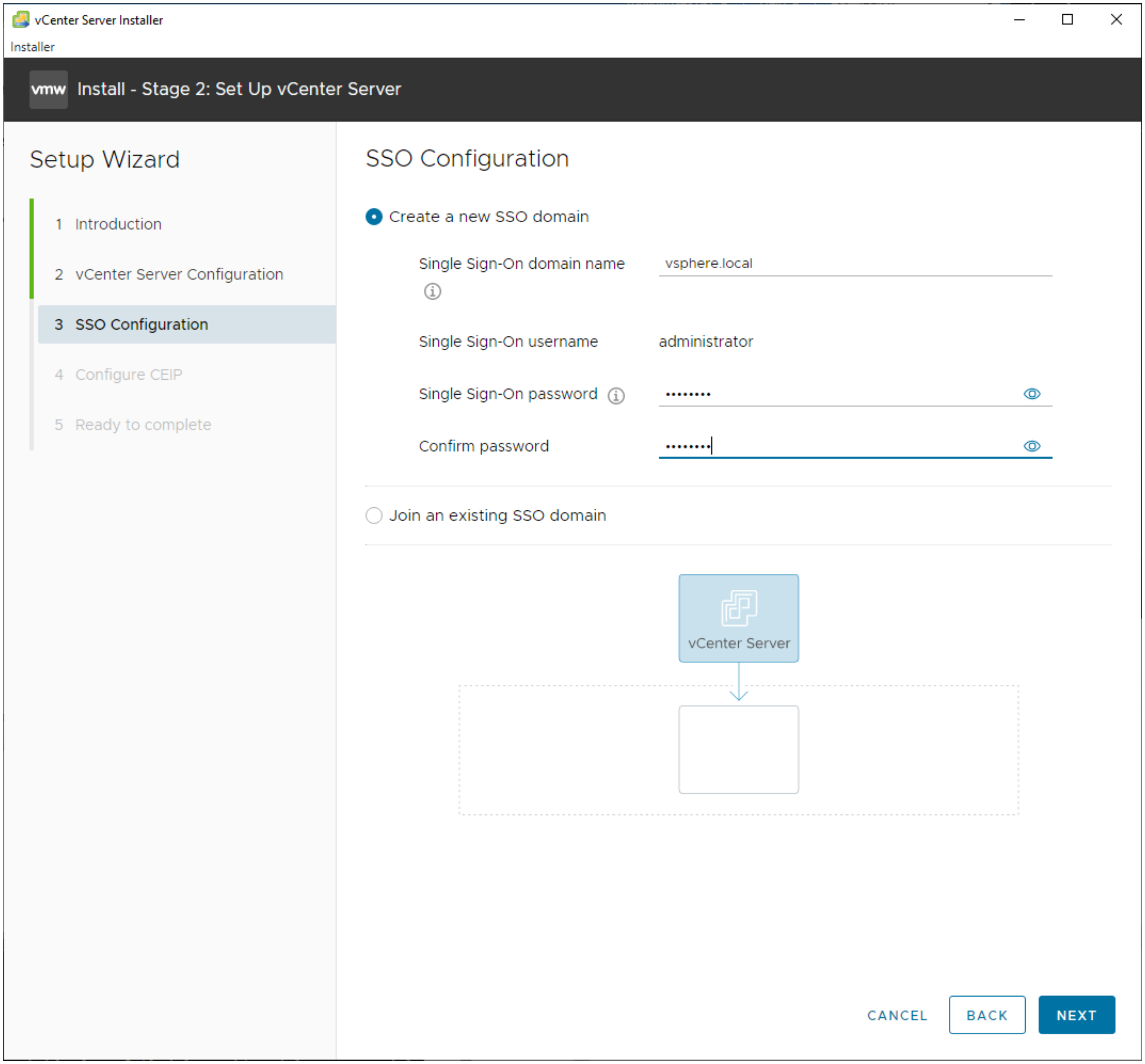
Time synchronization mode: Synchronize time with the NTP servers

NTP servers (comma-separated list): 10.1.156.135,10.1.156.136

SSH access: Enabled

18. Click NEXT.

19. Complete the SSO configuration as shown below (or according to your organization's security policies):



vCenter Server Installer

Installer

Install - Stage 2: Set Up vCenter Server

Setup Wizard

1 Introduction

2 vCenter Server Configuration

3 SSO Configuration

4 Configure CEIP

5 Ready to complete

SSO Configuration

● Create a new SSO domain

Single Sign-On domain name: vsphere.local

Single Sign-On username: administrator

Single Sign-On password: ••••••••

Confirm password: ••••••••

○ Join an existing SSO domain

20. Click NEXT.

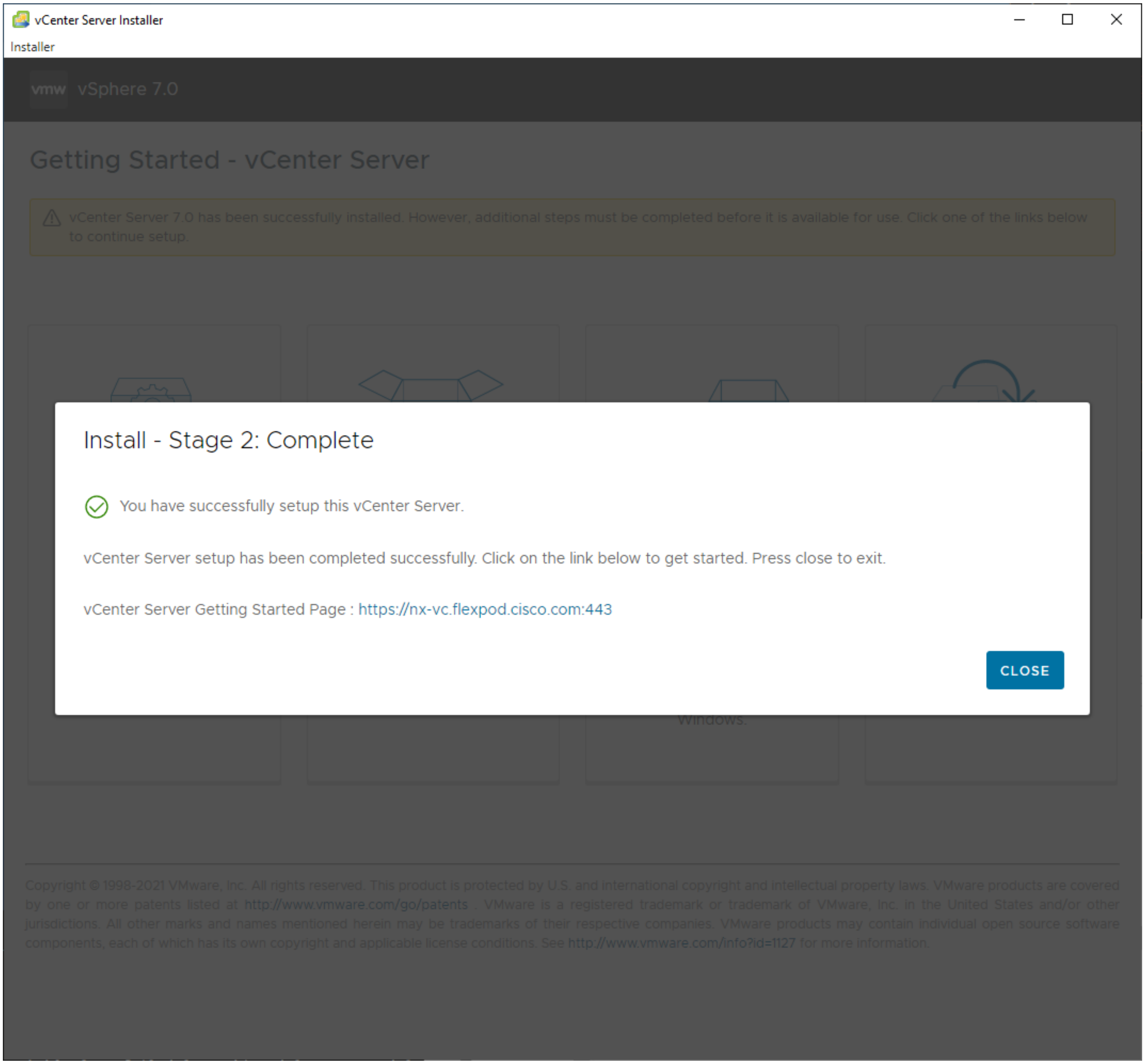
21. Decide whether to join VMware's Customer Experience Improvement Program (CEIP).

22. Click NEXT.

23. Review the configuration and click FINISH.

24. Click OK.

vCenter Server setup will take a few minutes to complete.



Getting Started - vCenter Server

vCenter Server 7.0 has been successfully installed. However, additional steps must be completed before it is available for use. Click one of the links below to continue setup.

Install - Stage 2: Complete

You have successfully setup this vCenter Server.

vCenter Server setup has been completed successfully. Click on the link below to get started. Press close to exit.

vCenter Server Getting Started Page : https://nx-vc.flexpod.cisco.com:443

25. Click CLOSE. Eject or unmount the VCSA installer ISO.

Adjust vCenter CPU Settings

If a vCenter deployment size of Small or larger was selected in the vCenter setup, it is possible that the VCSA’s CPU setup does not match the Cisco UCS server CPU hardware configuration. Cisco UCS B and C-Series servers are normally 2-socket servers. In this validation, the Small deployment size was selected and vCenter was setup for a 4-socket server. This setup can cause issues in the VMware ESXi cluster Admission Control. To resolve the Admission Control issue, follow these steps:

1. Open a web browser on the management workstation and navigate to https://<VM-Host-Infra-01-IP>.

2. Enter root for the user name.

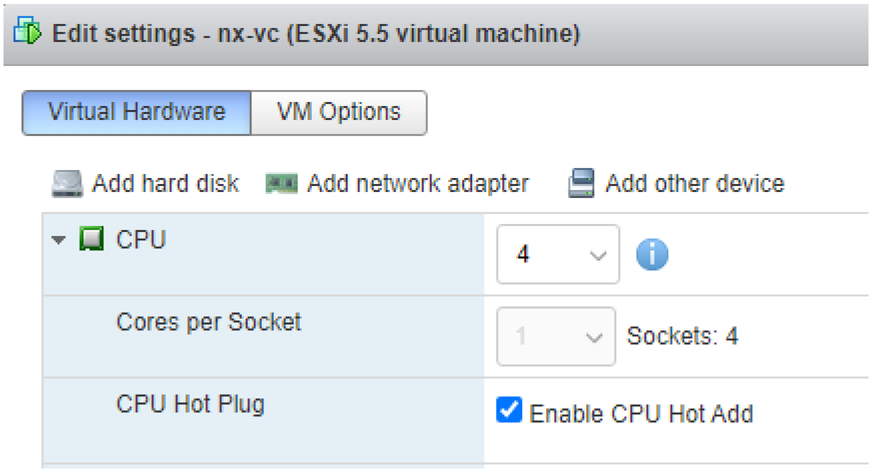
3. Enter the root password.

4. Click Login to connect.

5. Choose Virtual Machines.

6. In the center pane, right-click the vCenter VM and choose Edit settings.

7. In the Edit settings window, expand CPU and check the value of Sockets.



Edit settings - nx-vc (ESXi 5.5 virtual machine)

CPU: 4

Cores per Socket: 1 Sockets: 4

CPU Hot Plug: ☑ Enable CPU Hot Add

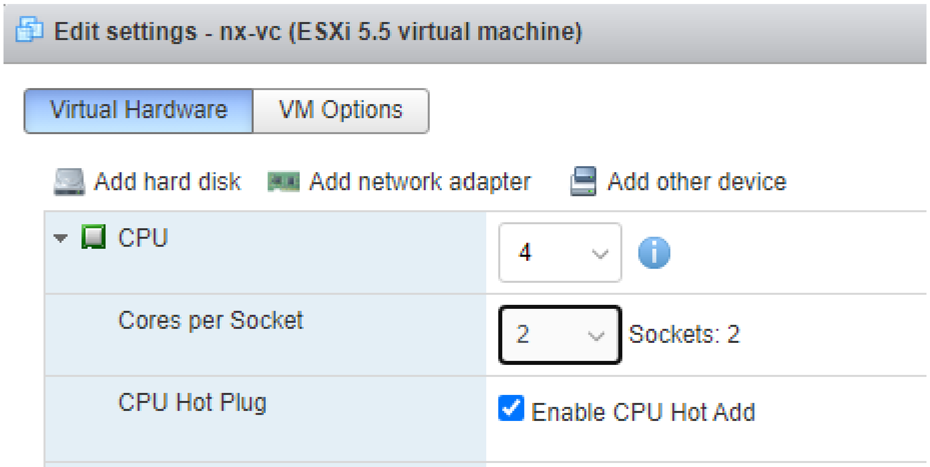
8. If the number of Sockets does not match your server configuration, it will need to be adjusted. Click Cancel.

9. If the number of Sockets needs to be adjusted:

   a. Right-click the vCenter VM and choose Guest OS > Shut down. Click Yes on the confirmation.

10. Once vCenter is shut down, right-click the vCenter VM and choose Edit settings.

11. In the Edit settings window, expand CPU and change the Cores per Socket value to make the Sockets value equal to your server configuration (normally 2).


Edit settings - nx-vc (ESXi 5.5 virtual machine)

CPU: 4

Cores per Socket: 2 Sockets: 2

CPU Hot Plug: ☑ Enable CPU Hot Add

12. Click Save.

13. Right-click the vCenter VM and choose Power > Power on. Wait approximately 10 minutes for vCenter to come up.

Install VMware vCenter Server Log4j Workaround

To install the VMware vCenter Server log4j workaround, follow the steps: https://kb.vmware.com/s/article/87081.

Setup VMware vCenter Server

To setup the VMware vCenter Server, follow these steps:

1. Using a web browser, navigate to https://<vcenter-ip-address>:5480. You will need to navigate security screens.

2. Log into the VMware vCenter Server Management interface as root with the root password set in the vCenter installation.

3. In the menu on the left, choose Time.

4. Choose EDIT to the right of Time zone.

5. Choose the appropriate Time zone and click SAVE.

6. In the menu on the left choose Administration.

7. According to your Security Policy, adjust the settings for the root user and password.

8. In the menu on the left choose Update.

9. Follow the prompts to STAGE AND INSTALL any available vCenter updates. In this validation, vCenter version 7.0.2.00200 was installed.

10. In the upper right-hand corner of the screen, choose root > Logout to logout of the Appliance Management interface.

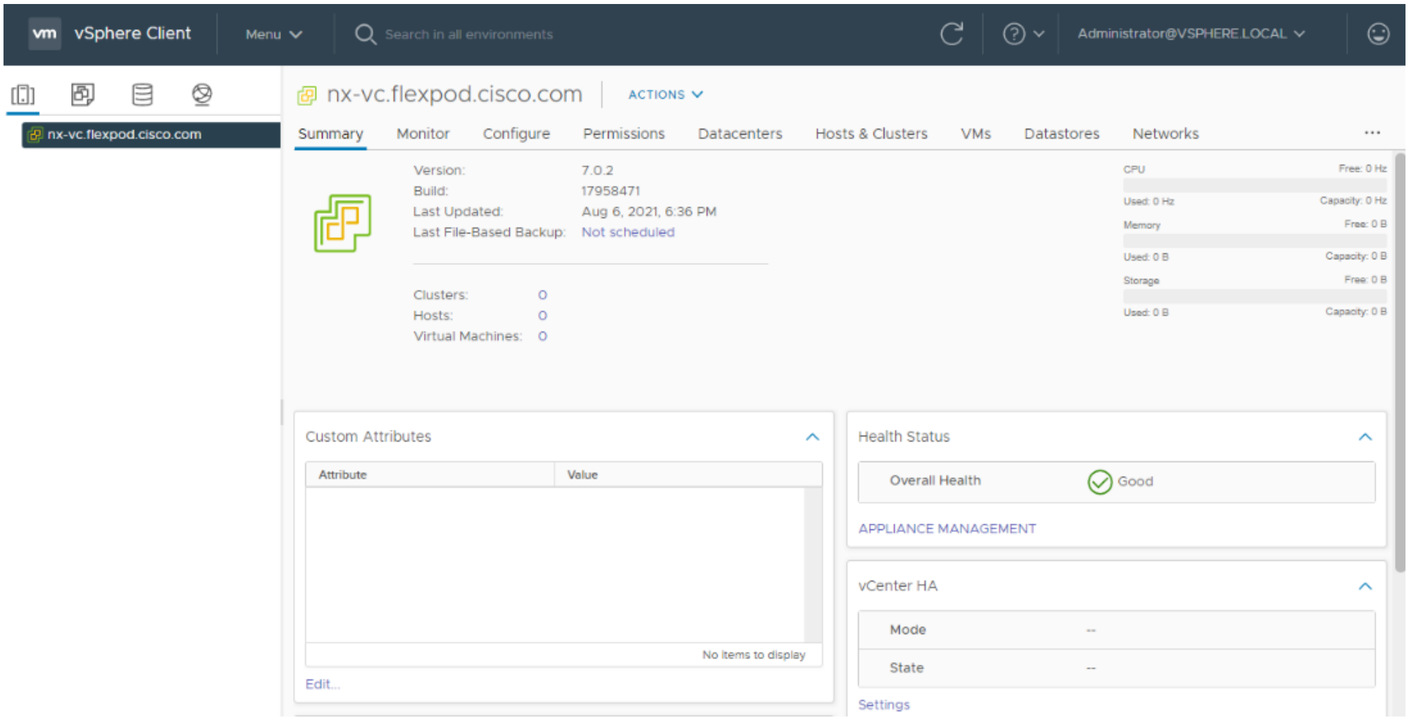
11. Using a web browser, navigate to https://<vcenter-fqdn>. You will need to navigate security screens.

> With VMware vCenter 7.0 and above, the use of the vCenter FQDN is required.

12. Choose LAUNCH VSPHERE CLIENT (HTML5).

> Although the previous versions of this document used the FLEX vSphere Web Client, the VMware vSphere HTML5 Client is the only option in vSphere 7 and will be used going forward.

13. Log in using the Single Sign-On username (administrator@vsphere.local) and password created during the vCenter installation. Dismiss the Licensing warning at this time.



nx-vc.flexpod.cisco.com

Version: 7.0.2
Build: 17958471
Last Updated: Aug 6, 2021, 6:36 PM
Last File-Based Backup: Not scheduled

Clusters: 0
Hosts: 0
Virtual Machines: 0

CPU Free: 0 Hz
Used: 0 Hz Capacity: 0 Hz
Memory Free: 0 B
Used: 0 B Capacity: 0 B
Storage Free: 0 B
Used: 0 B Capacity: 0 B

Overall Health: Good

Mode: --
State: --

Add AD User Authentication to vCenter (Optional)

If an AD Infrastructure is set up in this FlexPod environment, you can setup in AD and authenticate from vCenter.

To add an AD user authentication to the vCenter, follow these steps:

1. In the AD Infrastructure, using the Active Directory Users and Computers tool, setup a Domain Administrator user with a user name such as flexadmin (FlexPod Admin).

2. Connect to https://<vcenter-ip> and choose LAUNCH VSPHERE CLIENT (HTML5).

3. Log in as Administrator@vsphere.local (or the SSO user set up in vCenter installation) with the corresponding password.

4. Under Menu, choose Administration. In the list on the left, under Single Sign On, choose Configuration.

5. In the center pane, under Configuration, choose the Identity Provider tab.

6. In the list under Type, select Active Directory Domain.

7. Choose JOIN AD.

8. Fill in the AD domain name, the Administrator user, and the domain Administrator password. Do not fill in an Organizational unit. Click JOIN.

9. Click Acknowledge.

10. In the list on the left under Deployment, choose System Configuration. Choose the radio button to choose the vCenter, then choose REBOOT NODE.

11. Input a reboot reason and click REBOOT. The reboot will take approximately 10 minutes for full vCenter initialization.

12. Log back into the vCenter vSphere HTML5 Client as Administrator@vsphere.local.

13. Under Menu, choose Administration. In the list on the left, under Single Sign On, choose Configuration.

14. In the center pane, under Configuration, choose the Identity Provider tab. Under Type, select Identity Sources. Click ADD.

15. Make sure Active Directory (Integrated Windows Authentication) is selected, your Windows Domain name is listed, and Use machine account is selected. Click ADD.

16. In the list select the Active Directory (Integrated Windows Authentication) Identity source type. If desired, select SET AS DEFAULT and click OK.

17. On the left under Access Control, choose Global Permissions.

18. In the center pane, click the + sign to add a Global Permission.

19. In the Add Permission window, choose your AD domain for the Domain.

20. On the User/Group line, enter either the FlexPod Admin username or the Domain Admins group. Leave the Role set to Administrator. Check the box for Propagate to children.

The FlexPod Admin user was created in the Domain Admins group. The selection here depends on whether the FlexPod Admin user will be the only user used in this FlexPod or you would like to add other users later. By selecting the Domain Admins group, any user placed in that group in the AD domain will be able to login to vCenter as an Administrator.

21. Click OK to add the selected User or Group. The user or group should now appear in the Global Permissions list with the Administrator role.

22. Log out and log back into the vCenter HTML5 Client as the FlexPod Admin user. You will need to add the domain name to the user, for example, flexadmin@domain.

vCenter and ESXi Ansible Setup

To complete the configuration of the VMware vCenter and the three management ESXi hosts:

1. Edit the following variable files to ensure proper Nexus variables are entered:

   - FlexPod-M6/FlexPod-UCSM-M6/inventory
   - FlexPod-M6/FlexPod-UCSM-M6/group_vars/all.yml
   - FlexPod-M6/FlexPod-UCSM-M6/roles/ESXIpostvC/defaults/main.yml

2. From /root/ FlexPod-M6/FlexPod-UCSM-M6, run the Setup_vCenter.yml Ansible playbook:

```
ansible-playbook ./Setup_vCenter.yml -i inventory
```

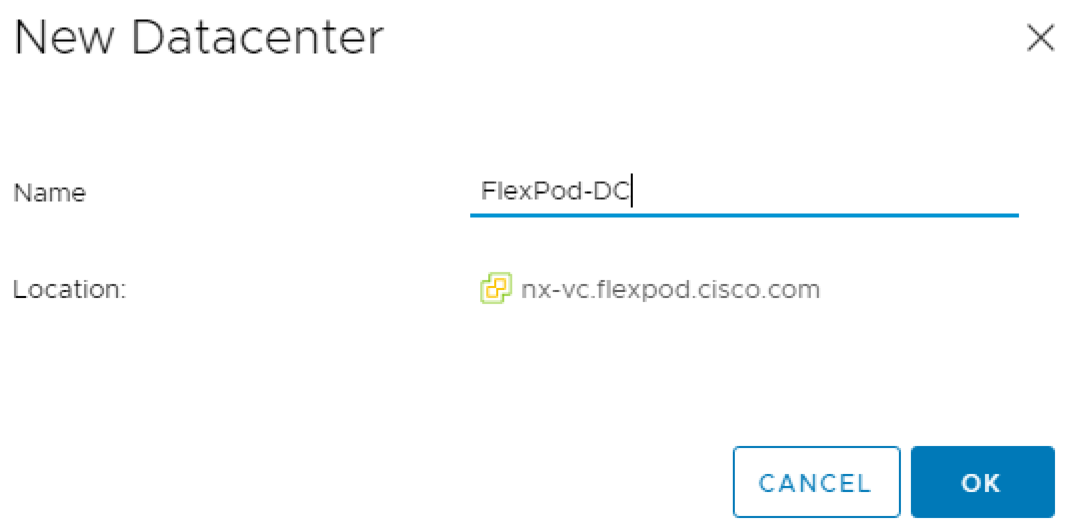
vCenter and ESXi Manual Setup

To manually set up vCenter, follow these steps:

Initial vCenter Setup

1. In the center pane, choose ACTIONS > New Datacenter.

2. Type “FlexPod-DC” in the Datacenter name field.



New Datacenter

Name: FlexPod-DC

Location: nx-vc.flexpod.cisco.com

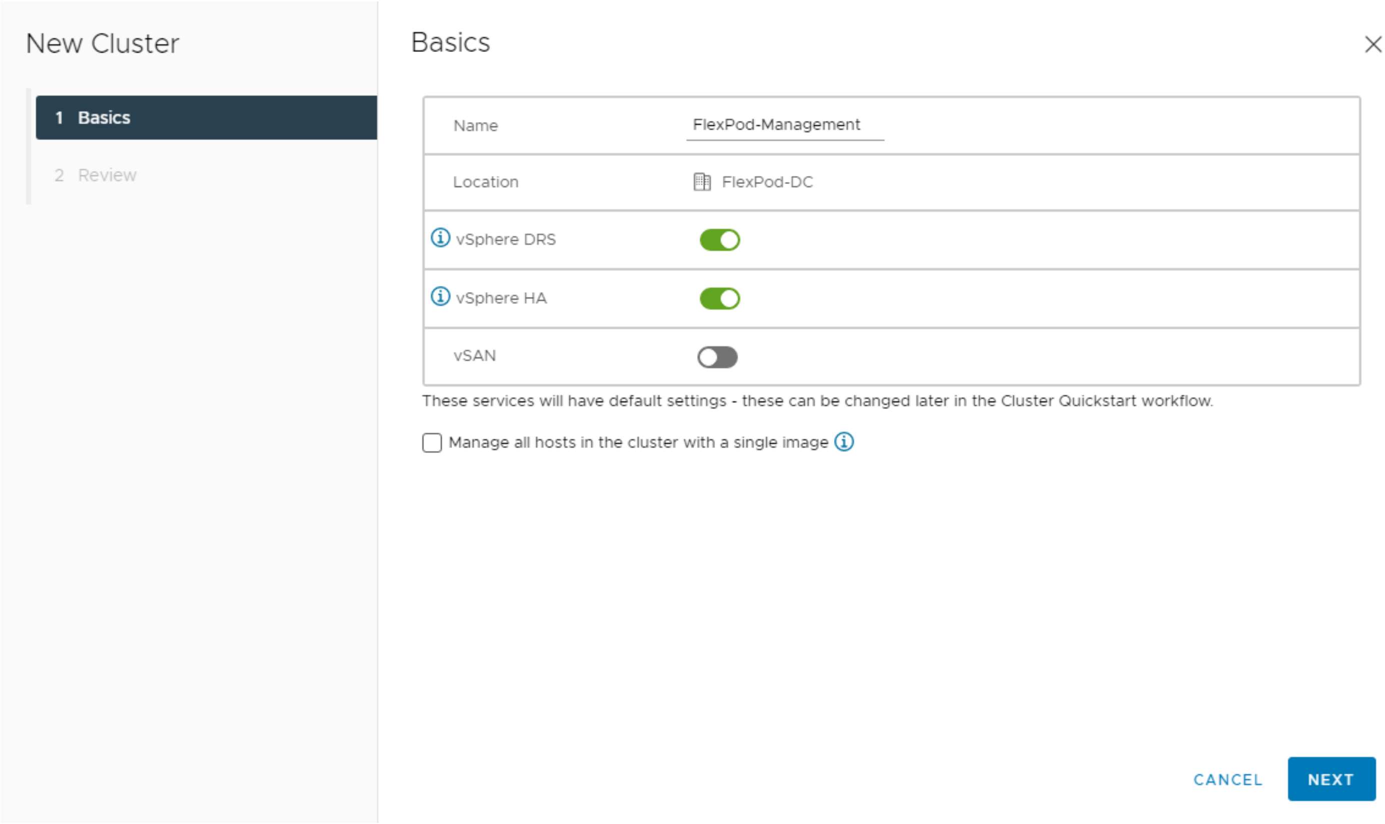
3. Click OK.

4. Expand the vCenter.

5. Right-click the datacenter FlexPod-DC in the list in the left pane. Choose New Cluster.

6. Name the cluster FlexPod-Management.

7. Turn on DRS and vSphere HA. Do not turn on vSAN.



Name FlexPod-Management

Location FlexPod-DC

vSphere DRS ●

vSphere HA ●

vSAN ○

These services will have default settings - these can be changed later in the Cluster Quickstart workflow.

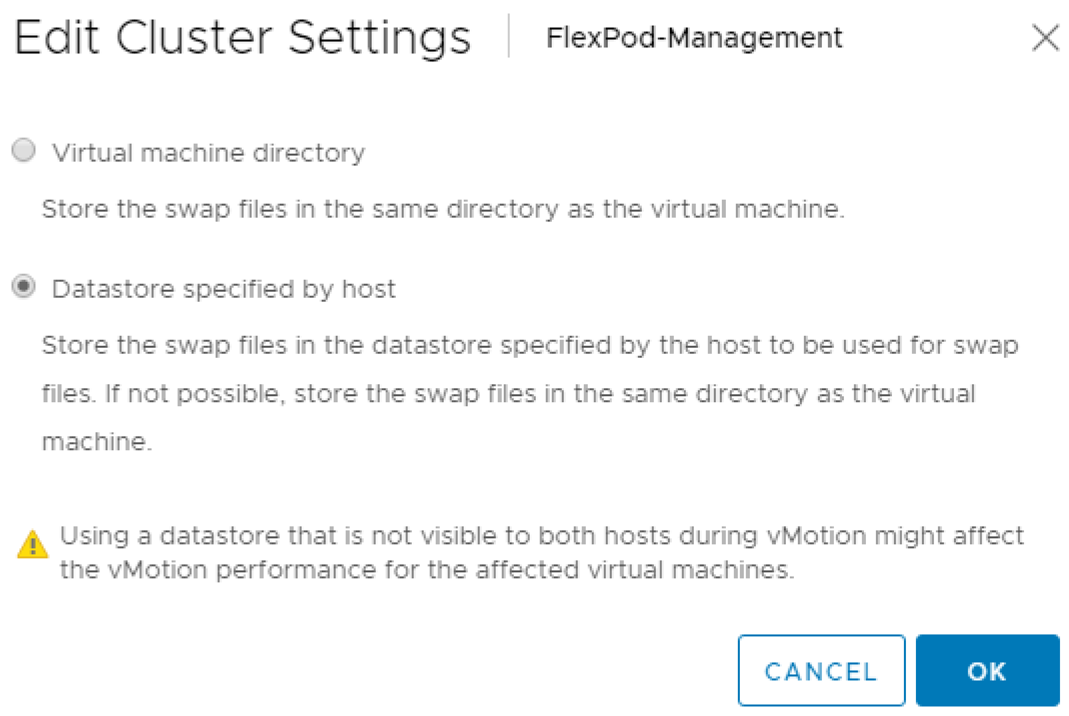
□ Manage all hosts in the cluster with a single image

8. Click NEXT and then click FINISH to create the new cluster.

9. Right-click “FlexPod-Management” and choose Settings.

10. Choose Configuration > General in the list located and choose EDIT.

11. Choose Datastore specified by host and click OK.



Edit Cluster Settings | FlexPod-Management

○ Virtual machine directory

Store the swap files in the same directory as the virtual machine.

● Datastore specified by host

Store the swap files in the datastore specified by the host to be used for swap files. If not possible, store the swap files in the same directory as the virtual machine.

Using a datastore that is not visible to both hosts during vMotion might affect the vMotion performance for the affected virtual machines.

12. Right-click FlexPod-Management and click Add Hosts.

13. In the IP address or FQDN field, enter either the IP address or the FQDN of the first VMware ESXi host. Enter root as the Username and the root password. Click NEXT.

14. In the Security Alert window, choose the host and click OK.

15. Verify the Host summary information and click NEXT.

16. Ignore warnings about the host being moved to Maintenance Mode and click FINISH to complete adding the host to the cluster.

17. The added ESXi host will have Warnings that the ESXi Shell and SSH have been enabled. These warnings can be suppressed. The host will also have a TPM Encryption Key Recovery alert that can be reset to green.

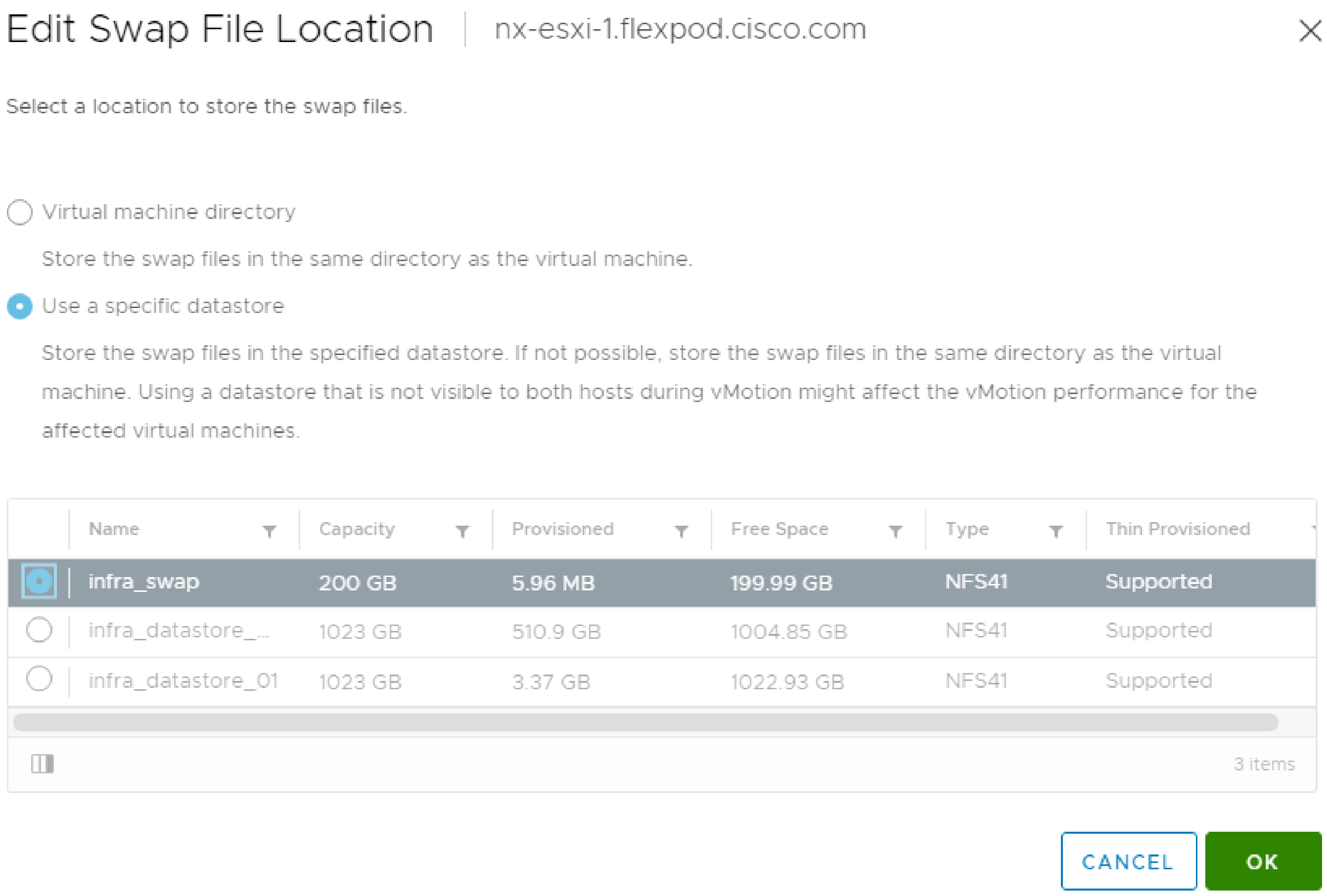
18. In the list, right-click the added ESXi host and choose Settings.

19. In the center pane under Virtual Machines, choose Swap File location.

20. On the right, click EDIT.

21. Because of a known issue with the vCenter UI, you will need to use the TAB key to move the cursor to the first datastore in the datastore list. Then use the arrow keys to move the highlight to the

infra_swap datastore. Once the infra_swap datastore is highlighted, use the spacebar to select it and click OK.



Edit Swap File Location | nx-esxi-1.flexpod.cisco.com

Select a location to store the swap files.

○ Virtual machine directory

Store the swap files in the same directory as the virtual machine.

● Use a specific datastore

Store the swap files in the specified datastore. If not possible, store the swap files in the same directory as the virtual machine. Using a datastore that is not visible to both hosts during vMotion might affect the vMotion performance for the affected virtual machines.

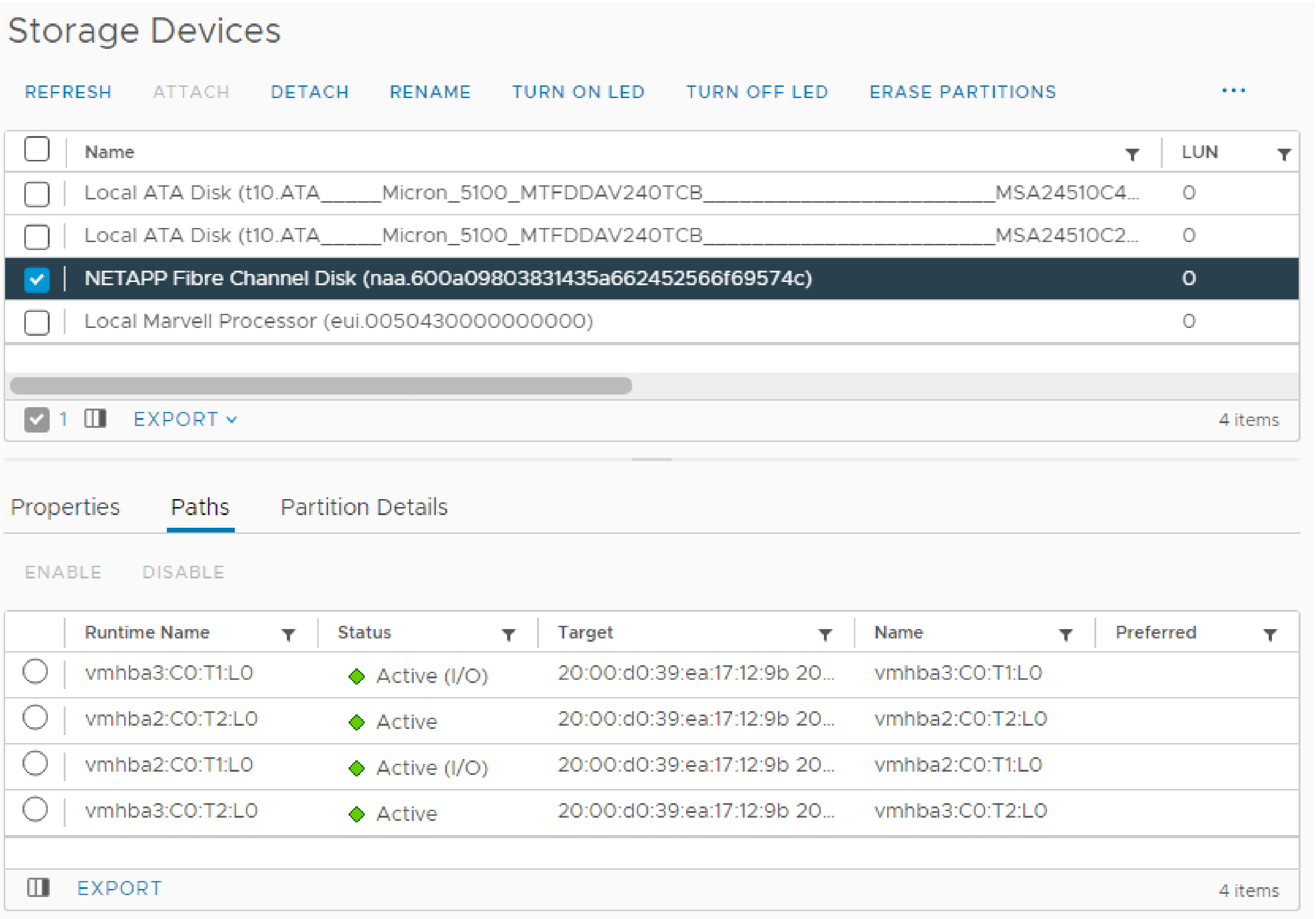
	Name	Capacity	Provisioned	Free Space	Type	Thin Provisioned
●	infra_swap	200 GB	5.96 MB	199.99 GB	NFS41	Supported
○	infra_datastore_...	1023 GB	510.9 GB	1004.85 GB	NFS41	Supported
○	infra_datastore_01	1023 GB	3.37 GB	1022.93 GB	NFS41	Supported

3 items

22. In the list under Storage, choose Storage Devices. Make sure the NETAPP Fibre Channel Disk LUN 0 or NETAPP iSCSI Disk LUN 0 is selected.

23. Choose the Paths tab.

24. Ensure that 4 paths appear, two of which should have the status Active (I/O).



Storage Devices

REFRESH ATTACH DETACH RENAME TURN ON LED TURN OFF LED ERASE PARTITIONS ...

☐	Name	LUN
☐	Local ATA Disk (t10.ATA_____Micron_5100_MTFDDAV240TCB________________________MSA24510C4...	0
☐	Local ATA Disk (t10.ATA_____Micron_5100_MTFDDAV240TCB________________________MSA24510C2...	0
☑	NETAPP Fibre Channel Disk (naa.600a09803831435a662452566f69574c)	0
☐	Local Marvell Processor (eui.0050430000000000)	0

☑ 1 EXPORT ⌄ 4 items

Properties Paths Partition Details

ENABLE DISABLE

	Runtime Name	Status	Target	Name	Preferred
○	vmhba3:C0:T1:L0	🟩 Active (I/O)	20:00:d0:39:ea:17:12:9b 20...	vmhba3:C0:T1:L0	
○	vmhba2:C0:T2:L0	🟩 Active	20:00:d0:39:ea:17:12:9b 20...	vmhba2:C0:T2:L0	
○	vmhba2:C0:T1:L0	🟩 Active (I/O)	20:00:d0:39:ea:17:12:9b 20...	vmhba2:C0:T1:L0	
○	vmhba3:C0:T2:L0	🟩 Active	20:00:d0:39:ea:17:12:9b 20...	vmhba3:C0:T2:L0	

EXPORT 4 items

FlexPod VMware vSphere Distributed Switch (vDS)

This section provides detailed procedures for installing the VMware vDS in vCenter and on the first FlexPod ESXi Management Host.

In the Cisco UCS setup section of this document two sets of vNICs were setup. The vmnic ports associated with the vDS0-A and B vNICs will be placed on the VMware vDS in this procedure. The vMotion VMkernel port(s) will be placed on the vDS.

A vMotion, and a VM-Traffic port group will be added to the vDS. Any additional VLAN-based port groups added to the vDS would need to have the corresponding VLANs added to the Cisco UCS LAN cloud, to the Cisco UCS vDS0-A and B vNIC templates, and to the Cisco Nexus 9K switches and vPC peer-link interfaces on the switches.

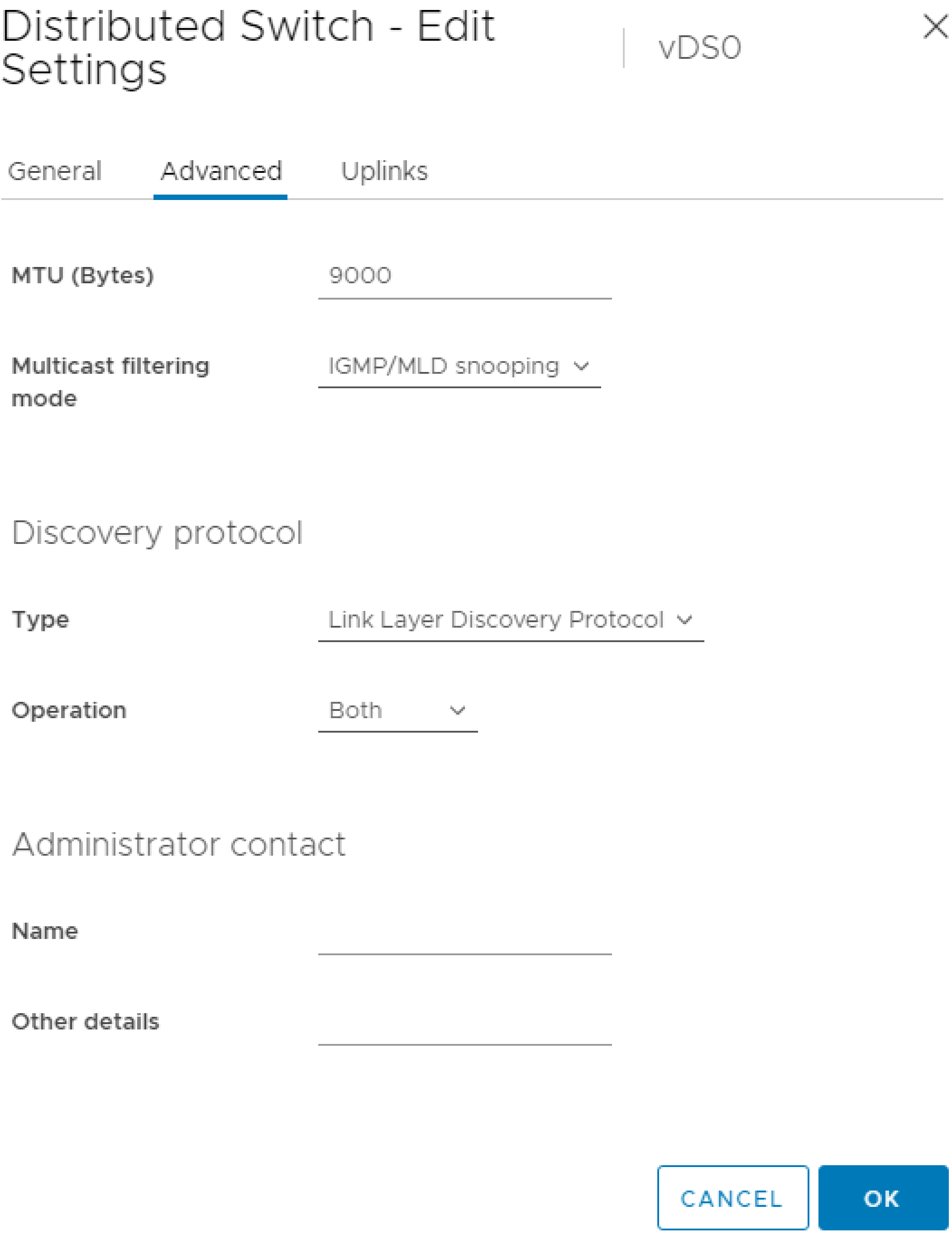
In this document, the infrastructure ESXi management VMkernel ports, the In-Band management interfaces including the vCenter management interface, and the infrastructure NFS VMkernel ports are left on vSwitch0 to facilitate bringing the virtual environment back up in the event it needs to be completely shut down. The vMotion VMkernel ports are moved to the vDS to allow QoS marking of vMotion to be done at the VLAN level in the vDS if vMotion needs to have QoS policies applied in the future. The vMotion port group is also pinned to Cisco UCS fabric B. Pinning should be done in a vDS to ensure consistency across all ESXi hosts.

Configure the VMware vDS in vCenter

VMware vSphere Web Client

To configure the vDS, follow these steps:

1. After logging into the VMware vSphere HTML5 Client, choose Networking under Menu.
2. Right-click the FlexPod-DC datacenter and choose Distributed Switch > New Distributed Switch.
3. Give the Distributed Switch a descriptive name (vDS0) and click NEXT.
4. Make sure version 7.0.2 – ESXi 7.0.2 and later is selected and click NEXT.
5. Change the Number of uplinks to 2. If VMware Network I/O Control is to be used for Quality of Service, leave Network I/O Control Enabled. Otherwise, Disable Network I/O Control. Enter VM-Traffic for the Port group name. Click NEXT.
6. Review the information and click FINISH to complete creating the vDS.
7. Expand the FlexPod-DC datacenter and the newly created vDS. Choose the newly created vDS.
8. Right-click the VM-Traffic port group and choose Edit Settings.
9. Choose VLAN.
10. Choose VLAN for VLAN type and enter the VM-Traffic VLAN ID. Click OK.
11. Right-click the vDS and choose Settings > Edit Settings.
12. In the Edit Settings window, choose the Advanced tab.
13. Change the MTU to 9000. The Discovery Protocol can optionally be changed to Link Layer Discovery Protocol and the Operation to Both. Click OK.


Distributed Switch - Edit Settings | vDS0

MTU (Bytes): 9000

Multicast filtering mode: IGMP/MLD snooping

Discovery protocol

Type: Link Layer Discovery Protocol

Operation: Both

Administrator contact

Name:

Other details:

14. For the vMotion port group, right-click the vDS, choose Distributed Port Group > New Distributed Port Group.

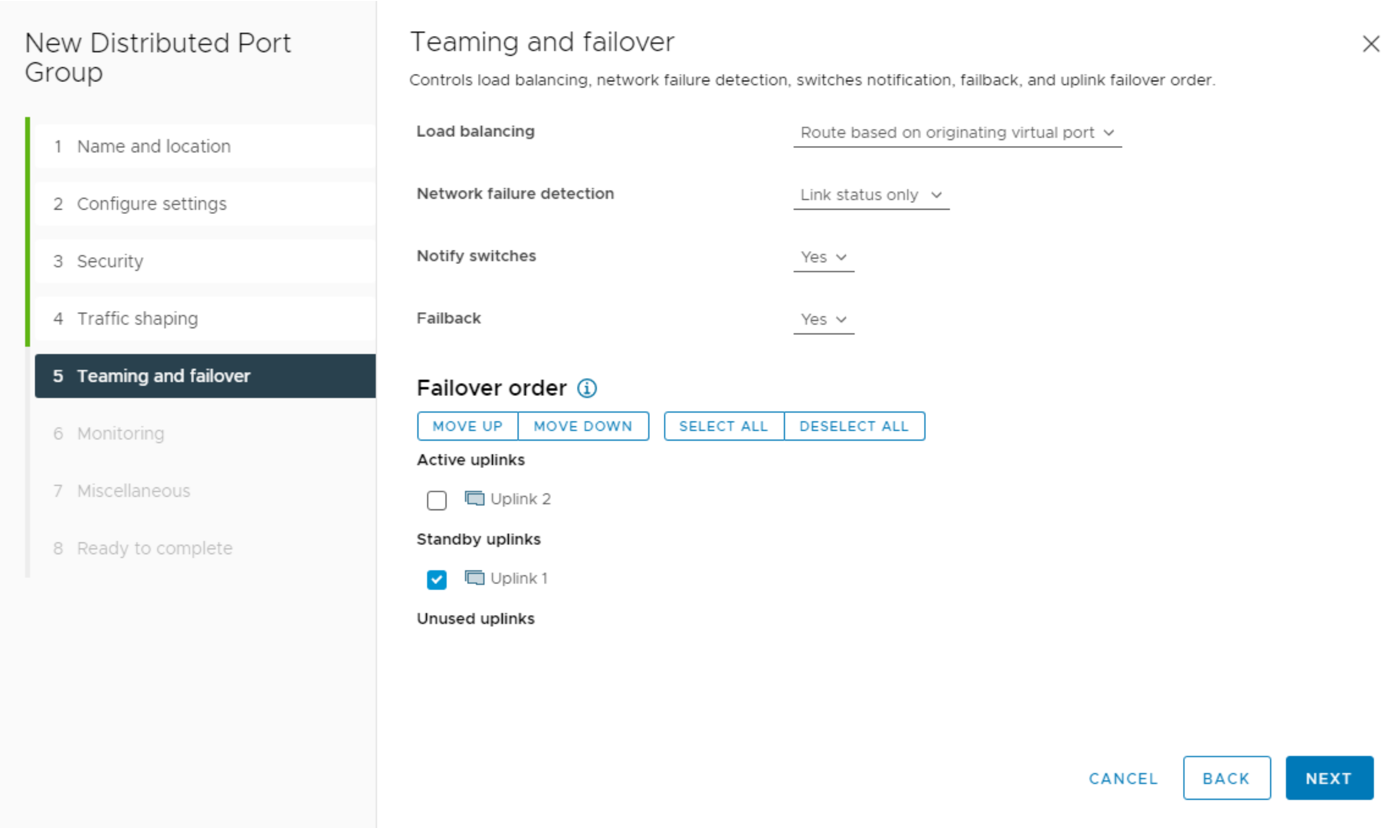
15. Enter vMotion as the name and click NEXT.

16. Set the VLAN type to VLAN, enter the VLAN ID used for vMotion, check the box for Customize default policies configuration, and click NEXT.

17. Leave the Security options set to Reject and click NEXT.

18. Leave the Ingress and Egress traffic shaping options as Disabled and click NEXT.

19. Choose Uplink 1 from the list of Active uplinks and click MOVE DOWN twice to place Uplink 1 in the list of Standby uplinks. This will pin all vMotion traffic to UCS Fabric Interconnect B except when a failure occurs.



Teaming and failover

Controls load balancing, network failure detection, switches notification, failback, and uplink failover order.

Load balancing: Route based on originating virtual port

Network failure detection: Link status only

Notify switches: Yes

Failback: Yes

Failover order

Active uplinks

□ Uplink 2

Standby uplinks

☑ Uplink 1

Unused uplinks

20. Click NEXT.

21. Leave NetFlow disabled and click NEXT.

22. Leave Block all ports set as No and click NEXT.

23. Confirm the options and click FINISH to create the port group.

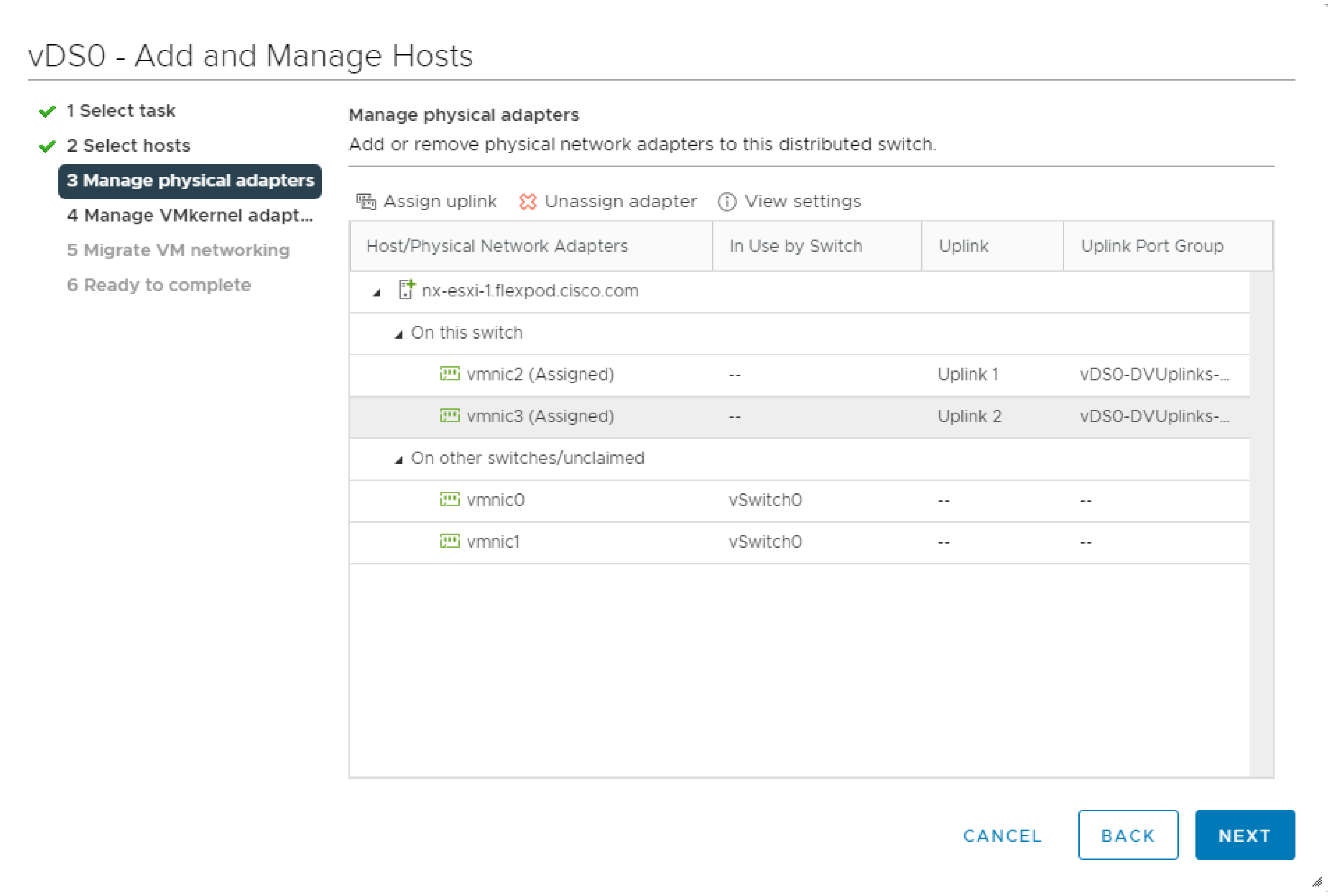
24. Right-click the vDS and choose Add and Manage Hosts.

25. Make sure Add hosts is selected and click NEXT.

26. Click the green + sign to add New hosts. Choose the one configured FlexPod Management host and click OK. Click NEXT.

27. Choose vmnic2 and click Assign uplink. Choose Uplink 1 and click OK. Choose vmnic3 and click Assign uplink. Choose Uplink 2 and click OK.

It is important to assign the uplinks as shown below. This allows the port groups to be pinned to the appropriate Cisco UCS fabric.



vDS0 - Add and Manage Hosts

✓ 1 Select task
✓ 2 Select hosts
3 Manage physical adapters
4 Manage VMkernel adapt...
5 Migrate VM networking
6 Ready to complete

Manage physical adapters

Add or remove physical network adapters to this distributed switch.

Host/Physical Network Adapters	In Use by Switch	Uplink	Uplink Port Group
nx-esxi-1.flexpod.cisco.com			
On this switch			
vmnic2 (Assigned)	--	Uplink 1	vDS0-DVUplinks-...
vmnic3 (Assigned)	--	Uplink 2	vDS0-DVUplinks-...
On other switches/unclaimed			
vmnic0	vSwitch0	--	--
vmnic1	vSwitch0	--	--

28. Click NEXT.

29. Do not migrate any VMkernel ports and click NEXT.

30. Do not migrate any virtual machine networking ports. Click NEXT.

31. Click FINISH to complete adding the ESXi host to the vDS.

32. Select Hosts and Clusters under Menu and select the first ESXi host. In the center pane, select the Configure tab.

33. In the list under Networking, select VMkernel adapters.

34. Select ADD NETWORKING.

35. In the Add Networking window, ensure that VMkernel Network Adapter is selected and click NEXT.

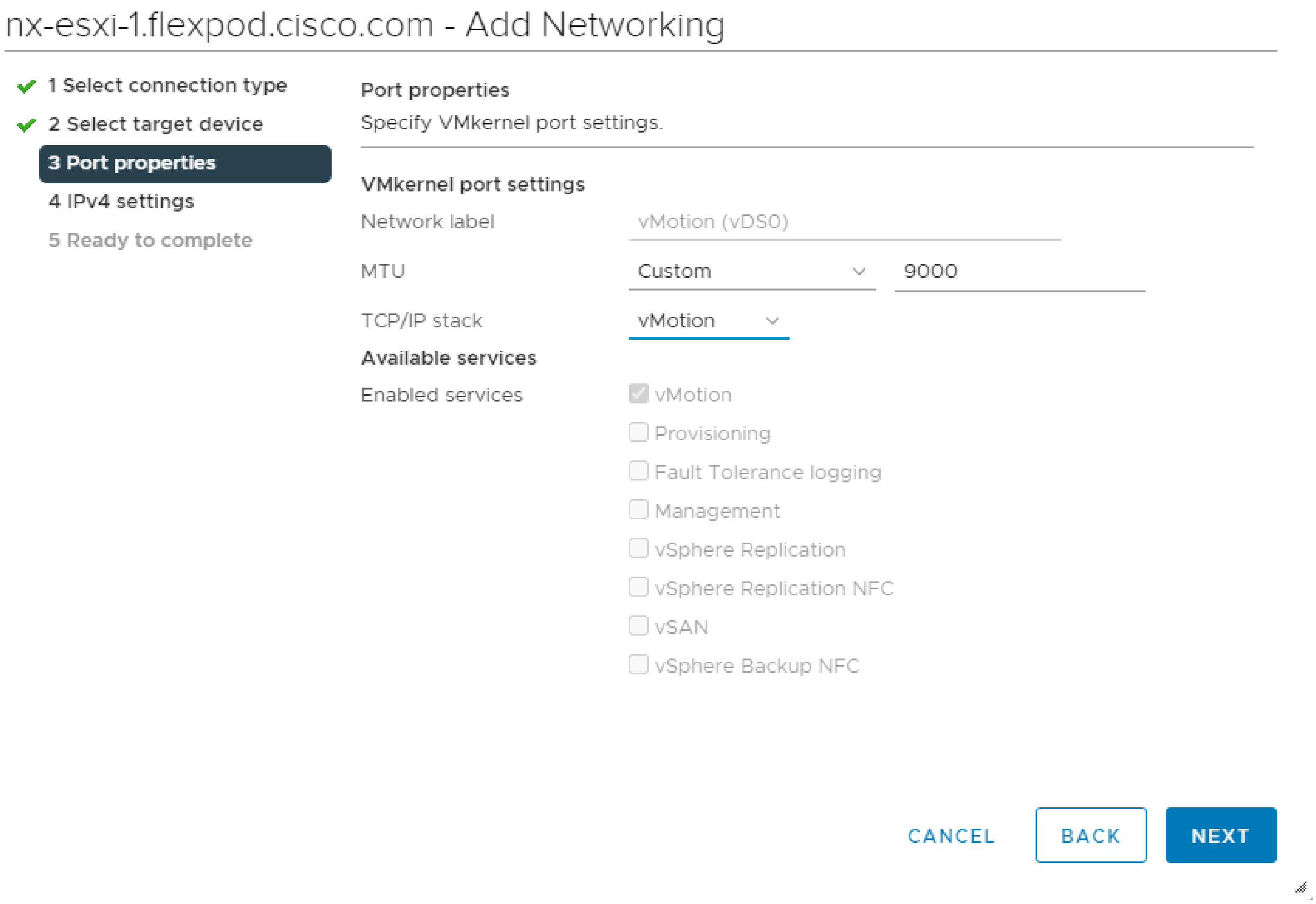
36. Ensure that Select and existing network is selected and click BROWSE .

37. Select vMotion and click OK.

38. Click NEXT.

39. From the MTU drop-down list, select Custom and ensure the MTU is set to 9000.

40. From the TCP/IP stack drop-down list, select vMotion. Click NEXT.



nx-esxi-1.flexpod.cisco.com - Add Networking

Port properties

Specify VMkernel port settings.

VMkernel port settings

Network label: vMotion (vDS0)

MTU: Custom 9000

TCP/IP stack: vMotion

Available services

Enabled services: ☑ vMotion

□ Provisioning

□ Fault Tolerance logging

□ Management

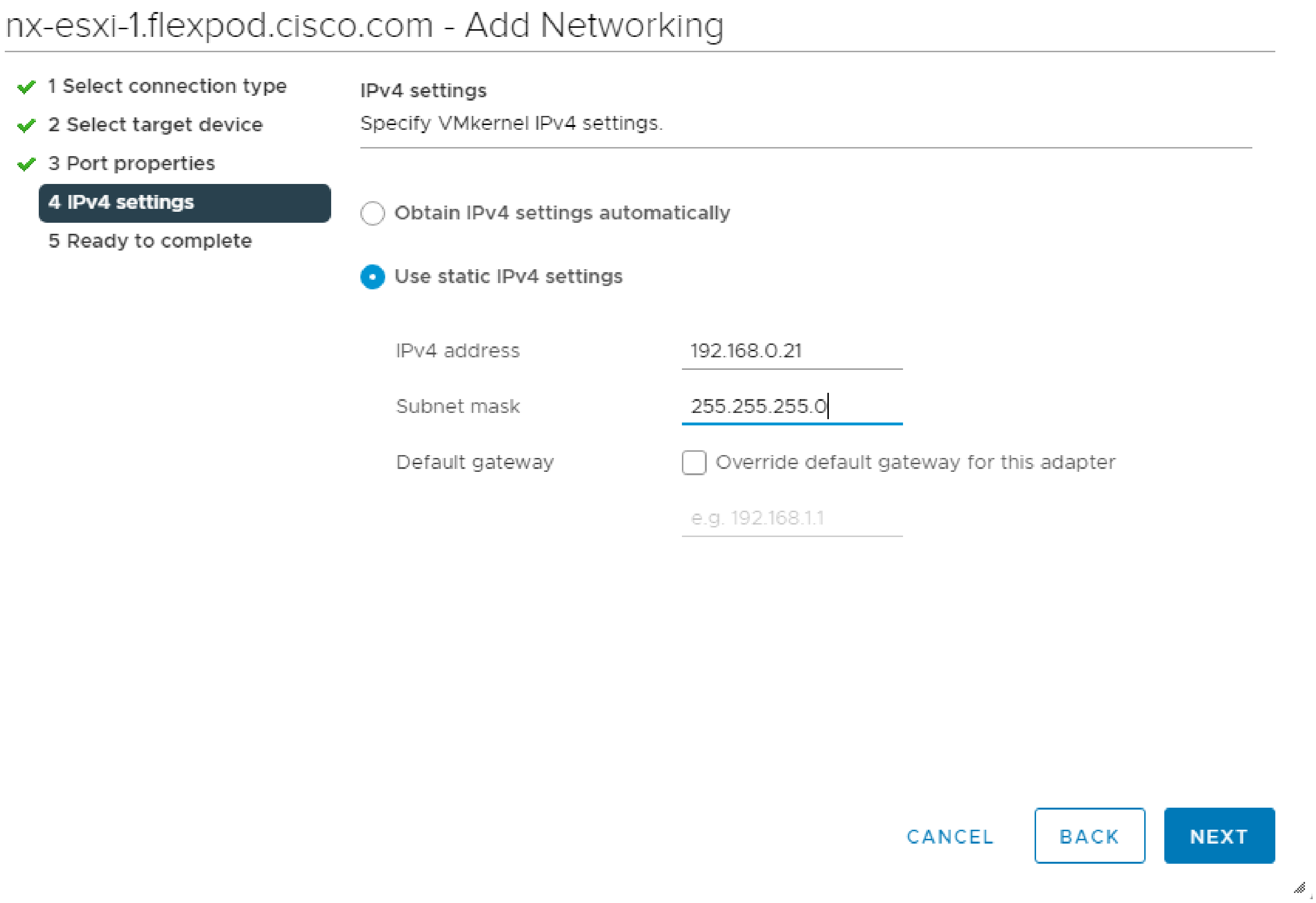
□ vSphere Replication

□ vSphere Replication NFC

□ vSAN

□ vSphere Backup NFC

41. Select Use static IPv4 settings and fill in the IPv4 address and Subnet mask for the first ESXi host’s vMotion IP address. Click NEXT.


nx-esxi-1.flexpod.cisco.com - Add Networking

IPv4 settings

Specify VMkernel IPv4 settings.

○ Obtain IPv4 settings automatically

● Use static IPv4 settings

IPv4 address: 192.168.0.21

Subnet mask: 255.255.255.0

Default gateway: □ Override default gateway for this adapter

e.g. 192.168.1.1

42. Review the information and click FINISH to complete adding the vMotion VMkernel port.

Add and Configure VMware ESXi Hosts in vCenter

This section details the steps to add and configure an ESXi host in vCenter. This section assumes the host has had the VMware ESXi 7.0 U2 Cisco Custom ISO installed, the management IP address set, the nfnic driver updated, and the Cisco UCS Tool and NetApp NFS Plug-in for VMware VAAI installed. This procedure is initially being run on the second and third ESXi management hosts but can be run on any added ESXi host.

Add the ESXi Hosts to vCenter

ESXi Host VM-Host-Infra-02 and VM-Host-Infra-03

To add the ESXi host(s) to vCenter, follow these steps:

1. From the Home screen in the VMware vCenter HTML5 Interface, choose Menu > Hosts and Clusters.

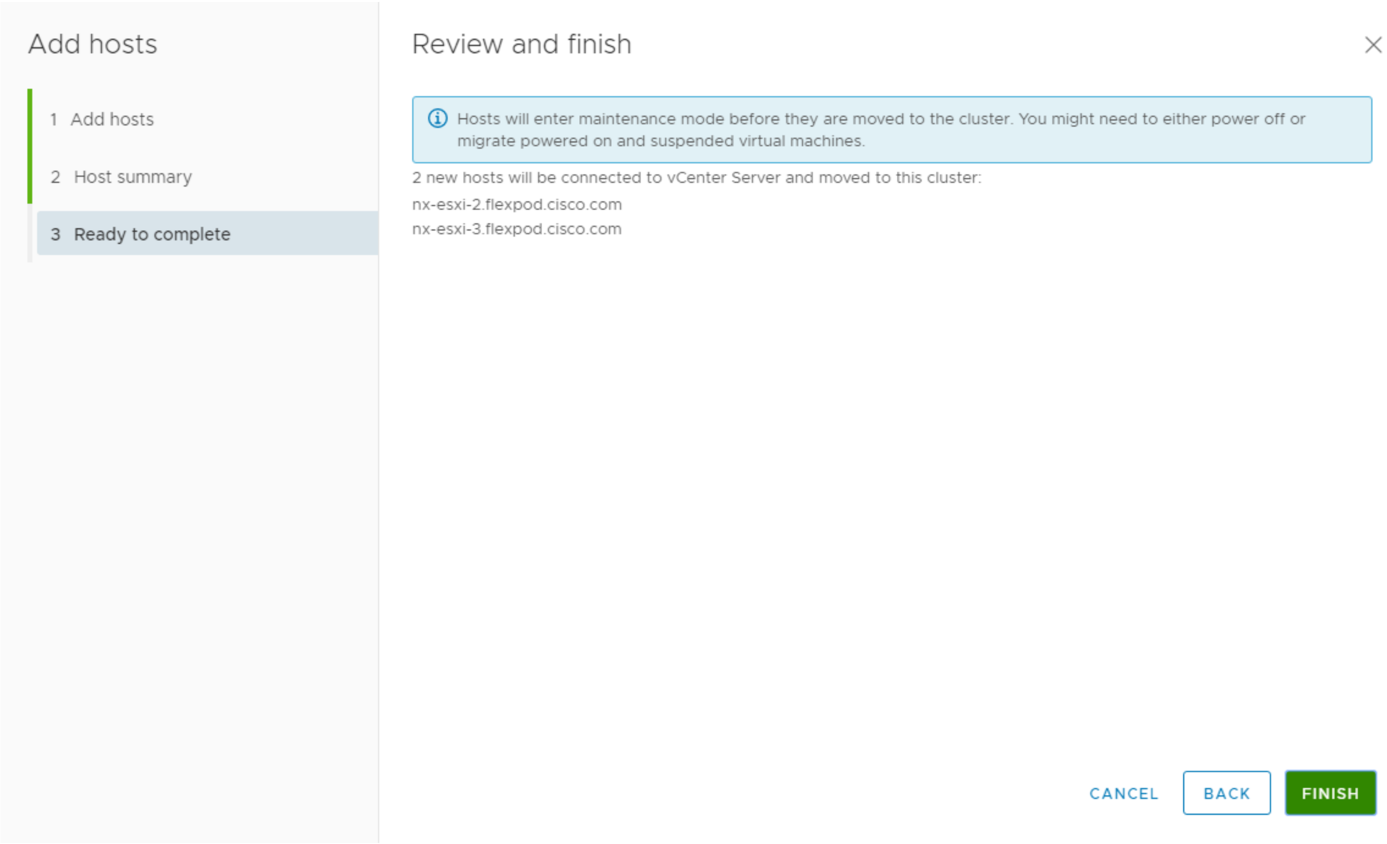
2. Right-click the “FlexPod-Management” cluster and click Add Hosts.

3. In the IP address or FQDN field, enter either the IP address or the FQDN name of the configured VMware ESXi host. Also enter the user id (root) and associated password. If more than one host is being added, add the corresponding host information, optionally selecting "Use the same credentials for all hosts." Click NEXT.

4. Choose all hosts being added and click OK to accept the thumbprint(s).

5. Review the host details and click NEXT to continue.

6. Review the configuration parameters and click FINISH to add the host(s).



Hosts will enter maintenance mode before they are moved to the cluster. You might need to either power off or migrate powered on and suspended virtual machines.

2 new hosts will be connected to vCenter Server and moved to this cluster:

nx-esxi-2.flexpod.cisco.com
nx-esxi-3.flexpod.cisco.com

> The added ESXi host(s) will be placed in Maintenance Mode and will have Warnings that the ESXi Shell and SSH have been enabled. These warnings can be suppressed. The TPM Encryption Recovery Key Backup Alarm can also be Reset to Green.

Set Up VMkernel Ports and Virtual Switch

ESXi Host VM-Host-Infra-02 and VM-Host-Infra-03

To set up the VMkernel ports and the virtual switches on the ESXi host, follow these steps:

1. In the vCenter HTML5 Interface, under Hosts and Clusters choose the ESXi host.

2. In the center pane, choose the Configure tab.

3. In the list, choose Virtual switches under Networking.

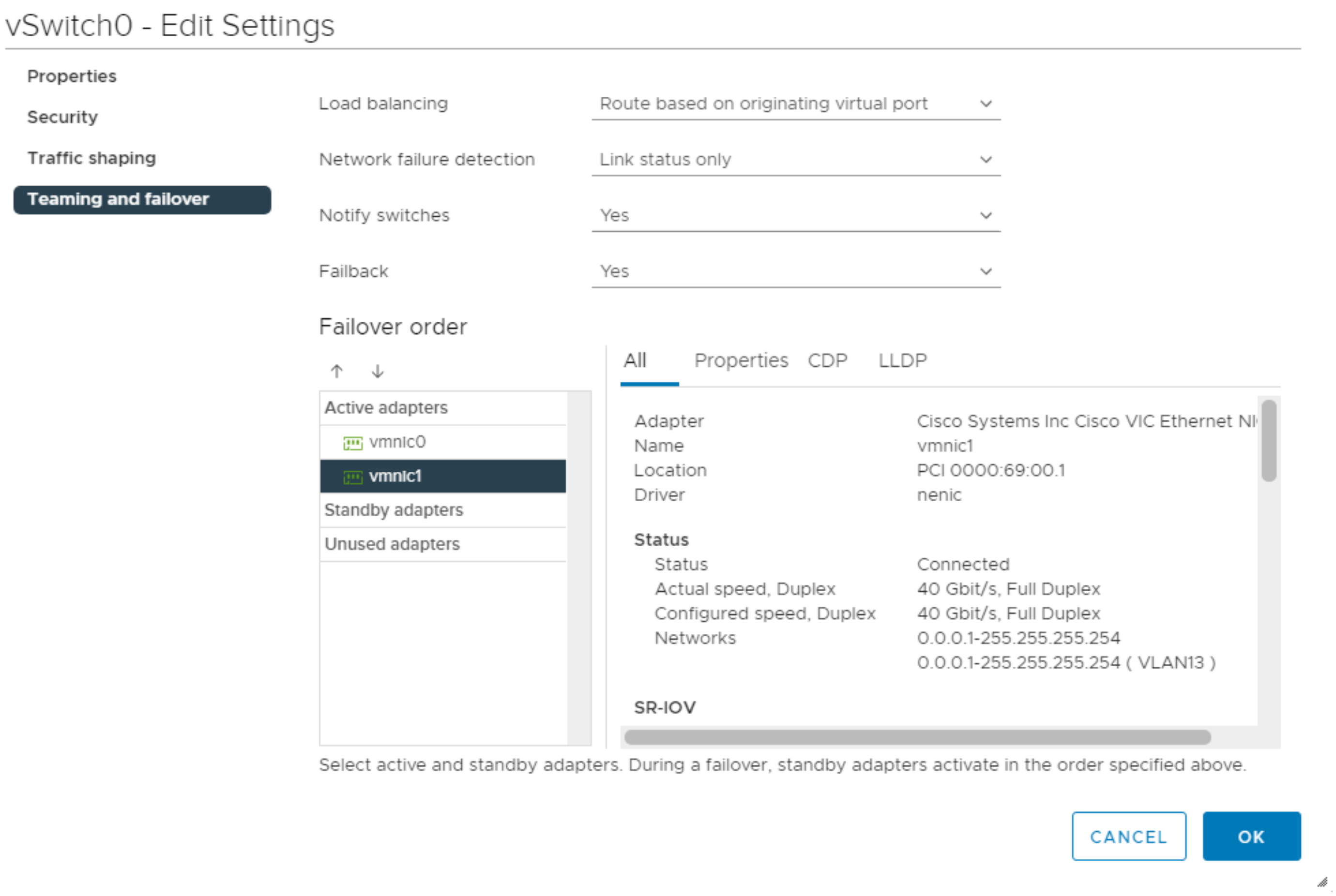
4. Expand Standard Switch: vSwitch0.

5. Choose EDIT to Edit settings.

6. Change the MTU to 9000.

7. Choose Teaming and failover located on the left.

8. In the Failover order section, use the arrow icons to move the vmnics until both are Active adapters.



vSwitch0 - Edit Settings

Load balancing: Route based on originating virtual port

Network failure detection: Link status only

Notify switches: Yes

Failback: Yes

Failover order

Adapter	Cisco Systems Inc Cisco VIC Ethernet NI
Name	vmnic1
Location	PCI 0000:69:00.1
Driver	nenic
Status	
Status	Connected
Actual speed, Duplex	40 Gbit/s, Full Duplex
Configured speed, Duplex	40 Gbit/s, Full Duplex
Networks	0.0.0.1-255.255.255.254 0.0.0.1-255.255.255.254 (VLAN13)
SR-IOV	

Select active and standby adapters. During a failover, standby adapters activate in the order specified above.

9. Click OK.

10. In the center pane, to the right of VM Network click ... > Remove to remove the port group. Click YES on the confirmation.

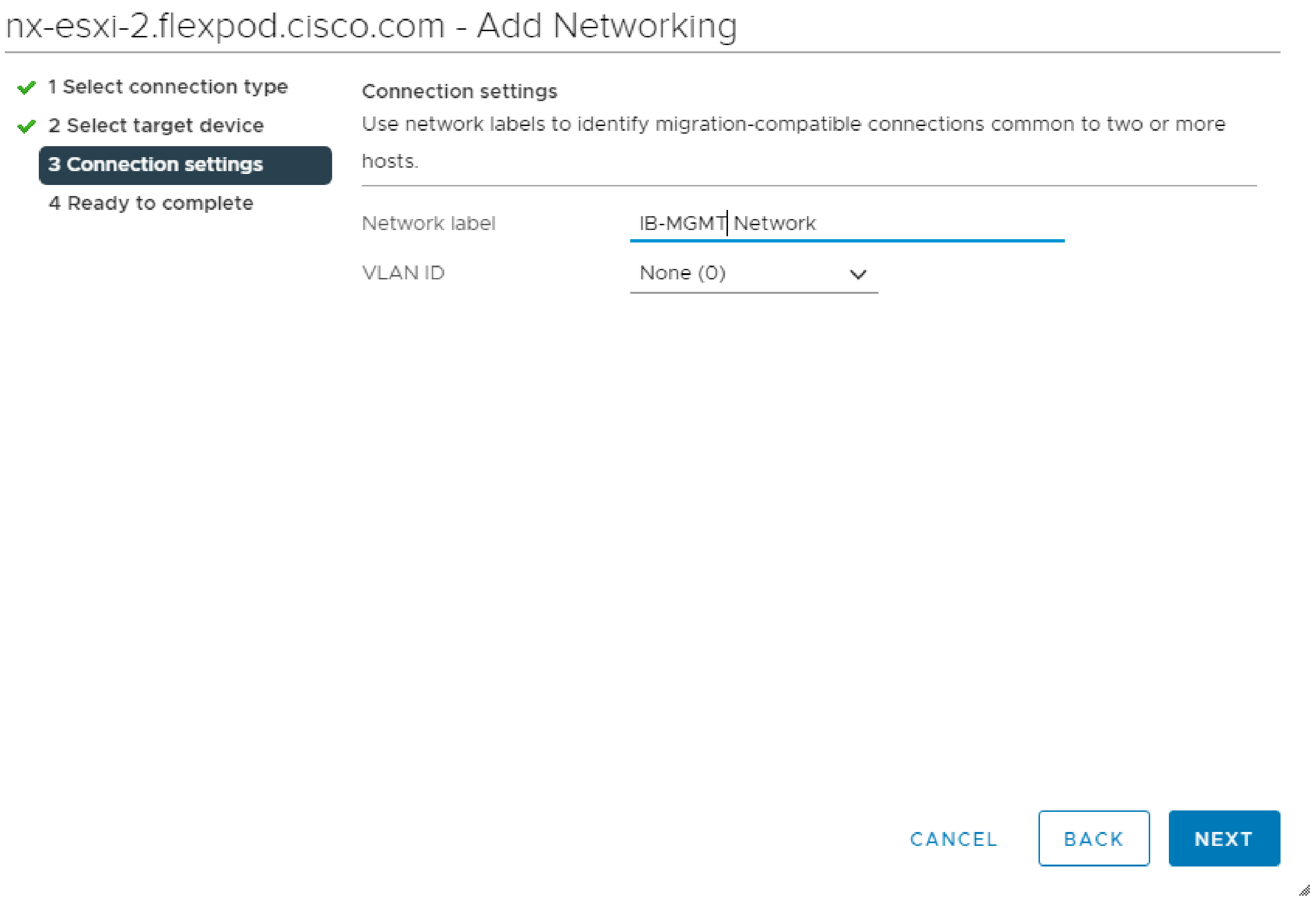
11. Click ADD NETWORKING to add a new VM port group.

12. Choose Virtual Machine Port Group for a Standard Switch and click NEXT.

13. Ensure vSwitch0 is shown for Select an existing standard switch and click NEXT.

14. Name the port group “IB-MGMT Network” and leave the VLAN ID field set to None (0). Click NEXT.

The IB-MGMT VLAN was set as the native VLAN for the vSwitch0 vNIC templates, allowing DHCP to be used on ESXi vmk0 without putting in a VLAN ID for this port. Since this port group is in the same VLAN, the port group’s VLAN ID should also be set to 0.



nx-esxi-2.flexpod.cisco.com - Add Networking

Connection settings

Use network labels to identify migration-compatible connections common to two or more hosts.

Network label: IB-MGMT Network

VLAN ID: None (0)

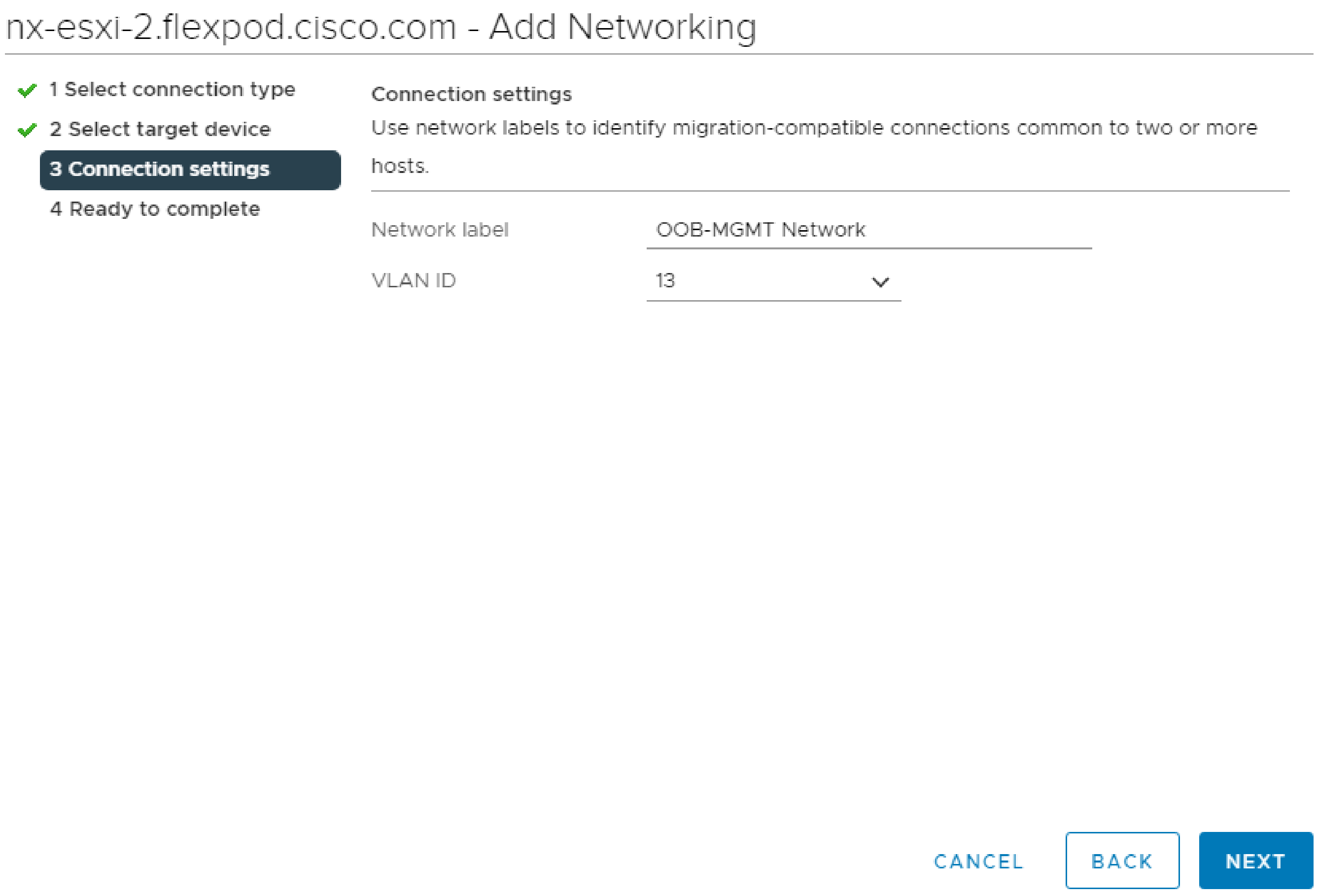
15. Click FINISH to complete adding the IB-MGMT Network VM port group.

16. Click ADD NETWORKING to add a new VM port group.

17. Choose Virtual Machine Port Group for a Standard Switch and click NEXT.

18. Ensure vSwitch0 is shown for Select an existing standard switch and click NEXT.

19. Name the port group “OOB-MGMT Network” and input <OOB-MGMT-vlan-id> for the VLAN ID field. Click NEXT.



nx-esxi-2.flexpod.cisco.com - Add Networking

Connection settings

Use network labels to identify migration-compatible connections common to two or more hosts.

Network label: OOB-MGMT Network

VLAN ID: 13

20. Click FINISH to complete adding the OOB-MGMT Network VM port group.

21. Located on the left under Networking, choose VMkernel adapters.

22. In the center pane, click Add Networking.

23. Make sure VMkernel Network Adapter is selected and click NEXT.

24. Choose Select an existing standard switch and click BROWSE. Choose vSwitch0 and click OK. Click NEXT.

25. For Network label, enter VMkernel-Infra-NFS.

26. Enter <infra-nfs-vlan-id> for the VLAN ID.

27. Choose Custom for MTU and make sure 9000 is entered.

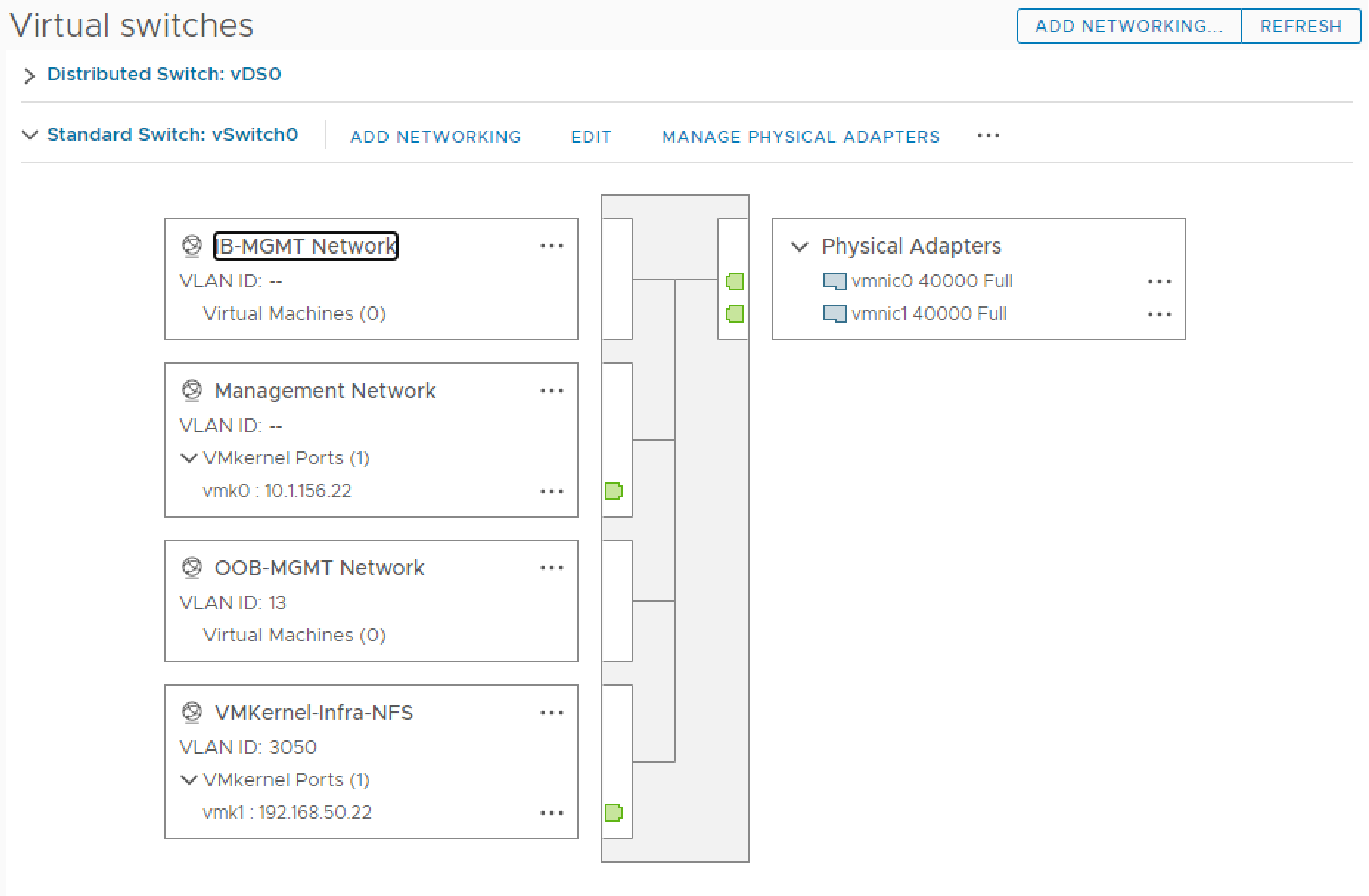
28. Leave the Default TCP/IP stack selected and do not choose any of the Enabled services. Click NEXT.

29. Choose Use static IPv4 settings and enter the IPv4 address and subnet mask for the Infra-NFS VMkernel port for this ESXi host.

30. Click NEXT.

31. Review the settings and click FINISH to create the VMkernel port.

32. Under Networking, choose Virtual switches, then expand vSwitch0. The properties for vSwitch0 should be similar to the following example:



Distributed Switch: vDS0

Standard Switch: vSwitch0

IB-MGMT Network
VLAN ID: --
Virtual Machines (0)

Management Network
VLAN ID: --
VMkernel Ports (1)
vmk0 : 10.1.156.22

OOB-MGMT Network
VLAN ID: 13
Virtual Machines (0)

VMKernel-Infra-NFS
VLAN ID: 3050
VMkernel Ports (1)
vmk1 : 192.168.50.22

Physical Adapters
vmnic0 40000 Full
vmnic1 40000 Full

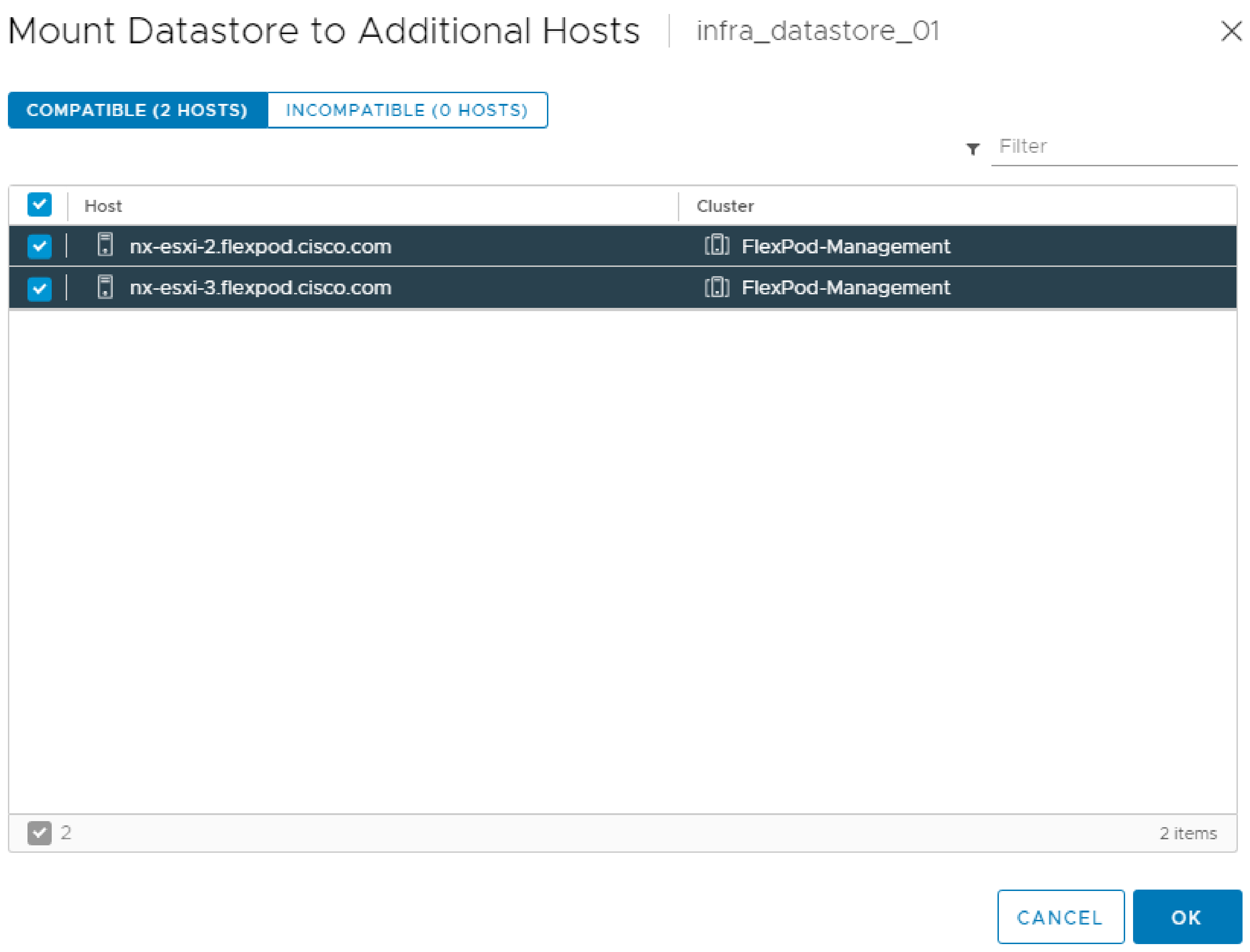
33. Repeat steps 1 – 32 for all hosts being added.

Mount Required Datastores

ESXi Host VM-Host-Infra-02 and VM-Host-Infra-03

To mount the required datastores, follow these steps on the ESXi host(s):

1. From the vCenter Home screen, choose Menu > Storage.
2. Expand FlexPod-DC.
3. Right-click infra_datastore_01 and choose Mount Datastore to Additional Hosts.
4. Choose the ESXi host(s) and click OK.



☑	Host	Cluster
☑	nx-esxi-2.flexpod.cisco.com	FlexPod-Management
☑	nx-esxi-3.flexpod.cisco.com	FlexPod-Management

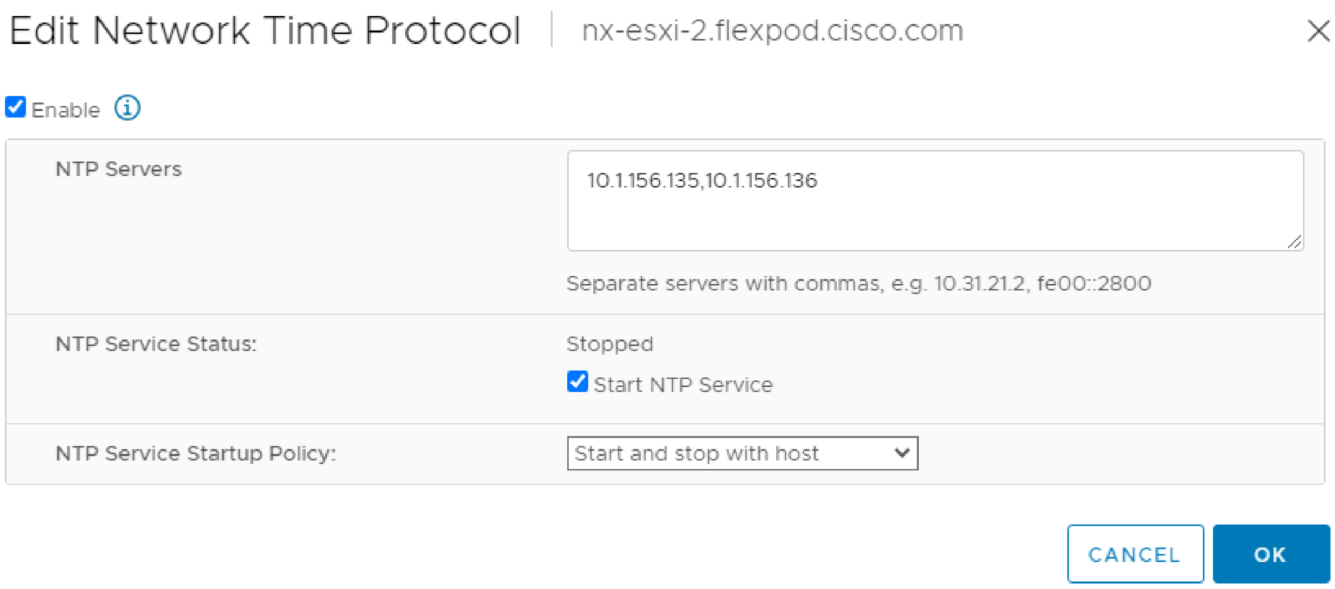
5. Repeat steps 1 - 4 to mount the infra_datastore_02 and infra_swap datastores to the ESXi host(s).
6. Choose infra_datastore_01. In the center pane, choose Hosts. Verify the ESXi host(s) now has the datastore mounted. Repeat this process to also verify that infra_datastore_02 and infra_swap are also mounted on all hosts.

Configure NTP on ESXi Host

ESXi Host VM-Host-Infra-02 and VM-Host-Infra-03

To configure Network Time Protocol (NTP) on the ESXi host(s), follow these steps:

1. In the vCenter HTML5 Interface, under Hosts and Clusters choose the ESXi host.
2. In the center pane, choose the Configure tab.
3. In the list under System, choose Time Configuration.
4. To the right of Manual Time Configuration, click EDIT.
5. Set the correct local time and click OK.
6. To the right of Network Time Protocol, click EDIT.
7. Check the box for Enable.
8. Enter the two Nexus switch NTP IP addresses in the NTP servers box separated by a comma.
9. Check the box for Start NTP Service.
10. Use the drop-down list to choose Start and stop with host.



Edit Network Time Protocol | nx-esxi-2.flexpod.cisco.com

☑ Enable

NTP Servers: 10.1.156.135,10.1.156.136

Separate servers with commas, e.g. 10.31.21.2, fe00::2800

NTP Service Status: Stopped

☑ Start NTP Service

NTP Service Startup Policy: Start and stop with host

11. Click OK to save the configuration changes.

12. Verify that NTP service is now enabled and running, and the clock is now set to approximately the correct time.

Change ESXi Power Management Policy

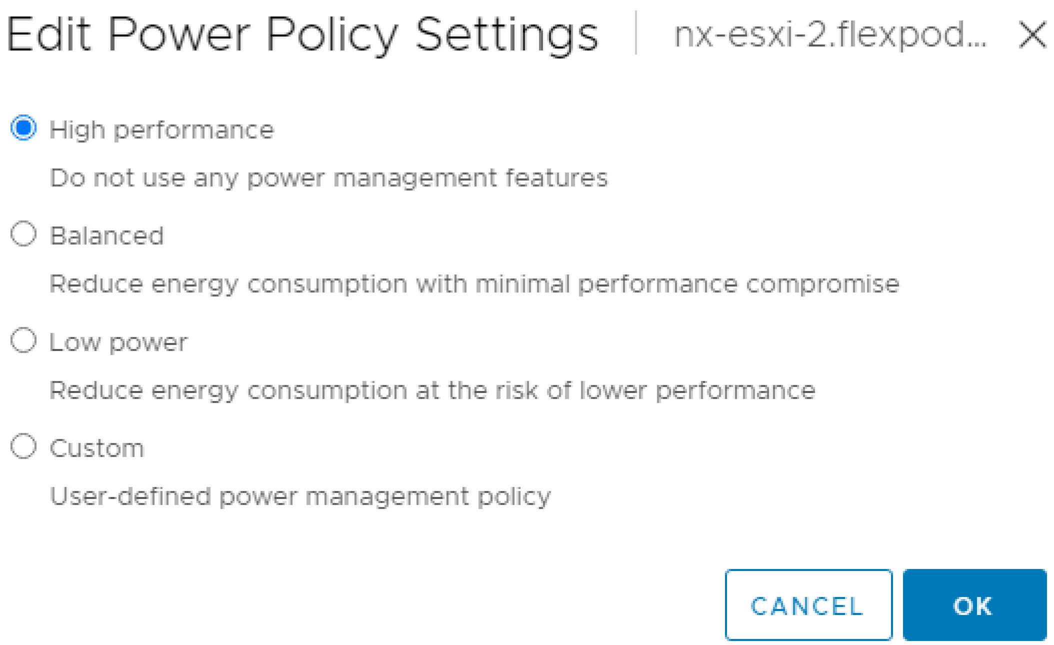
ESXi Host VM-Host-Infra-02 and VM-Host-Infra-03

To change the ESXi power management policy, follow these steps:

> Implementation of this policy is recommended in Performance Tuning Guide for Cisco UCS M5 Servers for maximum VMware ESXi performance. If your organization has specific power policies, please set this policy accordingly.

1. In the list under Hardware, choose Overview. Scroll to the bottom and to the right of Power Management, choose EDIT POWER POLICY.

2. Choose High performance and click OK.



Edit Power Policy Settings | nx-esxi-2.flexpod...

● High performance

Do not use any power management features

○ Balanced

Reduce energy consumption with minimal performance compromise

○ Low power

Reduce energy consumption at the risk of lower performance

○ Custom

User-defined power management policy

Add the ESXi Host(s) to the VMware Virtual Distributed Switch

ESXi Host VM-Host-Infra-02 and VM-Host-Infra-03

To add the ESXi host(s) to the VMware vDS, follow these steps on the host:

1. After logging into the VMware vSphere HTML5 Client, choose Networking under Menu.

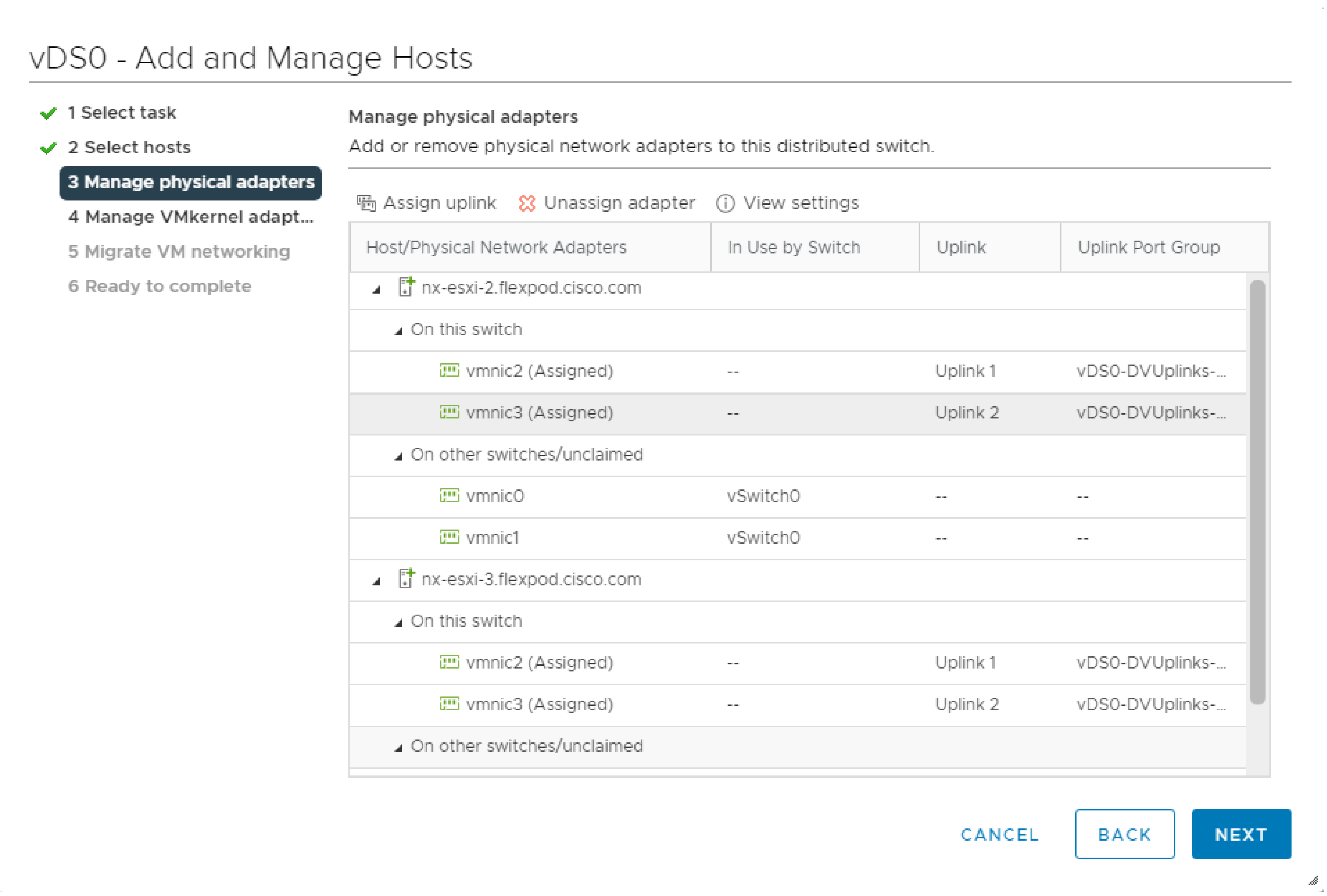
2. Right-click the vDS (vDS0) and click Add and Manage Hosts.

3. Make sure Add hosts is selected and click NEXT.

4. Click the green + sign to add New hosts. Choose the configured FlexPod Management host(s) and click OK. Click NEXT.

5. Choose vmnic2 on each host and click Assign uplink. Choose Uplink 1 and click OK. Choose vmnic3 on each host and click Assign uplink. Choose Uplink 2 and click OK. If more than one host is being connected to the vDS, check the box for Apply this uplink assignment to the rest of the hosts.

It is important to assign the uplinks as shown below. This allows the port groups to be pinned to the appropriate Cisco UCS fabric.



vDS0 - Add and Manage Hosts

✓ 1 Select task
✓ 2 Select hosts
3 Manage physical adapters
4 Manage VMkernel adapt...
5 Migrate VM networking
6 Ready to complete

Manage physical adapters

Add or remove physical network adapters to this distributed switch.

Host/Physical Network Adapters	In Use by Switch	Uplink	Uplink Port Group
nx-esxi-2.flexpod.cisco.com			
On this switch			
vmnic2 (Assigned)	--	Uplink 1	vDS0-DVUplinks-...
vmnic3 (Assigned)	--	Uplink 2	vDS0-DVUplinks-...
On other switches/unclaimed			
vmnic0	vSwitch0	--	--
vmnic1	vSwitch0	--	--
nx-esxi-3.flexpod.cisco.com			
On this switch			
vmnic2 (Assigned)	--	Uplink 1	vDS0-DVUplinks-...
vmnic3 (Assigned)	--	Uplink 2	vDS0-DVUplinks-...
On other switches/unclaimed			

6. Click NEXT.

7. Do not migrate any VMkernel ports and click NEXT.

8. Do not migrate any VM ports and click NEXT.

9. Click FINISH to complete adding the ESXi host(s) to the vDS.

Add the vMotion VMkernel Port(s) to the ESXi Host

ESXi Host VM-Host-Infra-01, VM-Host-Infra-02 and VM-Host-Infra-03

To add the vMotion VMkernel Port to the ESXi host(s) on the VMware vDS, follow these steps on the host:

1. In the vCenter HTML5 Interface, under Hosts and Clusters choose the ESXi host.

2. Click the Configure tab.

3. In the list under Networking, choose VMkernel adapters.

4. Choose Add Networking to Add host networking.

5. Make sure VMkernel Network Adapter is selected and click NEXT.

6. Choose BROWSE to the right of Select an existing network.

7. Choose vMotion on the vDS and click OK.

8. Click NEXT.

9. Make sure the Network label is vMotion with the vDS in parenthesis. From the drop-down list, select Custom for MTU and make sure the MTU is set to 9000. Choose the vMotion TCP/IP stack and click NEXT.

10. Choose Use static IPv4 settings and input the host's vMotion IPv4 address and Subnet mask.

11. Click NEXT.

12. Review the parameters and click FINISH to add the vMotion VMkernel port.

13. If NetApp VSC is installed, under Hosts and Clusters, right-click the host and click NetApp VSC > Set Recommended Values. Reboot the host.

14. If this is an iSCSI-booted host, execute the instructions in the Appendix for an iSCSI-booted host being added in vCenter.

15. Exit Maintenance Mode on each ESXi host in Maintenance Mode.

16. Migrate the vCenter VM to another ESXi host to move its swap into the infra_swap datastore.

vCenter and ESXi Final Setup

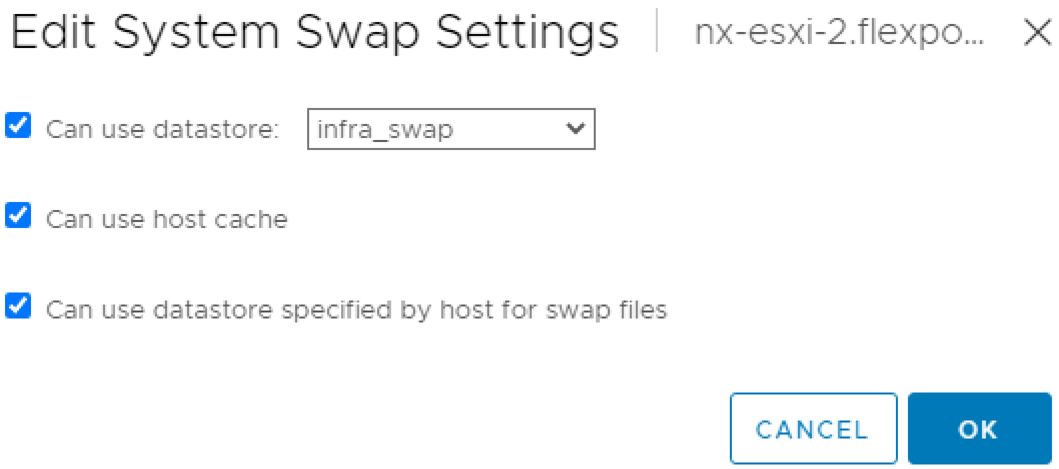
Execute the following steps whether the Ansible or manual setup of VMware vCenter was done.

Configure ESXi Host Swap

ESXi Host VM-Host-Infra-01, VM-Host-Infra-02 and VM-Host-Infra-03

To configure host swap on the ESXi host(s), follow these steps on the host:

1. In the vCenter HTML5 Interface, under Hosts and Clusters choose the ESXi host.
2. In the center pane, choose the Configure tab.
3. In the list under System, choose System Swap.
4. Located on the right, click EDIT.
5. Choose Can use datastore and use the drop-down list to choose infra_swap. Leave all other settings unchanged.



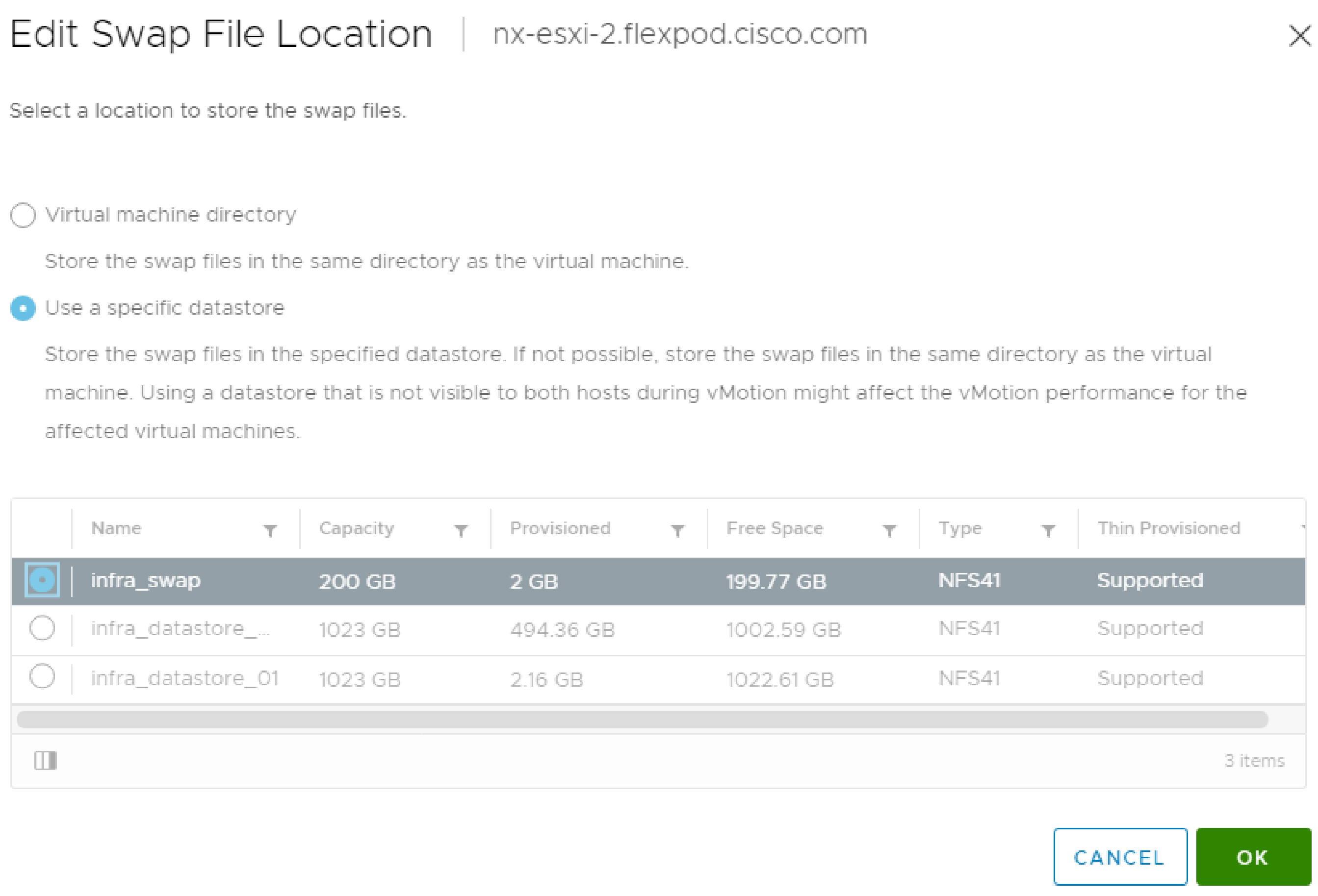
Edit System Swap Settings | nx-esxi-2.flexpo...

☑ Can use datastore: infra_swap

☑ Can use host cache

☑ Can use datastore specified by host for swap files

6. Click OK to save the configuration changes.
7. In the list under Virtual Machines, choose Swap File Location.
8. Located on the right, click EDIT.
9. Because of a known issue with the vCenter UI, you will need to use the TAB key to move the cursor to the first datastore in the datastore list. Then use the arrow keys to move the highlight to the infra_swap datastore. Once the infra_swap datastore is highlighted, use the spacebar to select it and click OK.



Edit Swap File Location | nx-esxi-2.flexpod.cisco.com

Select a location to store the swap files.

○ Virtual machine directory

Store the swap files in the same directory as the virtual machine.

● Use a specific datastore

Store the swap files in the specified datastore. If not possible, store the swap files in the same directory as the virtual machine. Using a datastore that is not visible to both hosts during vMotion might affect the vMotion performance for the affected virtual machines.

	Name	Capacity	Provisioned	Free Space	Type	Thin Provisioned
●	infra_swap	200 GB	2 GB	199.77 GB	NFS41	Supported
○	infra_datastore_...	1023 GB	494.36 GB	1002.59 GB	NFS41	Supported
○	infra_datastore_01	1023 GB	2.16 GB	1022.61 GB	NFS41	Supported

3 items

Configure ESXi IPMI/iLO Settings for Power Management (Optional)

ESXi Host VM-Host-Infra-01, VM-Host-Infra-02 and VM-Host-Infra-03

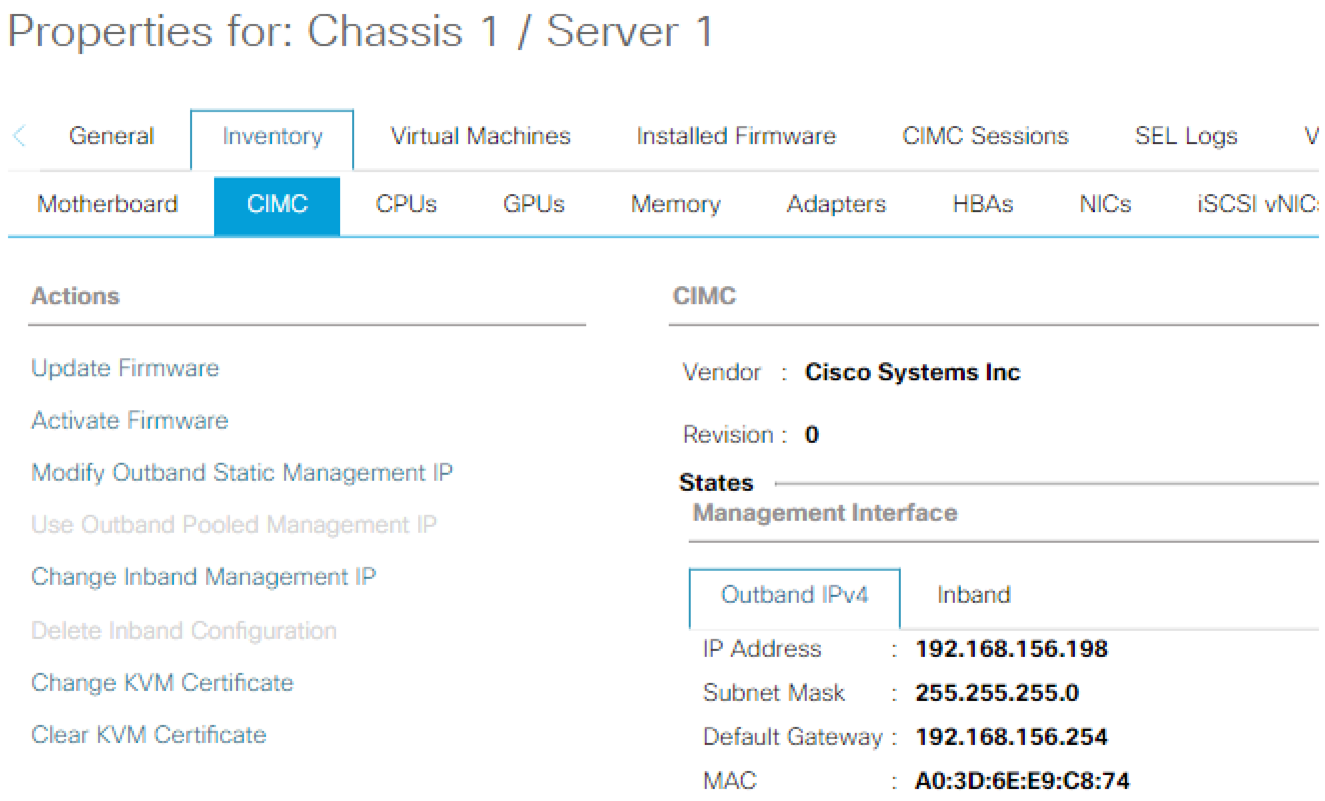
The vSphere Distributed Power Management (DPM) feature allows a DRS cluster to reduce its power consumption by powering hosts on and off based on cluster resource utilization. In order to implement this optional feature, an IPMI Access Profile was configured in Cisco UCS Manager and assigned to each service profile template. This procedure configures IPMI access for each ESXi host allowing DPM to be configured. To configure ESXi IPMI/iLO Settings for Power Management for each ESXi host, follow these steps:

1. In Cisco UCS Manager, select the ESXi host’s corresponding service profile template under Servers > Service Profiles > root > Sub-Organizations > FlexPod Organization.

2. On the right, click the link for the Associated Server in the format of “sys/chassis-1/blade-1”. A new window should pop up.

3. In the Properties for: window, select the Inventory tab. Then select the CIMC tab.

4. Under the Outband IPv4 tab, note the IP address and MAC.



Properties for: Chassis 1 / Server 1

CIMC

Vendor : **Cisco Systems Inc**

Revision : **0**

States

Management Interface

IP Address : **192.168.156.198**

Subnet Mask : **255.255.255.0**

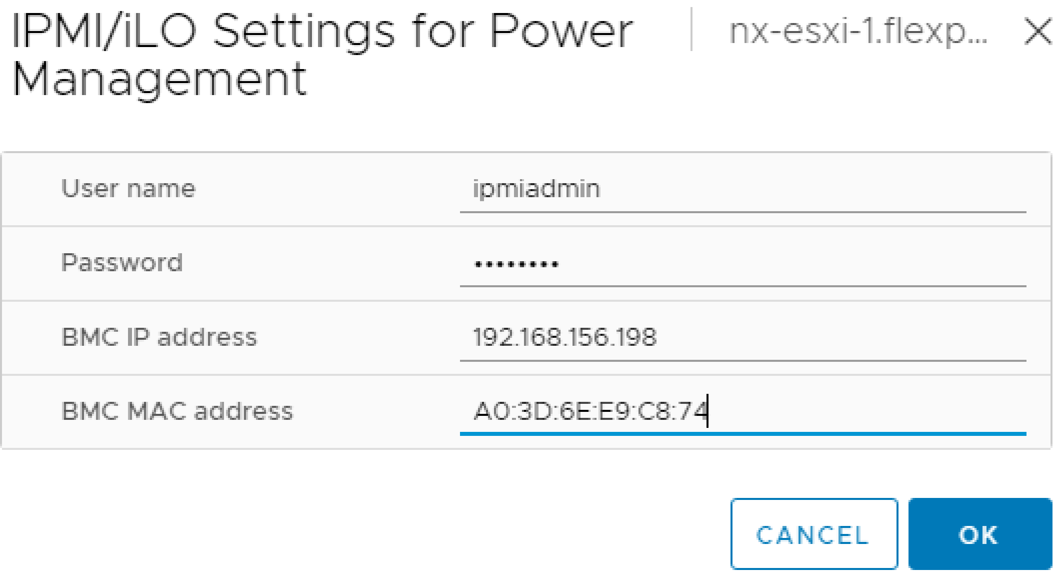
Default Gateway : **192.168.156.254**

MAC : **A0:3D:6E:E9:C8:74**

5. In the VMware vSphere Client, under Hosts and Clusters, select the ESXi host. In the center pane, select the Configure tab, and select Power Management under System.

6. Click EDIT.

7. Fill in the User name (ipmiadmin), the corresponding password, and the BMC IP address and BMC MAC address from Cisco UCS Manager.



IPMI/iLO Settings for Power Management | nx-esxi-1.flexp...

User name	ipmiadmin
Password	•••••••••
BMC IP address	192.168.156.198
BMC MAC address	A0:3D:6E:E9:C8:74

8. Click OK. The ESXi host will query the server CIMC at the BMC IP address and verify the BMC MAC address. If an error occurs, make sure the correct server information is being entered.

The BMC MAC address is hard coded in the CIMC (not part of the service profile), and this set of parameters will need to be entered again if the service profile is associated to a different server.

9. Repeat this process for each VMware ESXi host.

Check ESXi Host Fibre Channel Pathing

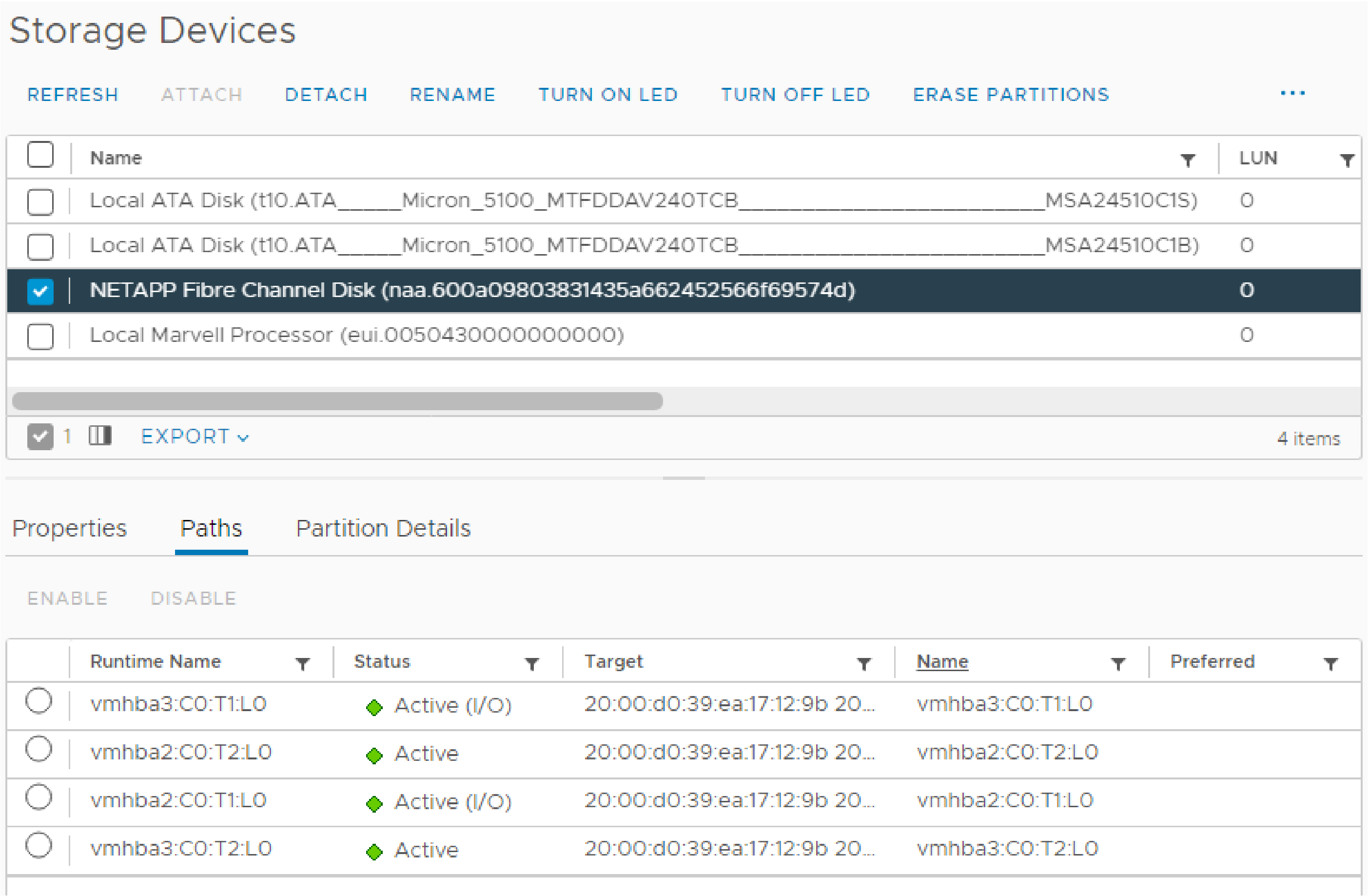
ESXi Host VM-Host-Infra-01, VM-Host-Infra-02 and VM-Host-Infra-03

For fibre channel SAN-booted ESXi hosts, to ensure that the host(s) boot disk contains all required fibre channel paths, follow these steps:

1. In the list under Storage, choose Storage Devices. Make sure the NETAPP Fibre Channel Disk is selected.

2. Choose the Paths tab.

3. Ensure that 4 fibre channel paths appear, two of which should have the status Active (I/O).



	Name	LUN
☐	Local ATA Disk (t10.ATA_____Micron_5100_MTFDDAV240TCB_______________________MSA24510C1S)	0
☐	Local ATA Disk (t10.ATA_____Micron_5100_MTFDDAV240TCB_______________________MSA24510C1B)	0
☑	NETAPP Fibre Channel Disk (naa.600a09803831435a662452566f69574d)	0
☐	Local Marvell Processor (eui.0050430000000000)	0

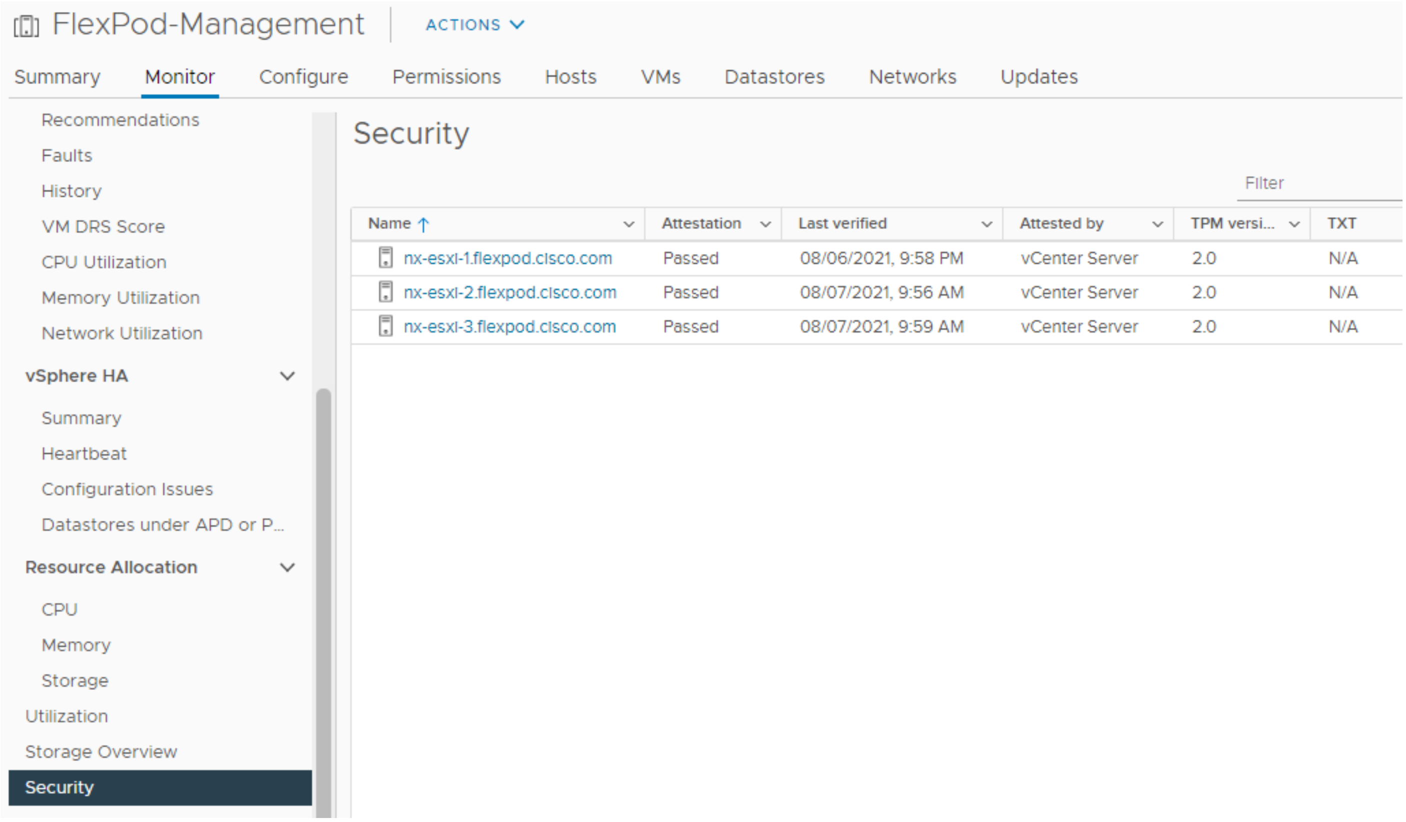
	Runtime Name	Status	Target	Name	Preferred
○	vmhba3:C0:T1:L0	◆ Active (I/O)	20:00:d0:39:ea:17:12:9b 20...	vmhba3:C0:T1:L0	
○	vmhba2:C0:T2:L0	◆ Active	20:00:d0:39:ea:17:12:9b 20...	vmhba2:C0:T2:L0	
○	vmhba2:C0:T1:L0	◆ Active (I/O)	20:00:d0:39:ea:17:12:9b 20...	vmhba2:C0:T1:L0	
○	vmhba3:C0:T2:L0	◆ Active	20:00:d0:39:ea:17:12:9b 20...	vmhba3:C0:T2:L0	

VMware ESXi 7.0 U2 TPM Attestation

If your Cisco UCS servers have Trusted Platform Module (TPM) 2.0 modules installed, the TPM can provide assurance that ESXi has booted with UEFI Secure Boot enabled and using only digitally signed code. In the Cisco UCS Configuration section of this document, UEFI secure boot was enabled in the boot policy. A server can boot with UEFI Secure Boot with or without a TPM 2.0 module. If it has a TPM, VMware vCenter can attest that the server booted with UEFI Secure Boot. To configure the Vmware ESXi 7.0 U2 TPM, follow these steps:

1. If your Cisco UCS servers have TPM 2.0 modules installed, TPM Attestation can be verified in the vSphere HTML5 Client.

2. From the Hosts and Clusters window in the vSphere Client, click the FlexPod-Management cluster. In the center pane, click Monitor > Security. The Attestation status will appear as shown below, where 2 of the 3 hosts have TPM 2.0 modules installed:



Security

Name ↑	Attestation	Last verified	Attested by	TPM versi...	TXT
nx-esxi-1.flexpod.cisco.com	Passed	08/06/2021, 9:58 PM	vCenter Server	2.0	N/A
nx-esxi-2.flexpod.cisco.com	Passed	08/07/2021, 9:56 AM	vCenter Server	2.0	N/A
nx-esxi-3.flexpod.cisco.com	Passed	08/07/2021, 9:59 AM	vCenter Server	2.0	N/A

It may be necessary to disconnect and reconnect a host from vCenter to get it to pass attestation the first time.

Storage Configuration – ONTAP NVMe Namespace Mapping and Finalizing ONTAP Storage

Ansible Configuration

This section details the Ansible Scripts used to configure storage.

To configure storage, follow these steps:

1. Edit the following variable file and update the nvme_specs variable with namespace and subsystem info:

   ```
   FlexPod-M6/FlexPod-UCSM-M6/vars/ontap_main.yml
   ```

Add the NQNs from each host to the subsystem variable. The NVMe namespace will be shared by all the hosts in the nvme subsystem.

2. From /root/ FlexPod-M6/FlexPod-UCSM-M6, invoke the ansible scripts for this section using the following command:

   ```
   ansible-playbook -i inventory Setup_ONTAP.yml -t ontap_config_part_3
   ```

Use the -vvv tag to see detailed execution output log.

Manual Configuration

1. Create NVMe namespace:

   ```
   vserver nvme namespace create -vserver SVM_name -path path -size size_of_namespace -ostype
   OS_type


   aa16-a400::> vserver nvme namespace create -vserver Infra-SVM -path
   /vol/NVMe_datastore_01/NVMe_namespace_01 -ostype vmware -size 50G


   Created a namespace of size 50GB (53687091200).
   ```

2. Create NVMe subsystem:

   ```
   vserver nvme subsystem create -vserver SVM_name -subsystem name_of_subsystem -ostype OS_type

   aa16-a400::> vserver nvme subsystem create -vserver Infra-SVM -subsystem
   nvme_infra_host_01_02_03 -ostype vmware
   ```

3. Verify the subsystem was created:

   ```
   vserver nvme subsystem show -vserver SVM_name

   aa16-a400::> vserver nvme subsystem show -vserver Infra-SVM

   Vserver Subsystem    Target NQN

   ------- ------------ --------------------------------------------------------

   Infra-SVM
   ```

```
        nvme_infra_host_01_02_03
                     nqn.1992-08.com.netapp:sn.e01bbb1de4f911ebac6fd039ea166b8c:subsystem.
nvme_infra_host_01_02_03
```

Configure NVMe over FC on ESXi Host

Execute the following steps whether the Ansible configuration or manual configuration was used to set up the NVME namespace and subsystem. To configure NVMe over FC on the ESXi host, follow these steps:

1. Enabling NVMe/FC with ANA:

```
esxcfg-advcfg -s 0 /Misc/HppManageDegradedPaths

Reboot the Host

After reboot, verify that the HppManageDegradedPaths parameter is now disabled:
esxcfg-advcfg -g /Misc/HppManageDegradedPaths

The Value of HppManageDegradedPaths is 0
```

2. Get the ESXi host NQN string and add this to the host NQN string for the corresponding subsystem on the ONTAP array:

```
esxcli nvme info get
```

3. Add the host NQNs to the subsystem. This information is obtained in Step 2 for Configuring NVME:

```
vserver nvme subsystem host add -vserver SVM_name -subsystem Subsystem_name -host-nqn
Host_NQN:subsystem.Subsystem_name


aa16-a400::> vserver nvme subsystem host add -vserver Infra_SVM  -subsystem
nvme_infra_host_01_02_03  -host-nqn nqn.2014-08.com.cisco.flexpod:nvme:nx-esxi-1

aa16-a400::> vserver nvme subsystem host add -vserver Infra_SVM  -subsystem
nvme_infra_host_01_02_03  -host-nqn nqn.2014-08.com.cisco.flexpod:nvme:nx-esxi-2

aa16-a400::> vserver nvme subsystem host add -vserver Infra_SVM  -subsystem
nvme_infra_host_01_02_03  -host-nqn nqn.2014-08.com.cisco.flexpod:nvme:nx-esxi-3


aa16-a400::> vserver nvme subsystem host show

Vserver Subsystem Host NQN

------- --------- ----------------------------------------------------------

Infra_SVM

        nvme_infra_host_01_02_03

                  nqn.2014-08.com.cisco.flexpod:nvme:nx-esxi-1

                  nqn.2014-08.com.cisco.flexpod:nvme:nx-esxi-2

                  nqn.2014-08.com.cisco.flexpod:nvme:nx-esxi-3

3 entries were displayed.
```

It is important that the separate host NQNs get added in separate commands and not as a comma-separated list in a single command. If a comma-separated list in a single command is entered, ONTAP will take the input as a single, long NQN and will not indicate an error. Also, the ESXi hosts will not map the namespaces mapped to this subsystem.

4. Map the Namespace to the subsystem:

```
vserver nvme subsystem map add -vserver SVM_name -subsystem subsystem_name -path path
```

```
aa16-a400::> vserver nvme subsystem map add -vserver Infra_SVM -subsystem
nvme_infra_host_01_02_03 -path /vol/NVMe_datastore_01/NVMe_namespace_01
```

5. Verify the Namespace is mapped to the subsystem:

```
vserver nvme subsystem map show -vserver Infra-SVM -instance
```

6. Reboot each ESXi host and then verify that the ONTAP target NVMe/FC controllers are properly discovered on the ESXi Host:

```
esxcli nvme controller list
```

```
[root@nx-esxi-1:~] esxcli nvme controller list

Name
Controller Number  Adapter  Transport Type  Is Online

---------------------------------------------------------------------------------------------
------------------------------------  -----------------  -------  --------------  ---------

nqn.1992-
08.com.netapp:sn.50919001efe111ebb785d039ea166b8c:subsystem.nvme_infra_host_01#vmhba65#2005d0
39ea17129b:2006d039ea17129b                258  vmhba65  FC                   true

nqn.1992-
08.com.netapp:sn.50919001efe111ebb785d039ea166b8c:subsystem.nvme_infra_host_01#vmhba64#2005d0
39ea17129b:2007d039ea17129b                261  vmhba64  FC                   true

nqn.1992-
08.com.netapp:sn.50919001efe111ebb785d039ea166b8c:subsystem.nvme_infra_host_01#vmhba65#2005d0
39ea17129b:2008d039ea17129b                265  vmhba65  FC                   true

nqn.1992-
08.com.netapp:sn.50919001efe111ebb785d039ea166b8c:subsystem.nvme_infra_host_01#vmhba64#2005d0
39ea17129b:2009d039ea17129b                266  vmhba64  FC                   true
```

Configure DNS

To configure DNS for the Infra_SVM, run the following commands:

```
dns create -vserver <vserver name> -domains <dns-domain> -nameserve <dns-servers>


dns create -vserver Infra_SVM -domains flexpod.cisco.com -nameservers
10.1.156.250,10.1.156.251
```

Delete Residual Default Broadcast Domains (Applicable for 2-node cluster only)

To delete the Default broadcast domains that are not in use, run the following commands:

```
broadcast-domain delete -broadcast-domain <broad-domain-name>
broadcast-domain delete -broadcast-domain Default-1
```

Test AutoSupport

To test the AutoSupport configuration by sending a message from all nodes of the cluster, run the following commands:

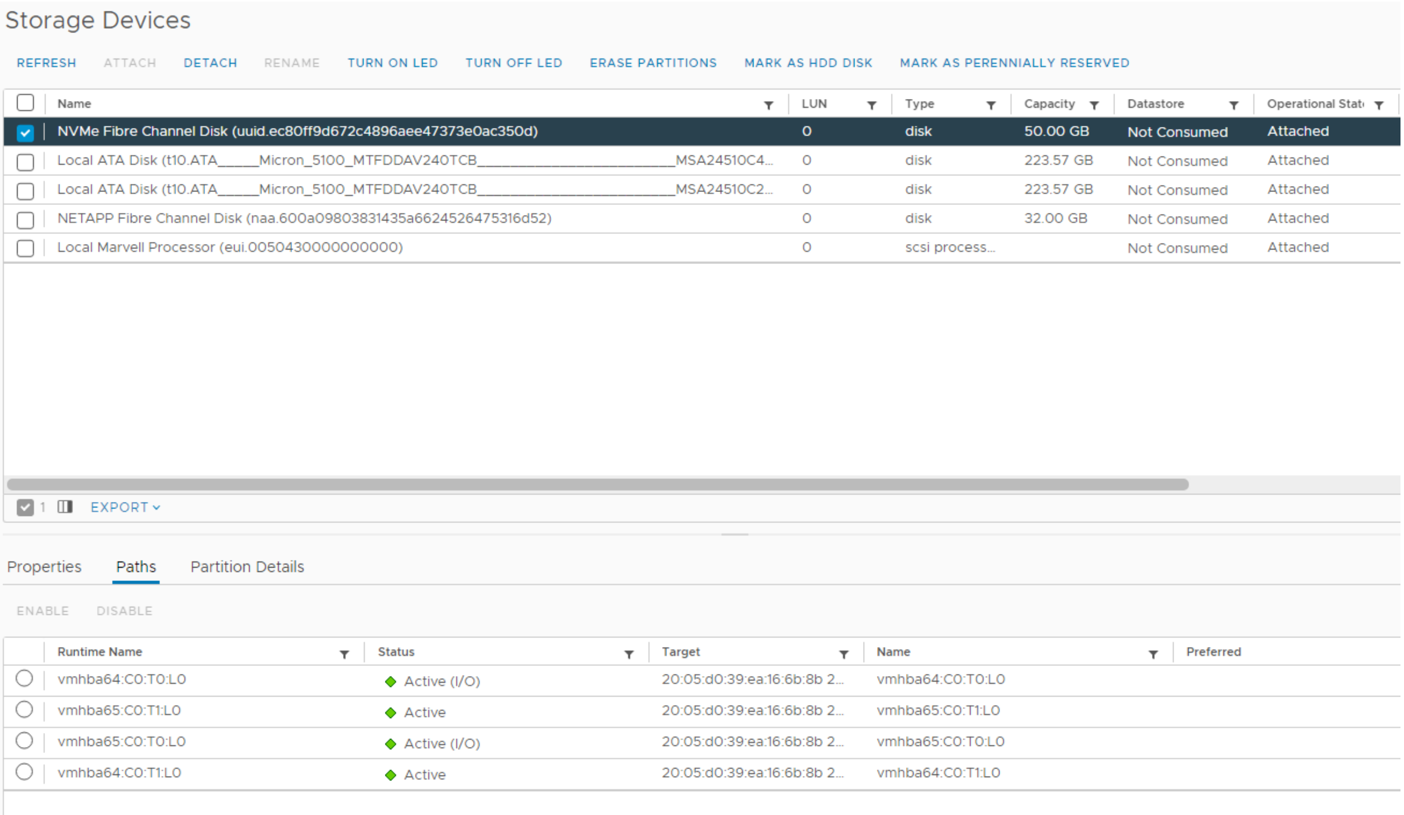
```
autosupport invoke -node * -type all -message “FlexPod storage configuration completed”
```

ESXi Host NVMe over FC Datastore Configuration

To configure the ESXi host NVMe over FC datastore, follow these steps:

1. The remaining steps in the VMware vSphere Client are manual steps that should be completed whether Ansible configuration or manual configuration is being done. Verify that the NVMe Fibre Channel Disk is mounted on each ESXi host. Under Hosts and Clusters select the ESXi host. In the center pane, select Configure > Storage > Storage Devices. The NVMe Fibre Channel Disk should be listed under Storage Devices. Select the NVMe Fibre Channel Disk, then select Paths underneath. Verify 2 paths have a status of Active (I/O) and 2 paths have a status of Active.

2. Repeat this step for all 3 hosts.



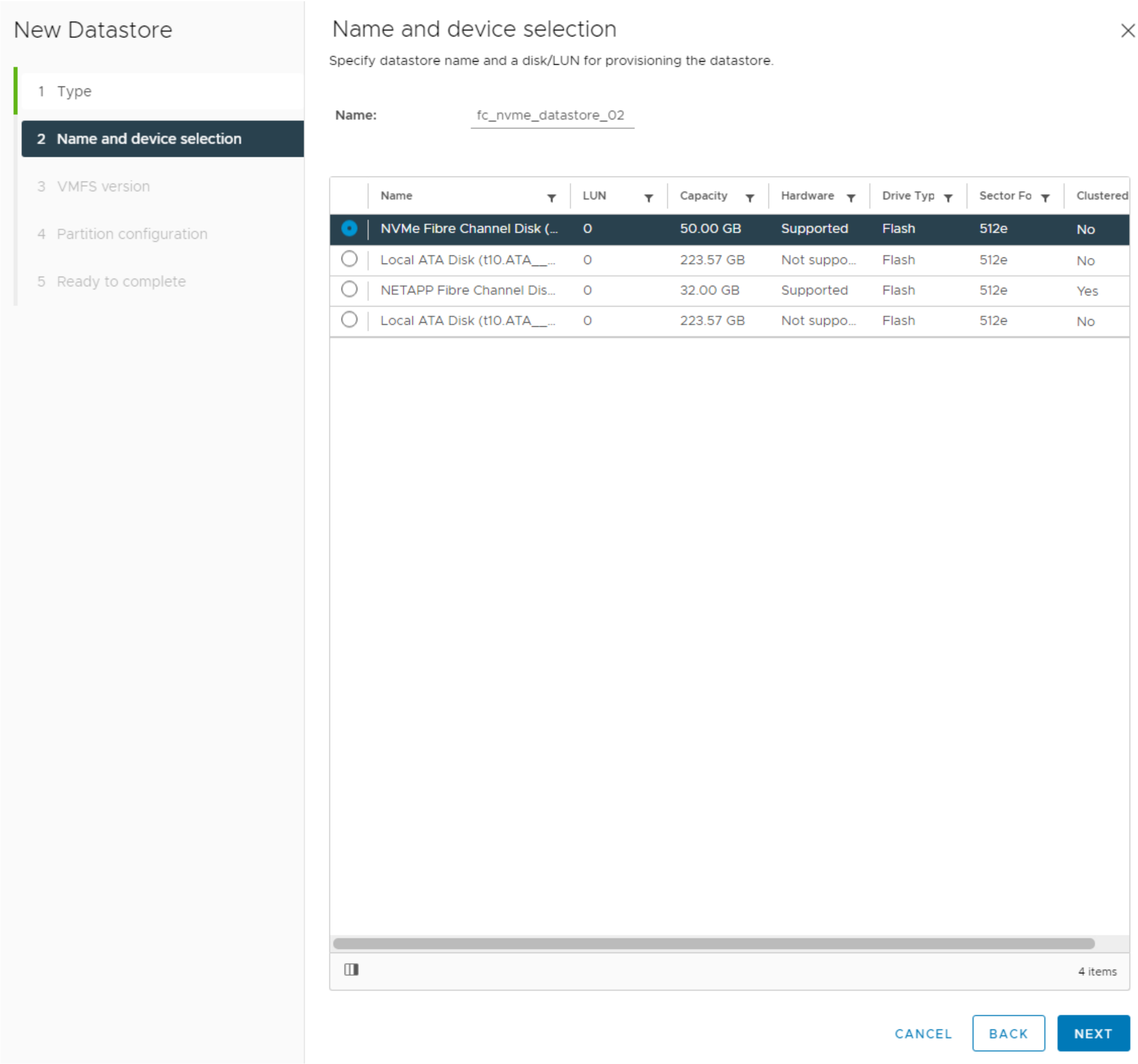
Storage Devices

□	Name	LUN	Type	Capacity	Datastore	Operational Stat
☑	NVMe Fibre Channel Disk (uuid.ec80ff9d672c4896aee47373e0ac350d)	0	disk	50.00 GB	Not Consumed	Attached
□	Local ATA Disk (t10.ATA_____Micron_5100_MTFDDAV240TCB________________________MSA24510C4...	0	disk	223.57 GB	Not Consumed	Attached
□	Local ATA Disk (t10.ATA_____Micron_5100_MTFDDAV240TCB________________________MSA24510C2...	0	disk	223.57 GB	Not Consumed	Attached
□	NETAPP Fibre Channel Disk (naa.600a09803831435a6624526475316d52)	0	disk	32.00 GB	Not Consumed	Attached
□	Local Marvell Processor (eui.0050430000000000)	0	scsi process...		Not Consumed	Attached

	Runtime Name	Status	Target	Name	Preferred
○	vmhba64:C0:T0:L0	◆ Active (I/O)	20:05:d0:39:ea:16:6b:8b 2...	vmhba64:C0:T0:L0	
○	vmhba65:C0:T1:L0	◆ Active	20:05:d0:39:ea:16:6b:8b 2...	vmhba65:C0:T1:L0	
○	vmhba65:C0:T0:L0	◆ Active (I/O)	20:05:d0:39:ea:16:6b:8b 2...	vmhba65:C0:T0:L0	
○	vmhba64:C0:T1:L0	◆ Active	20:05:d0:39:ea:16:6b:8b 2...	vmhba64:C0:T1:L0	

3. For any of the three hosts, right-click the host under Hosts and Clusters and select Storage > New Datastore. Leave VMFS selected and click NEXT.

4. Name the datastore and select the NVMe Fibre Channel Disk. Click NEXT.



Name and device selection

Specify datastore name and a disk/LUN for provisioning the datastore.

Name: fc_nvme_datastore_02

	Name	LUN	Capacity	Hardware	Drive Typ	Sector Fo	Clustered
●	NVMe Fibre Channel Disk (...	0	50.00 GB	Supported	Flash	512e	No
○	Local ATA Disk (t10.ATA__...	0	223.57 GB	Not suppo...	Flash	512e	No
○	NETAPP Fibre Channel Dis...	0	32.00 GB	Supported	Flash	512e	Yes
○	Local ATA Disk (t10.ATA__...	0	223.57 GB	Not suppo...	Flash	512e	No

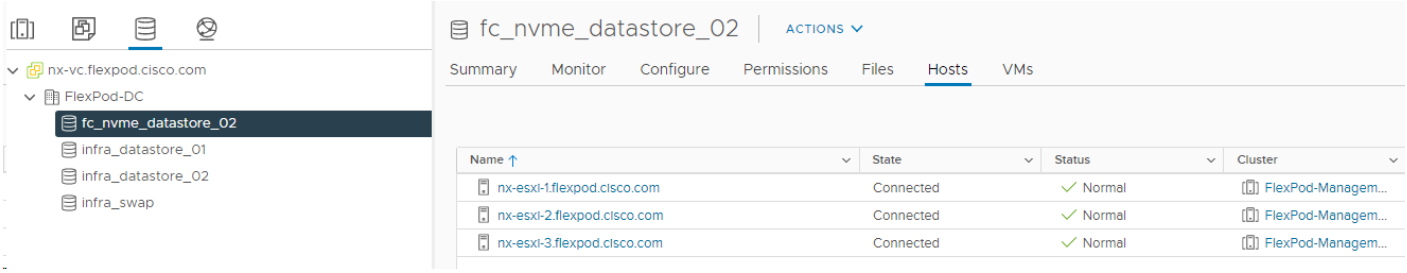
4 items

5. Leave VMFS 6 selected and click NEXT.

6. Leave all Partition configuration values at the default values and click NEXT.

7. Review the information and click FINISH.

8. Select Storage and select the just-created NVMe datastore. In the center pane, select Hosts. Ensure all three hosts have the datastore mounted.



fc_nvme_datastore_02

Name ↑	State	Status	Cluster
nx-esxi-1.flexpod.cisco.com	Connected	✓ Normal	FlexPod-Managem...
nx-esxi-2.flexpod.cisco.com	Connected	✓ Normal	FlexPod-Managem...
nx-esxi-3.flexpod.cisco.com	Connected	✓ Normal	FlexPod-Managem...

FlexPod Management Tools Setup

Cisco UCS Manager Plug-in for VMware vSphere Web Client

The Cisco UCS Manager Plug-in for VMware vSphere Web Client allows administration of UCS domains through the VMware vCenter administrative interface. The capabilities of the plug-in include:

- Cisco UCS physical hierarchy view
- Overall health of server and other infrastructure components
- Maps UCS servers to ESX hosts
- Inventory, installed firmware, faults, power, and temperature statistics for each server/ESX host
- KVM launch for all ESX and non-ESX servers
- Switch on and off locater LED and launch Cisco UCS Manager GUI for each server
- Registration tool for registering the plug-in with the vCenter
- Perform key actions on ESX, non-ESX servers, and other UCS components
- View service profile, service profile templates, server pools, and host firmware packs for each UCS Domain
- Server firmware management using host firmware pack
- Support for VMware vSphere HTML client 6.7 and later
- Firmware Management for blades and rack servers in UCS domain. You can perform the following operations:
- Upload firmware
- Modify firmware package version for the host firmware packs with option to move the affected ESX host into maintenance mode before triggering the firmware upgrade
- Acknowledge pending activities
- Delete firmware package
- Delete firmware upload task
- View VIF paths for servers
- Monitor UCS domain, chassis, fabric interconnect, fabric extender, ESX, and non-ESX servers
- View faults with ability to filter based on the severity
- Support for In-Band access with IPv4, and IPv6 addresses
- Managing of UCS domains using IPv6 addresses
- Enhancement to allow registered domains to be globally visible
- Support for Proactive High Availability (HA)—The Cisco UCS Provider supports the Proactive HA feature which allows you to protect the hosts within a vCenter cluster from potential failures

The installation is only valid for VMware vCenter 6.7 or higher and will require revisions of .NET Framework 4.5 or higher, and VMware PowerCLI 5.1 or higher.

Cisco UCS Manager Plug-in Installation

To begin the plug-in installation on a Windows system that meets the previously stated requirements, follow these steps:

1. Download the plugin and registration tool from: https://software.cisco.com/download/home/286282669/type/286282010/release/3.0.5.

2. Place the downloaded ucs-vcplugin-html-3.0.5.zip file onto the web server used for hosting the ONTAP software, VMware ESXi ISO, and VMware ESXi drivers.

3. Unzip the Cisco_UCS_Plugin_Registration_Tool_v1-2-3.zip and open the executable file within it.

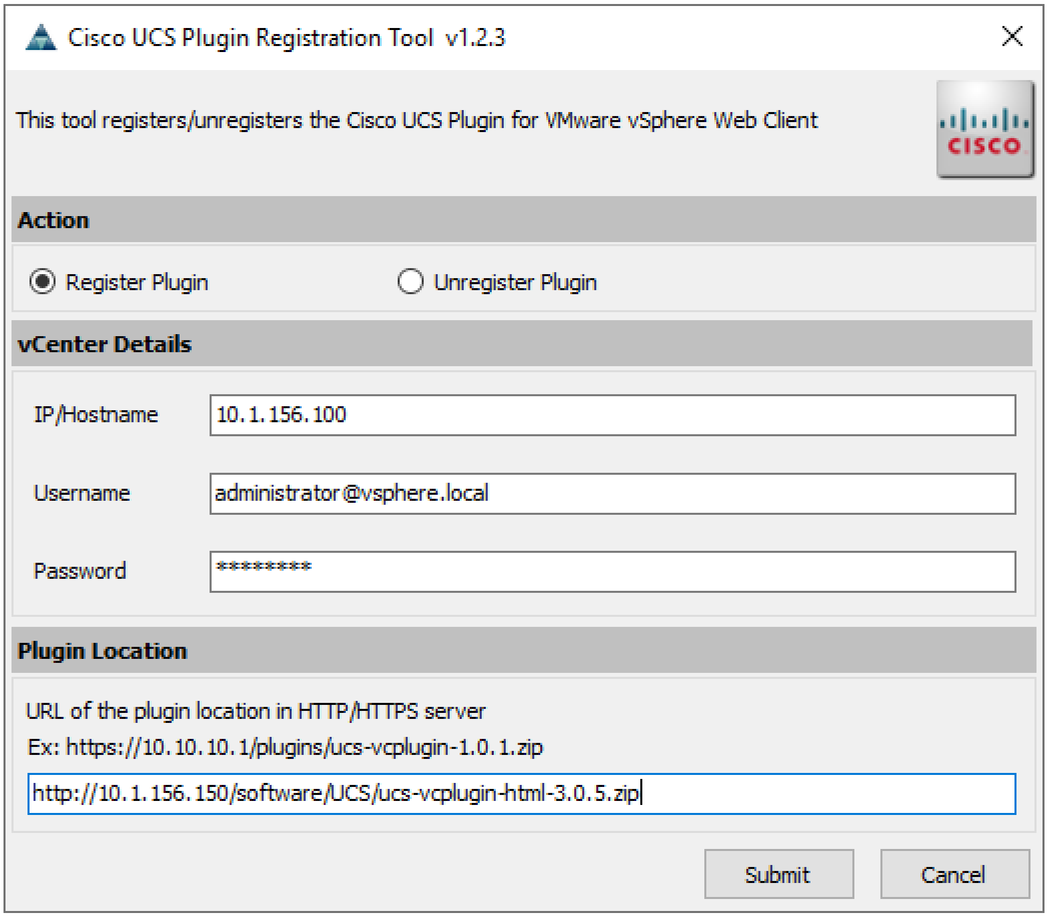
4. Leave Register Plugin selected for the Action, fill in the following vCenter information and click Submit:

    a. IP/Hostname

    b. Username (administrator@vsphere.local)

    c. Password

    d. URL that plugin has been uploaded to



Cisco UCS Plugin Registration Tool v1.2.3

This tool registers/unregisters the Cisco UCS Plugin for VMware vSphere Web Client

Action

● Register Plugin ○ Unregister Plugin

vCenter Details

IP/Hostname: 10.1.156.100

Username: administrator@vsphere.local

Password: *********

Plugin Location

URL of the plugin location in HTTP/HTTPS server

Ex: https://10.10.10.1/plugins/ucs-vcplugin-1.0.1.zip

http://10.1.156.150/software/UCS/ucs-vcplugin-html-3.0.5.zip

5. A pop-up will appear explaining that ‘allowHttp=true’ will need to be added to the webclient.properties file on the VCSA in the /etc/vmware/vsphere-ui directory.

6. This issue will be resolved after the plugin has been registered, click OK to close the Information dialogue box.

7. Click OK to confirm that the Cisco UCS Plugin registered successfully.

8. Click Cancel to close the registration tool.

9. To resolve the change needed for the HTTP download of the vSphere Web Client launch, connect to the VCSA with ssh using the root account, open the BASH shell, and type:

```
echo ‘allowHttp=true’ >> /etc/vmware/vsphere-ui/webclient.properties
```

This will add “allowHttp=true” to the end of the webclient.properties file. Make sure to use two greater than symbols “>>” to append to the end of the configuration file, a single greater than symbol will replace the entire pre-existing file with what has been sent with the echo command.

10. To verify the change, type the following. If allowHttp=true is not on the last line of the file by itself, use an editor such as vim to fix this and make allowHttp=true the last line of the file:

```
cat /etc/vmware/vsphere-ui/webclient.properties
```

11. Logout and log back into the vSphere Client.

FlexPod UCS Domain Registration

You can now register the FlexPod UCS Domain. The account used will correlate to the permissions allowed to the plugin, admin will be used in our example, but a read only account could be used with the plugin if that was appropriate for the environment.

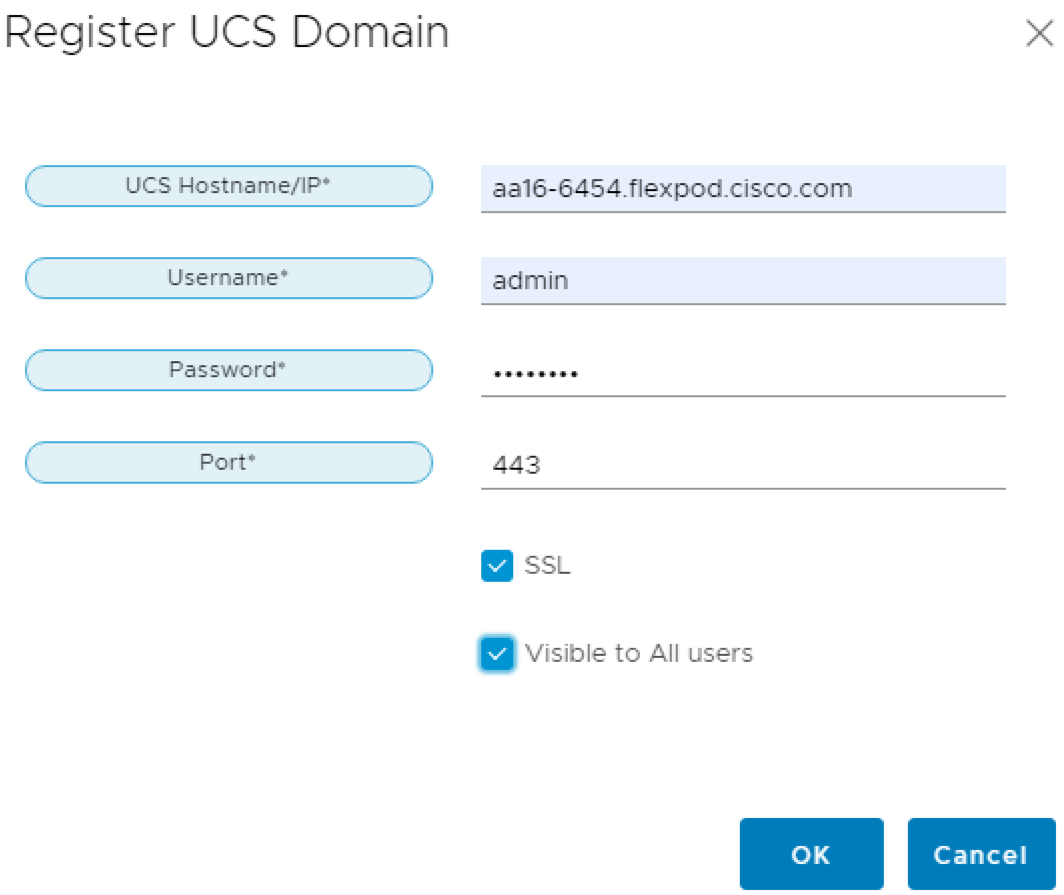
To register the UCS Domain, follow these steps:

1. Open the vSphere Client.

2. Select the Menu drop-down list and select the Cisco UCS icon.

3. Click Register and provide the following options in the Register UCS Domain dialogue box that appears:

   a. UCS Hostname/IP
   b. Username
   c. Password
   d. Port (if different than 443)
   e. Leave SSL selected and click the Visible to All users option



Register UCS Domain

UCS Hostname/IP*: aa16-6454.flexpod.cisco.com

Username*: admin

Password*: •••••••••

Port*: 443

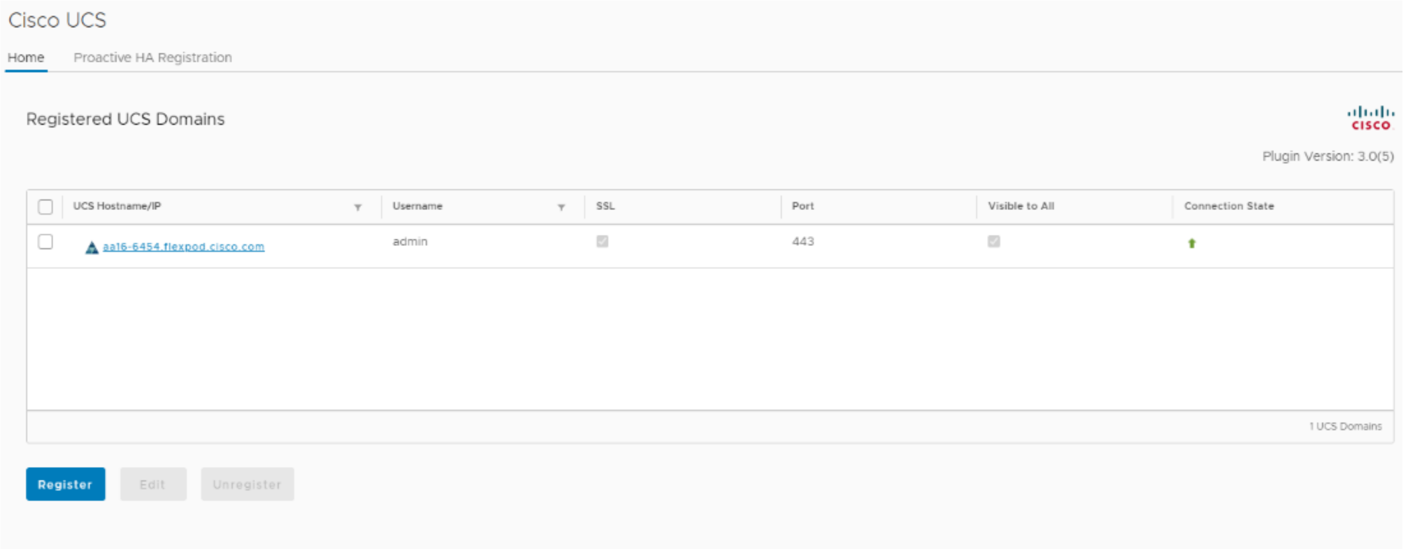
☑ SSL

☑ Visible to All users

4. Click OK then click OK again to register the UCS Domain.

Use the Cisco UCS vCenter Plugin

The plugin can now enable the functions described at the start of this section by double-clicking the registered UCS Domain:



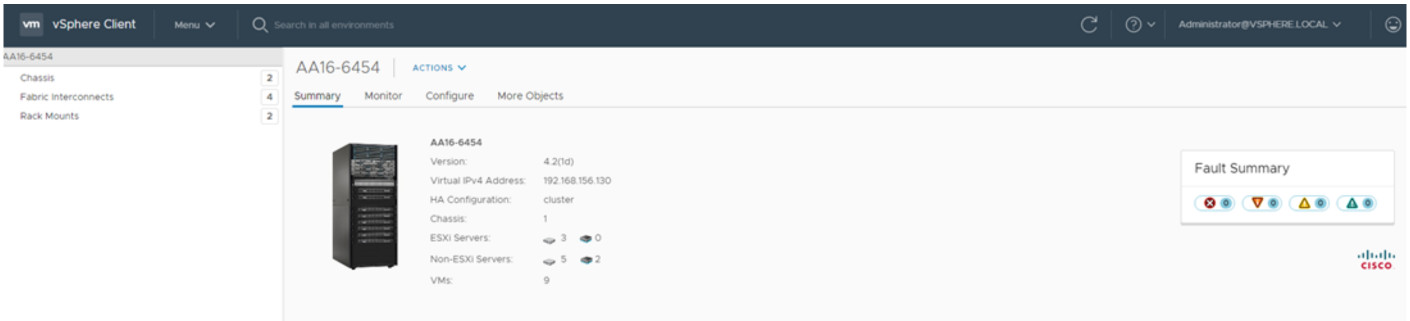
Registered UCS Domains

Plugin Version: 3.0(5)

□	UCS Hostname/IP	Username	SSL	Port	Visible to All	Connection State
□	aa16-6454.flexpod.cisco.com	admin	☑	443	☑	↑

1 UCS Domains

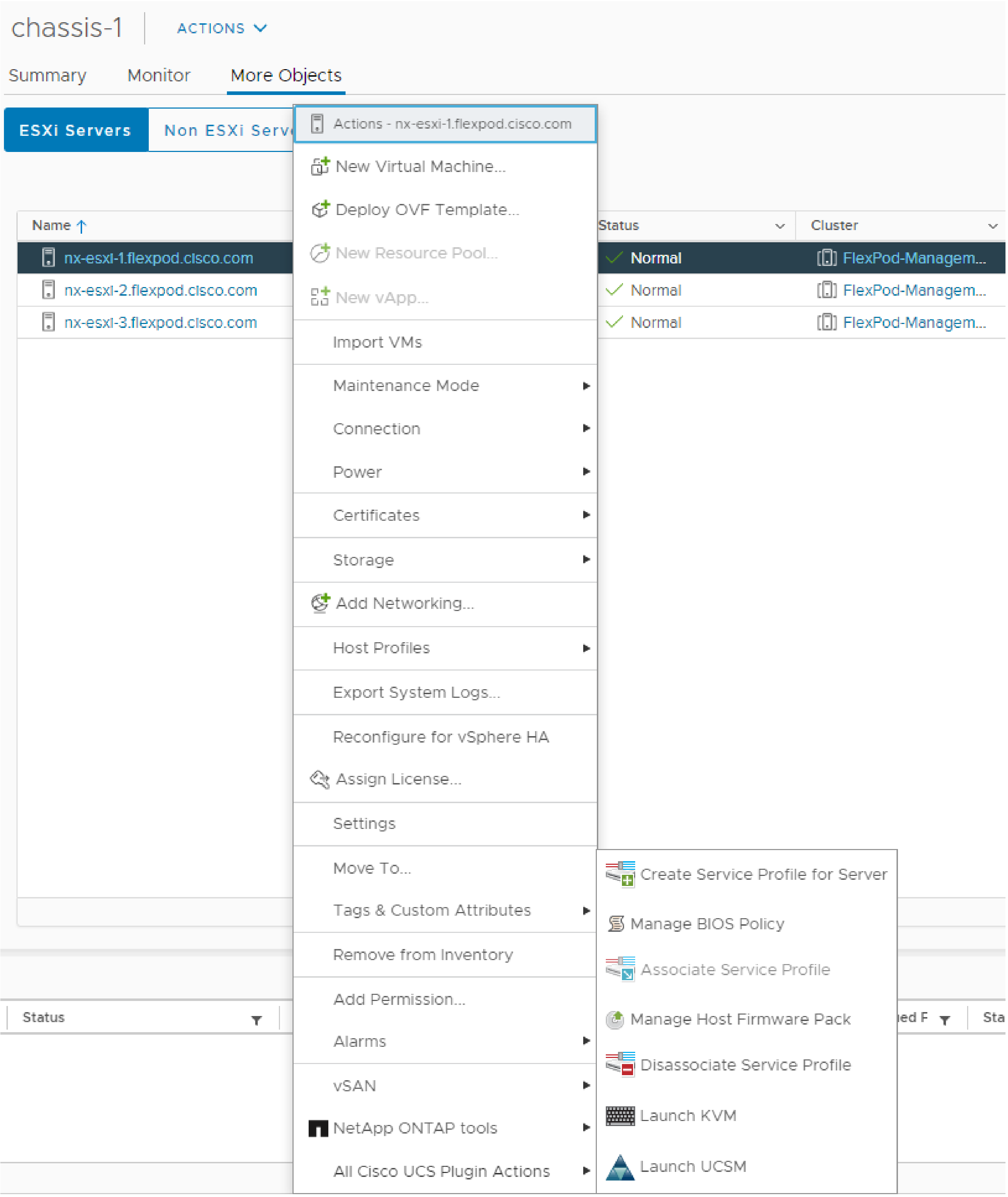
You can view the components associated to the domain:



AA16-6454

Version: 4.2(1d)
Virtual IPv4 Address: 192.168.156.130
HA Configuration: cluster
Chassis: 1
ESXi Servers: 3 0
Non-ESXi Servers: 5 2
VMs: 9

Selecting within the chassis or rack mounts will provide a list of ESXi or non-ESXi servers to perform operations on the following:



Name ↑	Status	Cluster
nx-esxi-1.flexpod.cisco.com	✓ Normal	FlexPod-Managem...
nx-esxi-2.flexpod.cisco.com	✓ Normal	FlexPod-Managem...
nx-esxi-3.flexpod.cisco.com	✓ Normal	FlexPod-Managem...

In addition to viewing and working within objects shown in the UCS Plugin's view of the UCS Domain, direct access of Cisco UCS functions provided by the plugin can be selected within the drop-down list of hosts registered to vCenter.

For full installation instructions and usage information, please refer to the Cisco UCS Manager Plug-in for VMware vSphere Web Client User Guide at: https://www.cisco.com/c/en/us/td/docs/unified_computing/ucs/sw/vmware_tools/vCenter/vCenter_Plugin_User_Guide/3x/b_UCSM_Plugin_VMware_vSphere_Web_Client_User_Guide_3_x.html.

NetApp ONTAP Tools 9.8P2 Deployment Procedure

The ONTAP tools for VMware vSphere provide end-to-end life cycle management for virtual machines in VMware environments that use NetApp storage systems. It simplifies storage and data management for VMware environments by enabling administrators to directly manage storage within the vCenter Server.

This section describes the deployment procedures for the NetApp ONTAP Tools for VMware vSphere.

NetApp ONTAP Tools for VMware vSphere 9.8P2 Pre-installation Considerations

The following licenses are required for ONTAP Tools on storage systems that run ONTAP 9.8 or above:

- Protocol licenses (NFS, FCP, and/or iSCSI)
- NetApp FlexClone® ((optional) Required for performing test failover operations for SRA and for vVols operations of VASA Provider.
- NetApp SnapRestore® (for backup and recovery)
- The NetApp SnapManager® Suite
- NetApp SnapMirror® or NetApp SnapVault® ((optional) Required for performing failover operations for SRA and VASA Provider if u using vVols replication.)

The Backup and Recovery capability has been integrated with SnapCenter and requires additional licenses for SnapCenter to perform backup and recovery of virtual machines and applications.

Table 8. Port Requirements for NetApp ONTAP Tools

Port	Requirement
443 (HTTPS)	Secure communications between VMware vCenter Server and the storage systems
8143 (HTTPS)	VSC listens for secure communications

9083 (HTTPS)	VASA Provider uses this port to communicate with the vCenter Server and obtain TCP/IP settings
7	VSC sends an echo request to ONTAP to verify reachability and is required only when adding storage system and can be disabled later.

The requirements for deploying NetApp ONTAP Tools (VSC) are listed here: https://docs.netapp.com/us-en/ontap-tools-vmware-vsphere/index.html.

Install NetApp ONTAP Tools

NetApp ONTAP Tools can be installed using the ansible scripts.

To invoke the ansible scripts use the following command:

```
ansible-playbook -i inventory  Setup_ONTAP_tools.yml
```

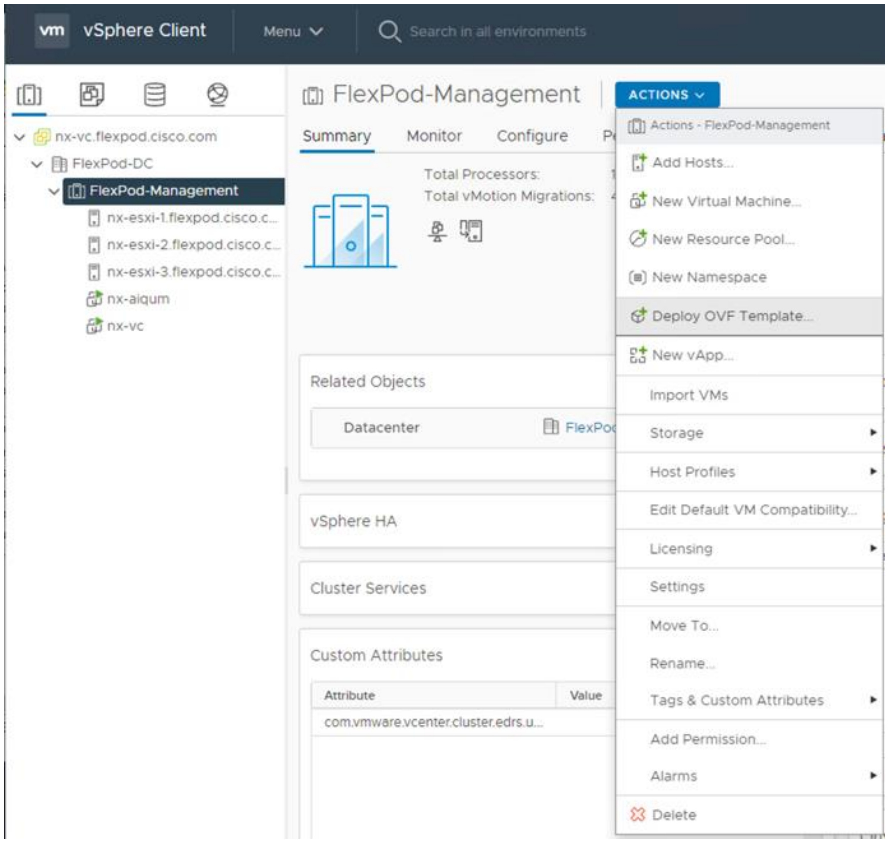
Update the following variable files:

```
vars/ontap_tools_main.yml
group_vars/vcenter
```

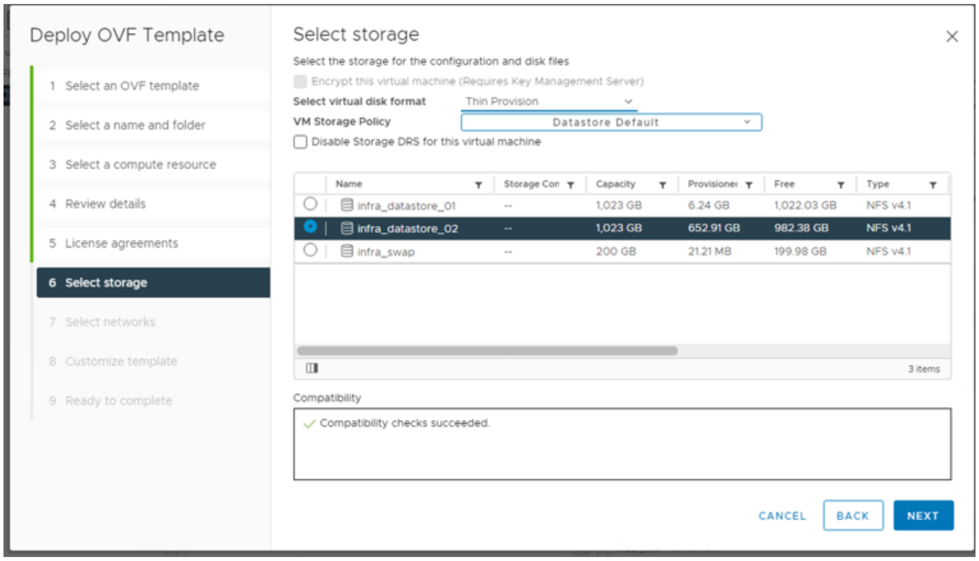
To install the NetApp ONTAP tools for VMware vSphere 7.0U2 software by using an Open Virtualization Format (OVF) deployment, follow these steps:

1. Launch the vSphere Web Client and navigate to Hosts and Clusters.

2. Select ACTIONS for the FlexPod-DC datacenter and choose Deploy OVF Template.



3. Browse to the ONTAP tools file downloaded from the NetApp Support site.
4. Enter the VM name and choose a datacenter or folder in which to deploy and click NEXT.
5. Choose a host cluster resource in which to deploy OVA and click NEXT.
6. Review the details and accept the license agreement.
7. Choose the infra_datastore_02 volume and choose the Thin Provision option for the virtual disk format.



Deploy OVF Template

1 Select an OVF template
2 Select a name and folder
3 Select a compute resource
4 Review details
5 License agreements
6 Select storage
7 Select networks
8 Customize template
9 Ready to complete

Select storage

Select the storage for the configuration and disk files

□ Encrypt this virtual machine (Requires Key Management Server)

Select virtual disk format: Thin Provision

VM Storage Policy: Datastore Default

□ Disable Storage DRS for this virtual machine

	Name	Storage Con	Capacity	Provisionec	Free	Type
○	infra_datastore_01	--	1,023 GB	6.24 GB	1,022.03 GB	NFS v4.1
●	infra_datastore_02	--	1,023 GB	652.91 GB	982.38 GB	NFS v4.1
○	infra_swap	--	200 GB	21.21 MB	199.98 GB	NFS v4.1

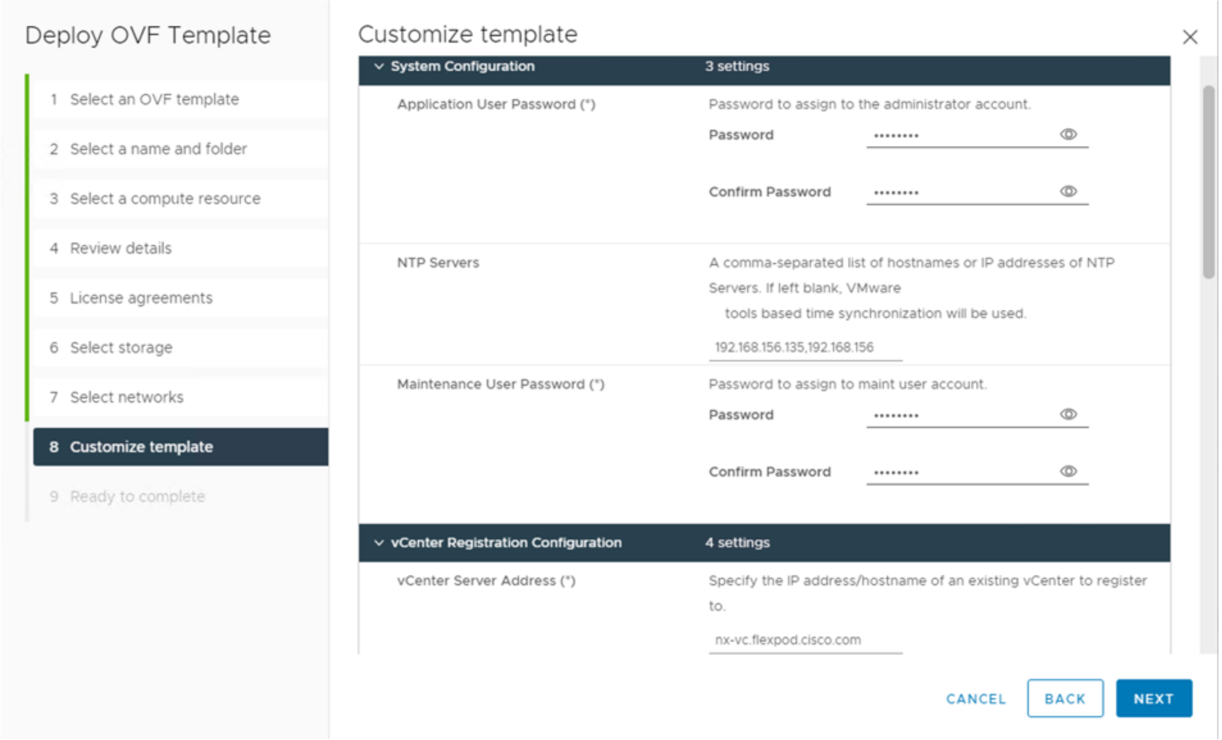
3 items

Compatibility

✓ Compatibility checks succeeded.

8. From Select Networks, choose a destination network (IB-MGMT Network) and click NEXT.

9. From Customize Template, enter the ONTAP tools administrator password, vCenter name or IP address and other configuration details and click NEXT.



Deploy OVF Template

1 Select an OVF template
2 Select a name and folder
3 Select a compute resource
4 Review details
5 License agreements
6 Select storage
7 Select networks
8 Customize template
9 Ready to complete

Customize template

System Configuration — 3 settings

Application User Password (*) — Password to assign to the administrator account.
Password: ••••••••
Confirm Password: ••••••••

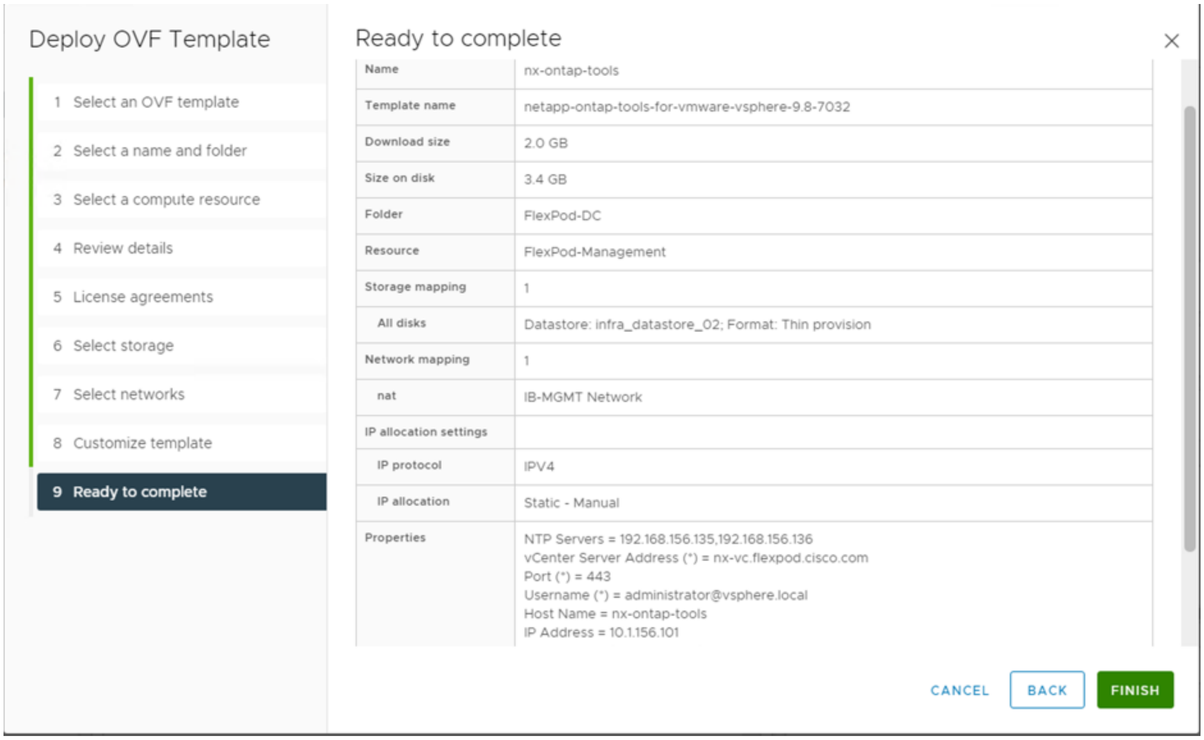
NTP Servers — A comma-separated list of hostnames or IP addresses of NTP Servers. If left blank, VMware tools based time synchronization will be used.
192.168.156.135,192.168.156

Maintenance User Password (*) — Password to assign to maint user account.
Password: ••••••••
Confirm Password: ••••••••

vCenter Registration Configuration — 4 settings

vCenter Server Address (*) — Specify the IP address/hostname of an existing vCenter to register to.
nx-vc.flexpod.cisco.com

10. Review the configuration details entered and click FINISH to complete the deployment of NetApp ONTAP-tools VM.



Ready to complete

Name	nx-ontap-tools
Template name	netapp-ontap-tools-for-vmware-vsphere-9.8-7032
Download size	2.0 GB
Size on disk	3.4 GB
Folder	FlexPod-DC
Resource	FlexPod-Management
Storage mapping	1
All disks	Datastore: infra_datastore_02; Format: Thin provision
Network mapping	1
nat	IB-MGMT Network
IP allocation settings	
IP protocol	IPV4
IP allocation	Static - Manual
Properties	NTP Servers = 192.168.156.135,192.168.156.136 vCenter Server Address (*) = nx-vc.flexpod.cisco.com Port (*) = 443 Username (*) = administrator@vsphere.local Host Name = nx-ontap-tools IP Address = 10.1.156.101

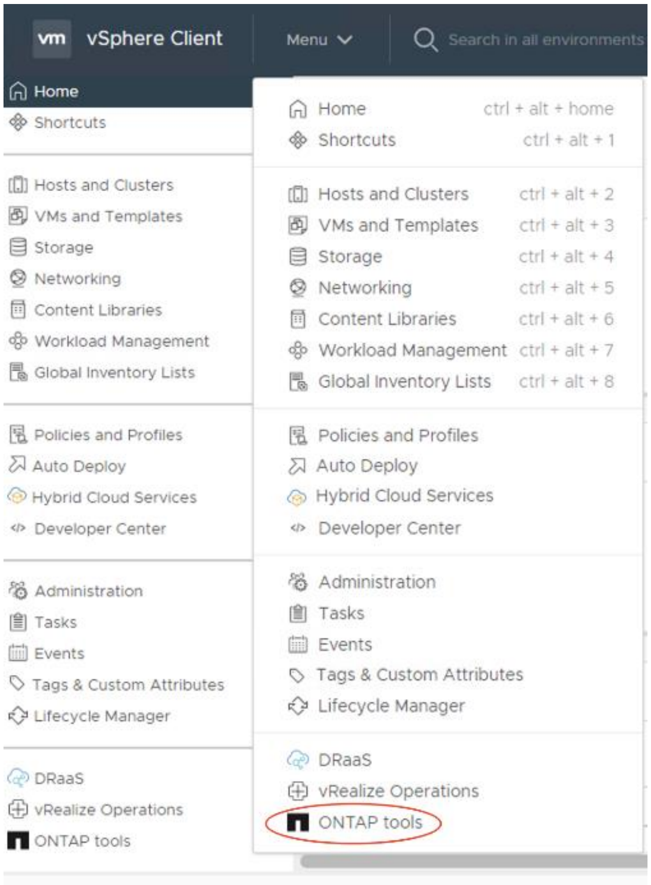
11. Power on the ONTAP-tools VM and open the VM console.

12. During the ONTAP-tools VM boot process, you see a prompt to install VMware Tools. From vCenter, right-click the ONTAP-tools VM > Guest OS > Install VMware Tools.

13. Networking configuration and vCenter registration information was provided during the OVF template customization, therefore after the VM is running, VSC and vSphere API for Storage Awareness (VASA) is registered with vCenter.

14. Refresh the Home Screen and confirm that the ONTAP tools is installed.

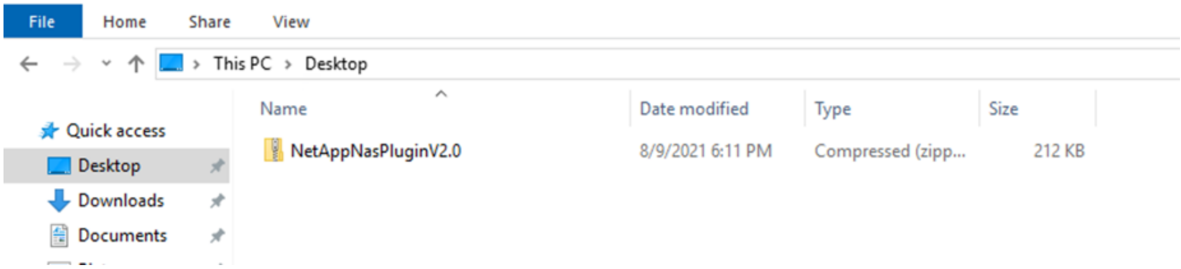
The NetApp ONTAP tools vCenter plug-in is only available in the vSphere HTML5 Client and is not available in the vSphere Web Client.



Download the NetApp NFS Plug-in for VAAI

To download the NetApp NFS Plug-in for VAAI, follow this step:

1. Download the NetApp NFS Plug-in 2.0 for VMware .vib file from the NFS Plugin Download page and save it to your local machine or admin host.



Name	Date modified	Type	Size
NetAppNasPluginV2.0	8/9/2021 6:11 PM	Compressed (zipp...	212 KB

Install the NetApp NFS Plug-in for VAAI

The NFS Plug-in for VAAI was previously installed on the ESXi hosts along with the Cisco UCS VIC drivers; it is not necessary to re-install.

To install the NetApp NFS Plug-in for VAAI, follow these steps:

1. Rename the .vib file that you downloaded from the NetApp Support Site to NetAppNasPlugin.vib to match the predefined name that ONTAP tools uses.

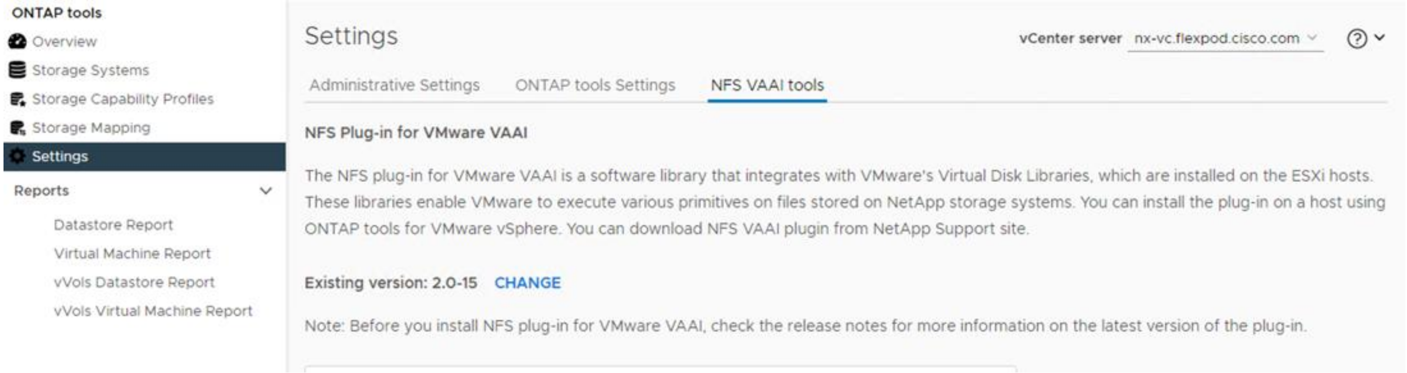
2. Click Settings in the ONTAP tool Getting Started page.

3. Click NFS VAAI Tools tab.

4. Click Change in the Existing version section.

5. Browse and choose the renamed .vib file, and then click Upload to upload the file to the virtual appliance.

6. In the Install on ESXi Hosts section, choose the ESXi host on which you want to install the NFS Plug-in for VAAI, and then click Install.



NFS Plug-in for VMware VAAI

The NFS plug-in for VMware VAAI is a software library that integrates with VMware's Virtual Disk Libraries, which are installed on the ESXi hosts. These libraries enable VMware to execute various primitives on files stored on NetApp storage systems. You can install the plug-in on a host using ONTAP tools for VMware vSphere. You can download NFS VAAI plugin from NetApp Support site.

Existing version: 2.0-15 CHANGE

Note: Before you install NFS plug-in for VMware VAAI, check the release notes for more information on the latest version of the plug-in.

7. Reboot the ESXi host after the installation finishes.

Verify the VASA Provider

The VASA provider for ONTAP is enabled by default during the installation of the NetApp ONTAP tools. To verify the VASA provider was enabled, follow these steps:

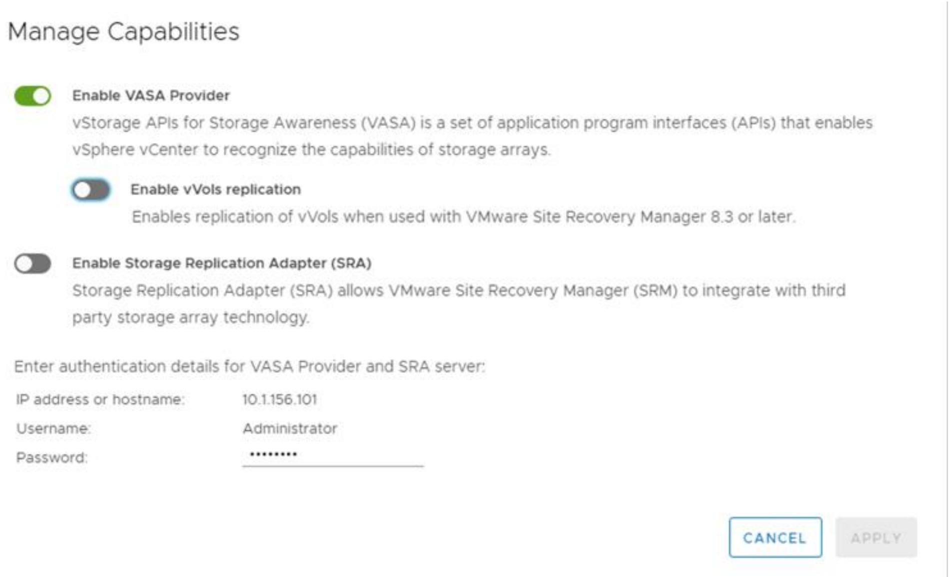
1. From the vSphere Client, click Menu > ONTAP tools.

2. Click Settings.

3. Click Manage Capabilities in the Administrative Settings tab.

4. In the Manage Capabilities dialog box if not enabled, click Enable VASA Provider slider.

5. Enter the IP address of the virtual appliance for ONTAP tools, VASA Provider, and VMware Storage Replication Adapter (SRA) and the administrator password, and then click Apply.



Manage Capabilities

Enable VASA Provider

vStorage APIs for Storage Awareness (VASA) is a set of application program interfaces (APIs) that enables vSphere vCenter to recognize the capabilities of storage arrays.

Enable vVols replication

Enables replication of vVols when used with VMware Site Recovery Manager 8.3 or later.

Enable Storage Replication Adapter (SRA)

Storage Replication Adapter (SRA) allows VMware Site Recovery Manager (SRM) to integrate with third party storage array technology.

Enter authentication details for VASA Provider and SRA server:

IP address or hostname:	10.1.156.101
Username:	Administrator
Password:	••••••••

Discover and Add Storage Resources

To Add storage resources for the Monitoring and Host Configuration capability and the Provisioning and Cloning capability, follow these steps:

1. Using the vSphere Web Client, log in to the vCenter Server as the FlexPod admin user. If the vSphere Web Client was previously opened, close the tab, and then reopen it.

2. In the Home screen, click the Home tab and click ONTTAP tools.

When using the cluster admin account, add storage from the cluster level.

You can modify the storage credentials with the vsadmin account or another SVM level account with role-based access control (RBAC) privileges. Refer to the ONTAP 9 Administrator Authentication and RBAC Power Guide for additional information.

3. Choose Storage Systems >Add

4. Click Overview > Getting Started, and then click ADD under Add Storage System.

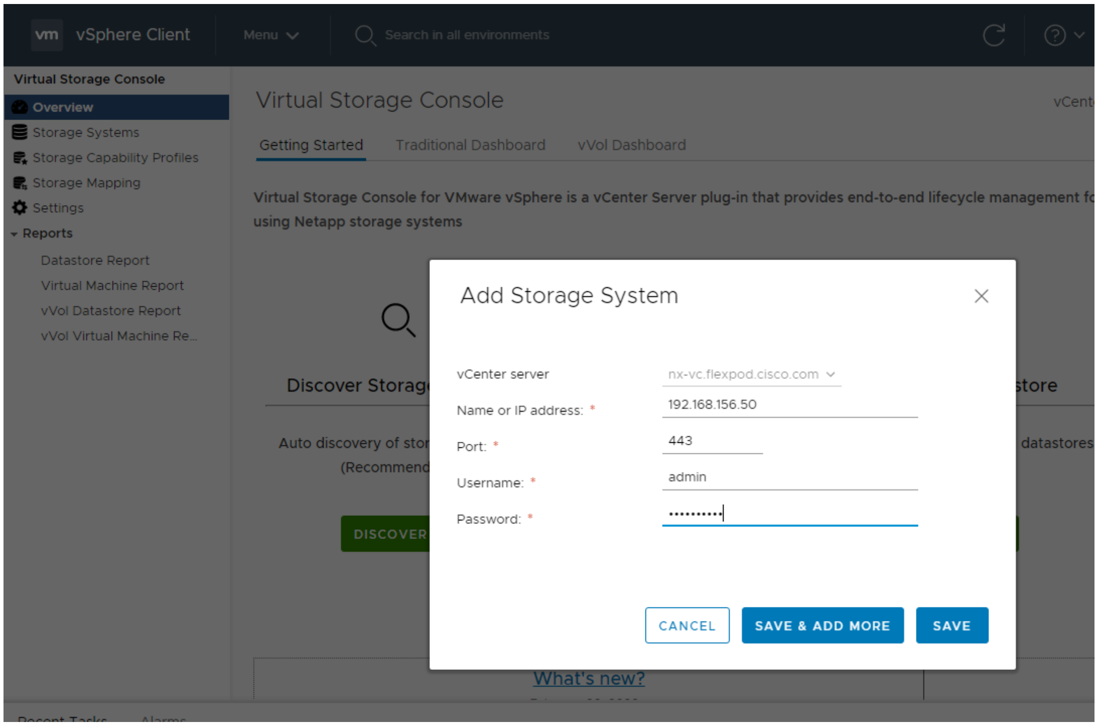
5. Specify the vCenter Server instance where the storage will be located.

6. In the IP Address/Hostname field, enter the storage cluster management IP.

7. Confirm Port 443 to Connect to this storage system.

8. Enter admin for the username and the admin password for the cluster.

9. Click Save to add the storage configuration to ONTAP tools.



Virtual Storage Console for VMware vSphere is a vCenter Server plug-in that provides end-to-end lifecycle management f using Netapp storage systems

Auto discovery of stor (Recommend

datastores

Add Storage System

vCenter server: nx-vc.flexpod.cisco.com

Name or IP address: * 192.168.156.50

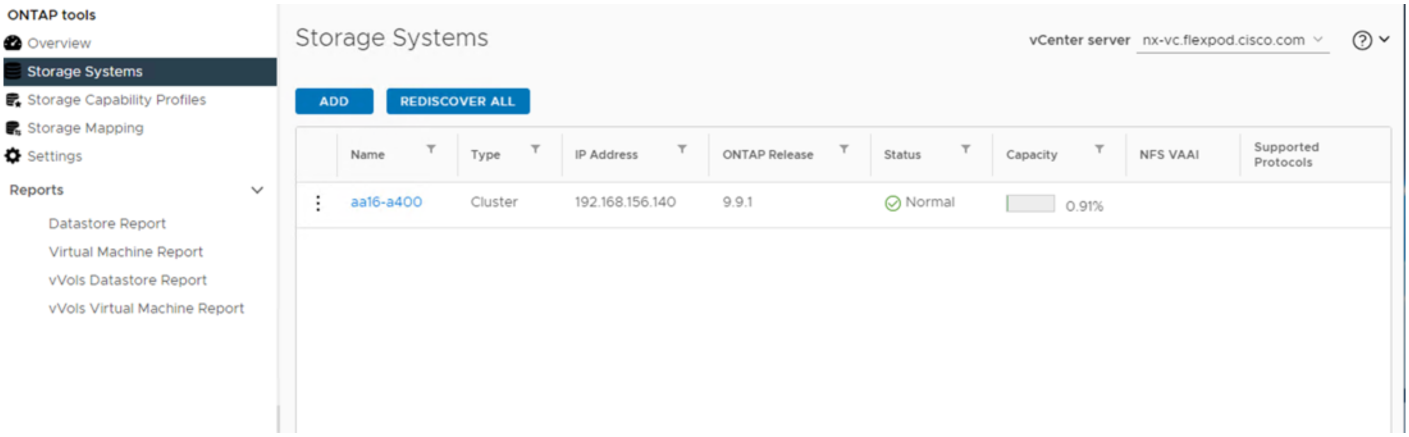
Port: * 443

Username: * admin

Password: * ••••••••••

10. Wait for the Storage Systems to update. You might need to click Refresh to complete this update.

To discover the cluster and SVMs with the cluster admin account, follow these steps:



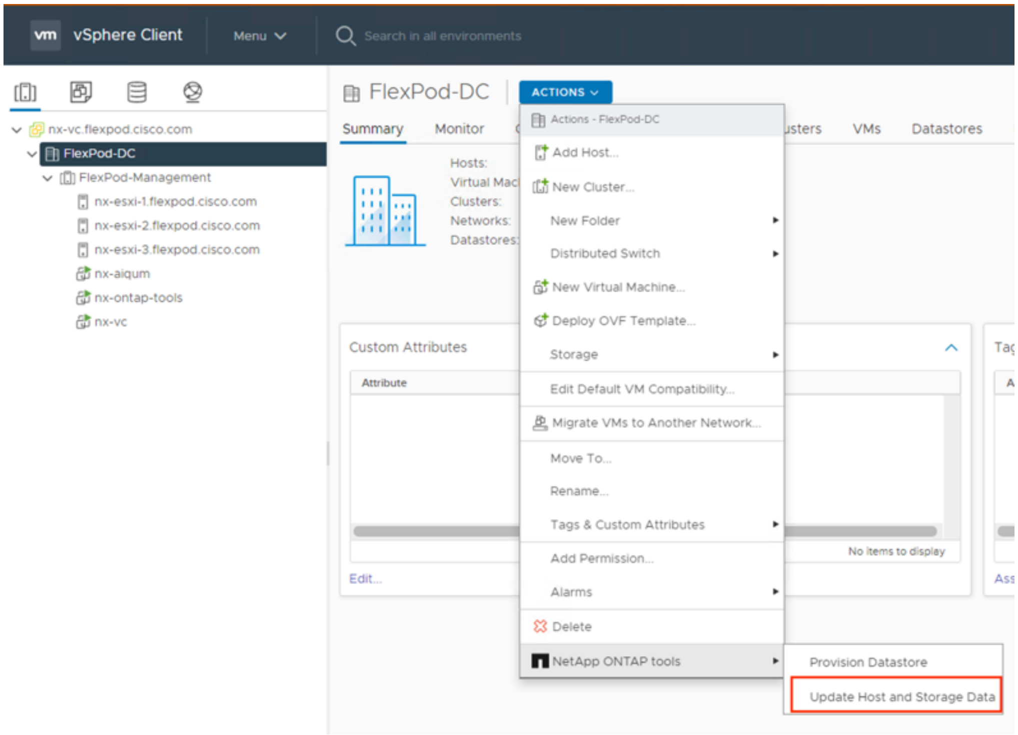
Storage Systems

vCenter server nx-vc.flexpod.cisco.com

Name	Type	IP Address	ONTAP Release	Status	Capacity	NFS VAAI	Supported Protocols
aa16-a400	Cluster	192.168.156.140	9.9.1	✓ Normal	0.91%		

1. From the vSphere Client Home page, click Hosts and Clusters.

2. Right-click the FlexPod-DC datacenter, click NetApp ONTAP tools > Update Host and Storage Data.



NetApp ONTAP tools displays a Confirm dialog box that informs you that this operation might take a few minutes.

3. Click OK.

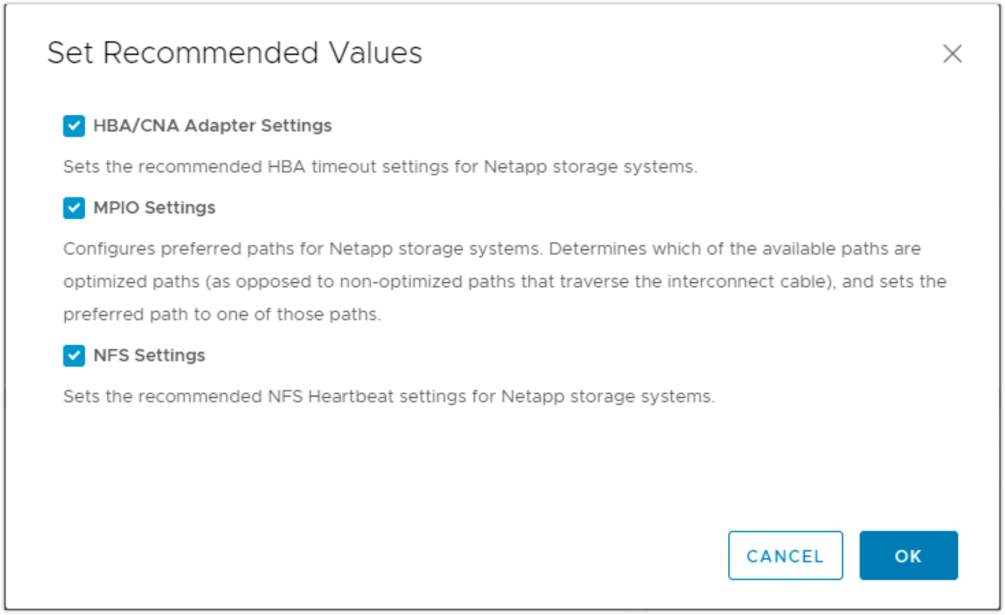
Optimal Storage Settings for ESXi Hosts

ONTAP tools enables the automated configuration of storage-related settings for all ESXi hosts that are connected to NetApp storage controllers. To use these settings, follow these steps:

1. From the VMware vSphere Web Client Home page, click vCenter > Hosts.

2. Choose a host and then click Actions > NetApp ONTAP tools > Set Recommended Values.

3. In the NetApp Recommended Settings dialog box, choose all the values for your system.


Set Recommended Values

☑ HBA/CNA Adapter Settings

Sets the recommended HBA timeout settings for Netapp storage systems.

☑ MPIO Settings

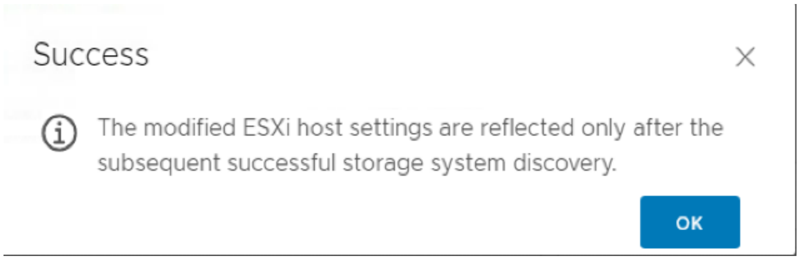
Configures preferred paths for Netapp storage systems. Determines which of the available paths are optimized paths (as opposed to non-optimized paths that traverse the interconnect cable), and sets the preferred path to one of those paths.

☑ NFS Settings

Sets the recommended NFS Heartbeat settings for Netapp storage systems.

This functionality sets values for HBAs and converged network adapters (CNAs), sets appropriate paths and path-selection plug-ins, and verifies appropriate settings for software-based I/O (NFS). A vSphere host reboot may be required after applying the settings.

4. Click OK.


Success

The modified ESXi host settings are reflected only after the subsequent successful storage system discovery.

ONTAP Tools 9.8P2 Provisioning Datastores

Using ONTAP tools, the administrator can provision an NFS, FC, FC-NVMe or iSCSI datastore and attach it to a single host or multiple hosts in the cluster. The following steps describe provisioning a datastore and attaching it to the cluster.

It is a NetApp best practice to use ONTAP tools to provision datastores for the FlexPod infrastructure. When using VSC to create vSphere datastores, all NetApp storage best practices are implemented during volume creation and no additional configuration is needed to optimize performance of the datastore volumes.

Storage Capabilities

A storage capability is a set of storage system attributes that identifies a specific level of storage performance (storage service level), storage efficiency, and other capabilities such as encryption for the storage object that is associated with the storage capability.

Create the Storage Capability Profile

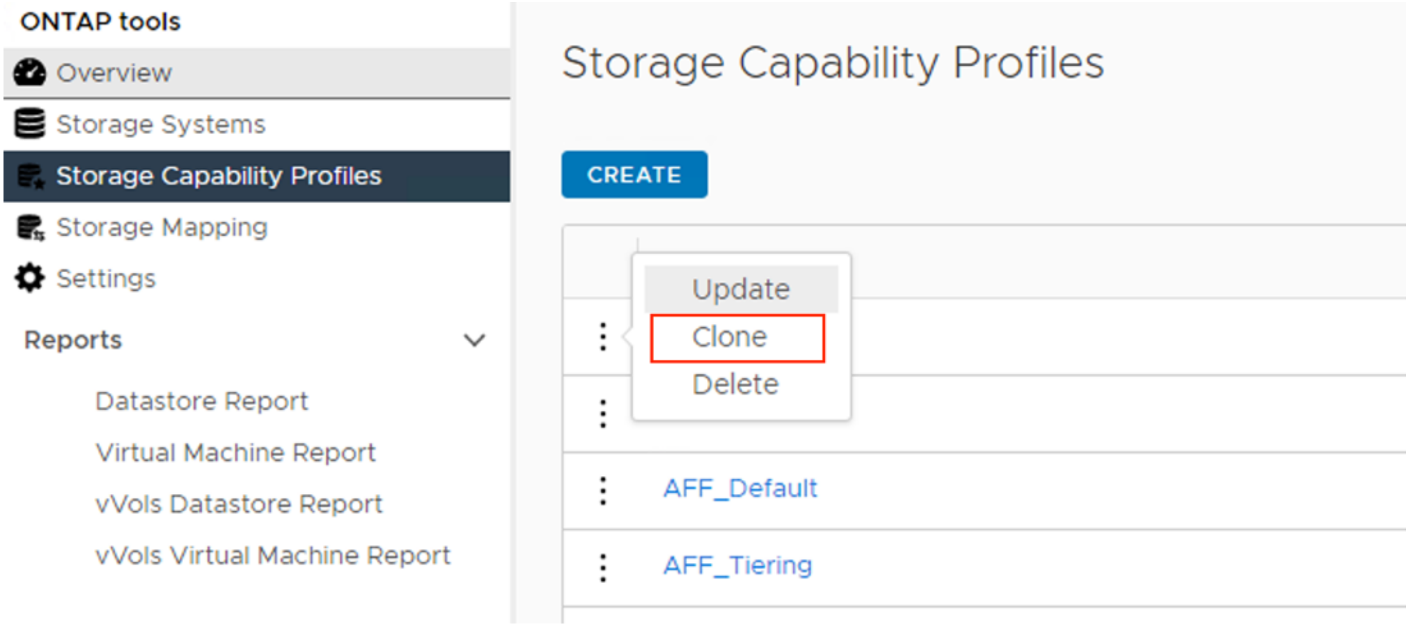
In order to leverage the automation features of VASA two primary components must first be configured. The Storage Capability Profile (SCP) and the VM Storage Policy. The Storage Capability Profile expresses a specific set of storage characteristics into one or more profiles used to when provisioning a Virtual Machine. The SCP is specified as part of VM Storage Policy which is specified when you deploy a virtual machine. NetApp Virtual Storage Console comes with two pre-configured Storage Capability Profiles- Platinum and Bronze.

The ONTAP tools for VMware vSphere plug-in also allow you to set Quality of Service (QoS) rule using a combination of maximum and/or minimum IOPs.

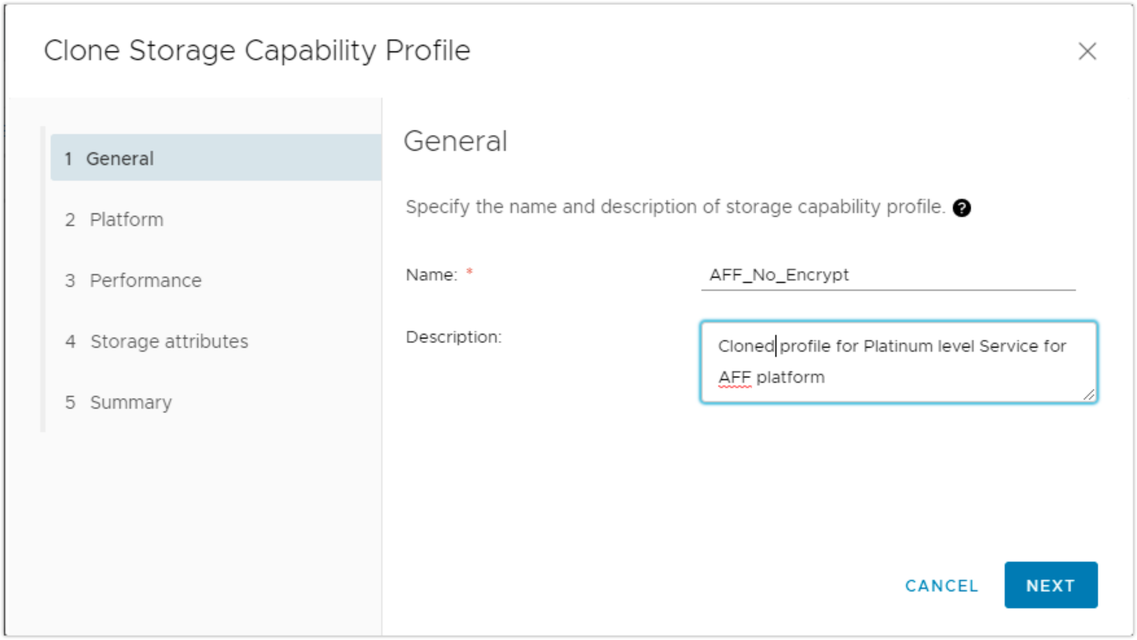
To review or edit one of the built-in profiles pre-configured with ONTAP tools, follow these steps:

1. In the NetApp ONTAP tools click Storage Capability Profiles.

2. Choose the Platinum Storage Capability Profile and choose Clone from the toolbar.



3. Enter a name for the cloned SCP and add a description if desired.



Clone Storage Capability Profile

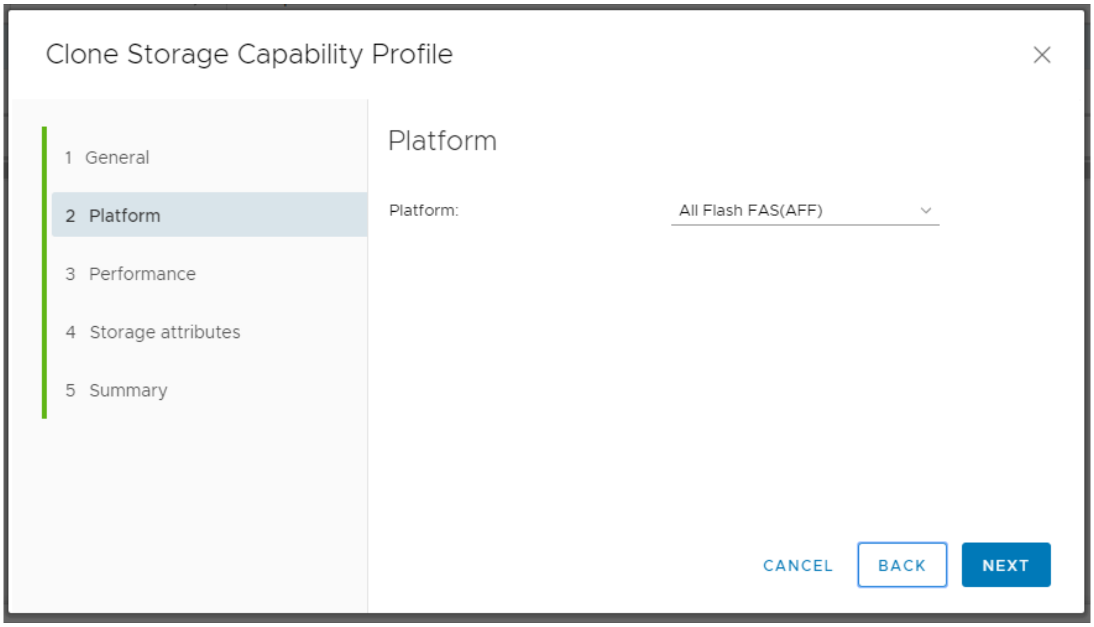
General

Specify the name and description of storage capability profile.

Name: * AFF_No_Encrypt

Description: Cloned profile for Platinum level Service for AFF platform

4. Choose All Flash FAS(AFF) for the storage platform and click Next.



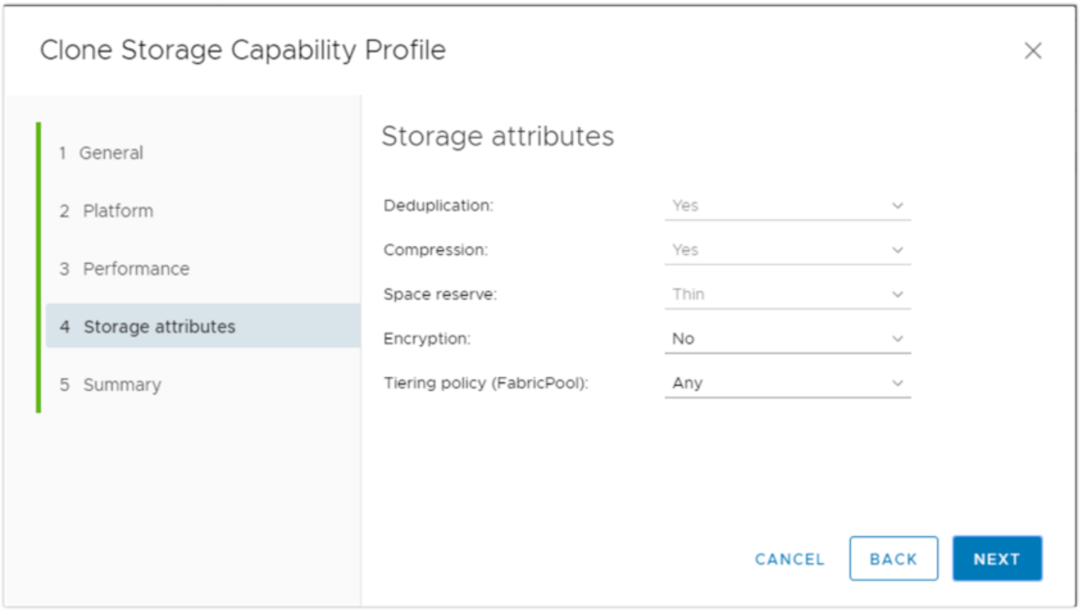
Clone Storage Capability Profile

Platform

Platform: All Flash FAS(AFF)

5. Choose None to allow unlimited performance or set a the desired minimum and maximum IOPS for the QoS policy group.

6. On the Storage attributes page, Change the Encryption and Tiering policy to the desired settings and click NEXT.


Clone Storage Capability Profile

Storage attributes

Deduplication: Yes

Compression: Yes

Space reserve: Thin

Encryption: No

Tiering policy (FabricPool): Any

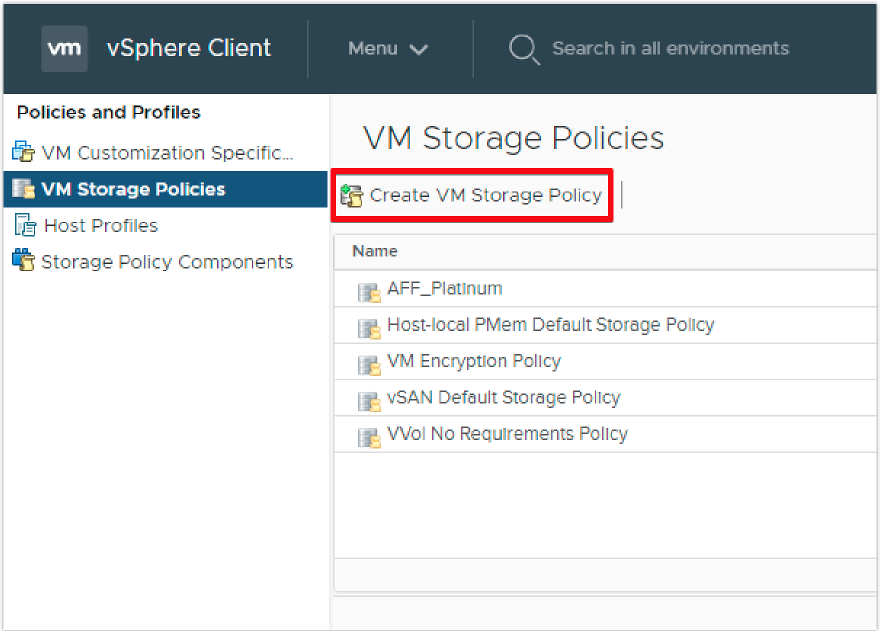
7. Review the summary page and choose FINISH to create the storage capability profile.

It is recommended to Clone the Storage Capability Profile if you wish to make any changes to the default profiles rather than editing the built-in profile.

Create a VM Storage Policy

Create a VM storage policy and associate a storage capability profile (SCP) to the datastore that meets the requirements defined in the SCP. To create a new VM Storage policy, follow these steps:

1. Navigate to Policies and Profiles from the vSphere Client menu.

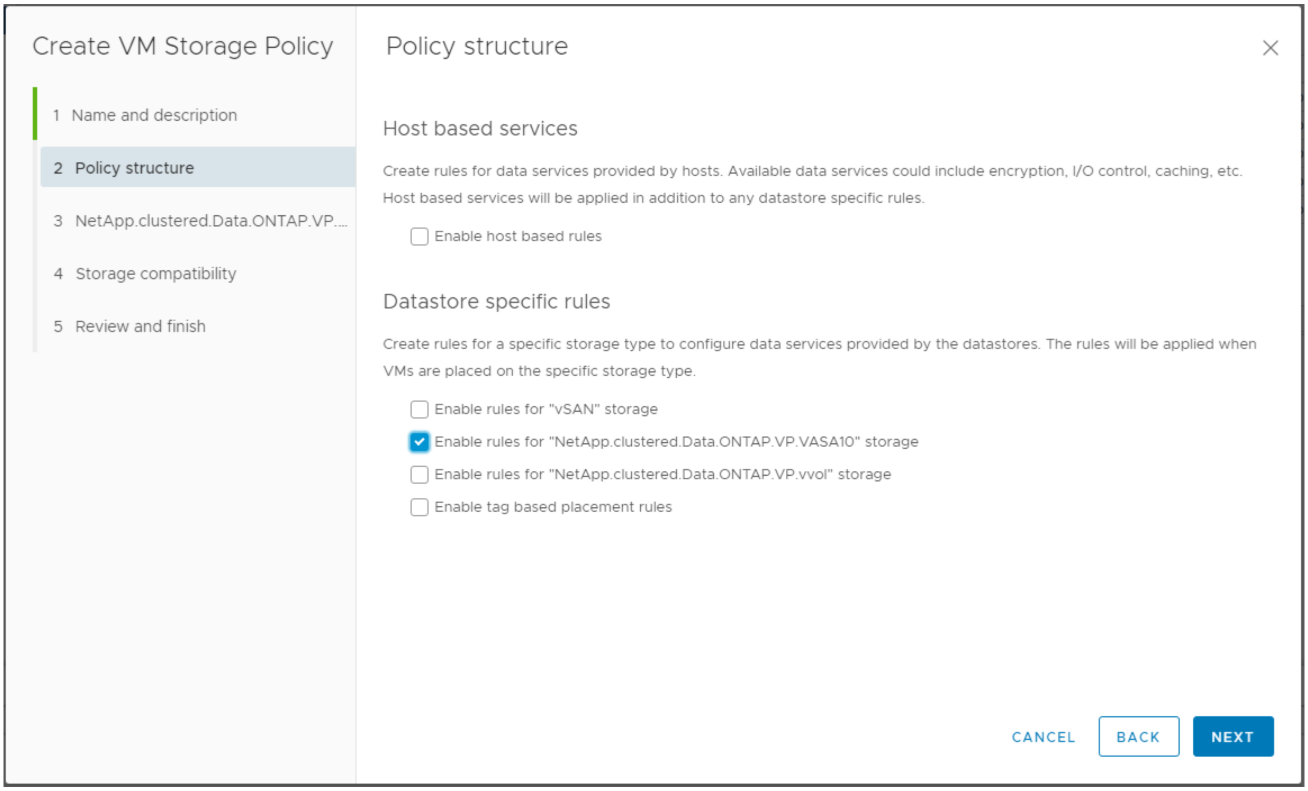


Name
AFF_Platinum
Host-local PMem Default Storage Policy
VM Encryption Policy
vSAN Default Storage Policy
VVol No Requirements Policy

2. Choose VM Storage Policies and click Create VM Storage Policy.

3. Create a name for the VM storage policy and enter a description and click NEXT.

4. Choose Enable rules for NetApp.clustered.Data.ONTAP.VP.VASA10 storage located under the Datastore specific rules section and click NEXT.



Create VM Storage Policy

Policy structure

1 Name and description
2 Policy structure
3 NetApp.clustered.Data.ONTAP.VP....
4 Storage compatibility
5 Review and finish

Host based services

Create rules for data services provided by hosts. Available data services could include encryption, I/O control, caching, etc. Host based services will be applied in addition to any datastore specific rules.

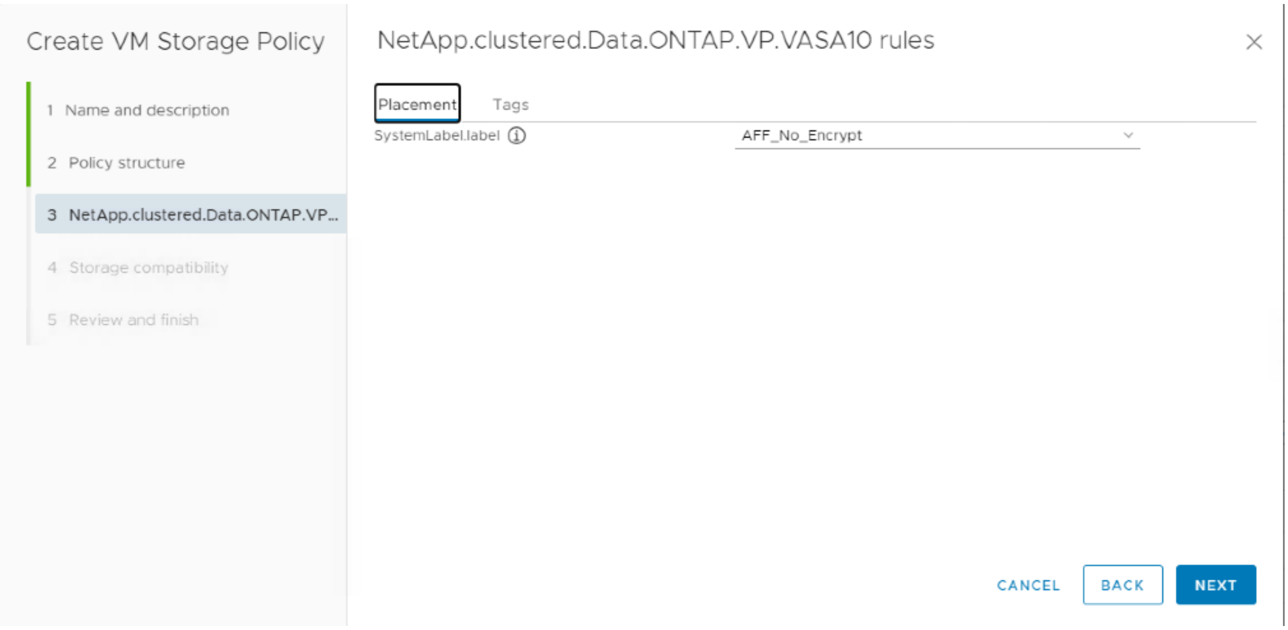
☐ Enable host based rules

Datastore specific rules

Create rules for a specific storage type to configure data services provided by the datastores. The rules will be applied when VMs are placed on the specific storage type.

☐ Enable rules for "vSAN" storage
☑ Enable rules for "NetApp.clustered.Data.ONTAP.VP.VASA10" storage
☐ Enable rules for "NetApp.clustered.Data.ONTAP.VP.vvol" storage
☐ Enable tag based placement rules

5. On the Placement tab select the SCP created in the previous step and click NEXT.



Create VM Storage Policy

NetApp.clustered.Data.ONTAP.VP.VASA10 rules

1 Name and description
2 Policy structure
3 NetApp.clustered.Data.ONTAP.VP...
4 Storage compatibility
5 Review and finish

SystemLabel.label AFF_No_Encrypt

6. The datastores with matching capabilities are displayed, click NEXT.

7. Review the policy summary and click FINISH.

Provision NFS Datastore

To provision the NFS datastore, follow these steps:

1. From the ONTAP tools Home page, click Overview.

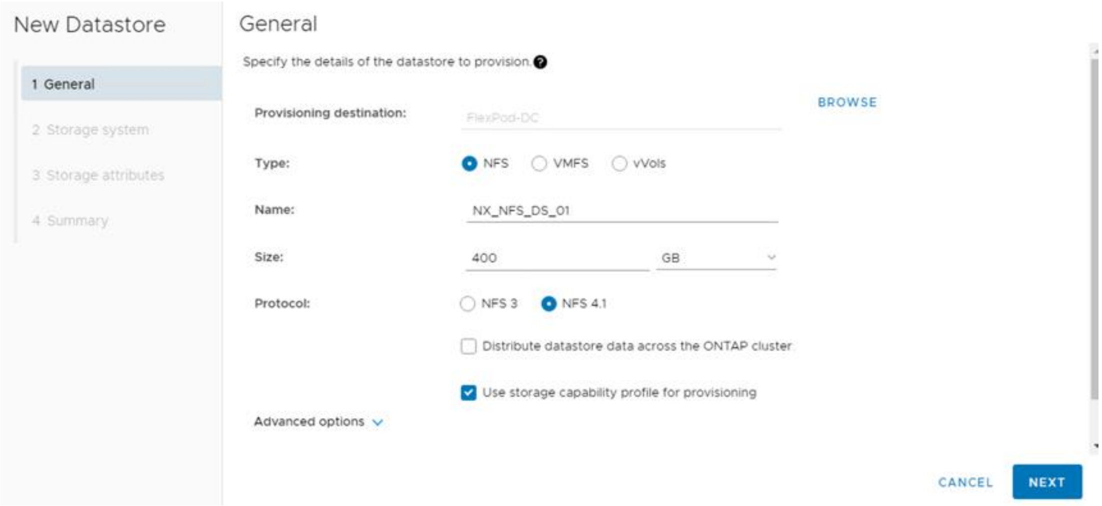
2. In the Getting Started tab, click Provision.

3. Click Browse to choose the destination to provision the datastore.

4. Choose the type as NFS and Enter the datastore name.

5. Provide the size of the datastore and the NFS Protocol.

6. Check the storage capability profile and click NEXT.



General

Specify the details of the datastore to provision.

Provisioning destination: FlexPod-DC

Type: ● NFS ○ VMFS ○ vVols

Name: NX_NFS_DS_01

Size: 400 GB

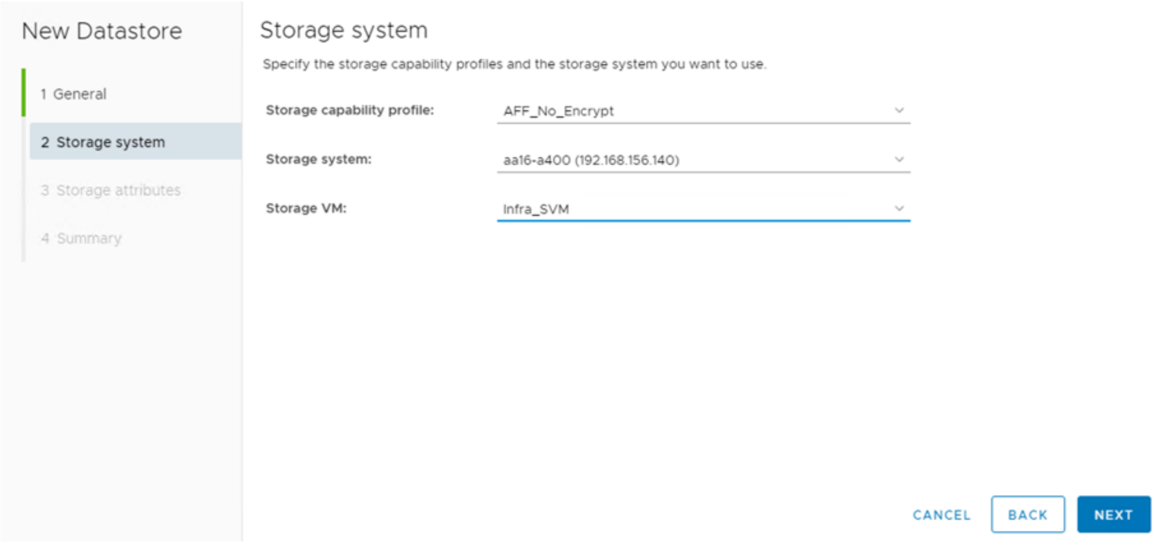
Protocol: ○ NFS 3 ● NFS 4.1

☐ Distribute datastore data across the ONTAP cluster

☑ Use storage capability profile for provisioning

7. Choose the desired Storage Capability Profile, cluster name and the desired SVM to create the datastore. In this example, the Infra-SVM is selected.

8. Click NEXT.



Storage system

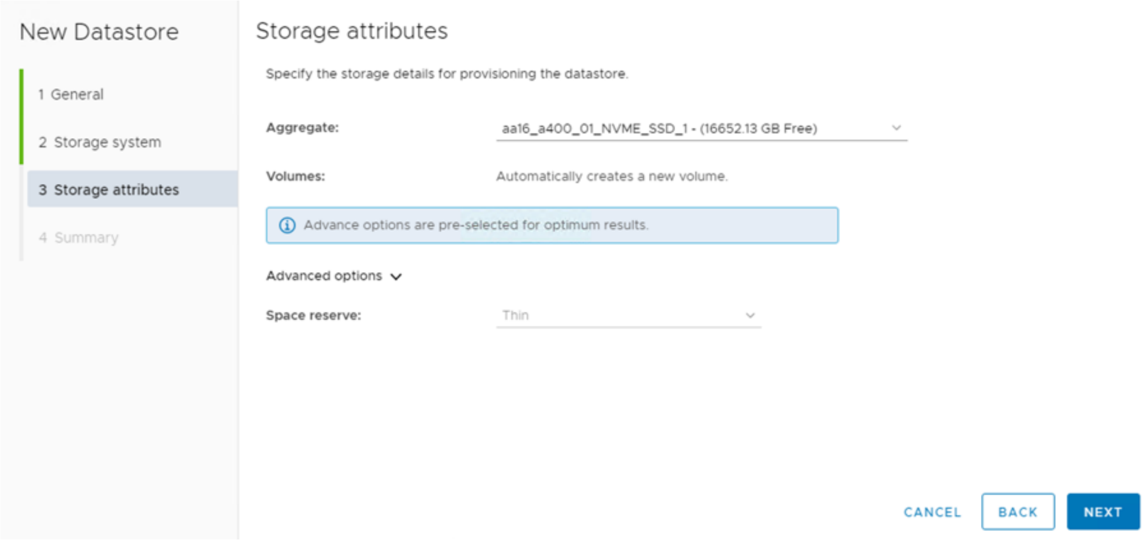
Specify the storage capability profiles and the storage system you want to use.

Storage capability profile: AFF_No_Encrypt

Storage system: aa16-a400 (192.168.156.140)

Storage VM: Infra_SVM

9. Choose the aggregate name and click NEXT.



Storage attributes

Specify the storage details for provisioning the datastore.

Aggregate: aa16_a400_01_NVME_SSD_1 - (16652.13 GB Free)

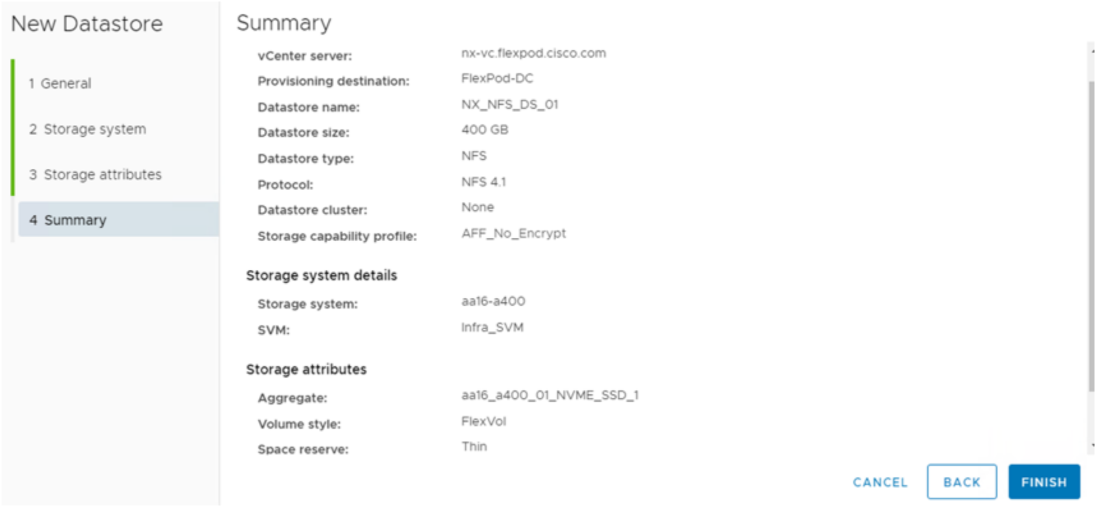
Volumes: Automatically creates a new volume.

Advance options are pre-selected for optimum results.

Advanced options

Space reserve: Thin

10. Review the Summary and click FINISH.



New Datastore

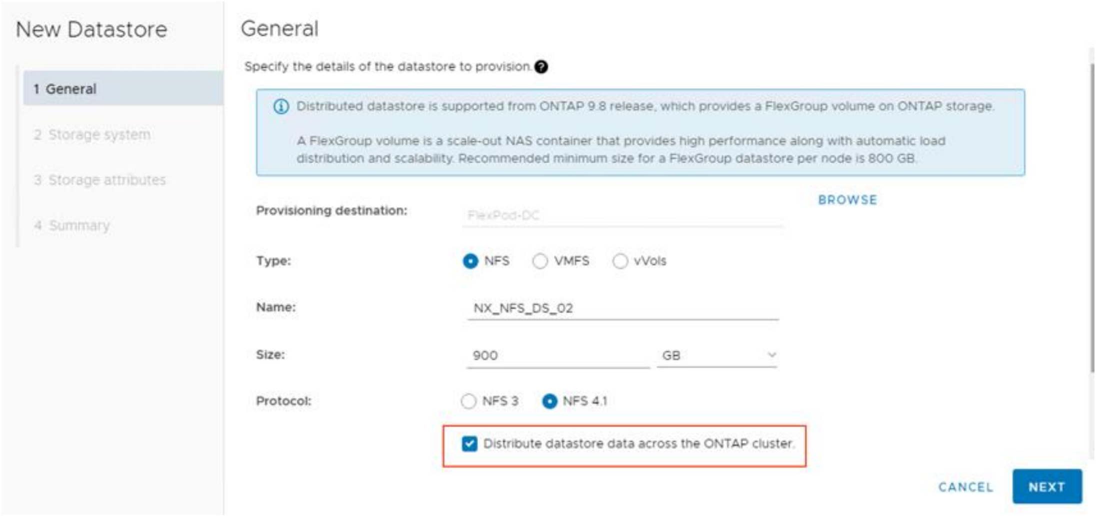
1 General
2 Storage system
3 Storage attributes
4 Summary

Summary

vCenter server:	nx-vc.flexpod.cisco.com
Provisioning destination:	FlexPod-DC
Datastore name:	NX_NFS_DS_01
Datastore size:	400 GB
Datastore type:	NFS
Protocol:	NFS 4.1
Datastore cluster:	None
Storage capability profile:	AFF_No_Encrypt
Storage system details	
Storage system:	aa16-a400
SVM:	Infra_SVM
Storage attributes	
Aggregate:	aa16_a400_01_NVME_SSD_1
Volume style:	FlexVol
Space reserve:	Thin

The datastore is created and mounted on the hosts in the cluster. Click Refresh from the vSphere Web Client to see the newly created datastore or it is also listed in the ONTAP tools home page > Traditional Dashboard > Datastores view. Also, ONTAP tools home page > Reports > Datastore Report should list the newly created datastore.

11. Distributed datastore is supported from ONTAP 9.8, which provides FlexGroup volume on ONTAP storage. To create a Distributed Datastore across the ONTAP Cluster select NFS 4.1 and check the box for Distributed Datastore data across the ONTAP Cluster.



New Datastore

1 General
2 Storage system
3 Storage attributes
4 Summary

General

Specify the details of the datastore to provision.

Distributed datastore is supported from ONTAP 9.8 release, which provides a FlexGroup volume on ONTAP storage.

A FlexGroup volume is a scale-out NAS container that provides high performance along with automatic load distribution and scalability. Recommended minimum size for a FlexGroup datastore per node is 800 GB.

Provisioning destination: FlexPod-DC BROWSE

Type: ● NFS ○ VMFS ○ vVols

Name: NX_NFS_DS_02

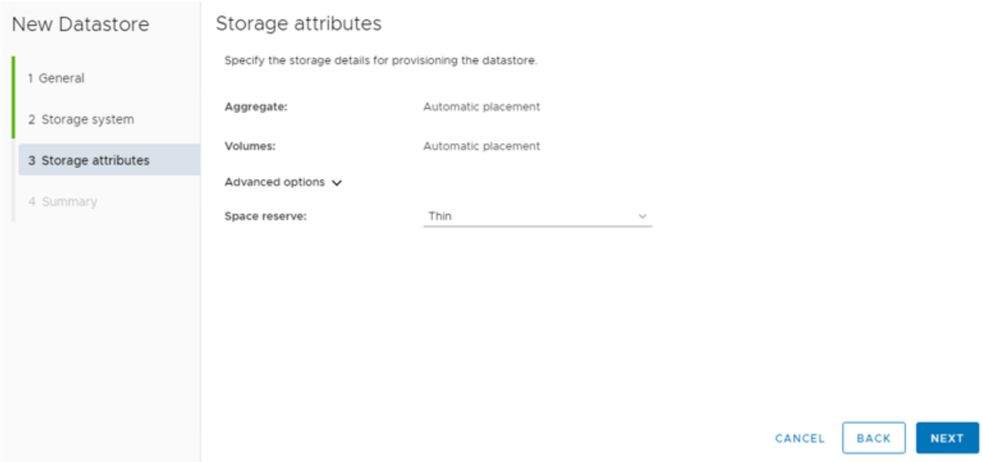
Size: 900 GB

Protocol: ○ NFS 3 ● NFS 4.1

☑ Distribute datastore data across the ONTAP cluster.

12. Provide the Storage System details and SVM name. Click Next.

13. The storage attributes are assigned automatically. Select the space reserve option by clicking Advanced options. Click Next.



Storage attributes

Specify the storage details for provisioning the datastore.

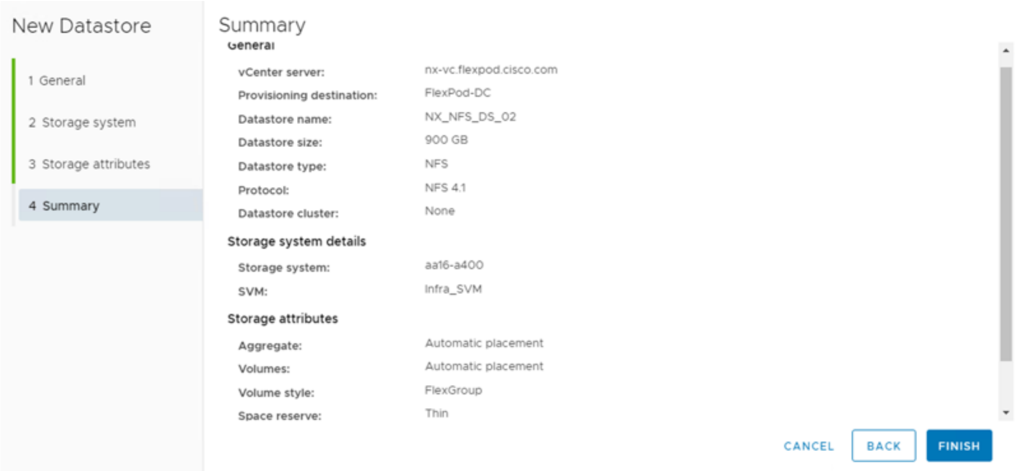
Aggregate: Automatic placement

Volumes: Automatic placement

Advanced options

Space reserve: Thin

14. Review the summary and click Finish.



Summary

General

vCenter server: nx-vc.flexpod.cisco.com

Provisioning destination: FlexPod-DC

Datastore name: NX_NFS_DS_02

Datastore size: 900 GB

Datastore type: NFS

Protocol: NFS 4.1

Datastore cluster: None

Storage system details

Storage system: aa16-a400

SVM: Infra_SVM

Storage attributes

Aggregate: Automatic placement

Volumes: Automatic placement

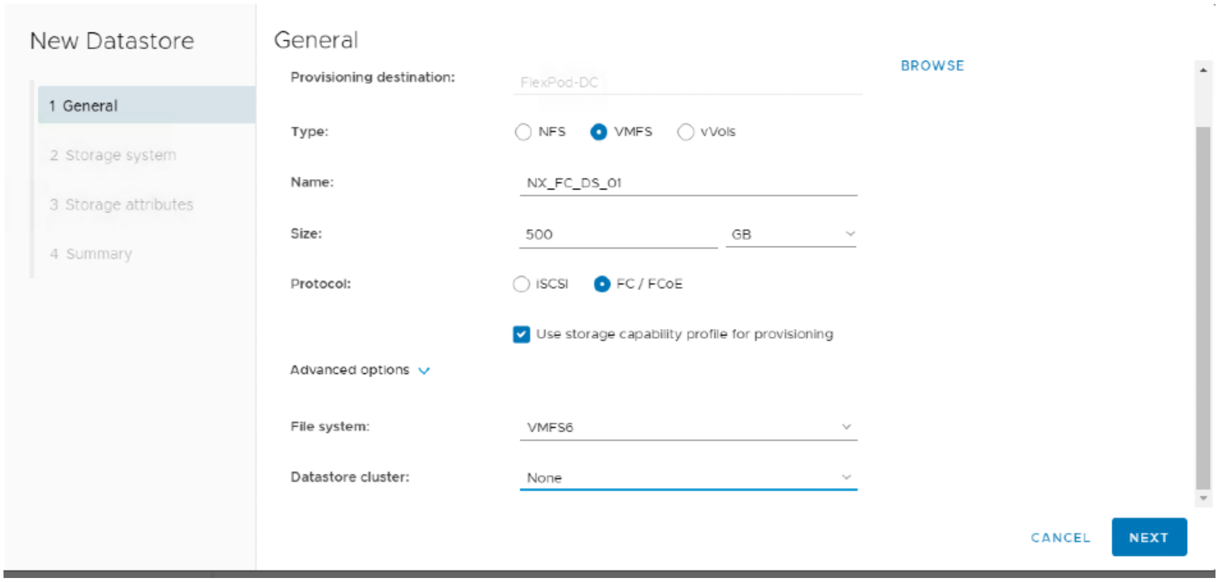
Volume style: FlexGroup

Space reserve: Thin

Provision FC Datastore

To provision the FC datastore, follow these steps:

1. From the ONTAP tools Home page, click Overview.
2. In the Getting Started tab, click Provision.
3. Click Browse to choose the destination to provision the datastore.
4. Choose the type as VMFS and Enter the datastore name.
5. Provide the size of the datastore and the FC Protocol.
6. Check the storage capability profile and click NEXT.



General

Provisioning destination: FlexPod-DC

Type: ○ NFS ● VMFS ○ vVols

Name: NX_FC_DS_01

Size: 500 GB

Protocol: ○ iSCSI ● FC / FCoE

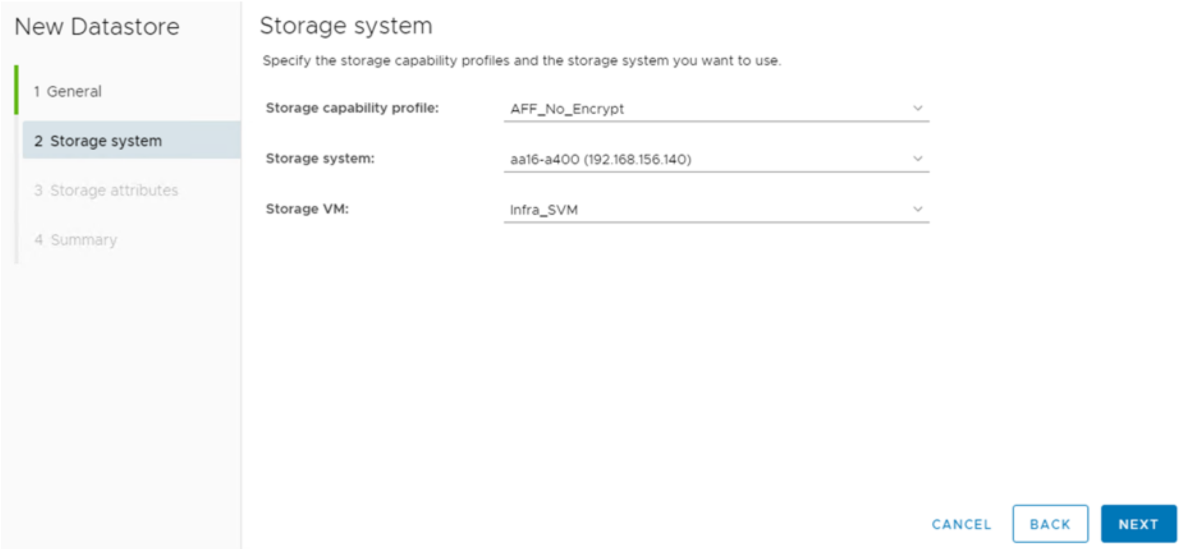
☑ Use storage capability profile for provisioning

File system: VMFS6

Datastore cluster: None

7. Choose the Storage Capability Profile, cluster name and the desired SVM to create the datastore. In this example, the Infra-SVM is selected.

8. Click NEXT.



Storage system

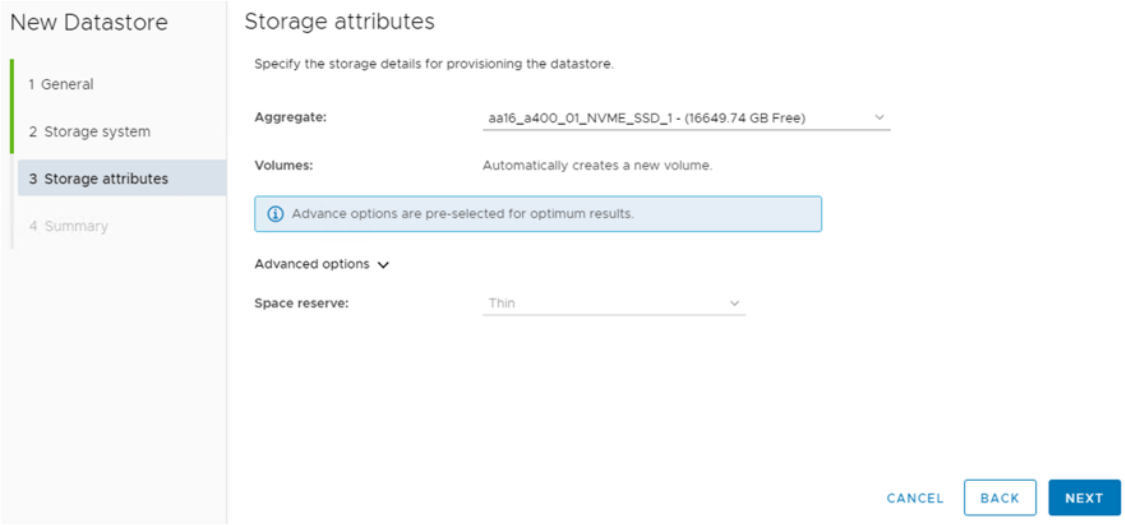
Specify the storage capability profiles and the storage system you want to use.

Storage capability profile: AFF_No_Encrypt

Storage system: aa16-a400 (192.168.156.140)

Storage VM: Infra_SVM

9. Choose the aggregate name and click NEXT.



Storage attributes

Specify the storage details for provisioning the datastore.

Aggregate: aa16_a400_01_NVME_SSD_1 - (16649.74 GB Free)

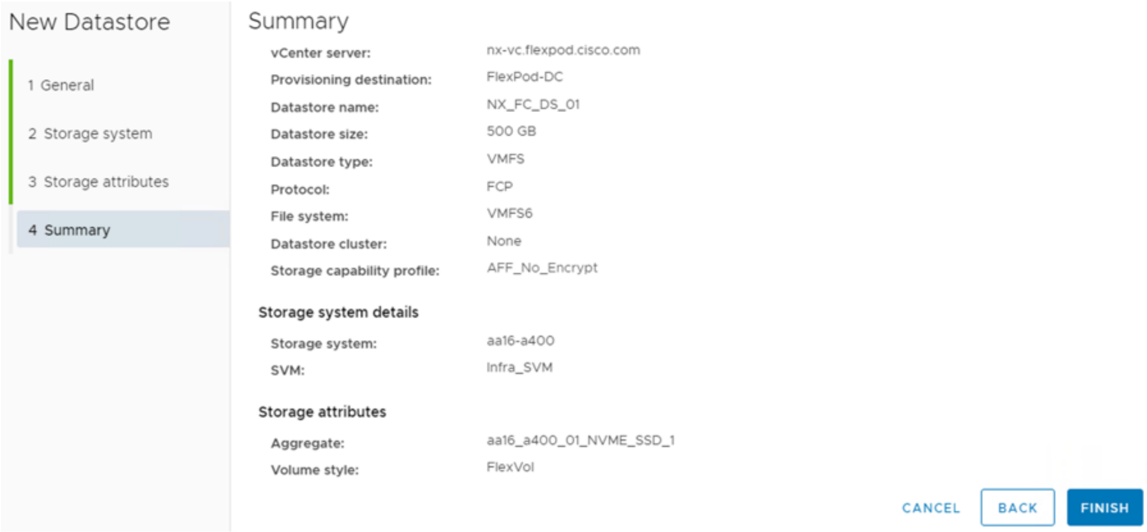
Volumes: Automatically creates a new volume.

Advance options are pre-selected for optimum results.

Advanced options

Space reserve: Thin

10. Review the Summary and click FINISH.



Summary

vCenter server: nx-vc.flexpod.cisco.com
Provisioning destination: FlexPod-DC
Datastore name: NX_FC_DS_01
Datastore size: 500 GB
Datastore type: VMFS
Protocol: FCP
File system: VMFS6
Datastore cluster: None
Storage capability profile: AFF_No_Encrypt

Storage system details

Storage system: aa16-a400
SVM: Infra_SVM

Storage attributes

Aggregate: aa16_a400_01_NVME_SSD_1
Volume style: FlexVol

11. Click OK.

The datastore is created and mounted on all the hosts in the cluster. Click Refresh from the vSphere Web Client to see the newly created datastore or it is also listed in the ONTAP tools home page > Traditional Dashboard > Datastores view. Also, ONTAP tools Home page > Reports > Datastore Report should be listing the newly created datastore.

Create Virtual Machine with Assigned VM Storage Policy

To create a virtual machine assigned to a VM storage policy, follow these steps:

1. Navigate to the VMs and Templates tab and click the FlexPod-DC datacenter.

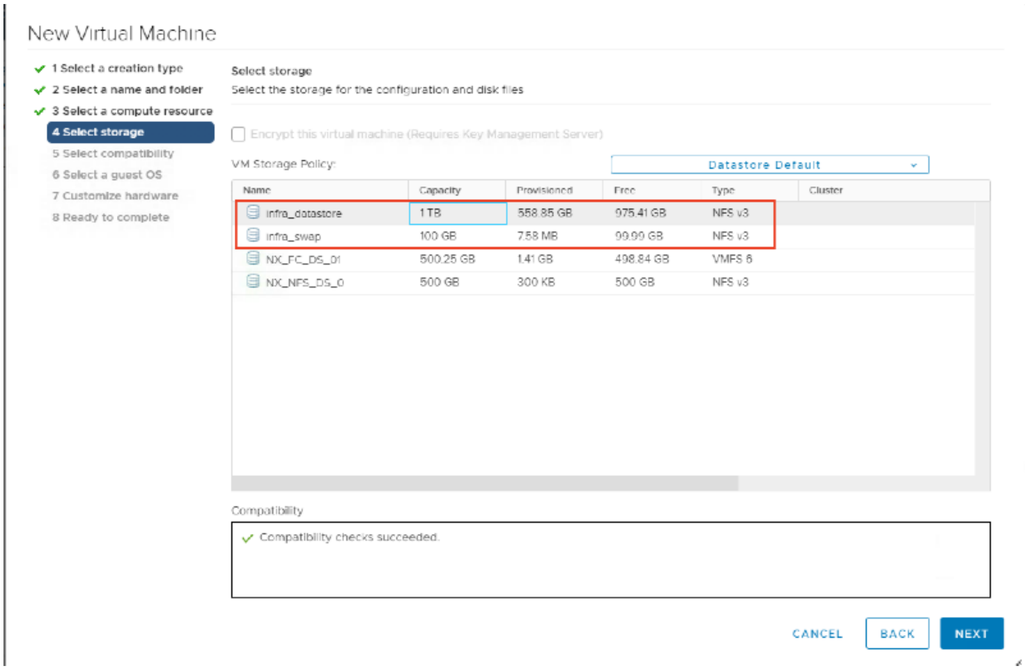
2. Click Actions and click New Virtual Machine.

3. Choose Create a new virtual machine and choose NEXT.

4. Enter a name for the VM and click the FlexPod-DC datacenter.

5. Choose the FlexPod-Management Data compute Resource.

6. Choose the VM storage policy from the selections and choose a compatible datastore and click NEXT.



New Virtual Machine

- ✓ 1 Select a creation type
- ✓ 2 Select a name and folder
- ✓ 3 Select a compute resource
- 4 Select storage
- 5 Select compatibility
- 6 Select a guest OS
- 7 Customize hardware
- 8 Ready to complete

Select storage

Select the storage for the configuration and disk files

□ Encrypt this virtual machine (Requires Key Management Server)

VM Storage Policy: Datastore Default

Name	Capacity	Provisioned	Free	Type	Cluster
infra_datastore	1 TB	558.85 GB	975.41 GB	NFS v3	
infra_swap	100 GB	7.58 MB	99.99 GB	NFS v3	
NX_FC_DS_01	500.25 GB	1.41 GB	498.84 GB	VMFS 6	
NX_NFS_DS_0	500 GB	300 KB	500 GB	NFS v3	

Compatibility

✓ Compatibility checks succeeded.

7. Choose Compatibility and click NEXT.

8. Choose the Guest OS and click NEXT.

9. Customize the hardware for the VM and click NEXT.

10. Review the details and click FINISH.

Virtual Volumes (vVols)

NetApp VASA Provider enables you to create and manage VMware virtual volumes (vVols). A vVols datastore consists of one or more FlexVol volumes within a storage container (also called " backing storage"). A virtual machine can be spread across one vVols datastore or multiple vVols datastores. All of the FlexVol volumes within the storage container must use the same protocol (NFS, iSCSI, or FCP) and the same SVMs.

Lab testing has shown that if a virtual machine (VM) has one or more disks in vVol datastores and the VM is migrated to another host, just at the end of the migration the VM can be stunned or frozen for 45 or more seconds.

Verify NDMP Vserver Scope Mode

To verify the NDMP Vserver scope mode, follow these steps:

1. View NDMP scope mode with the following command:

```
system services ndmp node-scope-mode status
NDMP node-scope-mode is enabled.
```

2. Disable NDMP node-scoped mode:

```
system services ndmp node-scope-mode off

NDMP node-scope-mode is disabled.
```

3. Enable NDMP services on the vserver:

```
vserver add-protocols -protocols ndmp -vserver Infra_svm

vserver services ndmp on -vserver Infra_svm
```

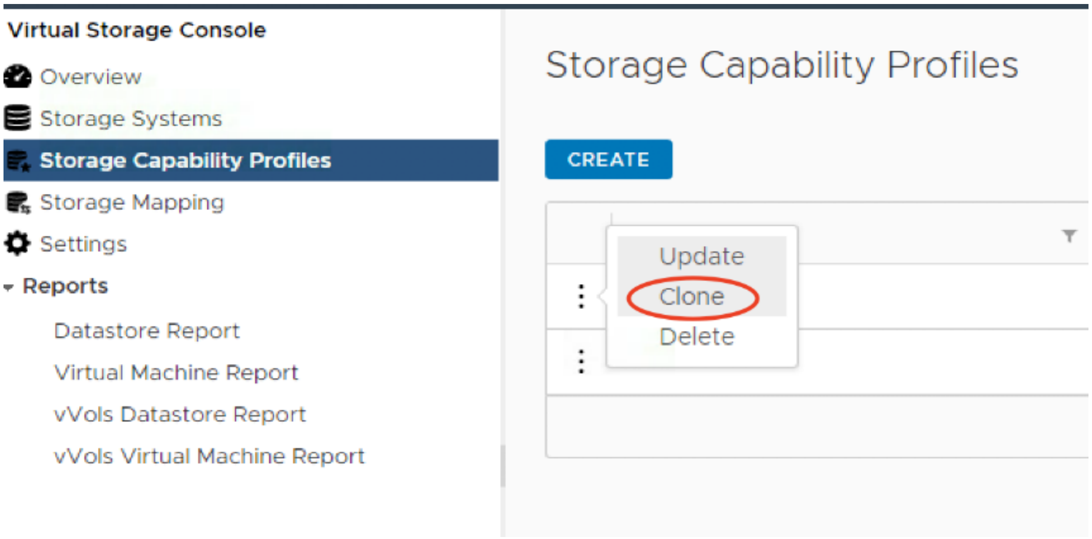
Create the Storage Capability Profile

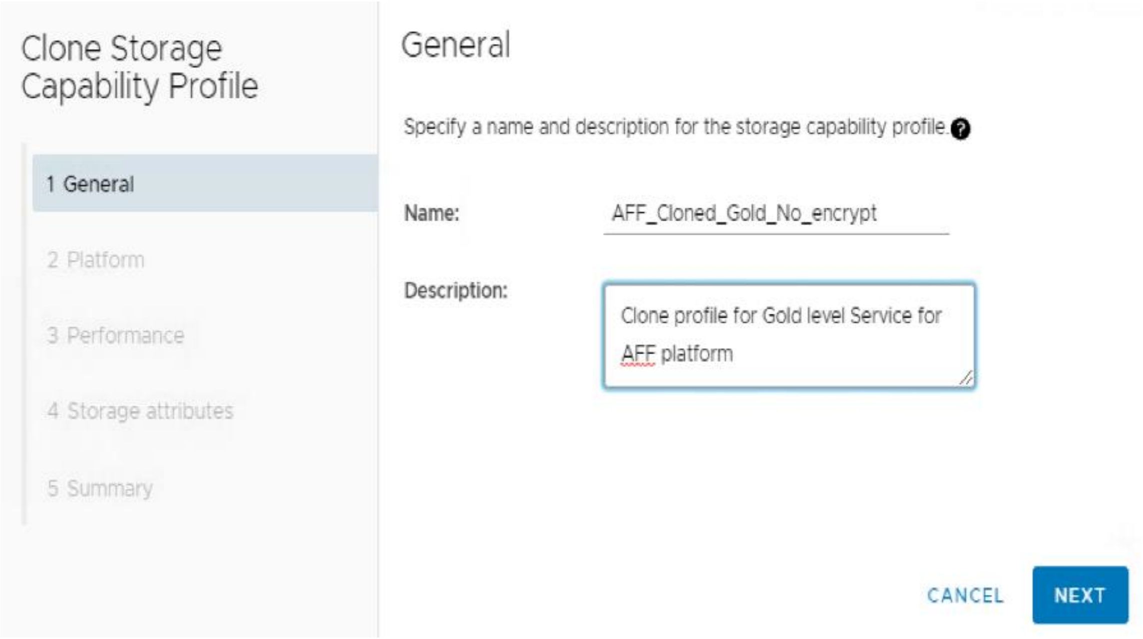
You can select one or more VASA Provider storage capability profiles for a vVols datastore. You can also specify a default storage capability profile for any vVols datastores that are automatically created in that storage container.

To create storage capability profile for the vVol datastore, follow these steps:

1. In the NetApp ONTAP tools click Storage Capability Profiles.

2. Choose the Platinum Storage Capability Profile and choose Clone from the toolbar.





Specify a name and description for the storage capability profile.

Name: AFF_Cloned_Gold_No_encrypt

Description: Clone profile for Gold level Service for AFF platform

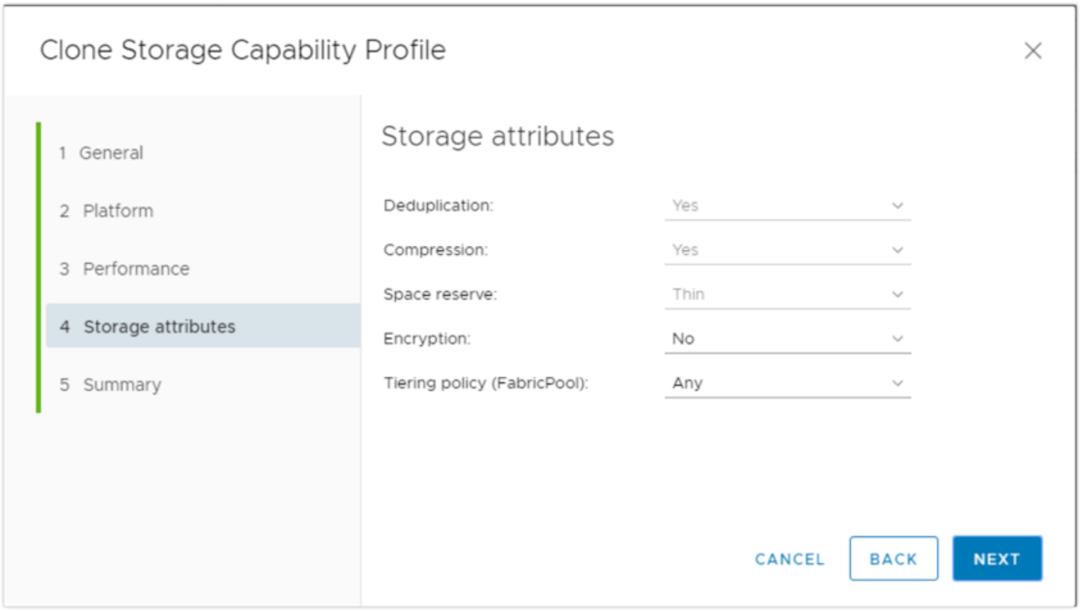
3. Choose All Flash FAS(AFF) for the storage platform and click Next.

4. Choose None to allow unlimited performance or set a the desired minimum and maximum IOPS for the QoS policy group. You can set the value for Max IOPS, which enables you to use the QoS functionality.

When applied for a virtual datastore, a QoS policy with " MAX IOPS" value is created for each data vVols.

When you select ONTAP Service Level, then the existing adaptive QoS policies of ONTAP are applied to a data vVols. You can select one of three service levels: Extreme, Performance, or Value. The ONTAP service level is applicable only to vVols datastores.

5. On the Storage attributes page, change the Encryption and Tiering policy to the desired settings and click NEXT.



Clone Storage Capability Profile

Storage attributes

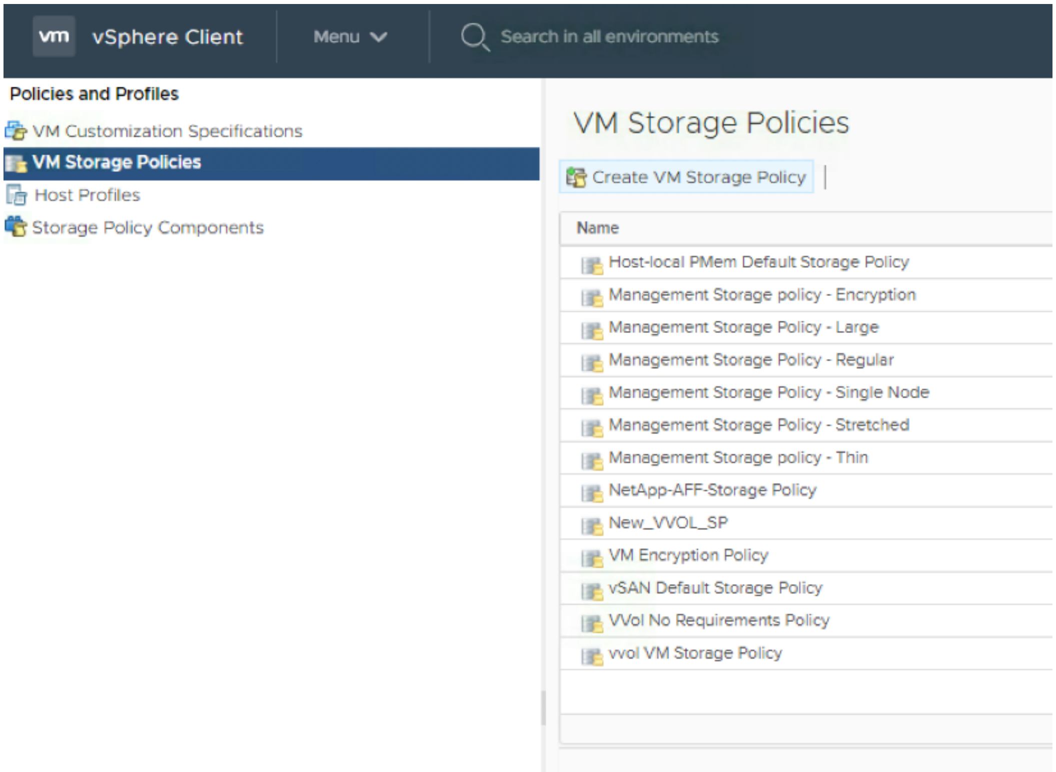
Deduplication: Yes
Compression: Yes
Space reserve: Thin
Encryption: No
Tiering policy (FabricPool): Any

6. Review the summary page and choose FINISH to create the storage capability profile.

Create a VM Storage Policy

Create a VM storage policy and associate a storage capability profile (SCP) to the datastore that meets the requirements defined in the SCP. To create a new VM Storage policy, follow these steps:

1. Navigate to Policies and Profiles from the vSphere Client menu.



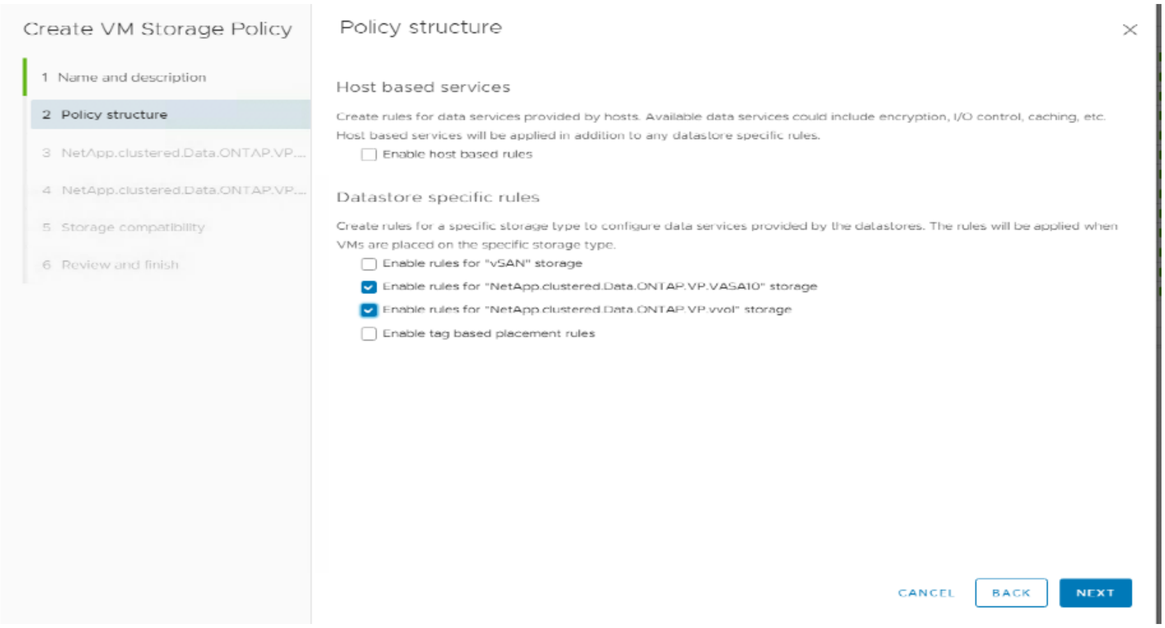
VM Storage Policies

Name
Host-local PMem Default Storage Policy
Management Storage policy - Encryption
Management Storage Policy - Large
Management Storage Policy - Regular
Management Storage Policy - Single Node
Management Storage Policy - Stretched
Management Storage policy - Thin
NetApp-AFF-Storage Policy
New_VVOL_SP
VM Encryption Policy
vSAN Default Storage Policy
VVol No Requirements Policy
vvol VM Storage Policy

2. Click Create VM Storage Policy.

3. Create a new name for the VM storage Policy and enter a description and click NEXT.

4. Choose Enable rules for NetApp.clustered.Data.ONTAP.VP.VASA.10 storage and NetApp.clustered.Data.ONTAP.VP.vvol storage, located under the Datastore specific rules section and click NEXT.



Policy structure

Host based services

Create rules for data services provided by hosts. Available data services could include encryption, I/O control, caching, etc. Host based services will be applied in addition to any datastore specific rules.

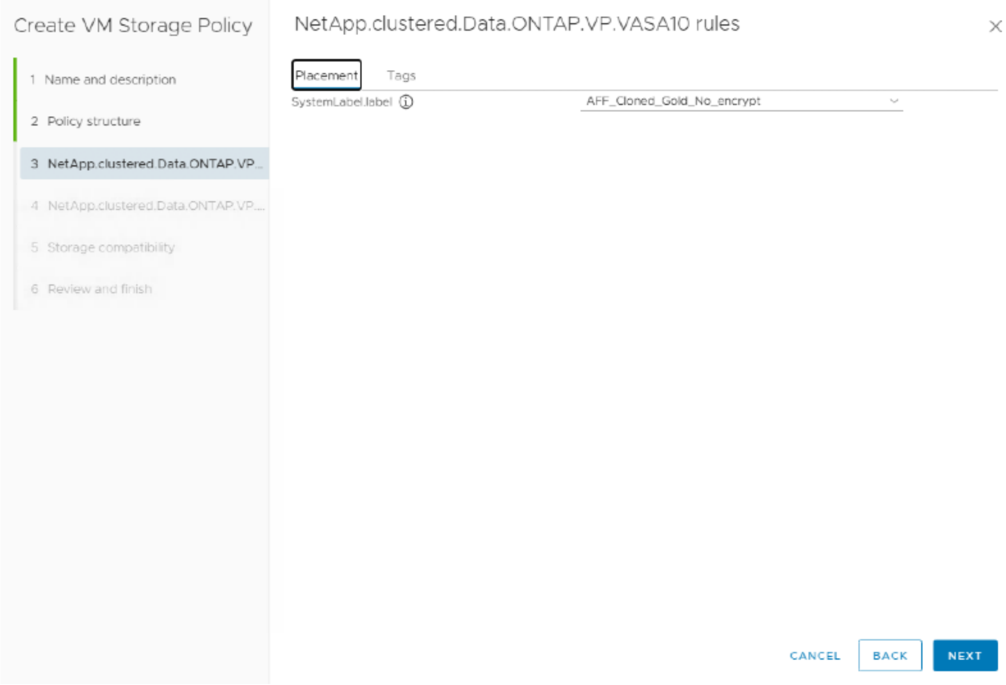
☐ Enable host based rules

Datastore specific rules

Create rules for a specific storage type to configure data services provided by the datastores. The rules will be applied when VMs are placed on the specific storage type.

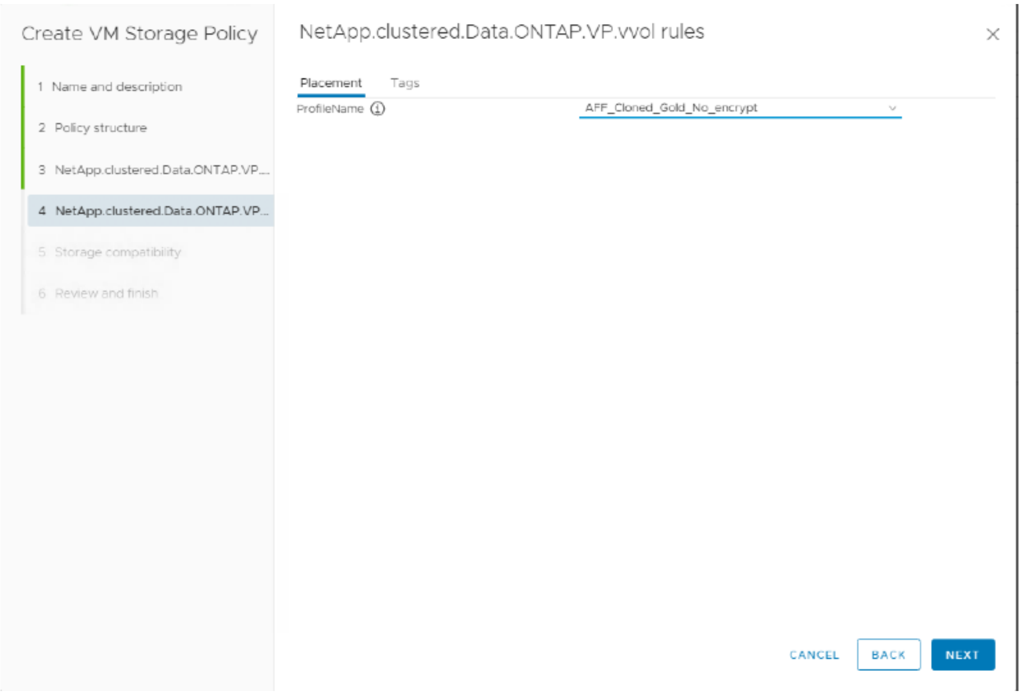
☐ Enable rules for "vSAN" storage
☑ Enable rules for "NetApp.clustered.Data.ONTAP.VP.VASA10" storage
☑ Enable rules for "NetApp.clustered.Data.ONTAP.VP.vvol" storage
☐ Enable tag based placement rules

5. On the Placement tab for VP.VASA and VP.vvol storage rules, select the SCP created in the previous step.



NetApp.clustered.Data.ONTAP.VP.VASA10 rules

SystemLabel.label AFF_Cloned_Gold_No_encrypt



NetApp.clustered.Data.ONTAP.VP.vvol rules

Placement Tags

ProfileName AFF_Cloned_Gold_No_encrypt

6. The datastores with matching capabilities are displayed, click NEXT.

7. Review the Policy Summary and click Finish.

Provision a vVols Datastore

To provision the vVols datastore over NFS protocol, follow these steps:

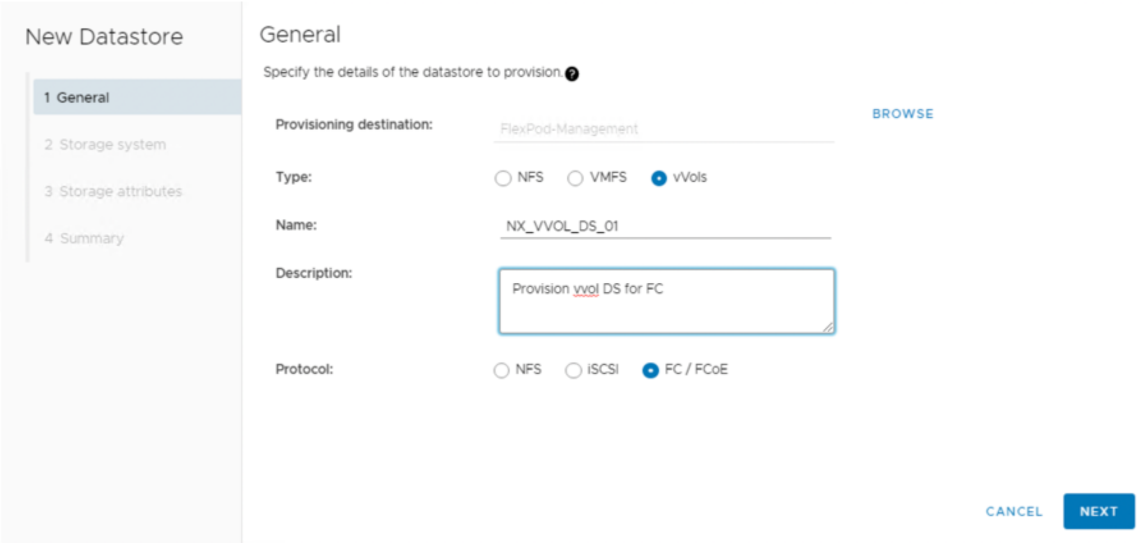
1. From the NetApp ONTAP tools Home page, click Overview.

2. In the Getting Started tab, click Provision.

3. Click Browse to choose the destination to provision the datastore as per the next step.

4. Choose the type as vVols and Enter the datastore name.

5. Select NFS for protocol and click Next.



New Datastore

1 General
2 Storage system
3 Storage attributes
4 Summary

General

Specify the details of the datastore to provision.

Provisioning destination: FlexPod-Management BROWSE

Type: ○ NFS ○ VMFS ● vVols

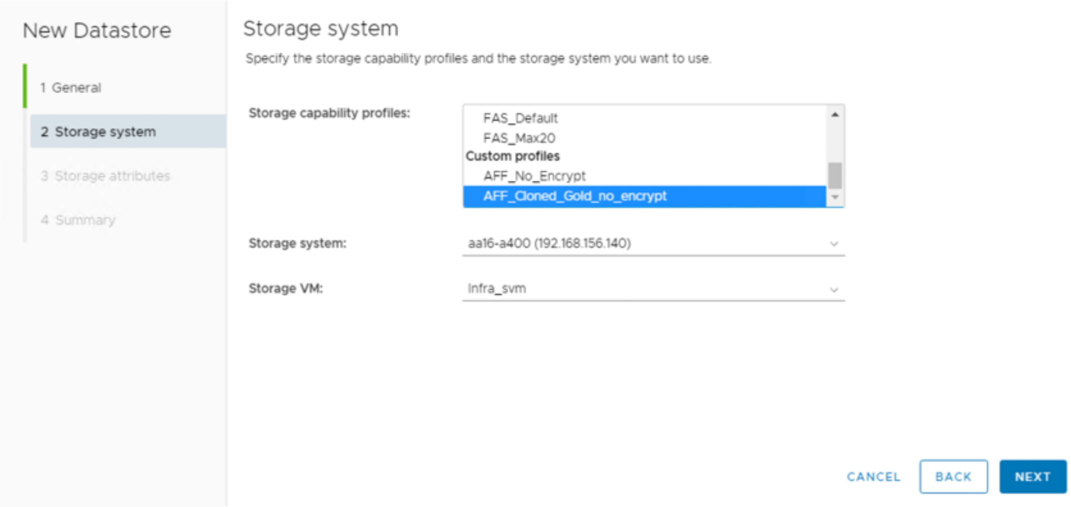
Name: NX_VVOL_DS_01

Description: Provision vvol DS for FC

Protocol: ○ NFS ○ iSCSI ● FC / FCoE

6. Select the Storage capability profile created earlier for vVols.

7. Select the NFS storage server and the NetApp Storage SVM where the vVols needs to be created and click Next.



New Datastore

1 General
2 Storage system
3 Storage attributes
4 Summary

Storage system

Specify the storage capability profiles and the storage system you want to use.

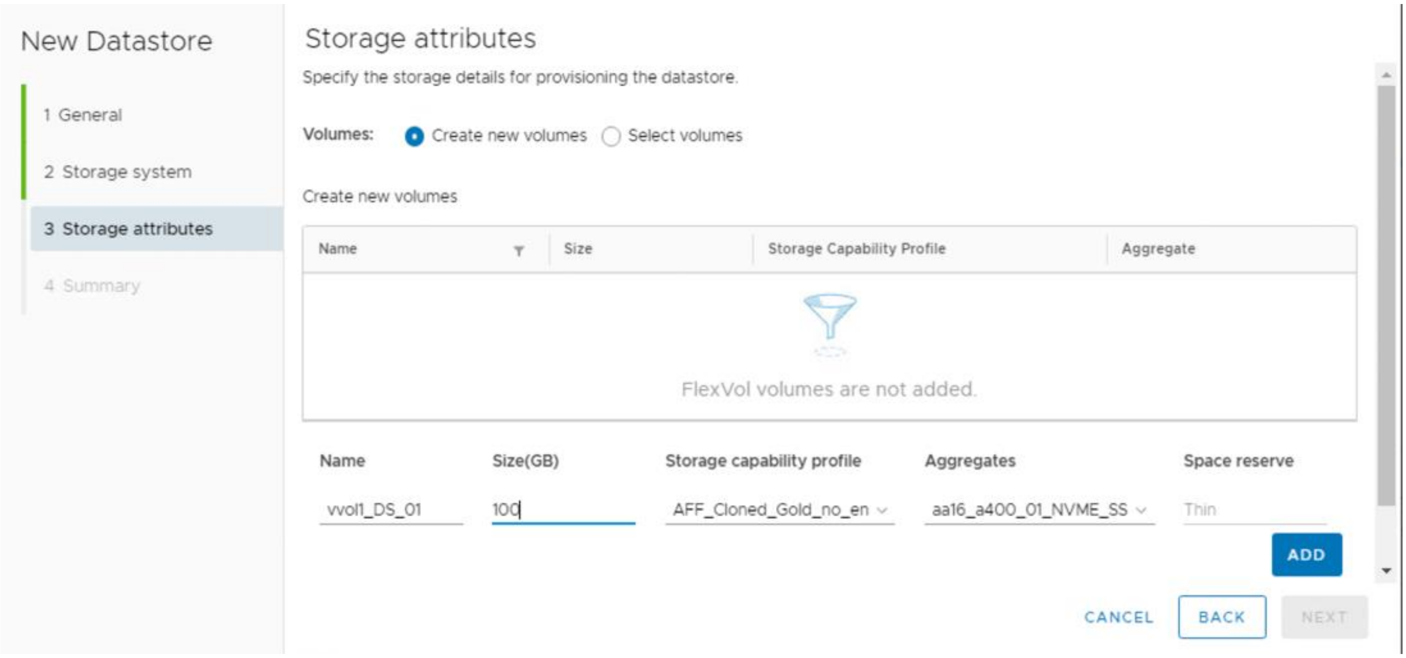
Storage capability profiles:
FAS_Default
FAS_Max20
Custom profiles
AFF_No_Encrypt
AFF_Cloned_Gold_no_encrypt

Storage system: aa16-a400 (192.168.156.140)

Storage VM: Infra_svm

8. Create new vVols or select existing vVols.

You can create multiple vVols for a datastore.



New Datastore

1 General

2 Storage system

3 Storage attributes

4 Summary

Storage attributes

Specify the storage details for provisioning the datastore.

Volumes: ● Create new volumes ○ Select volumes

Create new volumes

Name	Size	Storage Capability Profile	Aggregate

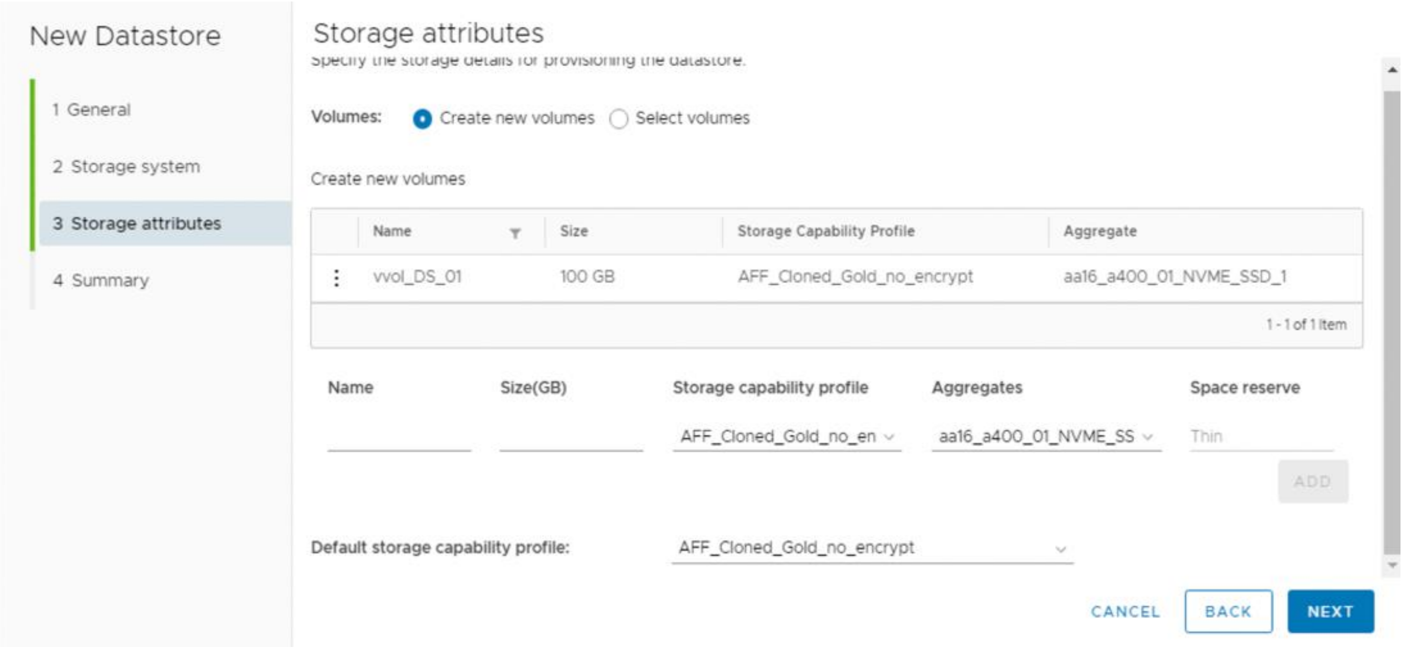
FlexVol volumes are not added.

Name	Size(GB)	Storage capability profile	Aggregates	Space reserve
vvol1_DS_01	100	AFF_Cloned_Gold_no_en	aa16_a400_01_NVME_SS	Thin

ADD

CANCEL BACK NEXT

9. Check the storage capability profile and click NEXT.



New Datastore

1 General

2 Storage system

3 Storage attributes

4 Summary

Storage attributes

Specify the storage details for provisioning the datastore.

Volumes: ● Create new volumes ○ Select volumes

Create new volumes

	Name	Size	Storage Capability Profile	Aggregate
⋮	vvol_DS_01	100 GB	AFF_Cloned_Gold_no_encrypt	aa16_a400_01_NVME_SSD_1

1 - 1 of 1 item

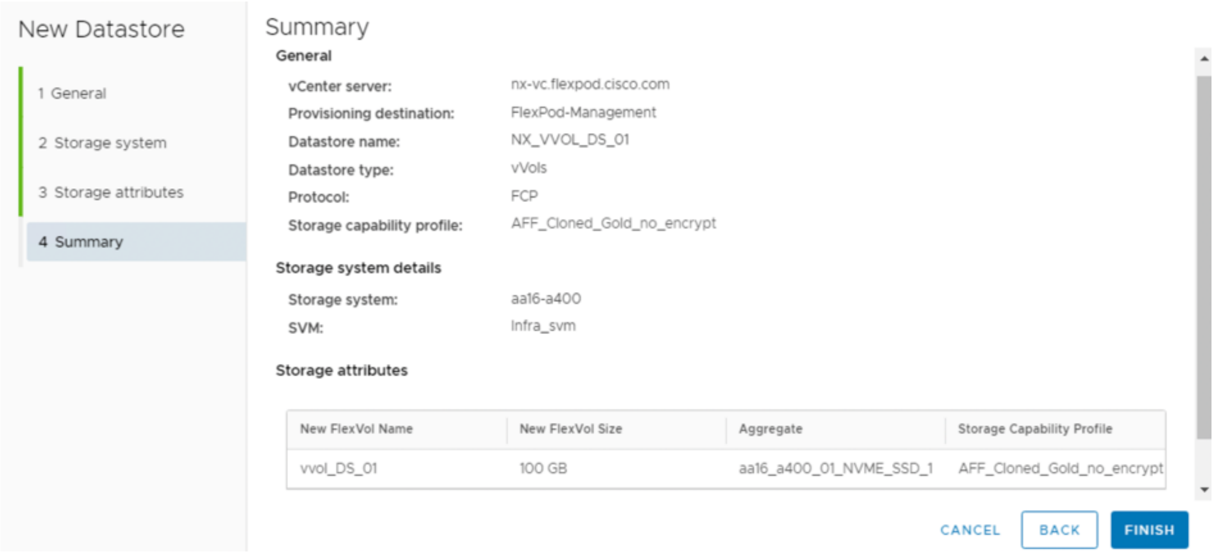
Name	Size(GB)	Storage capability profile	Aggregates	Space reserve
		AFF_Cloned_Gold_no_en	aa16_a400_01_NVME_SS	Thin

ADD

Default storage capability profile: AFF_Cloned_Gold_no_encrypt

CANCEL BACK NEXT

10. Review all the fields on the summary page and click Finish.



Summary

General

vCenter server: nx-vc.flexpod.cisco.com
Provisioning destination: FlexPod-Management
Datastore name: NX_VVOL_DS_01
Datastore type: vVols
Protocol: FCP
Storage capability profile: AFF_Cloned_Gold_no_encrypt

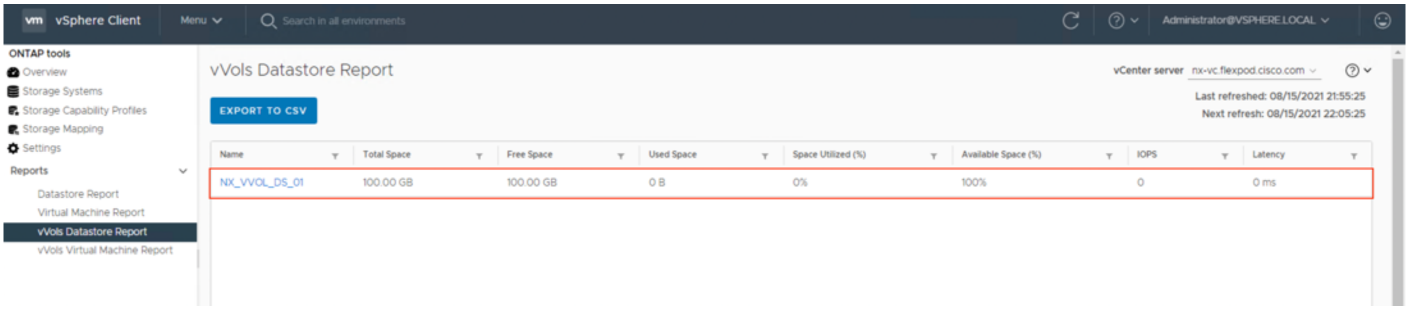
Storage system details

Storage system: aa16-a400
SVM: Infra_svm

Storage attributes

New FlexVol Name	New FlexVol Size	Aggregate	Storage Capability Profile
vvol_DS_01	100 GB	aa16_a400_01_NVME_SSD_1	AFF_Cloned_Gold_no_encrypt

11. Verify in the vVols Datastore report the vVols is mounted correctly, go to VSC > Reports > vVols Datastore Report.



vVols Datastore Report

vCenter server nx-vc.flexpod.cisco.com

Last refreshed: 08/15/2021 21:55:25
Next refresh: 08/15/2021 22:05:25

Name	Total Space	Free Space	Used Space	Space Utilized (%)	Available Space (%)	IOPS	Latency
NX_VVOL_DS_01	100.00 GB	100.00 GB	0 B	0%	100%	0	0 ms

To provision vVols for FC or ISCSI protocol, select it in the General tab and provide protocol-specific storage attributes in the Storage Attributes Inputs to create vVols successfully.

Update a vVols Datastore

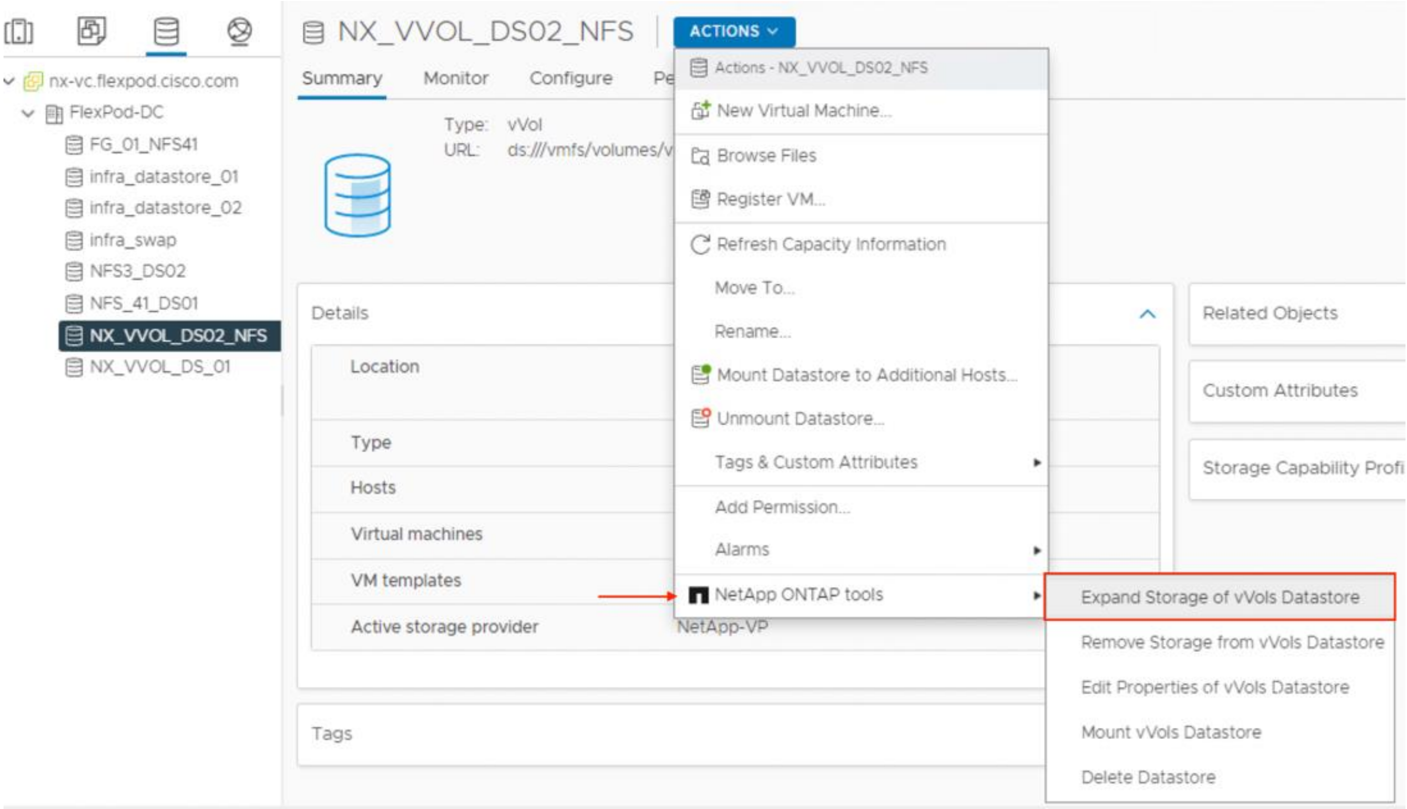
The following actions can be performed on a vVols Datastore:

- Expand Storage on a vVols Datastore
- Remove Storage on a vVols Datastore
- Edit Properties of vVols Datastore
- Mount vVols Datastore
- Delete vVols Datastore

Expand Storage on a vVol Datastore

To expand storage on a vVol datastore, follow these steps:

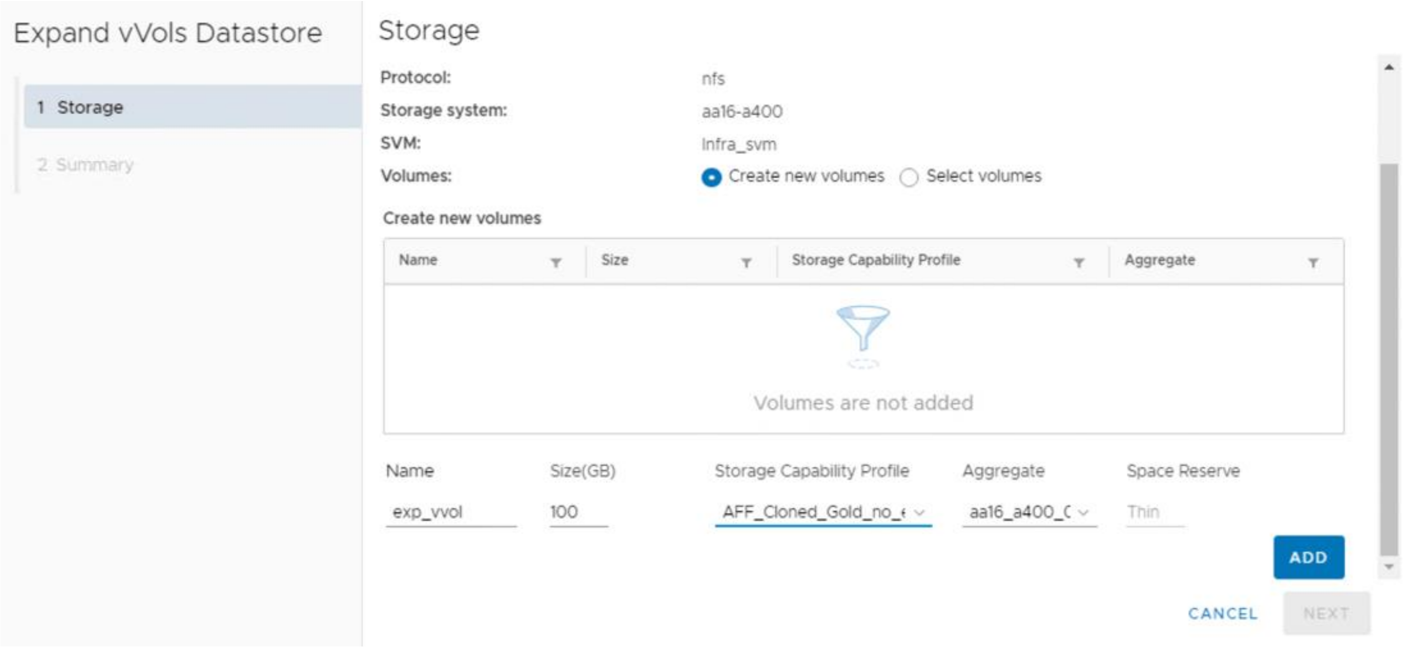
1. In the Storage tab, click the vVols datastore to expand > Actions > NetApp ONTAP tools > Expand Storage on a vVols Datastore.



Type: vVol
URL: ds:///vmfs/volumes/v

Active storage provider: NetApp-VP

2. Provide the storage attributes. Create new vVols or select existing vVols. Click Add.



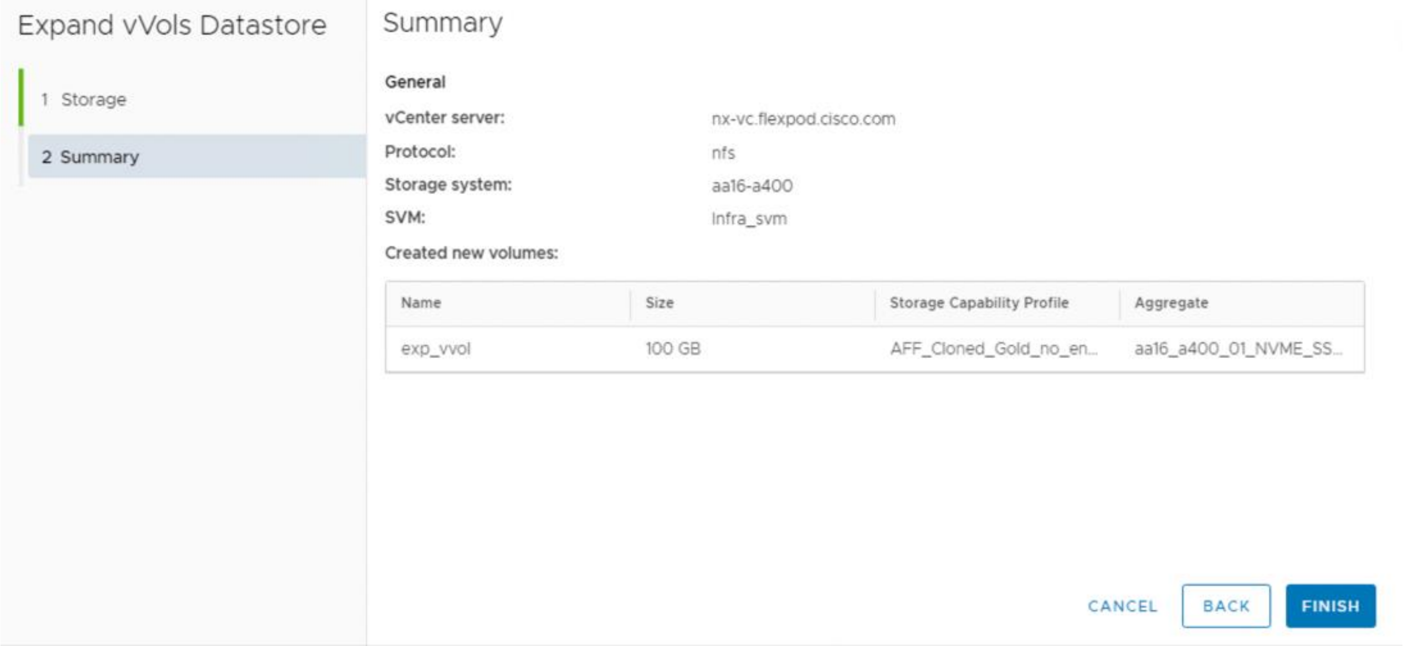
Protocol: nfs
Storage system: aa16-a400
SVM: Infra_svm
Volumes: ● Create new volumes ○ Select volumes

Create new volumes

Name	Size	Storage Capability Profile	Aggregate

Name	Size(GB)	Storage Capability Profile	Aggregate	Space Reserve
exp_vvol	100	AFF_Cloned_Gold_no_	aa16_a400_C	Thin

3. Review the details in the Summary page and click Finish.



Summary

General

vCenter server: nx-vc.flexpod.cisco.com

Protocol: nfs

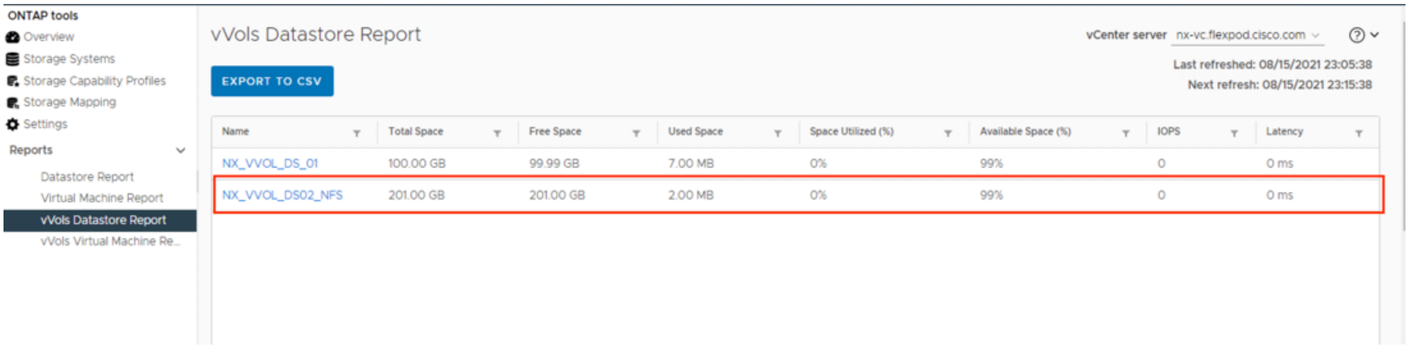
Storage system: aa16-a400

SVM: Infra_svm

Created new volumes:

Name	Size	Storage Capability Profile	Aggregate
exp_vvol	100 GB	AFF_Cloned_Gold_no_en...	aa16_a400_01_NVME_SS...

4. Verify that the size of the vVols datastore has been expanded successfully.



vCenter server nx-vc.flexpod.cisco.com

Last refreshed: 08/15/2021 23:05:38

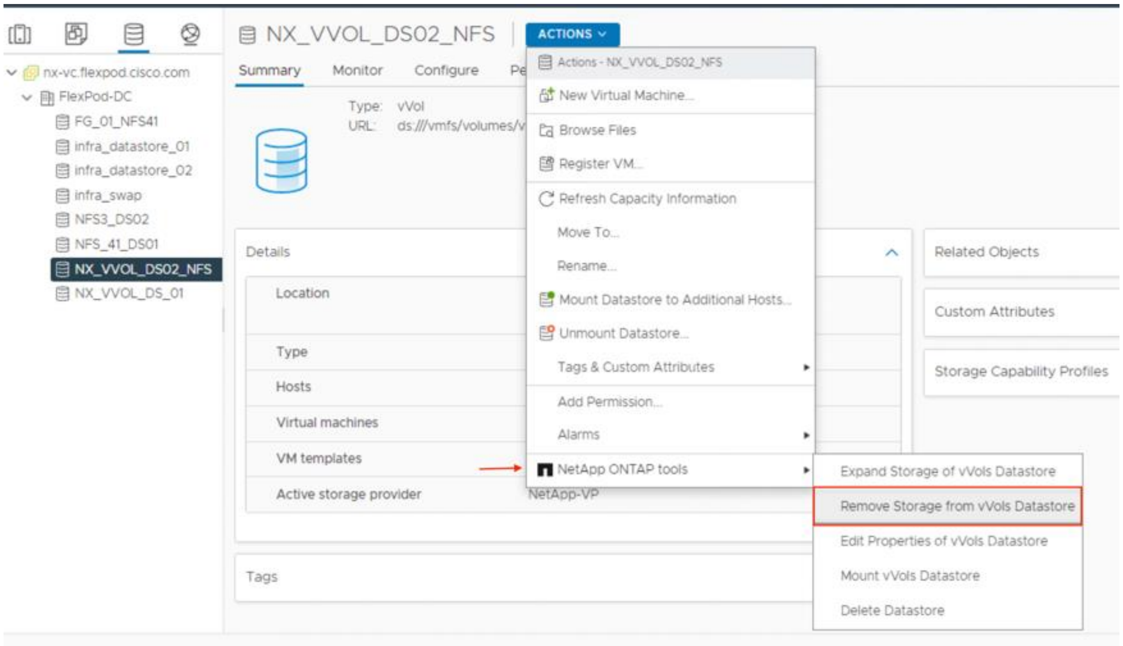
Next refresh: 08/15/2021 23:15:38

Name	Total Space	Free Space	Used Space	Space Utilized (%)	Available Space (%)	IOPS	Latency
NX_VVOL_DS_01	100.00 GB	99.99 GB	7.00 MB	0%	99%	0	0 ms
NX_VVOL_DS02_NFS	201.00 GB	201.00 GB	2.00 MB	0%	99%	0	0 ms

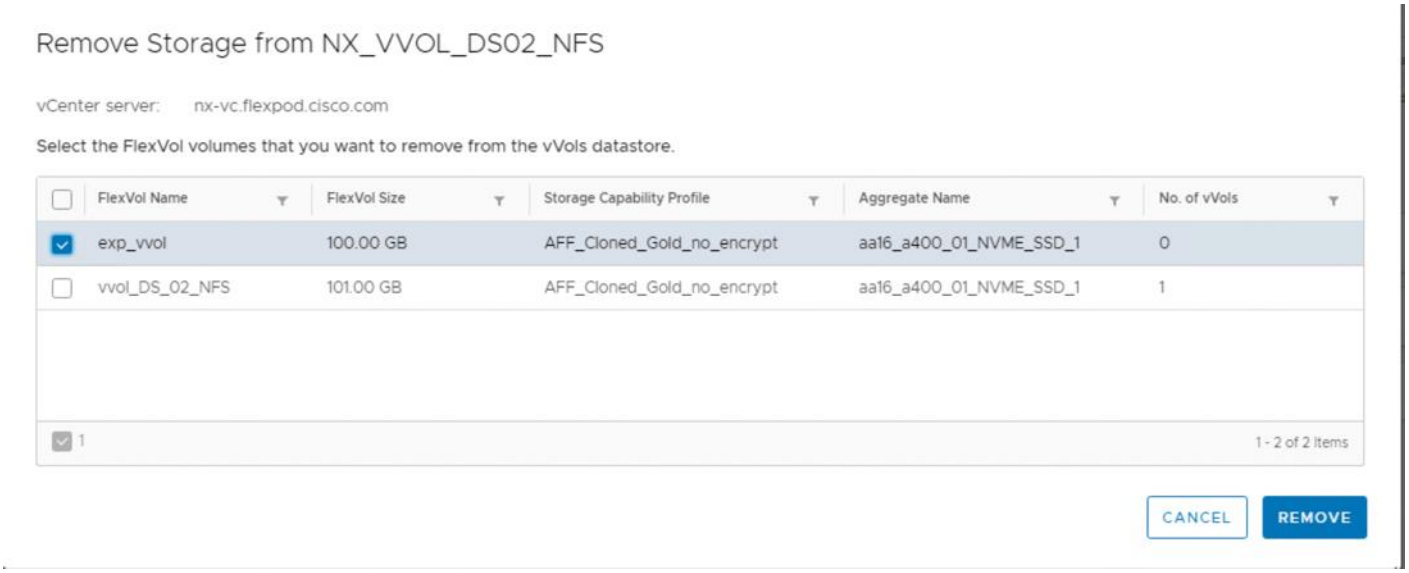
Remove Storage from a vVol Datastore

To remove storage from a vVol datastore, follow these steps:

1. In the Storage tab , click the vVol datastore to remove storage > Actions > NetApp VSC > Remove Storage from vVols Datastore.



2. Select the vVols within the datastore to remove and click Remove.



Remove Storage from NX_VVOL_DS02_NFS

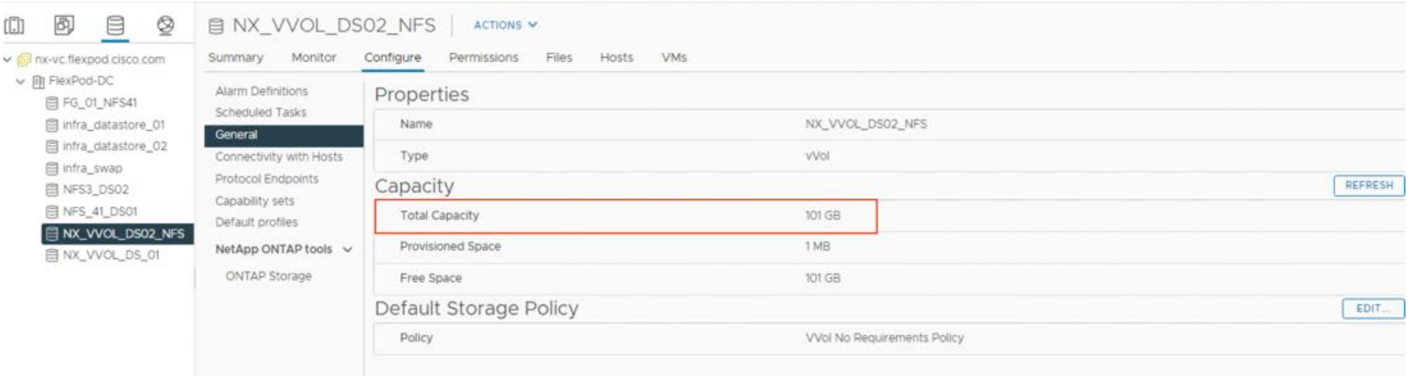
vCenter server: nx-vc.flexpod.cisco.com

Select the FlexVol volumes that you want to remove from the vVols datastore.

□	FlexVol Name	FlexVol Size	Storage Capability Profile	Aggregate Name	No. of vVols
☑	exp_vvol	100.00 GB	AFF_Cloned_Gold_no_encrypt	aa16_a400_01_NVME_SSD_1	0
□	vvol_DS_02_NFS	101.00 GB	AFF_Cloned_Gold_no_encrypt	aa16_a400_01_NVME_SSD_1	1

☑ 1 1 - 2 of 2 items

3. Verify the size of the datastore to validate the successful removal of storage from the vVols Datastore.



NX_VVOL_DS02_NFS | ACTIONS

Summary Monitor Configure Permissions Files Hosts VMs

- nx-vc.flexpod.cisco.com
  - FlexPod-DC
    - FG_01_NFS41
    - infra_datastore_01
    - infra_datastore_02
    - infra_swap
    - NFS3_DS02
    - NFS_41_DS01
    - NX_VVOL_DS02_NFS
    - NX_VVOL_DS_01

Alarm Definitions
Scheduled Tasks
General
Connectivity with Hosts
Protocol Endpoints
Capability sets
Default profiles
NetApp ONTAP tools
ONTAP Storage

Properties

Name	NX_VVOL_DS02_NFS
Type	VVol

Capacity REFRESH

Total Capacity	101 GB
Provisioned Space	1 MB
Free Space	101 GB

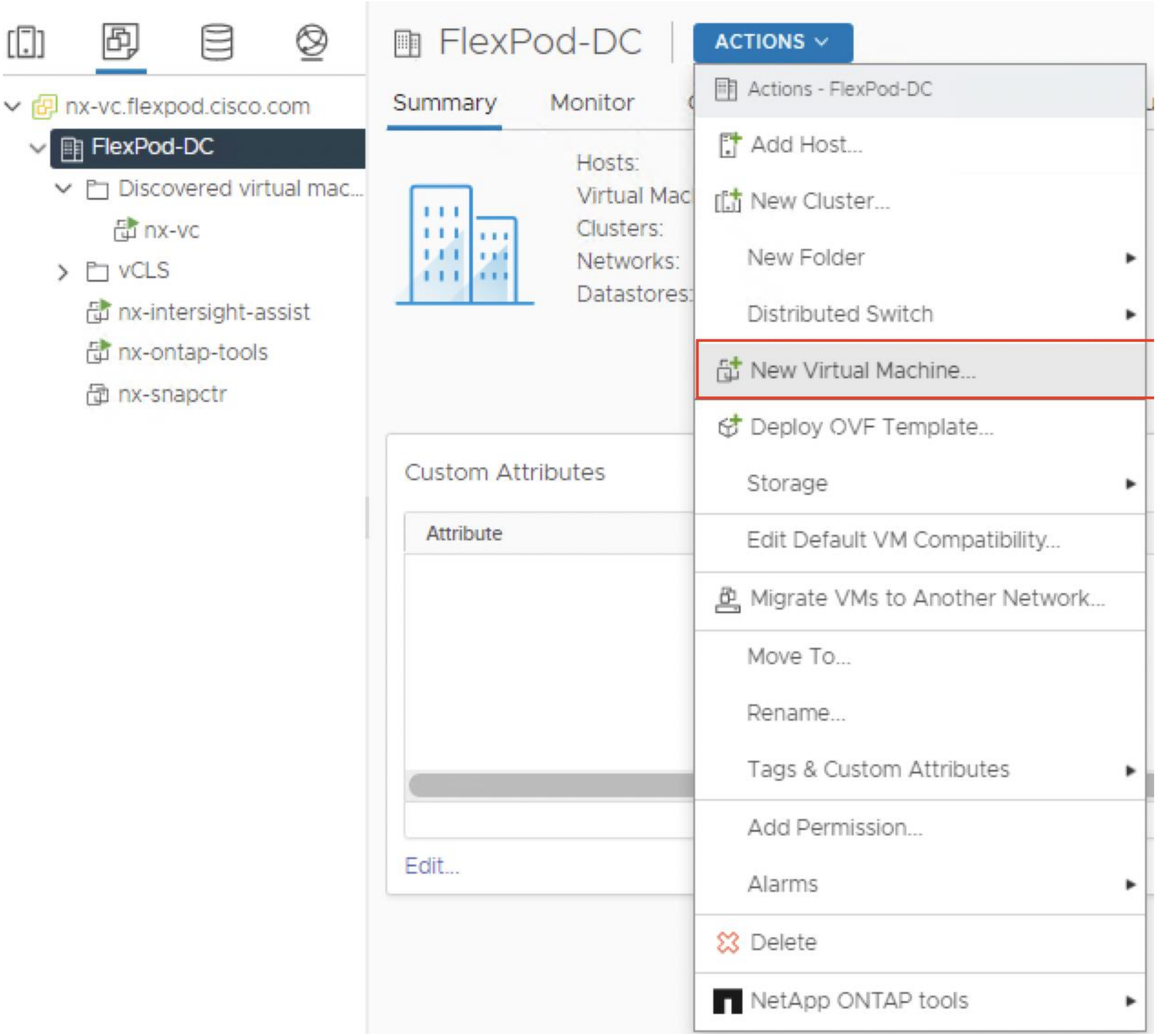
Default Storage Policy EDIT...

Policy	VVol No Requirements Policy

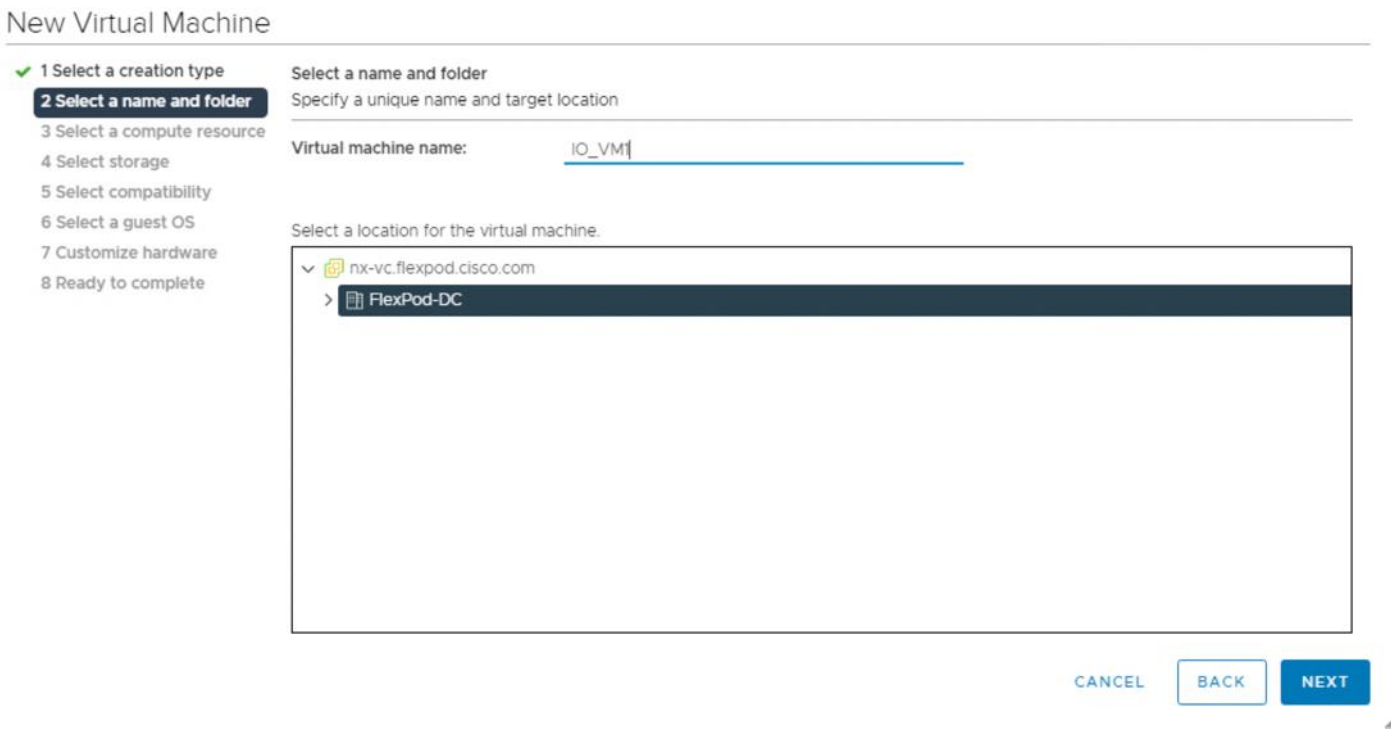
Create a Virtual Machine on a vVols Datastore with Assigned Virtual Machine Storage Policy

To provision a virtual machine on a vVols datastore, follow these steps:

1. Navigate to vSphere Client > VMs and Templates > Actions > New Virtual Machine.



2. Enter the name for the VM and click the datacenter.



New Virtual Machine

- ✓ 1 Select a creation type
- **2 Select a name and folder**
- 3 Select a compute resource
- 4 Select storage
- 5 Select compatibility
- 6 Select a guest OS
- 7 Customize hardware
- 8 Ready to complete

Select a name and folder

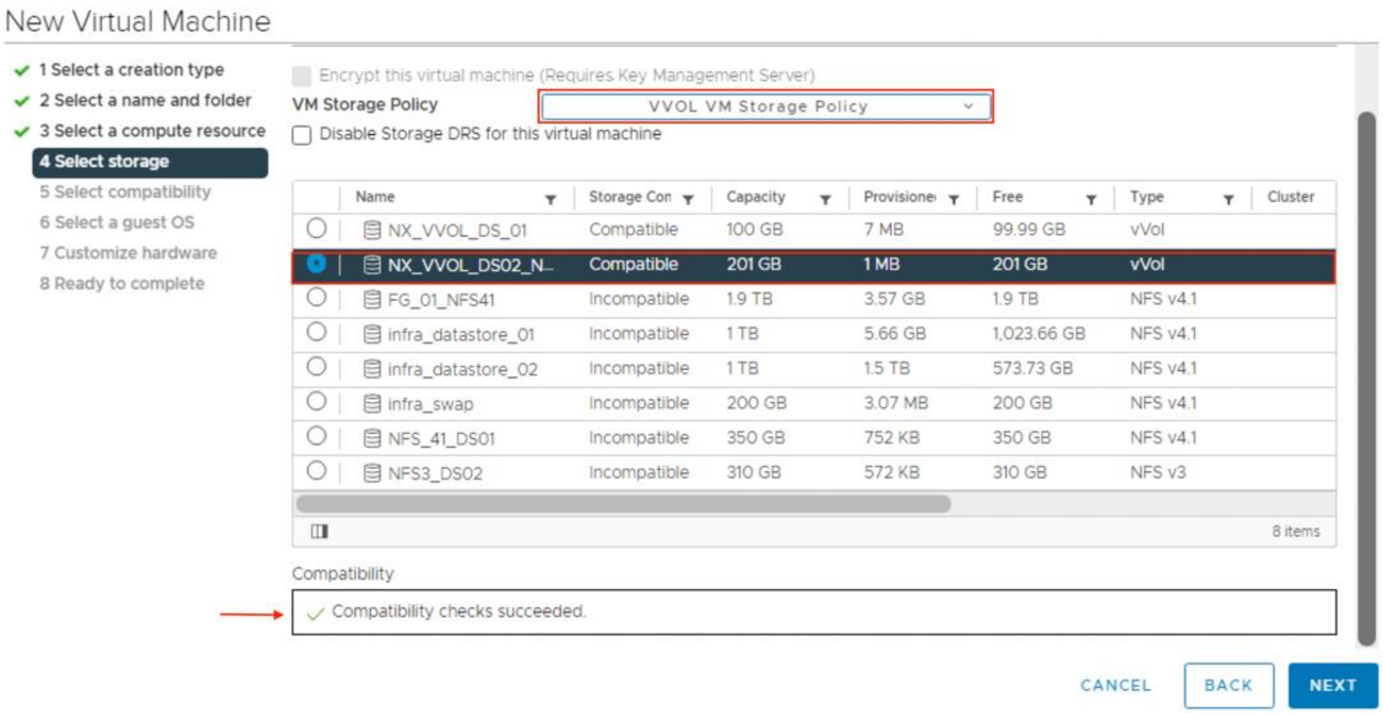
Specify a unique name and target location

Virtual machine name: IO_VM1

Select a location for the virtual machine.

- nx-vc.flexpod.cisco.com
  - FlexPod-DC

3. Choose the FlexPod-Management Data compute Resource.



New Virtual Machine

- ✓ 1 Select a creation type
- ✓ 2 Select a name and folder
- ✓ 3 Select a compute resource
- **4 Select storage**
- 5 Select compatibility
- 6 Select a guest OS
- 7 Customize hardware
- 8 Ready to complete

□ Encrypt this virtual machine (Requires Key Management Server)

VM Storage Policy: VVOL VM Storage Policy

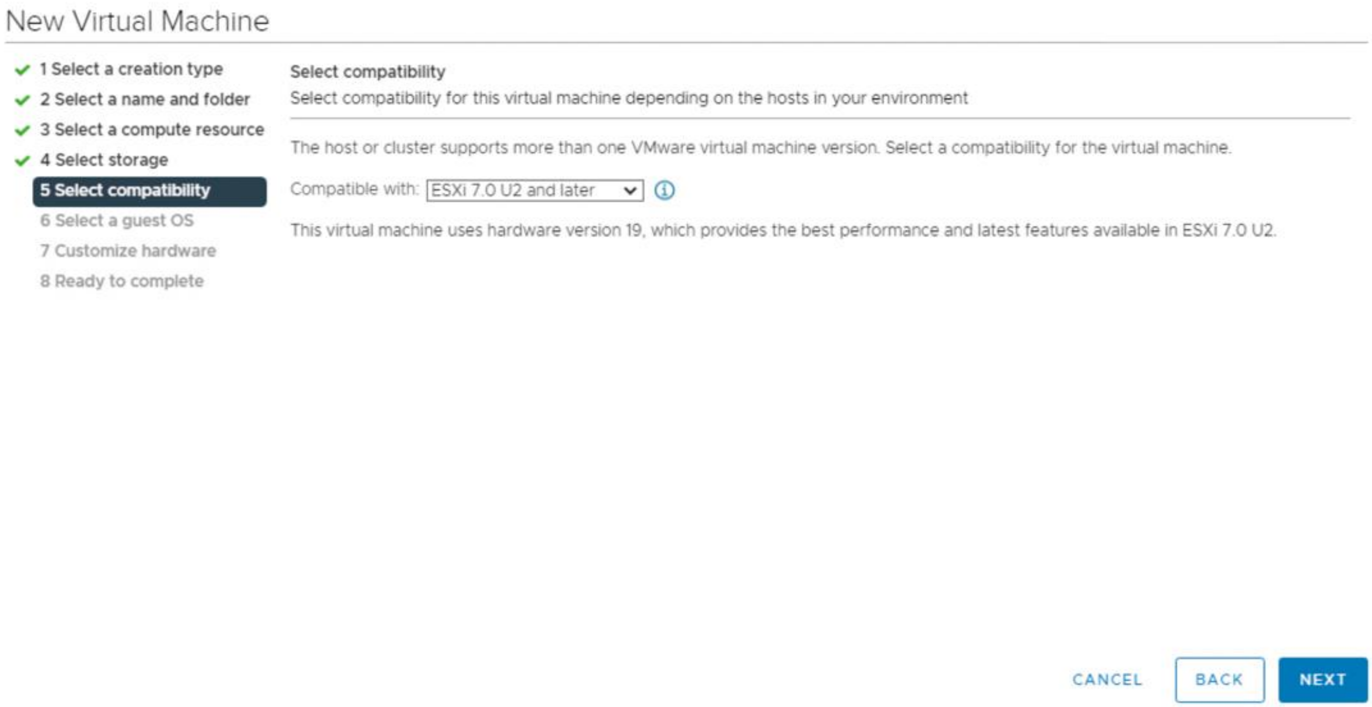
□ Disable Storage DRS for this virtual machine

	Name	Storage Con	Capacity	Provisione	Free	Type	Cluster
○	NX_VVOL_DS_01	Compatible	100 GB	7 MB	99.99 GB	vVol	
●	NX_VVOL_DS02_N...	Compatible	201 GB	1 MB	201 GB	vVol	
○	FG_01_NFS41	Incompatible	1.9 TB	3.57 GB	1.9 TB	NFS v4.1	
○	infra_datastore_01	Incompatible	1 TB	5.66 GB	1,023.66 GB	NFS v4.1	
○	infra_datastore_02	Incompatible	1 TB	1.5 TB	573.73 GB	NFS v4.1	
○	infra_swap	Incompatible	200 GB	3.07 MB	200 GB	NFS v4.1	
○	NFS_41_DS01	Incompatible	350 GB	752 KB	350 GB	NFS v4.1	
○	NFS3_DS02	Incompatible	310 GB	572 KB	310 GB	NFS v3	

8 items

Compatibility

✓ Compatibility checks succeeded.



New Virtual Machine

- ✓ 1 Select a creation type
- ✓ 2 Select a name and folder
- ✓ 3 Select a compute resource
- ✓ 4 Select storage
- **5 Select compatibility**
- 6 Select a guest OS
- 7 Customize hardware
- 8 Ready to complete

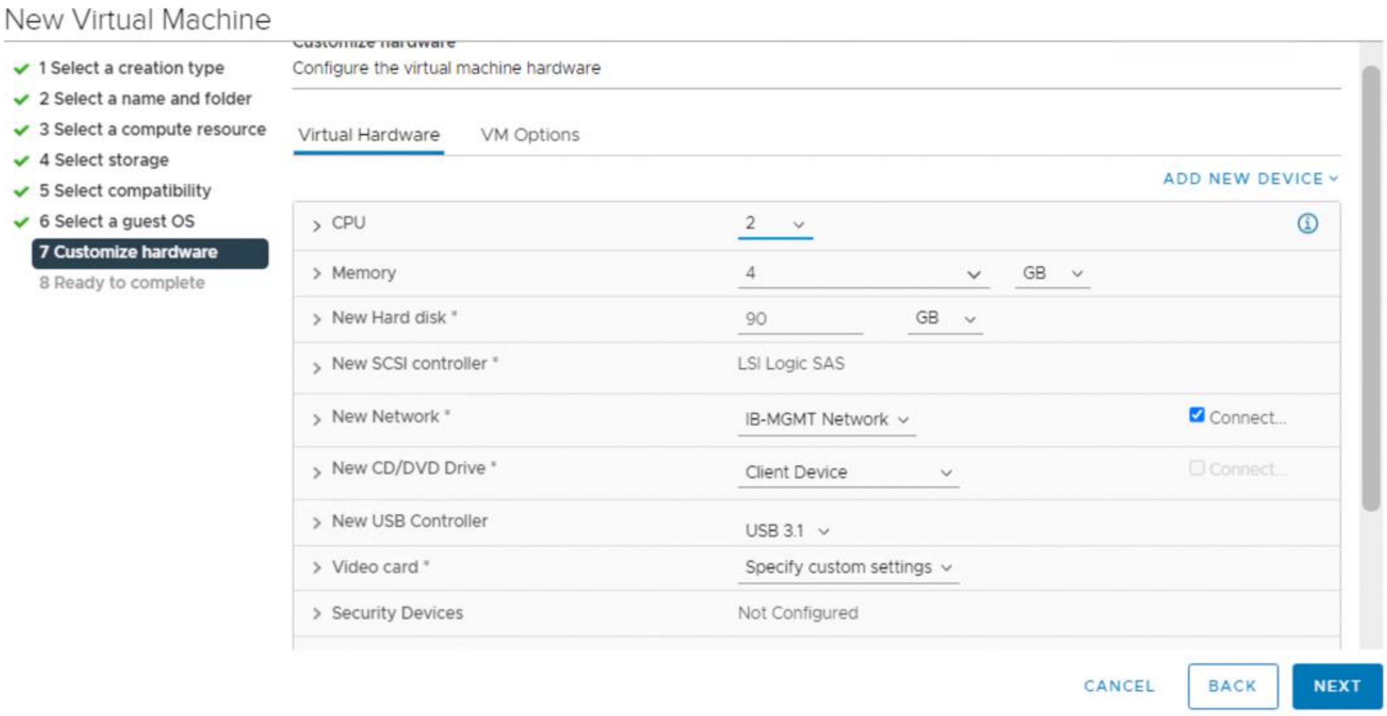
Select compatibility

Select compatibility for this virtual machine depending on the hosts in your environment

The host or cluster supports more than one VMware virtual machine version. Select a compatibility for the virtual machine.

Compatible with: ESXi 7.0 U2 and later

This virtual machine uses hardware version 19, which provides the best performance and latest features available in ESXi 7.0 U2.



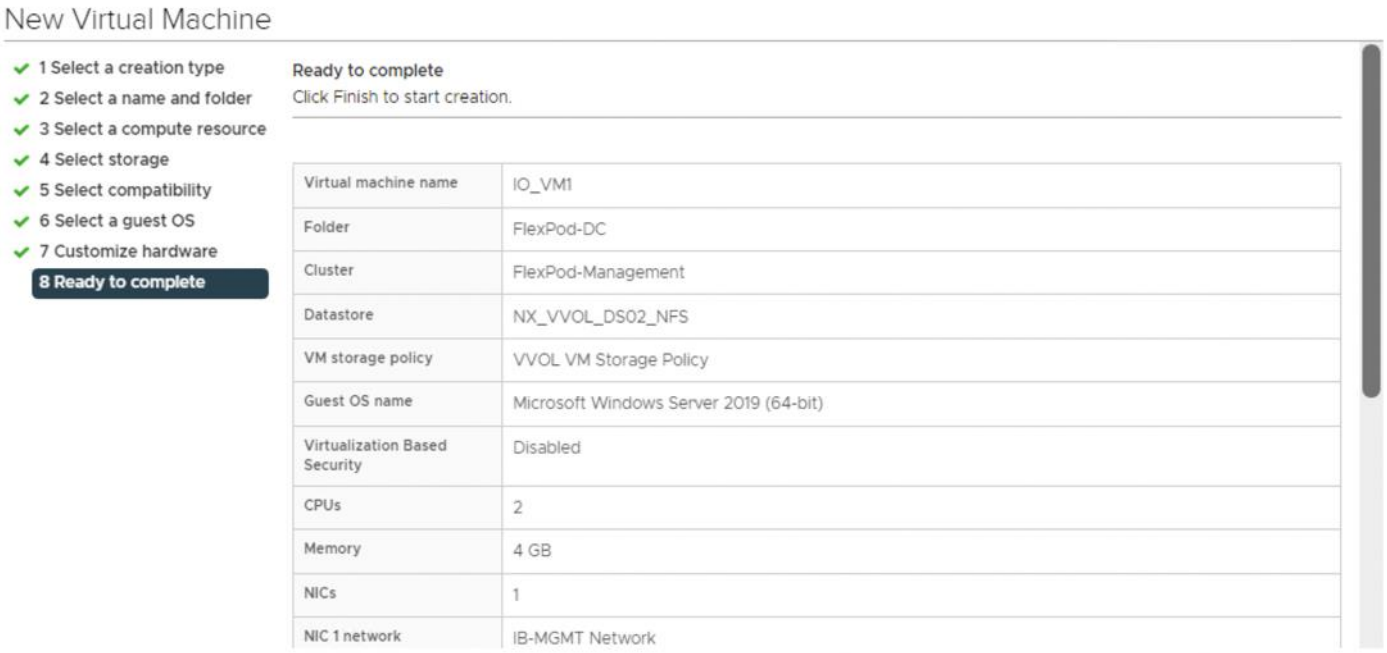
New Virtual Machine

- ✓ 1 Select a creation type
- ✓ 2 Select a name and folder
- ✓ 3 Select a compute resource
- ✓ 4 Select storage
- ✓ 5 Select compatibility
- ✓ 6 Select a guest OS
- **7 Customize hardware**
- 8 Ready to complete

Customize hardware

Configure the virtual machine hardware

CPU	2	
Memory	4 GB	
New Hard disk *	90 GB	
New SCSI controller *	LSI Logic SAS	
New Network *	IB-MGMT Network	☑ Connect...
New CD/DVD Drive *	Client Device	□ Connect...
New USB Controller	USB 3.1	
Video card *	Specify custom settings	
Security Devices	Not Configured	



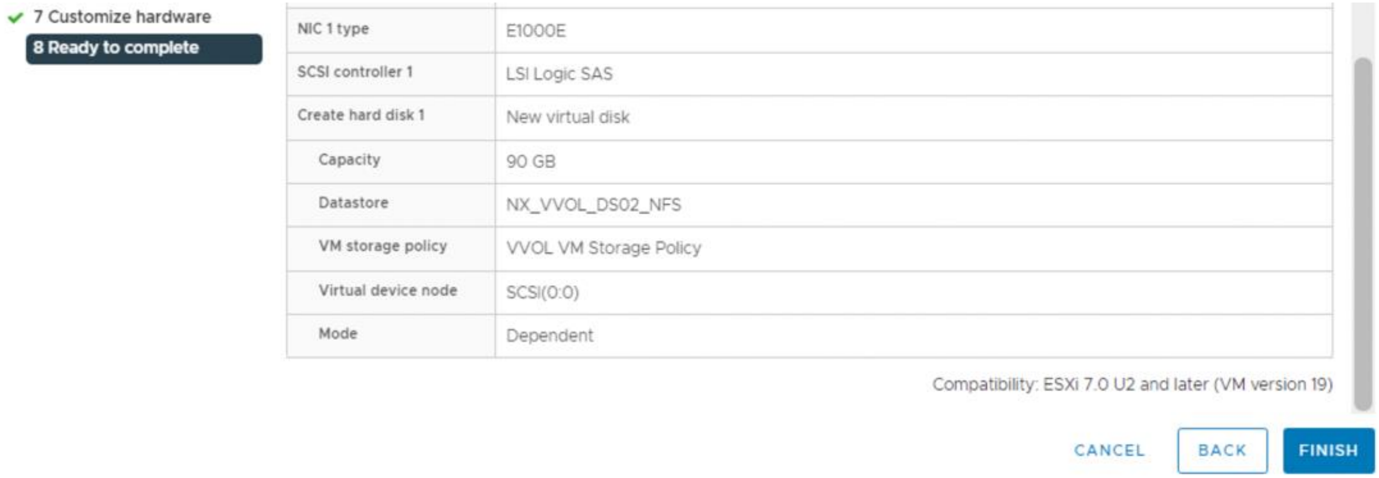
New Virtual Machine

- ✓ 1 Select a creation type
- ✓ 2 Select a name and folder
- ✓ 3 Select a compute resource
- ✓ 4 Select storage
- ✓ 5 Select compatibility
- ✓ 6 Select a guest OS
- ✓ 7 Customize hardware
- 8 Ready to complete

Ready to complete

Click Finish to start creation.

Virtual machine name	IO_VM1
Folder	FlexPod-DC
Cluster	FlexPod-Management
Datastore	NX_VVOL_DS02_NFS
VM storage policy	VVOL VM Storage Policy
Guest OS name	Microsoft Windows Server 2019 (64-bit)
Virtualization Based Security	Disabled
CPUs	2
Memory	4 GB
NICs	1
NIC 1 network	IB-MGMT Network



- ✓ 7 Customize hardware
- 8 Ready to complete

NIC 1 type	E1000E
SCSI controller 1	LSI Logic SAS
Create hard disk 1	New virtual disk
Capacity	90 GB
Datastore	NX_VVOL_DS02_NFS
VM storage policy	VVOL VM Storage Policy
Virtual device node	SCSI(0:0)
Mode	Dependent

Compatibility: ESXi 7.0 U2 and later (VM version 19)

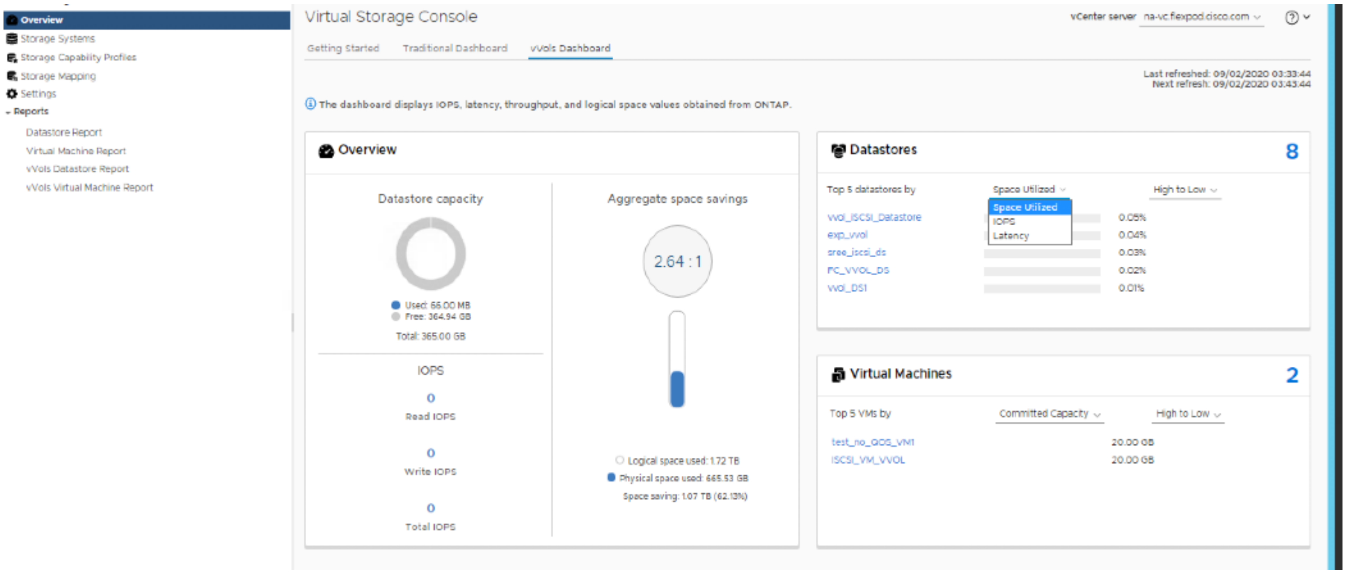
4. Validate that the VM is created successfully.

Monitor a vVols Datastore

To monitor a vVols datastore, follow these steps:

1. The vVols dashboard in the NetApp ONTAP tools Overview tab provides:

   - Overview
   - Top 5 datastores by Space Utilization, IOPs and Latency in ascending and descending order
   - A list of VMs on the vVols Datastore



vCenter server na-vc.flexpod.cisco.com

Last refreshed: 09/02/2020 03:33:44
Next refresh: 09/02/2020 03:43:44

The dashboard displays IOPS, latency, throughput, and logical space values obtained from ONTAP.

● Used: 66.00 MB
● Free: 364.94 GB
Total: 365.00 GB

0 Read IOPS

0 Write IOPS

0 Total IOPS

○ Logical space used: 1.72 TB
● Physical space used: 665.53 GB
Space saving: 1.07 TB (62.13%)

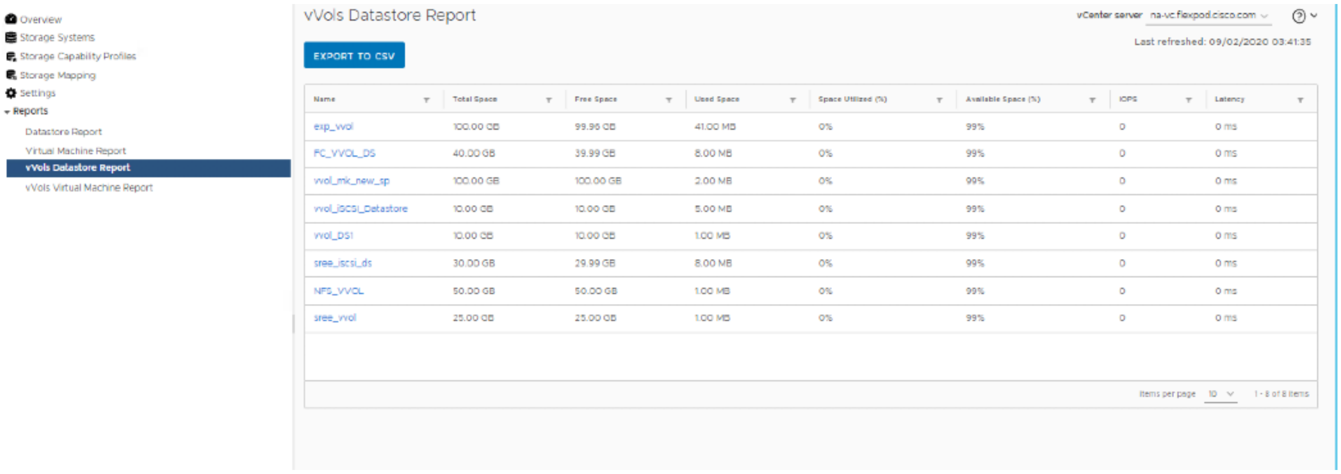
Top 5 datastores by Space Utilized High to Low

vvol_ISCSI_Datastore	0.05%
exp_vvol	0.04%
sree_iscsi_ds	0.03%
FC_VVOL_DS	0.02%
vvol_DS1	0.01%

Top 5 VMs by Committed Capacity High to Low

test_no_QOS_VM1	20.00 GB
ISCSI_VM_VVOL	20.00 GB

2. The vVol Datastore Report can be retrieved from VSC > Reports > vVol Datastore Report.



vVols Datastore Report

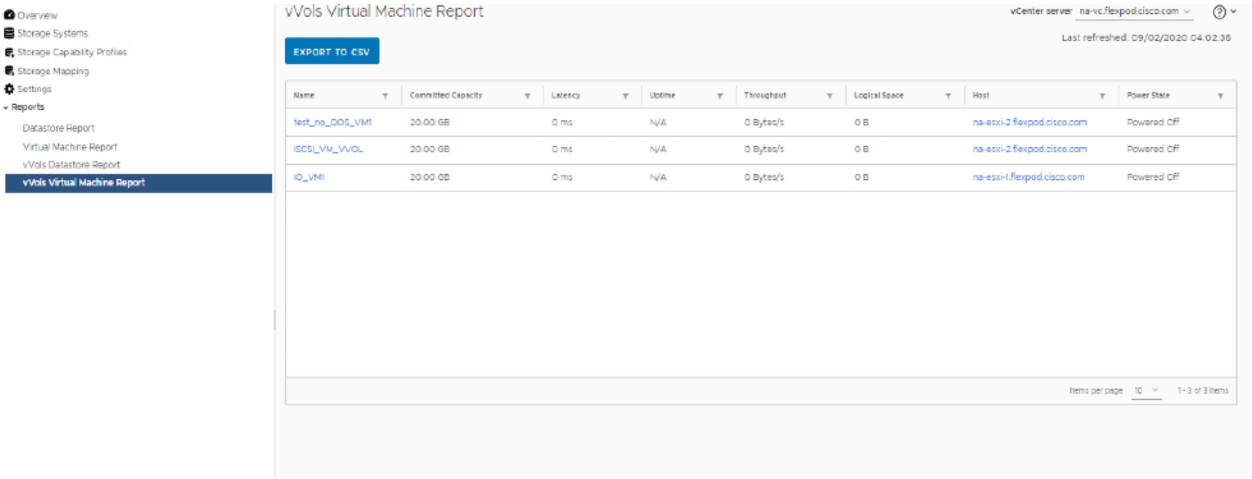
vCenter server na-vc.flexpod.cisco.com

Last refreshed: 09/02/2020 03:41:35

Name	Total Space	Free Space	Used Space	Space Utilized (%)	Available Space (%)	IOPS	Latency
exp_vvol	100.00 GB	99.96 GB	41.00 MB	0%	99%	0	0 ms
FC_VVOL_DS	40.00 GB	39.99 GB	8.00 MB	0%	99%	0	0 ms
vvol_mk_new_sp	100.00 GB	100.00 GB	2.00 MB	0%	99%	0	0 ms
vvol_iSCSI_Datastore	10.00 GB	10.00 GB	5.00 MB	0%	99%	0	0 ms
vvol_DS1	10.00 GB	10.00 GB	1.00 MB	0%	99%	0	0 ms
sree_iscsi_ds	30.00 GB	29.99 GB	8.00 MB	0%	99%	0	0 ms
NFS_VVOL	50.00 GB	50.00 GB	1.00 MB	0%	99%	0	0 ms
sree_vvol	25.00 GB	25.00 GB	1.00 MB	0%	99%	0	0 ms

Items per page 10 1 - 8 of 8 items

3. The vVol Virtual Machine Report can be retrieved from VSC > Reports > vVol Virtual Machine Report.



vVols Virtual Machine Report

vCenter server na-vc.flexpod.cisco.com

Last refreshed: 09/02/2020 04:02:36

Name	Committed Capacity	Latency	Uptime	Throughput	Logical Space	Host	Power State
test_no_QOS_VM1	20.00 GB	0 ms	N/A	0 Bytes/s	0 B	na-esxi-2.flexpod.cisco.com	Powered Off
ISCSI_VM_VVOL	20.00 GB	0 ms	N/A	0 Bytes/s	0 B	na-esxi-2.flexpod.cisco.com	Powered Off
IO_VM1	20.00 GB	0 ms	N/A	0 Bytes/s	0 B	na-esxi-1.flexpod.cisco.com	Powered Off

NetApp SnapCenter 4.6

SnapCenter Software is a simple, centralized, scalable platform that provides application-consistent data protection for applications, databases, host file systems, and VMs running on ONTAP systems anywhere in the Hybrid Cloud.

NetApp SnapCenter Architecture

The SnapCenter platform is based on a multitier architecture that includes a centralized management server (SnapCenter Server) and a SnapCenter host agent. The host agent that performs virtual machine and datastore backups for VMware vSphere is the SnapCenter Plug-in for VMware vSphere. It is packaged as a Linux appliance (Debian-based Open Virtual Appliance format) and is no longer part of the SnapCenter Plug-ins Package for Windows. Additional information on deploying SnapCenter server for application backups can be found in the documentation listed below.

This guide focuses on deploying and configuring the SnapCenter plug-in for VMware vSphere to protect virtual machines and VM datastores.

You must install SnapCenter Server and the necessary plug-ins to support application-consistent backups for Microsoft SQL, Microsoft Exchange, Oracle databases and SAP HANA. Application-level protection is beyond the scope of this deployment guide. Refer to the SnapCenter documentation for more information or the application specific CVD's and technical reports for detailed information on how to deploy SnapCenter for a specific application configuration.

- SnapCenter Documentation: https://docs.netapp.com/us-en/snapcenter/index.html
- FlexPod Datacenter for Microsoft SQL Server 2019 and VMware vSphere 6.7
- SnapCenter Plug-in for VMware vSphere Documentation

Install SnapCenter Plug-In for VMware vSphere 4.6

NetApp SnapCenter Plug-in for VMware vSphere is a Linux-based virtual appliance which enables the SnapCenter Plug-in for VMware vSphere to protect virtual machines and VMware datastores.

Host and Privilege Requirements for the SnapCenter Plug-In for VMware vSphere

Review the following requirements before you install the SnapCenter Plug-in for VMware vSphere virtual appliance:

- You must deploy the SnapCenter Plug-in for VMware vSphere virtual appliance as a Linux VM.
- You should deploy the virtual appliance on the vCenter Server.
- You must not deploy the virtual appliance in a folder that has a name with special characters.
- You must deploy and register a separate, unique instance of the virtual appliance for each vCenter Server.

Table 9. Port Requirements

Port	Requirement
8080(HTTPS) bidirectional	This port is used to manage the virtual appliance
8144(HTTPs) bidirectional	Communication between SnapCenter Plug-in for VMware vSphere and vCenter
443 (HTTPS)	Communication between SnapCenter Plug-in for VMware vSphere and vCenter

License Requirements for SnapCenter Plug-In for VMware vSphere

The following licenses are required to be installed on the ONTAP storage system to backup and restore VM's in the virtual infrastructure:

Table 10.SnapCenter Plug-in for VMware vSphere License Requirements

Product	License Requirements
ONTAP	**SnapManager Suite:** Used for backup operations One of these: SnapMirror or SnapVault (for secondary data protection regardless of the type of relationship)
ONTAP Primary Destinations	To perform protection of VMware VMs and datastores the following licenses should be installed: **SnapRestore**: used for restoring operations **FlexClone**: used for mount and attach operations
ONTAP Secondary Destinations	To perform protection of VMware VMs and datastores only: **FlexClone**: used for mount and attach operations

VMware	**vSphere Standard, Enterprise, or Enterprise Plus** A vSphere license is required to perform restore operations, which use Storage vMotion. vSphere Essentials or Essentials Plus licenses do not include Storage vMotion.

It is recommended but not required, that you add SnapCenter Standard licenses to secondary destinations. If SnapCenter Standard licenses are not enabled on secondary systems, you cannot use SnapCenter after performing a failover operation. A FlexClone license on secondary storage is required to perform mount and attach operations. A SnapRestore license is required to perform restore operations.

Download and Deploy the SnapCenter Plug-In for VMware vSphere 4.6

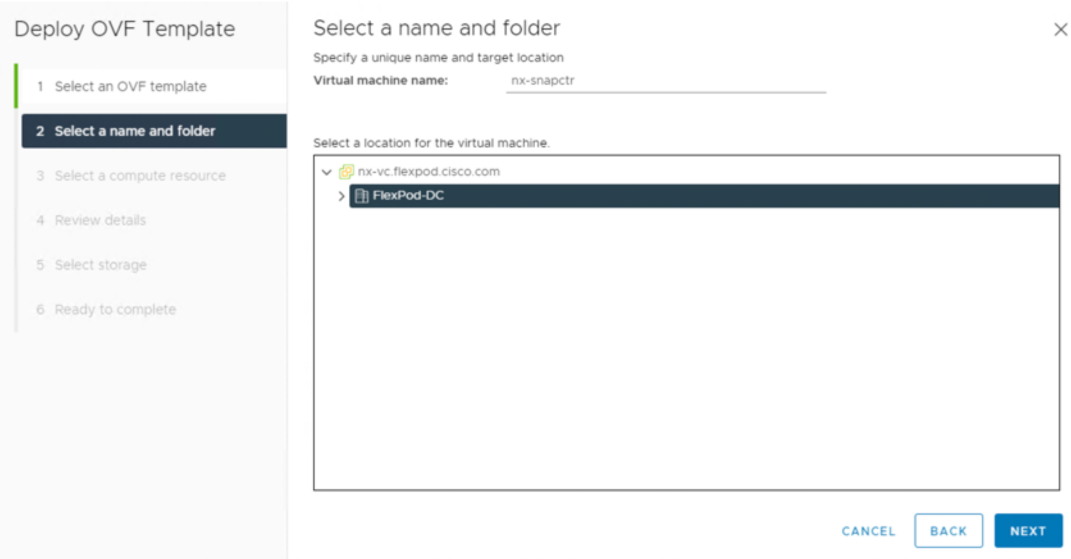
To download and deploy the SnapCenter Plug-in for VMware vSphere appliance, follow these steps:

1. Download SnapCenter Plug-in for VMware vSphere OVA file from NetApp support site (https://mysupport.netapp.com).

2. From VMware vCenter, navigate to the VMs and Templates tab, right-click FlexPod-DC and choose Deploy OVF Template.

3. Specify the location of the OVF Template and click NEXT.

4. On the Select a name and folder page, enter a unique name and location for the VM and click NEXT to continue.



Select a name and folder

Specify a unique name and target location

Virtual machine name: nx-snapctr

Select a location for the virtual machine.

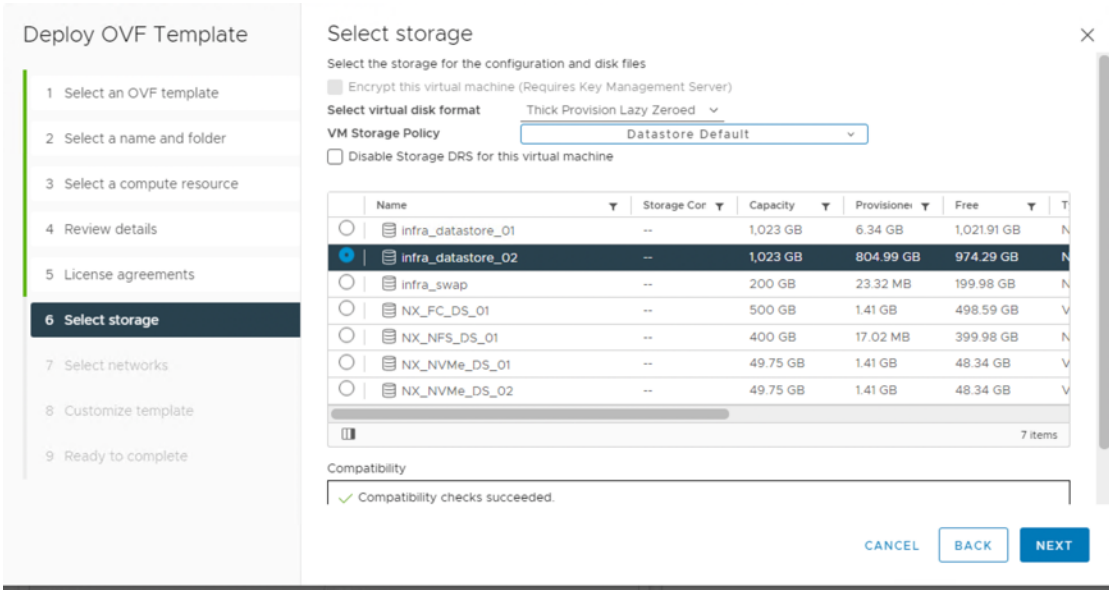
nx-vc.flexpod.cisco.com
FlexPod-DC

5. On the Select a compute resource page, choose a resource where you want to run the deployed VM template, and click NEXT.

6. On the Review details page, verify the OVA template details and click NEXT.

7. On the License agreements page, check the box I accept all license agreements.

8. On the Select storage page, change the datastore virtual disk format to Thin Provision and click NEXT.



Deploy OVF Template

1 Select an OVF template
2 Select a name and folder
3 Select a compute resource
4 Review details
5 License agreements
6 Select storage
7 Select networks
8 Customize template
9 Ready to complete

Select storage

Select the storage for the configuration and disk files

□ Encrypt this virtual machine (Requires Key Management Server)

Select virtual disk format: Thick Provision Lazy Zeroed

VM Storage Policy: Datastore Default

□ Disable Storage DRS for this virtual machine

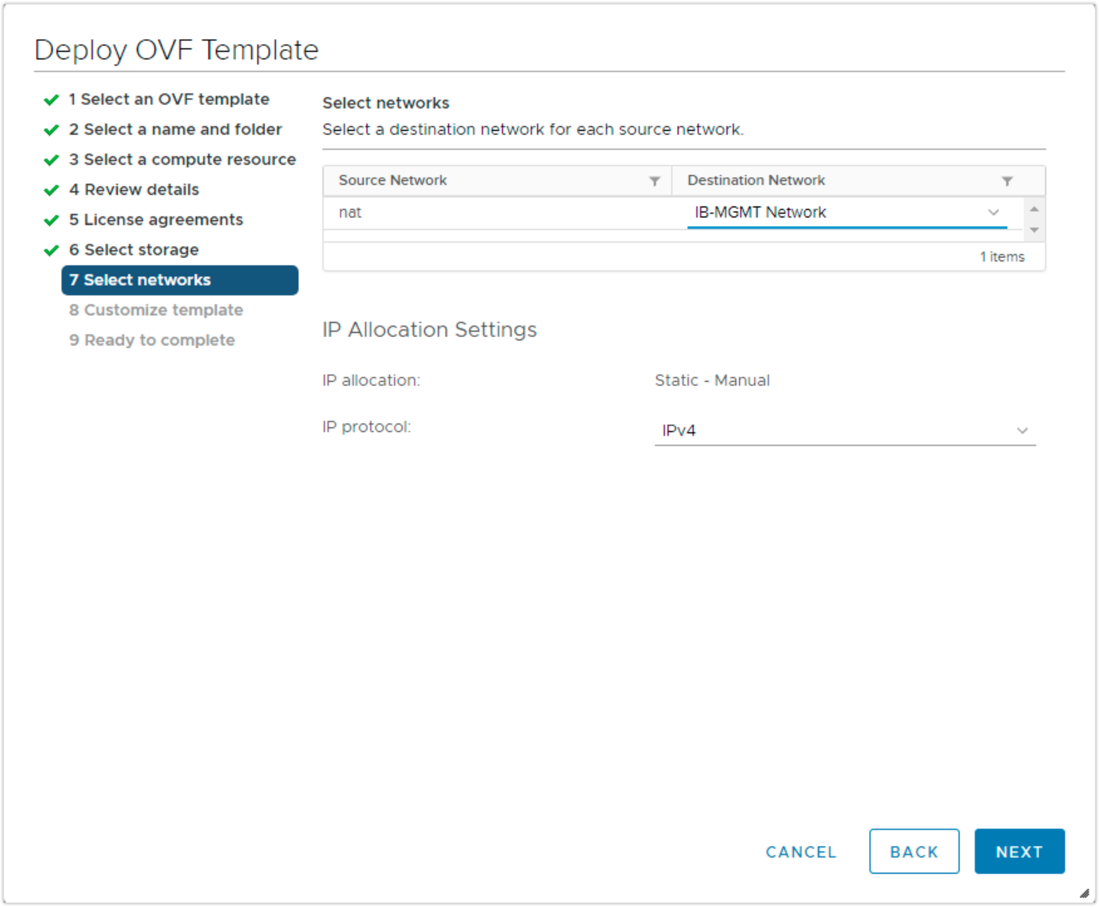
	Name	Storage Cor	Capacity	Provisione	Free	T
○	infra_datastore_01	--	1,023 GB	6.34 GB	1,021.91 GB	N
●	infra_datastore_02	--	1,023 GB	804.99 GB	974.29 GB	N
○	infra_swap	--	200 GB	23.32 MB	199.98 GB	N
○	NX_FC_DS_01	--	500 GB	1.41 GB	498.59 GB	V
○	NX_NFS_DS_01	--	400 GB	17.02 MB	399.98 GB	N
○	NX_NVMe_DS_01	--	49.75 GB	1.41 GB	48.34 GB	V
○	NX_NVMe_DS_02	--	49.75 GB	1.41 GB	48.34 GB	V

7 items

Compatibility

✓ Compatibility checks succeeded.

9. On the Select networks page, choose a source network, and map it to a destination network, and then click NEXT.



Deploy OVF Template

✓ 1 Select an OVF template
✓ 2 Select a name and folder
✓ 3 Select a compute resource
✓ 4 Review details
✓ 5 License agreements
✓ 6 Select storage
7 Select networks
8 Customize template
9 Ready to complete

Select networks

Select a destination network for each source network.

Source Network	Destination Network
nat	IB-MGMT Network

1 items

IP Allocation Settings

IP allocation: Static - Manual

IP protocol: IPv4

10. On the Customize template page, do the following:

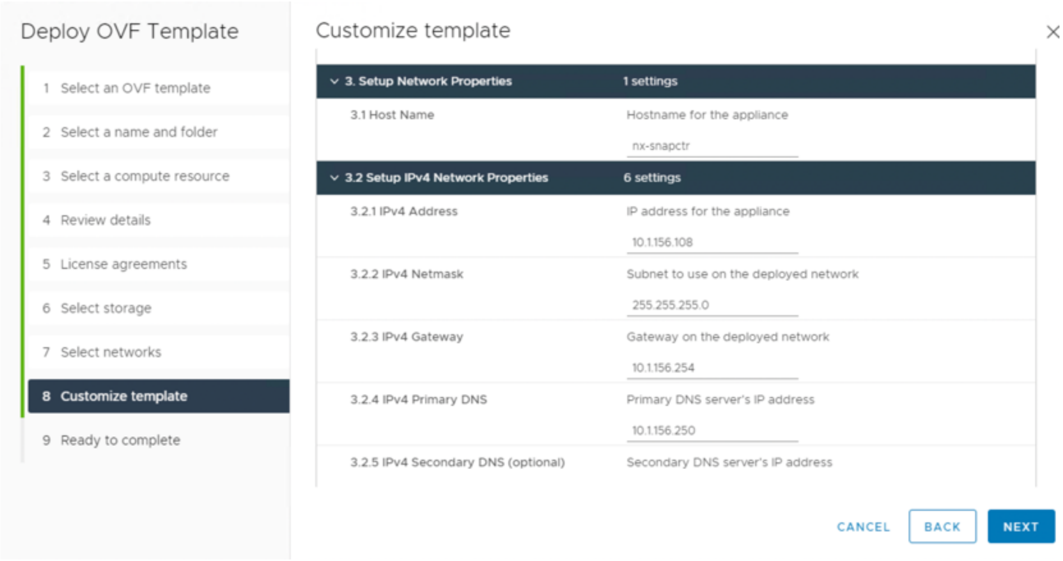
    a. In Register to existing vCenter, enter the vCenter credentials.

11. In Create SnapCenter Plug-in for VMware vSphere credentials, enter the SnapCenter Plug-in for VMware vSphere credentials.

12. In Create SCV credentials, create a username and password for the SCV maintenance user.

13. In Setup Network Properties, enter the network information.

14. In Setup Date and Time, choose the time zone where the vCenter is located.



Customize template

3. Setup Network Properties — 1 settings

3.1 Host Name — Hostname for the appliance: nx-snapctr

3.2 Setup IPv4 Network Properties — 6 settings

3.2.1 IPv4 Address — IP address for the appliance: 10.1.156.108

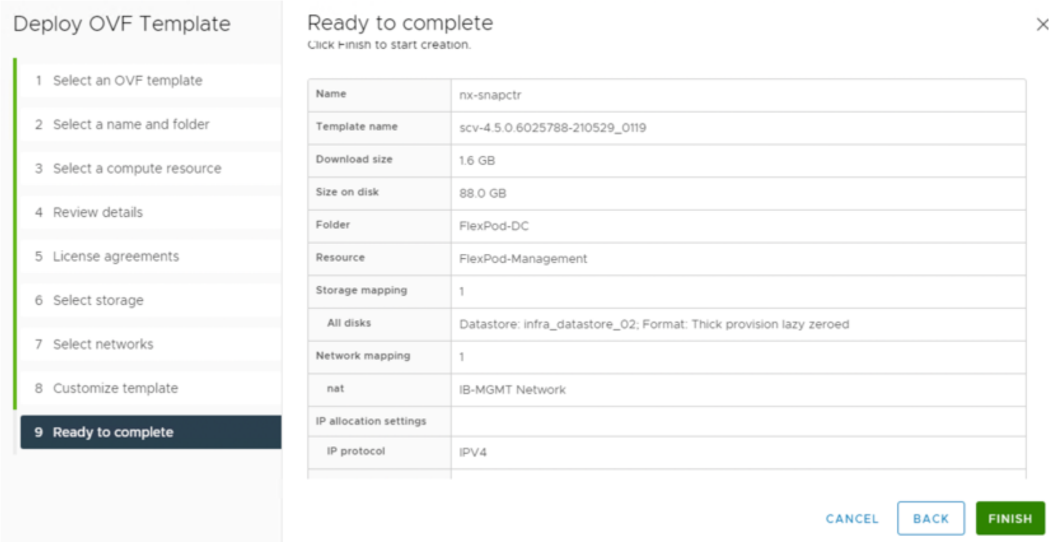
3.2.2 IPv4 Netmask — Subnet to use on the deployed network: 255.255.255.0

3.2.3 IPv4 Gateway — Gateway on the deployed network: 10.1.156.254

3.2.4 IPv4 Primary DNS — Primary DNS server's IP address: 10.1.156.250

3.2.5 IPv4 Secondary DNS (optional) — Secondary DNS server's IP address

15. On the Ready to complete page, review the page and click FINISH.



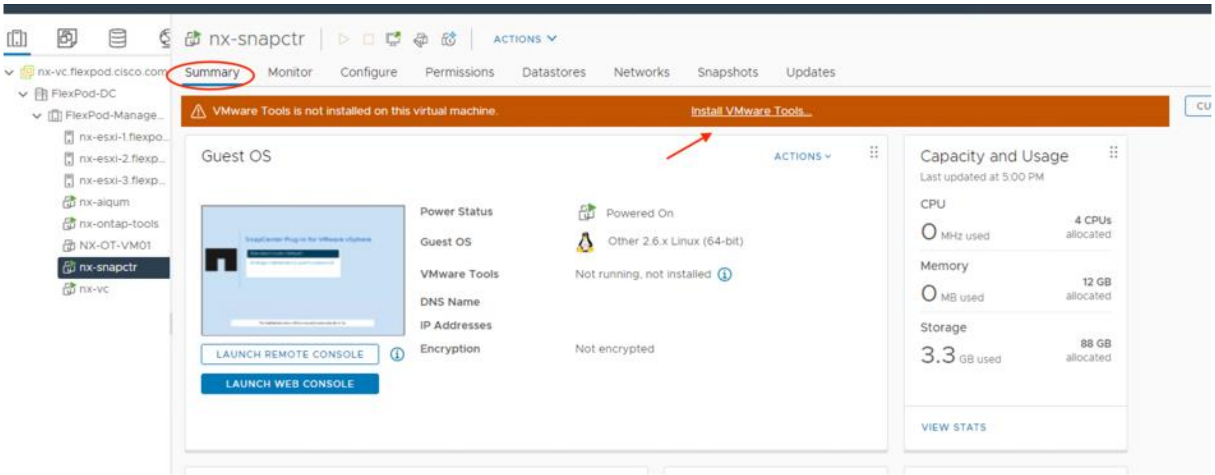
Ready to complete

Click Finish to start creation.

Name	nx-snapctr
Template name	scv-4.5.0.6025788-210529_0119
Download size	1.6 GB
Size on disk	88.0 GB
Folder	FlexPod-DC
Resource	FlexPod-Management
Storage mapping	1
All disks	Datastore: infra_datastore_02; Format: Thick provision lazy zeroed
Network mapping	1
nat	IB-MGMT Network
IP allocation settings	
IP protocol	IPV4

16. Navigate to the VM where the virtual appliance was deployed, then click the Summary tab, and then check the box for Power On to start the virtual appliance.

17. While the virtual appliance is powering on, click Install VMware tools in the orange banner displayed in the summary tab of the appliance.



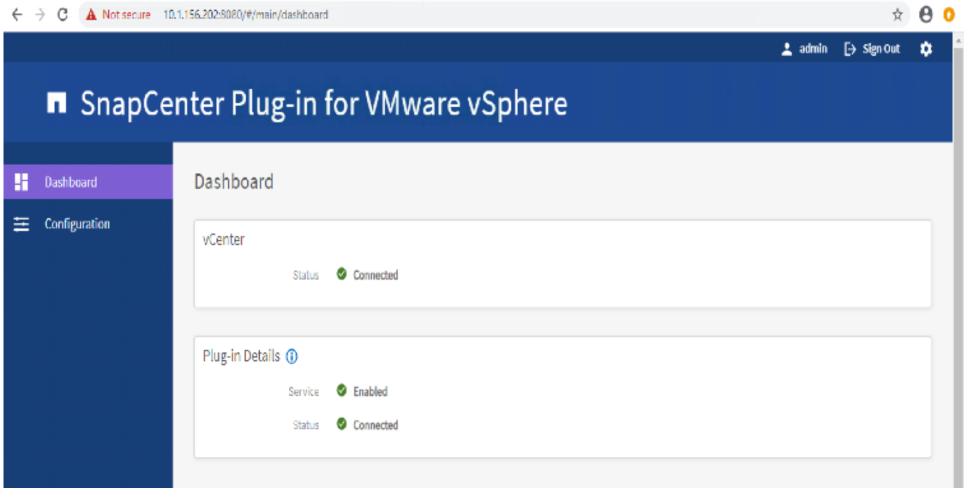
VMware Tools is not installed on this virtual machine.

Power Status	Powered On
Guest OS	Other 2.6.x Linux (64-bit)
VMware Tools	Not running, not installed
DNS Name	
IP Addresses	
Encryption	Not encrypted

Last updated at 5:00 PM

CPU	0 MHz used	4 CPUs allocated
Memory	0 MB used	12 GB allocated
Storage	3.3 GB used	88 GB allocated

18. Log into SnapCenter Plug-in for VMware vSphere using the IP address (https://<ip>:8080) displayed on the appliance console screen with the credentials that you provided in the deployment wizard. Verify on the Dashboard that the virtual appliance is successfully connected to vCenter and the SnapCenter Plug-in for VMware vSphere is successfully enabled and connected.


Not secure
10.1.156.202:8080/#/main/dashboard
admin
Sign Out
SnapCenter Plug-in for VMware vSphere
Dashboard
Configuration

Dashboard

vCenter

Status: Connected

Plug-in Details

Service: Enabled

Status: Connected

SnapCenter Plug-In for VMware vSphere in vCenter Server

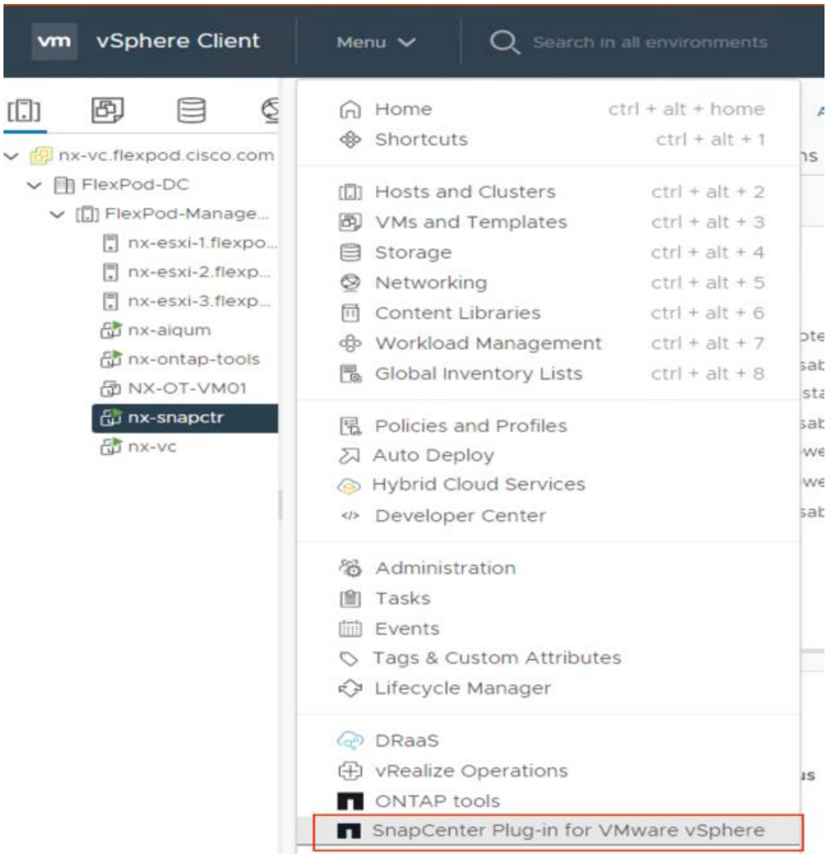
After you have successfully installed the Plug-in for VMware vSphere, to configure SnapCenter and make it ready to backup virtual machines, follow these steps:

1. In your browser, navigate to VMware vSphere Web Client URL https://<vCenter Server>/ui.

If currently logged into vCenter, logoff, close the open tab and sign-on again to access the SnapCenter Plug-in for VMware vSphere.

2. After logging on to the vSphere Web Client you will see a blue banner indicating the SnapCenter plug-in was successfully deployed. Click Refresh to activate the plug-in.

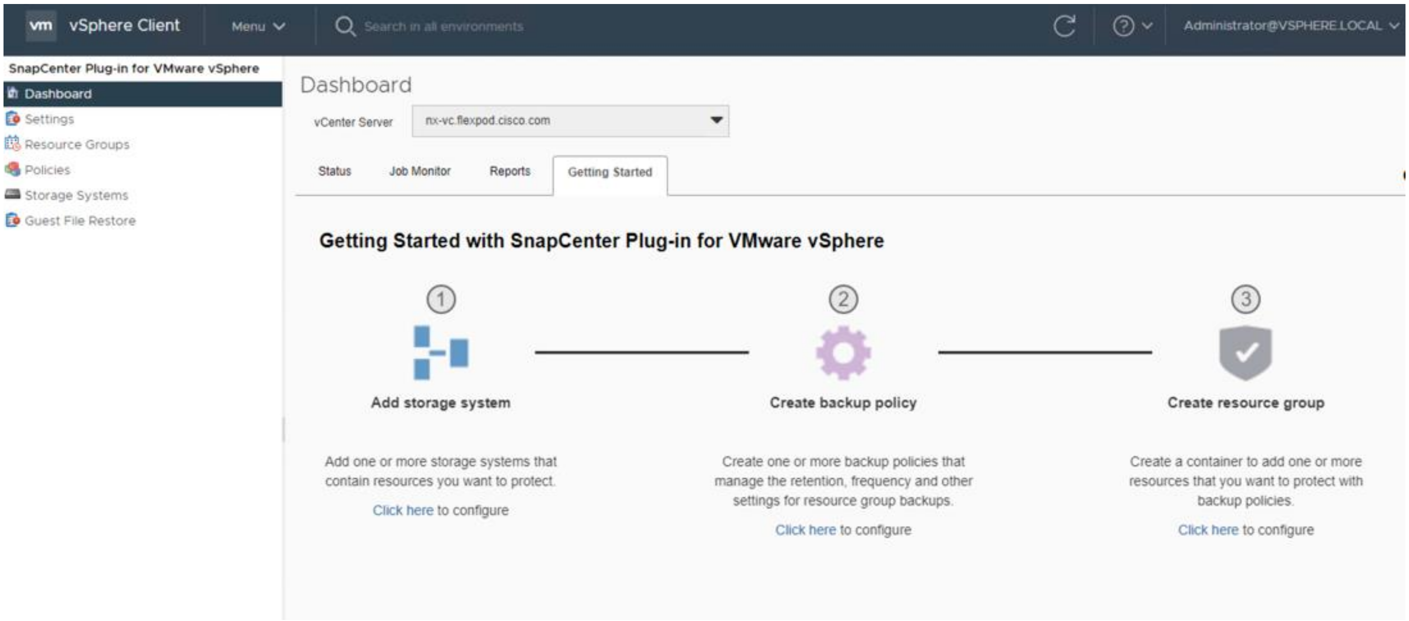
3. On the VMware vSphere Web Client page, click the menu and click SnapCenter Plug-in for VMware vSphere to launch the SnapCenter Plug-in for VMware GUI.



Add Storage Systems (SVM)

To add storage systems, follow these steps:

1. Go to the Storage Systems tab.



Getting Started with SnapCenter Plug-in for VMware vSphere

Add one or more storage systems that contain resources you want to protect.

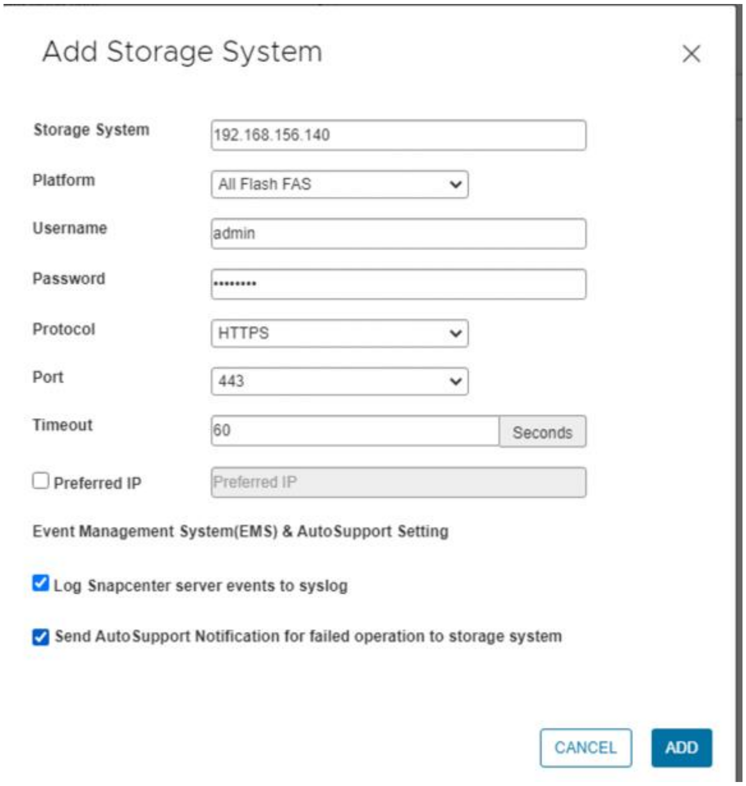
Create one or more backup policies that manage the retention, frequency and other settings for resource group backups.

Create a container to add one or more resources that you want to protect with backup policies.

2. Click Add Storage System to add a cluster or SVM.

3. Enter vCenter, Storage System, user credentials, and other required information in following dialog box.

4. Check the box for Log SnapCenter server events to syslog and Send AutoSupport Notification for failed operation to storage system.


Add Storage System

Storage System	192.168.156.140
Platform	All Flash FAS
Username	admin
Password	••••••••
Protocol	HTTPS
Port	443
Timeout	60 Seconds
□ Preferred IP	Preferred IP

Event Management System(EMS) & AutoSupport Setting

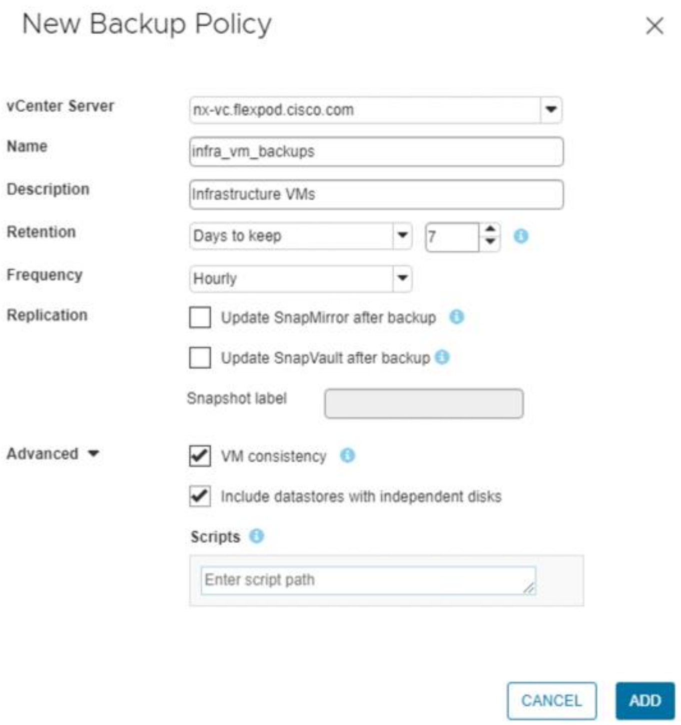
☑ Log Snapcenter server events to syslog

☑ Send AutoSupport Notification for failed operation to storage system

Create Backup Policies for Virtual Machines and Datastores

To create backup policies for VMs and datastores, follow these steps:

1. In the left Navigator pane of the VMware vSphere Web Client, click Policies.
2. On the Policies page, click New Policy in the toolbar.
3. On the New Backup Policy page, follow these steps:
   a. Enter the policy name and a description.
   b. Enter the backups to keep.
4. From the Frequency drop-down list, choose the backup frequency (hourly, daily, weekly, monthly, and on-demand only).
5. Expand the Advanced options and select VM Consistency and Include datastore with independent disks.
6. Click Add.



New Backup Policy

vCenter Server: nx-vc.flexpod.cisco.com

Name: infra_vm_backups

Description: Infrastructure VMs

Retention: Days to keep 7

Frequency: Hourly

Replication: □ Update SnapMirror after backup

□ Update SnapVault after backup

Snapshot label

Advanced: ☑ VM consistency

☑ Include datastores with independent disks

Scripts

Enter script path

7. Create multiple policies as required for different sets of VMs or datastores.

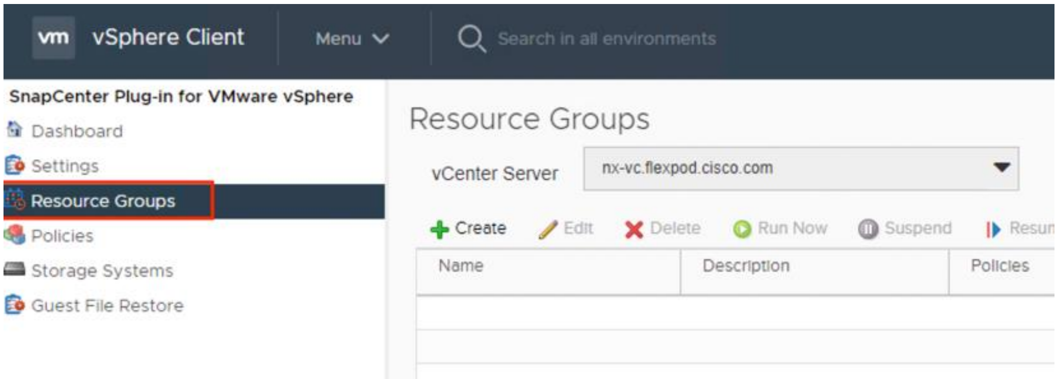
Create Resource Groups

Resource groups are groups of virtual machines or datastores that are backed up together. A backup policy is associated with the resource group to back up the virtual machines and retain a certain number of backups as defined in the policy.

To create resource groups, follow these steps:

1. In Navigator pane of the SnapCenter Plug-in for VMware vSphere, click Resource Groups and then click Create Resource Group. This is the easiest way to create a resource group. However, you can also create a resource group with one resource by performing one of the following steps:

   - To create a resource group for one virtual machine, click VMs and Templates, right-click a virtual machine, choose NetApp SnapCenter from the drop-down list, and then choose Create Resource Group from the secondary drop-down list.

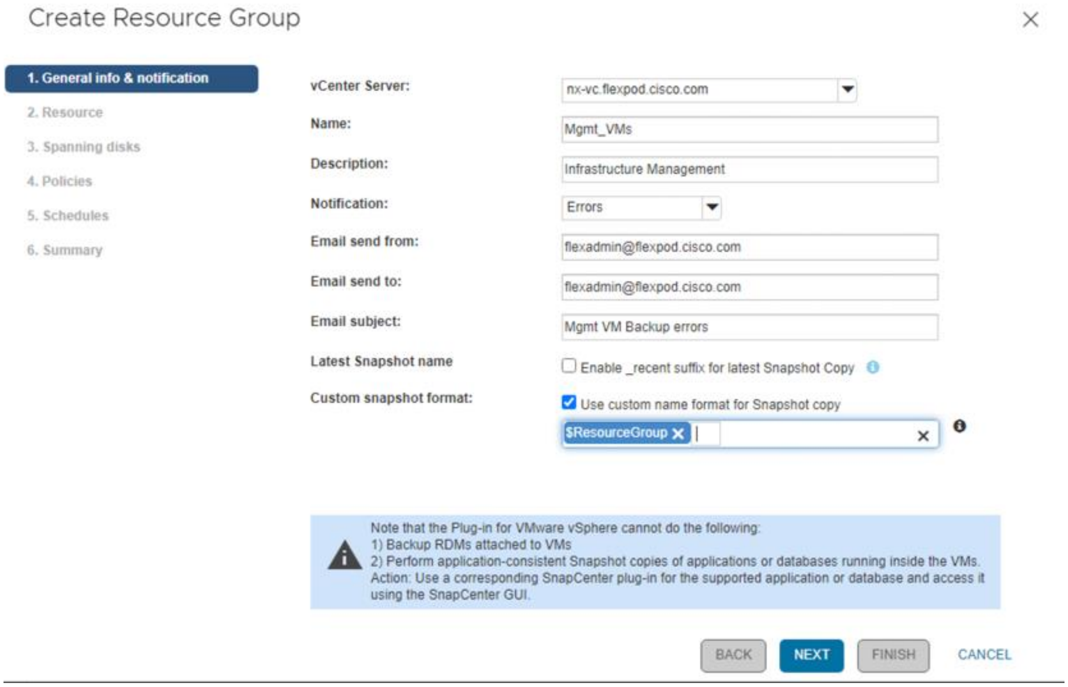


vCenter Server: nx-vc.flexpod.cisco.com

Name	Description	Policies

- To create a resource group for one datastore, click Storage, right-click a datastore, choose NetApp SnapCenter from the drop-down list, and then choose Create Resource Group from the secondary drop-down list.

2. In the General Info & Notification page, enter the resource group name and complete the notification settings. Click Next.

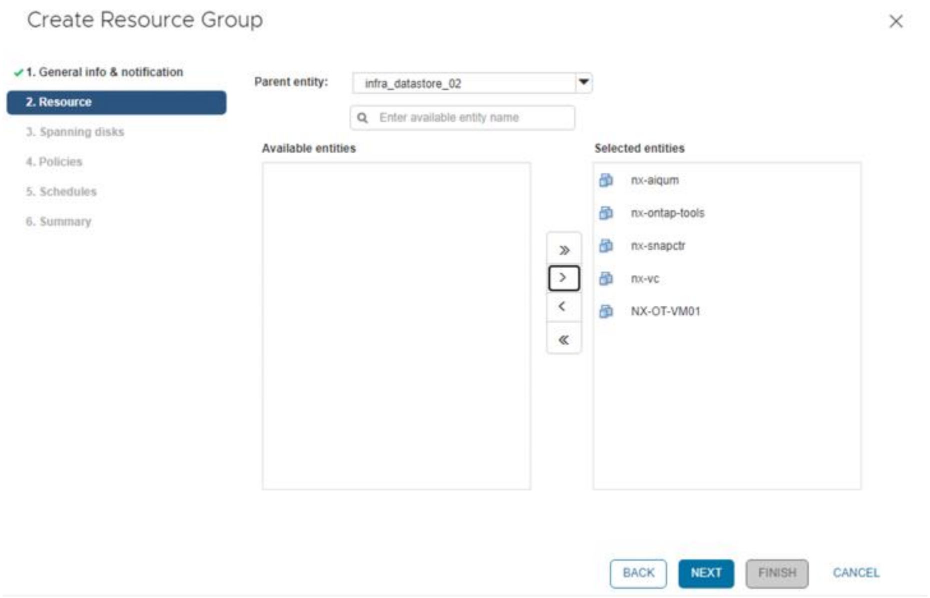


vCenter Server:	nx-vc.flexpod.cisco.com
Name:	Mgmt_VMs
Description:	Infrastructure Management
Notification:	Errors
Email send from:	flexadmin@flexpod.cisco.com
Email send to:	flexadmin@flexpod.cisco.com
Email subject:	Mgmt VM Backup errors
Latest Snapshot name	□ Enable _recent suffix for latest Snapshot Copy
Custom snapshot format:	☑ Use custom name format for Snapshot copy $ResourceGroup

Note that the Plug-in for VMware vSphere cannot do the following:
1) Backup RDMs attached to VMs
2) Perform application-consistent Snapshot copies of applications or databases running inside the VMs.
Action: Use a corresponding SnapCenter plug-in for the supported application or database and access it using the SnapCenter GUI.

Simplify the task of locating virtual machine and datastore snapshots by selecting the Custom snapshot format option and choose the desired label such as $ResourceGroup to have the resource group name appended to the snapshot name during snapshot operation.

3. Choose a datastore as the parent entity to create a resource group of virtual machines, and then choose the virtual machines from the available list. Click Next.


Create Resource Group

✓ 1. General info & notification
2. Resource
3. Spanning disks
4. Policies
5. Schedules
6. Summary

Parent entity: infra_datastore_02

Enter available entity name

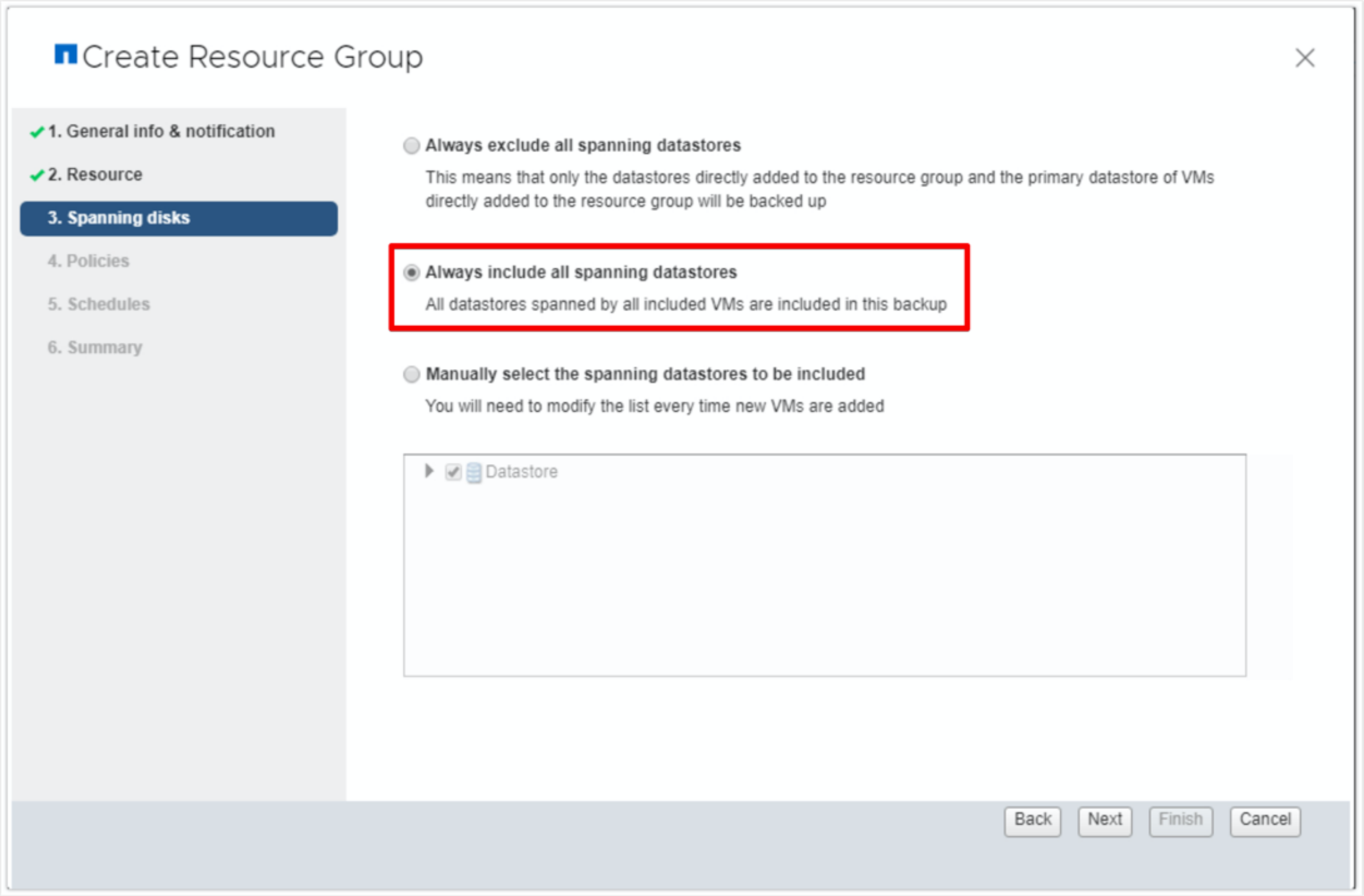
Available entities

Selected entities

- nx-aiqum
- nx-ontap-tools
- nx-snapctr
- nx-vc
- NX-OT-VM01

Entire datastores can be backed up by selecting FlexPod-DC in the parent entity list box and selecting the datastore.

4. From the Spanning Disks options, choose the Always include all spanning datastores option.

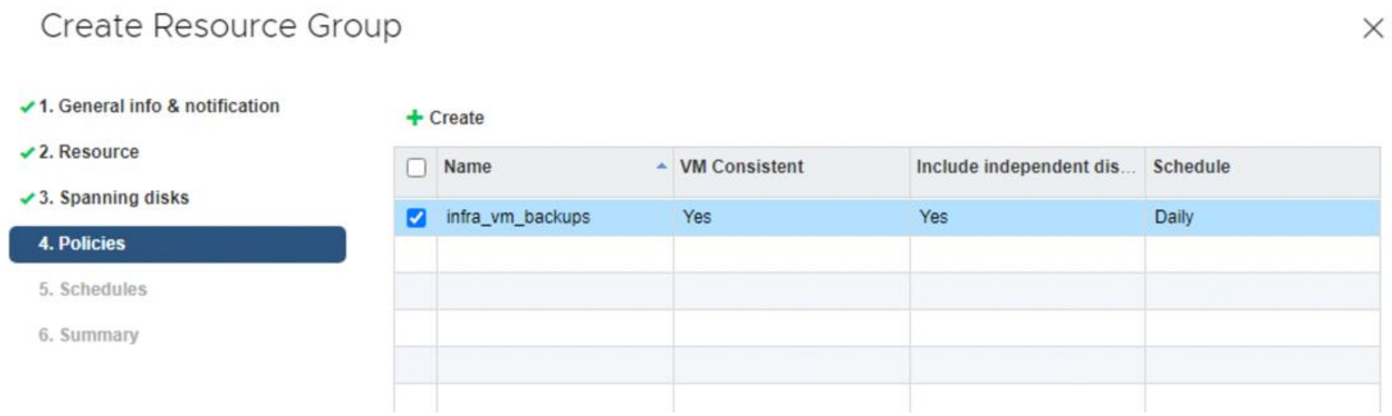


○ **Always exclude all spanning datastores**
This means that only the datastores directly added to the resource group and the primary datastore of VMs directly added to the resource group will be backed up

● **Always include all spanning datastores**
All datastores spanned by all included VMs are included in this backup

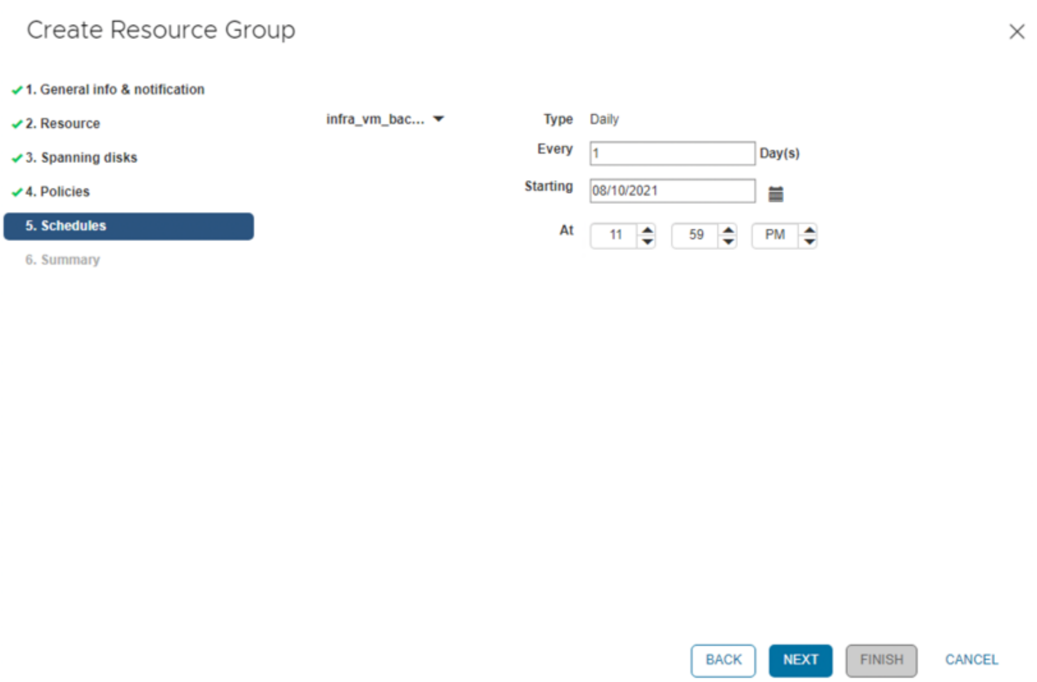
○ **Manually select the spanning datastores to be included**
You will need to modify the list every time new VMs are added

5. From the Policies tab, choose one of the previously created policies that you want to associate with the resource group and click Next.



□	Name	VM Consistent	Include independent dis...	Schedule
☑	infra_vm_backups	Yes	Yes	Daily

6. From the Schedules option, choose the schedule for each selected policy and click Next.



infra_vm_bac...

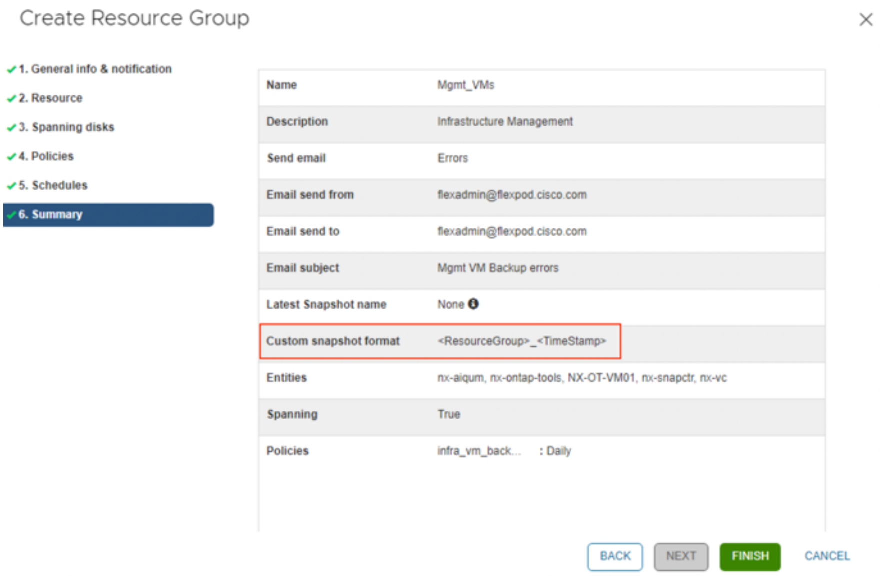
Type Daily

Every 1 Day(s)

Starting 08/10/2021

At 11 59 PM

7. Review the summary and click Finish to complete the creation of the resource group.



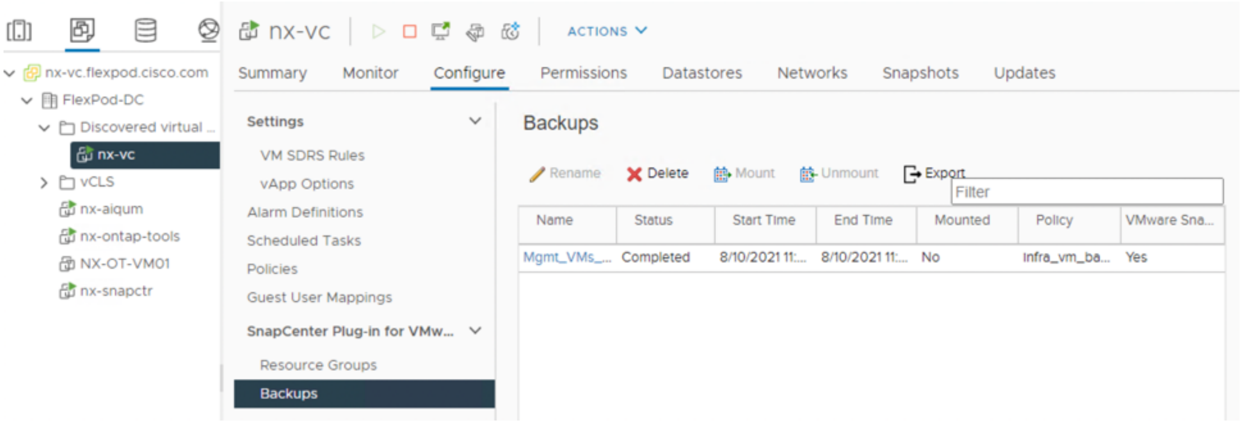
Name	Mgmt_VMs
Description	Infrastructure Management
Send email	Errors
Email send from	flexadmin@flexpod.cisco.com
Email send to	flexadmin@flexpod.cisco.com
Email subject	Mgmt VM Backup errors
Latest Snapshot name	None
Custom snapshot format	<ResourceGroup>_<TimeStamp>
Entities	nx-aiqum, nx-ontap-tools, NX-OT-VM01, nx-snapctr, nx-vc
Spanning	True
Policies	infra_vm_back... : Daily

View Virtual Machine Backups from vCenter by Using SnapCenter Plug-In

Backups of the virtual machines included in the resource group occurs according to the schedule of the policies associated with the resource group. To view the backups associated with each schedule, follow these steps:

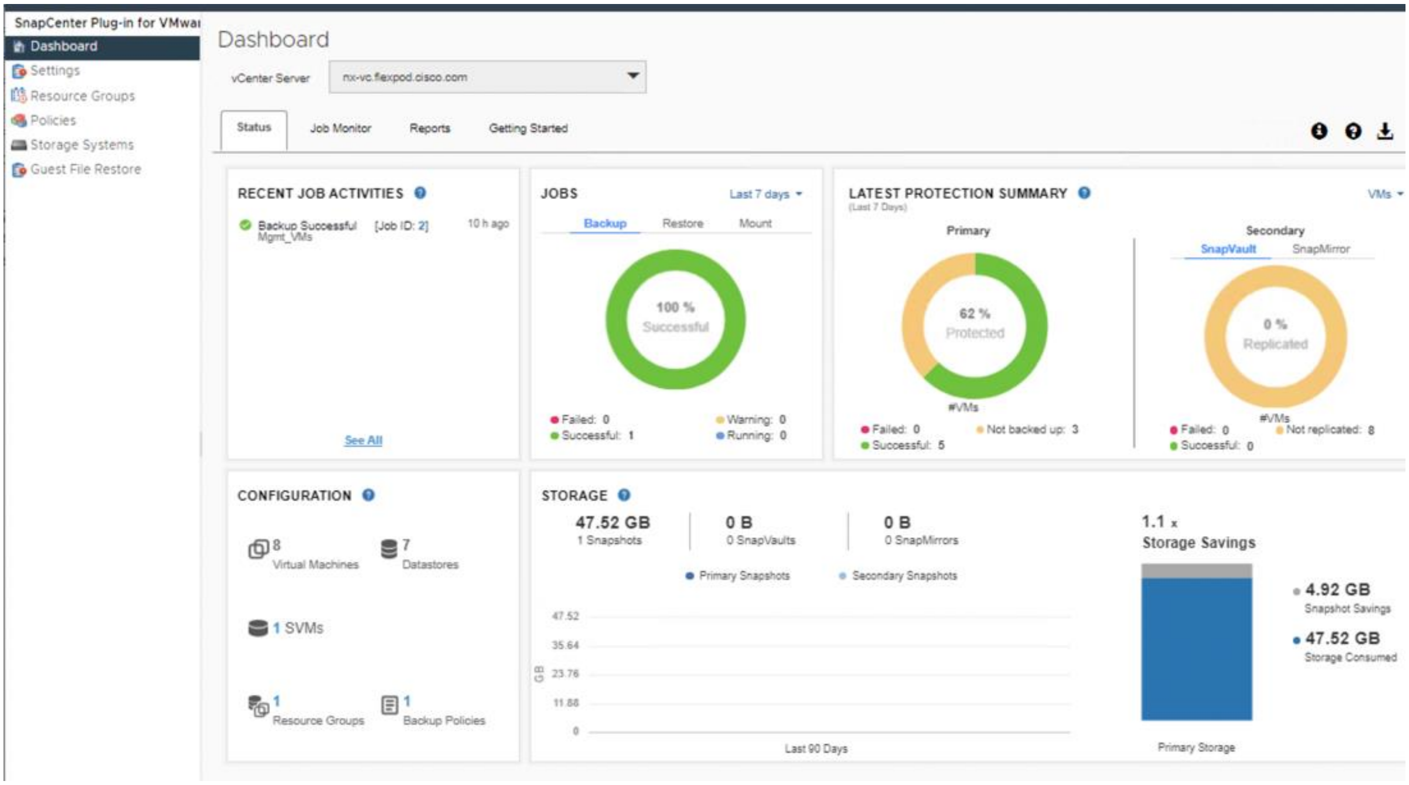
1. Navigate to the VMs and Templates tab.

2. Go to any virtual machine that is a member of a Resource Group, select the Configure tab. Under SnapCenter Plug-in for VMware vSphere choose the Backups tab to view all the backups available for the virtual machine..

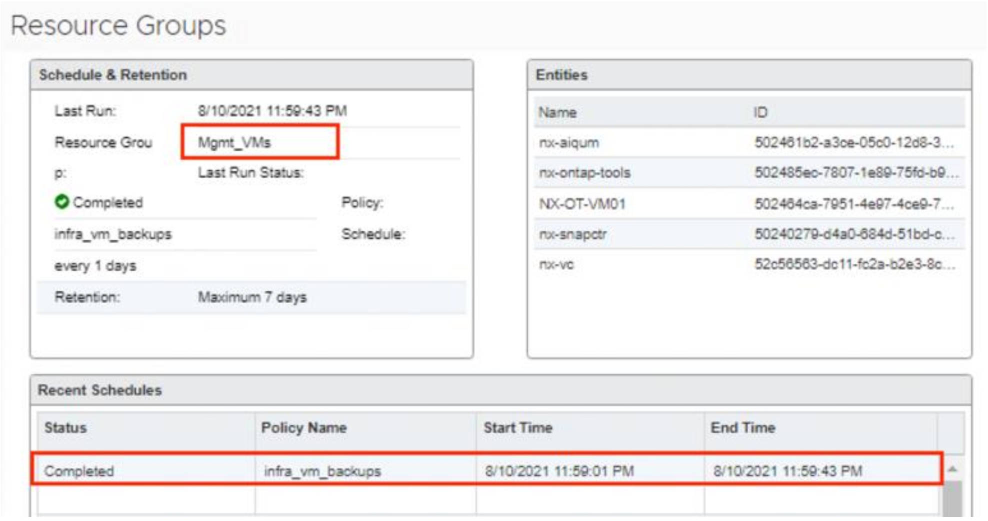


Name	Status	Start Time	End Time	Mounted	Policy	VMware Sna...
Mgmt_VMs_...	Completed	8/10/2021 11:...	8/10/2021 11:...	No	Infra_vm_ba...	Yes

3. Navigate to the SnapCenter Plug-in for VMware vSphere and choose the Dashboard tab to view recent job activity, backup jobs and configuration details.



4. In the SnapCenter Plug-in for VMware vSphere, click Resource Groups and choose any resource group. In the right pane, the completed backups are displayed.



Resource Groups

Schedule & Retention

Last Run: 8/10/2021 11:59:43 PM

Resource Grou p: Mgmt_VMs

Last Run Status: Completed

Policy: infra_vm_backups

Schedule: every 1 days

Retention: Maximum 7 days

Entities

Name	ID
nx-aiqum	502461b2-a3ce-05c0-12d8-3...
nx-ontap-tools	502485ec-7807-1e89-75fd-b9...
NX-OT-VM01	502464ca-7951-4e97-4ce9-7...
nx-snapctr	50240279-d4a0-684d-51bd-c...
nx-vc	52c56563-dc11-fc2a-b2e3-8c...

Recent Schedules

Status	Policy Name	Start Time	End Time
Completed	infra_vm_backups	8/10/2021 11:59:01 PM	8/10/2021 11:59:43 PM

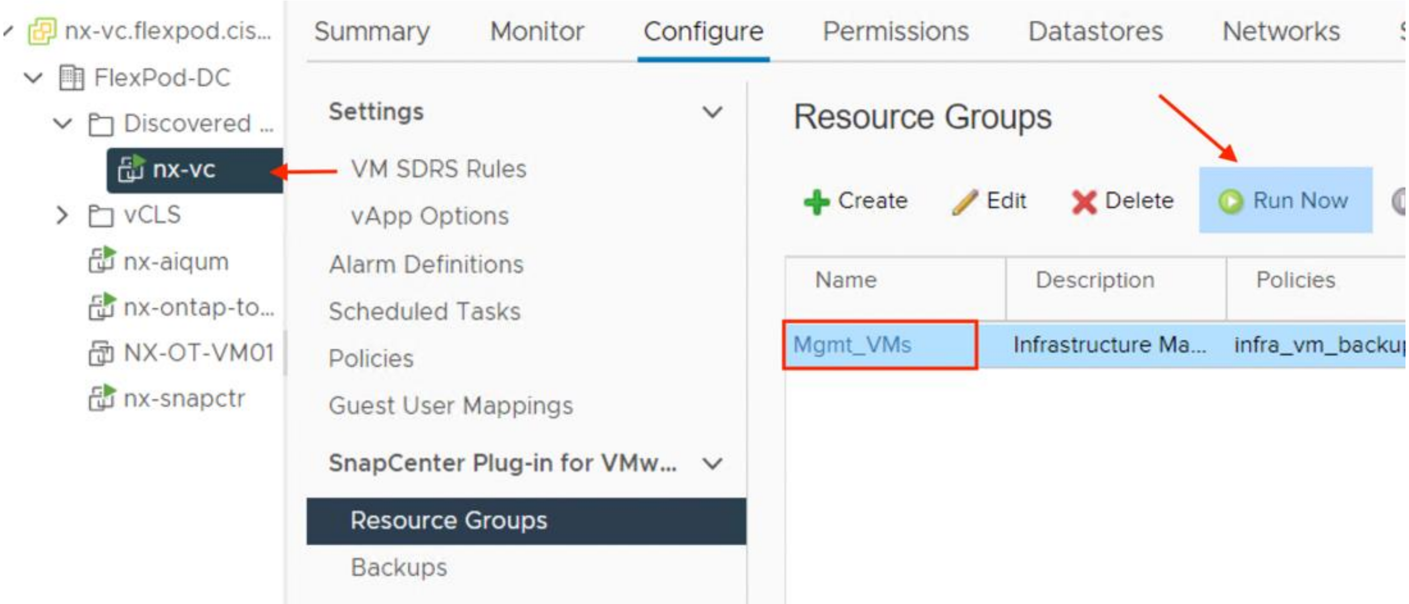
Create On-Demand Backup

To create an on-demand backup for any resource group, follow these steps:

1. From the VMs and Templates tab, choose a virtual machine contained in the resource group where you want to create an on-demand backup.

2. Click the Configure > SnapCenter Plugin for VMware vSphere > Resource Groups.

3. Select the resource group and click Run Now to run the backup immediately.



Resource Groups

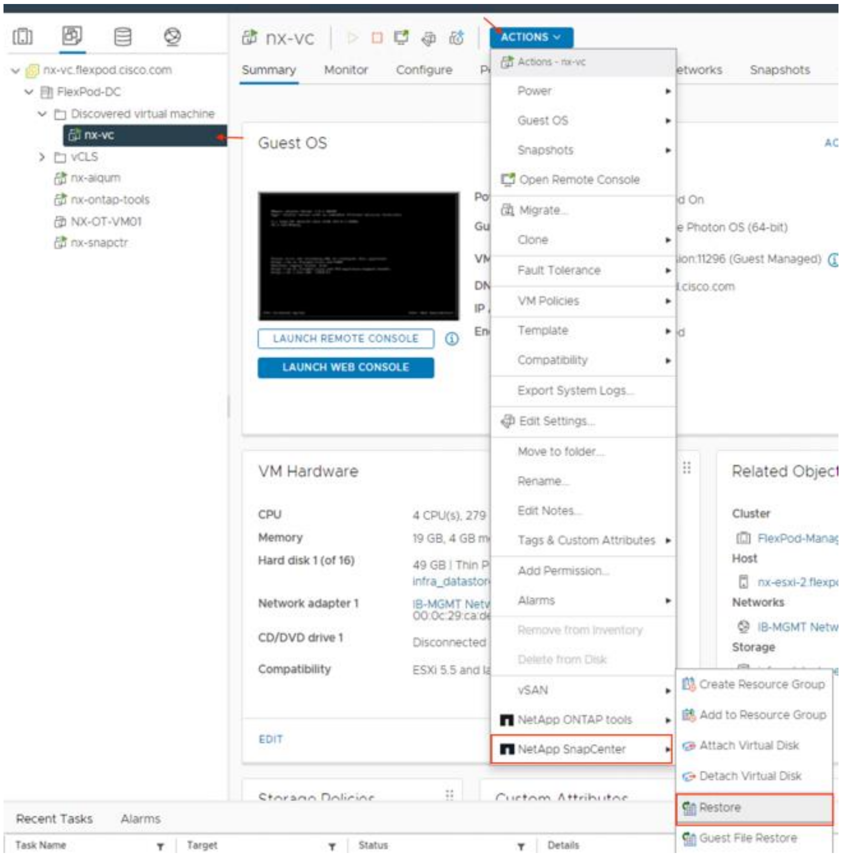
Name	Description	Policies
Mgmt_VMs	Infrastructure Ma...	infra_vm_backu

Restore from vCenter by Using SnapCenter Plug-In

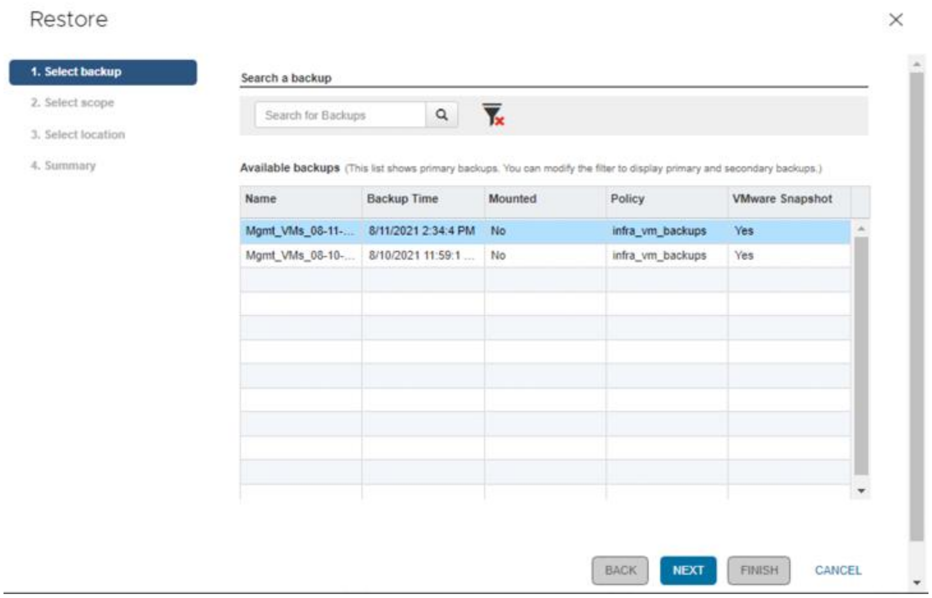
To restore from vCenter by using SnapCenter Plug-in, follow these steps:

The Plug-in for VMware vSphere provides native backup, recovery, and cloning of virtualized applications.

1. Navigate to VMs and Templates, choose a VM and right-click to access the context menu. Choose NetApp SnapCenter > Restore.



2. Choose a backup from which to restore. Click Next.



Restore

1. Select backup
2. Select scope
3. Select location
4. Summary

Search a backup

Search for Backups

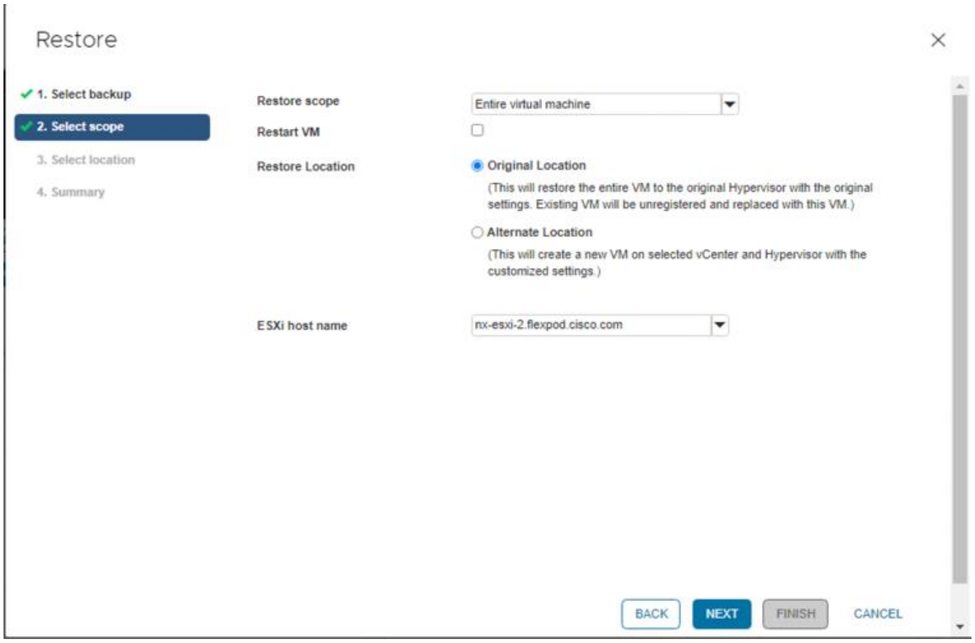
Available backups (This list shows primary backups. You can modify the filter to display primary and secondary backups.)

Name	Backup Time	Mounted	Policy	VMware Snapshot
Mgmt_VMs_08-11-...	8/11/2021 2:34:4 PM	No	infra_vm_backups	Yes
Mgmt_VMs_08-10-...	8/10/2021 11:59:1 ...	No	infra_vm_backups	Yes

3. From the Restore Scope drop-down list:

   a. Choose either " Entire virtual machine" to restore the virtual machine with all Virtual Machine Disks (VMDKs) or choose " Particular Virtual Disk" to restore the VMDK without affecting the virtual machine configuration and other VMDKs.

   b. Choose the ESXi host that the VM should be restored to and check the box if you wish to re-start the VM upon being restored. Click Next.



Restore

✓ 1. Select backup
✓ 2. Select scope
3. Select location
4. Summary

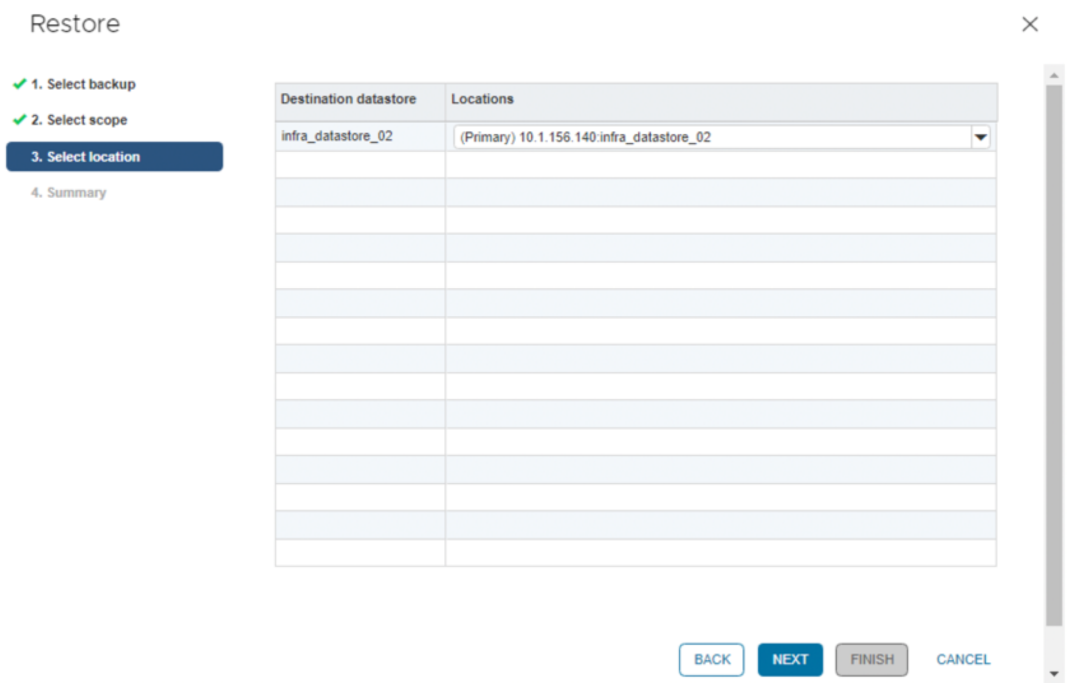
Restore scope: Entire virtual machine

Restart VM: □

Restore Location:
● Original Location
(This will restore the entire VM to the original Hypervisor with the original settings. Existing VM will be unregistered and replaced with this VM.)
○ Alternate Location
(This will create a new VM on selected vCenter and Hypervisor with the customized settings.)

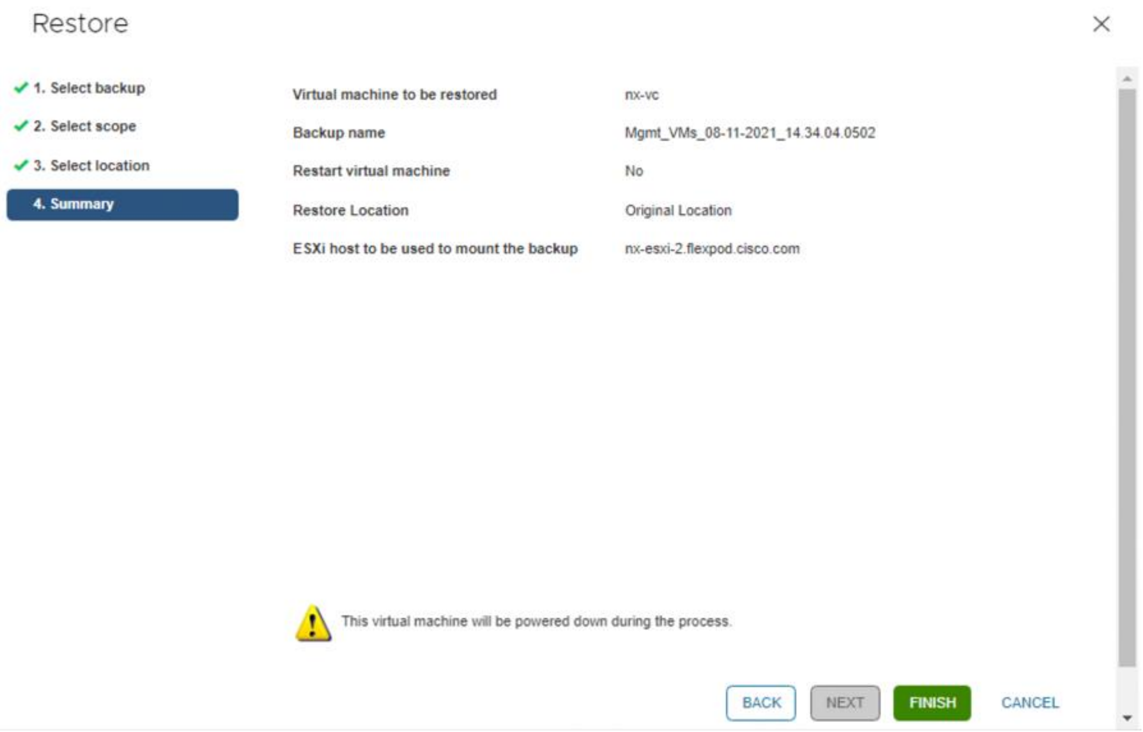
ESXi host name: nx-esxi-2.flexpod.cisco.com

4. Choose the destination datastore and click Next.



Destination datastore	Locations
infra_datastore_02	(Primary) 10.1.156.140:infra_datastore_02

5. Review the Summary and click Finish to complete the restore process.



Virtual machine to be restored	nx-vc
Backup name	Mgmt_VMs_08-11-2021_14.34.04.0502
Restart virtual machine	No
Restore Location	Original Location
ESXi host to be used to mount the backup	nx-esxi-2.flexpod.cisco.com

⚠ This virtual machine will be powered down during the process.

Active IQ Unified Manager 9.10

Active IQ Unified Manager enables you to monitor and manage the health and performance of your ONTAP storage systems and virtual infrastructure from a single interface. Unified Manager provides a graphical interface that displays the capacity, availability, protection, and performance status of the monitored storage systems.

This section describes the steps to deploy NetApp Active IQ Unified Manager 9.10 as a virtual appliance. The following table lists the recommended configuration for the virtual machine to install and run Active IQ Unified Manager to ensure acceptable performance.

Table 11.Virtual Machine Configuration

Hardware Configuration	Recommended Settings
RAM	12 GB
Processors	4 CPUs/ vCPUs
CPU Cycle Capacity	9572 MHz total
Free Disk Space/virtual disk size	5 GB - Thin provisioned 152 GB – Thick provisioned

There is a limit to the number of nodes that a single instance of Active IQ Unified Manager can monitor before you need to install a second instance of Active IQ Unified Manager. See the Unified Manager Best Practices Guide (TR-4621) for more details.

Install NetApp Active IQ Unified Manager 9.10

Install Active IQ Unified Manager using Ansible

To install Active IQ Unified Manager using Ansible, follow these steps:

1. Follow the Pre-Requisites from https://github.com/NetApp-Automation/NetApp-AIQUM

2. Download ansible git: git clone https://github.com/NetApp-Automation/NetApp-AIQUM.git

3. To invoke the ansible scripts use the following command:

```
ansible-playbook aiqum.yml -t aiqum_setup
```

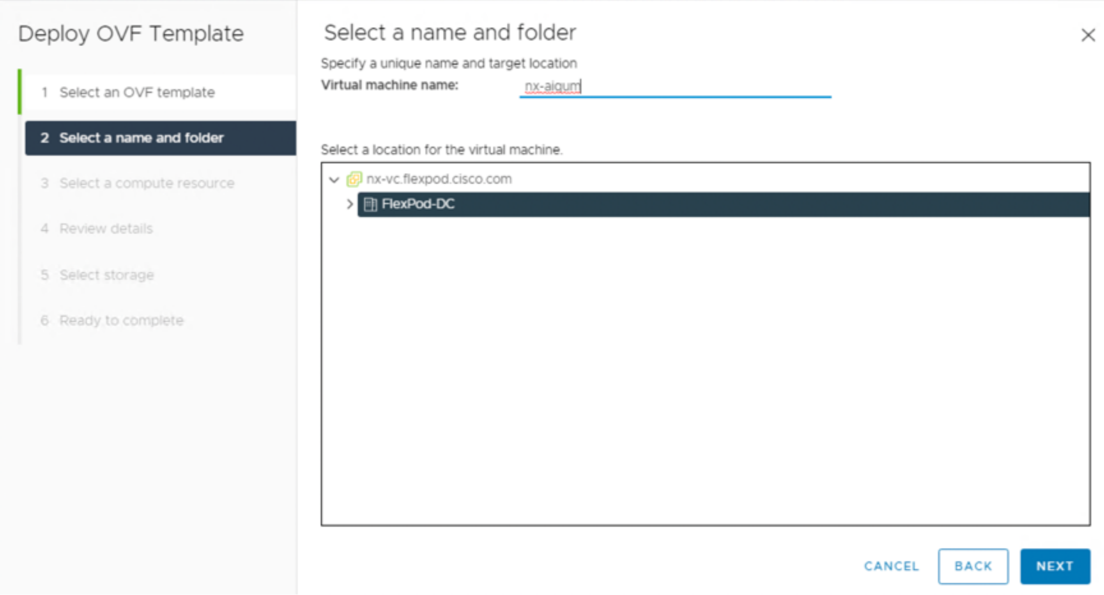
To install Active IQ Unified Manager 9.10 manually, follow these steps:

1. Download NetApp Active IQ Unified Manager for VMware vSphere OVA file from NetApp support site.

2. From the VMware vCenter, click the VMs and Templates tab, then click Actions> Deploy OVF Template.

3. Specify the location of the OVF Template and click NEXT.

4. On the Select a name and folder page, enter a unique name for the VM, and choose a deployment location, and then click NEXT.



Select a name and folder

Specify a unique name and target location

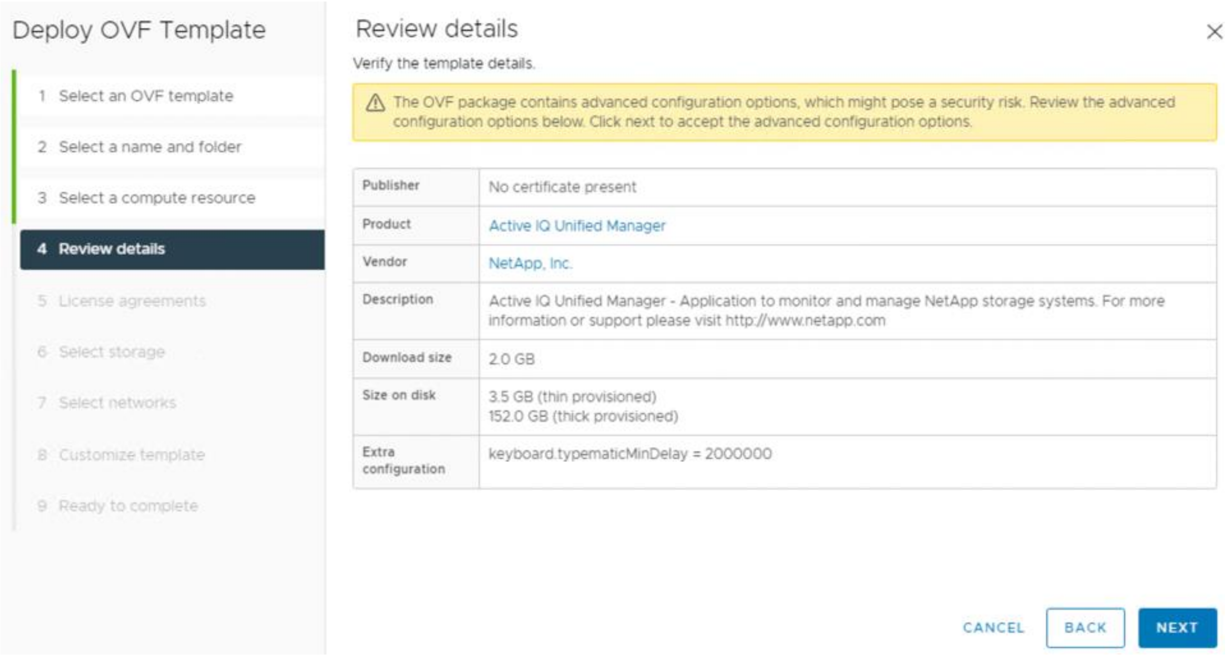
Virtual machine name: nx-aiqum

Select a location for the virtual machine.

- nx-vc.flexpod.cisco.com
  - FlexPod-DC

5. On the Select a compute resource page, choose a resource where you want to run the deployed VM template, and click NEXT.

6. On the Review details page, verify the OVA template details and click NEXT.



Review details

Verify the template details.

⚠ The OVF package contains advanced configuration options, which might pose a security risk. Review the advanced configuration options below. Click next to accept the advanced configuration options.

Publisher	No certificate present
Product	Active IQ Unified Manager
Vendor	NetApp, Inc.
Description	Active IQ Unified Manager - Application to monitor and manage NetApp storage systems. For more information or support please visit http://www.netapp.com
Download size	2.0 GB
Size on disk	3.5 GB (thin provisioned) 152.0 GB (thick provisioned)
Extra configuration	keyboard.typematicMinDelay = 2000000

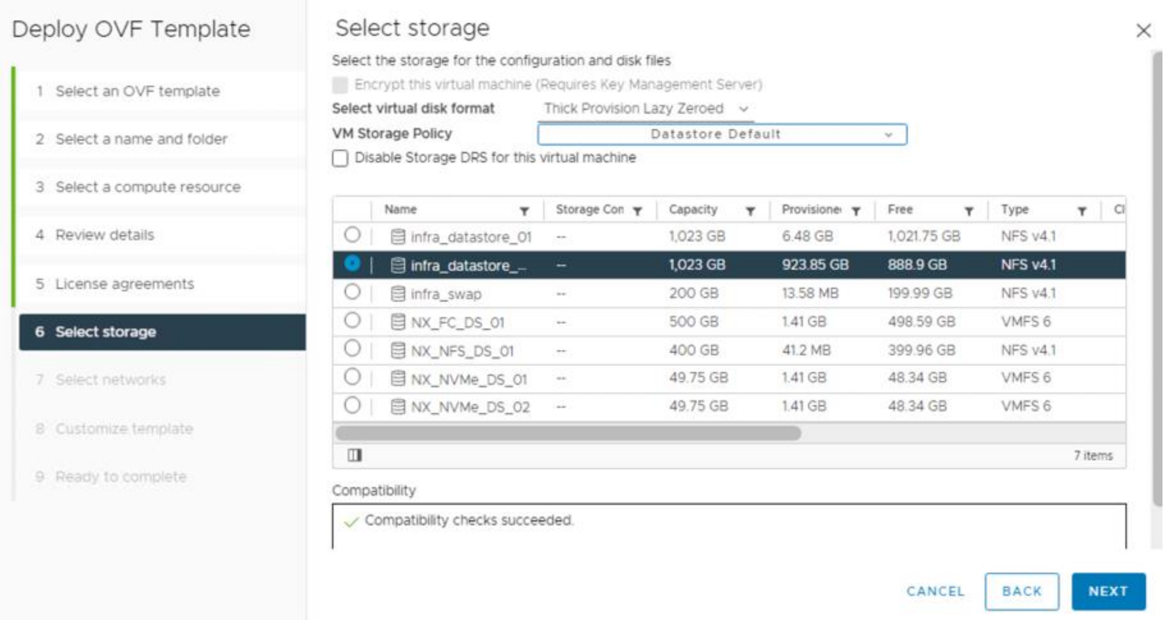
7. On the License agreements page, check the box for I accept all license agreements.

8. On the Select storage page, define where and how to store the files for the deployed OVF template:

   a. Choose the disk format for the VMDKs.

   b. Choose a VM Storage Policy.

   c. Choose a datastore to store the deployed OVA template.



Deploy OVF Template

1 Select an OVF template
2 Select a name and folder
3 Select a compute resource
4 Review details
5 License agreements
6 Select storage
7 Select networks
8 Customize template
9 Ready to complete

Select storage

Select the storage for the configuration and disk files

□ Encrypt this virtual machine (Requires Key Management Server)

Select virtual disk format: Thick Provision Lazy Zeroed

VM Storage Policy: Datastore Default

□ Disable Storage DRS for this virtual machine

	Name	Storage Con	Capacity	Provisione	Free	Type	Cl
○	infra_datastore_01	--	1,023 GB	6.48 GB	1,021.75 GB	NFS v4.1	
●	infra_datastore_...	--	1,023 GB	923.85 GB	888.9 GB	NFS v4.1	
○	infra_swap	--	200 GB	13.58 MB	199.99 GB	NFS v4.1	
○	NX_FC_DS_01	--	500 GB	1.41 GB	498.59 GB	VMFS 6	
○	NX_NFS_DS_01	--	400 GB	41.2 MB	399.96 GB	NFS v4.1	
○	NX_NVMe_DS_01	--	49.75 GB	1.41 GB	48.34 GB	VMFS 6	
○	NX_NVMe_DS_02	--	49.75 GB	1.41 GB	48.34 GB	VMFS 6	

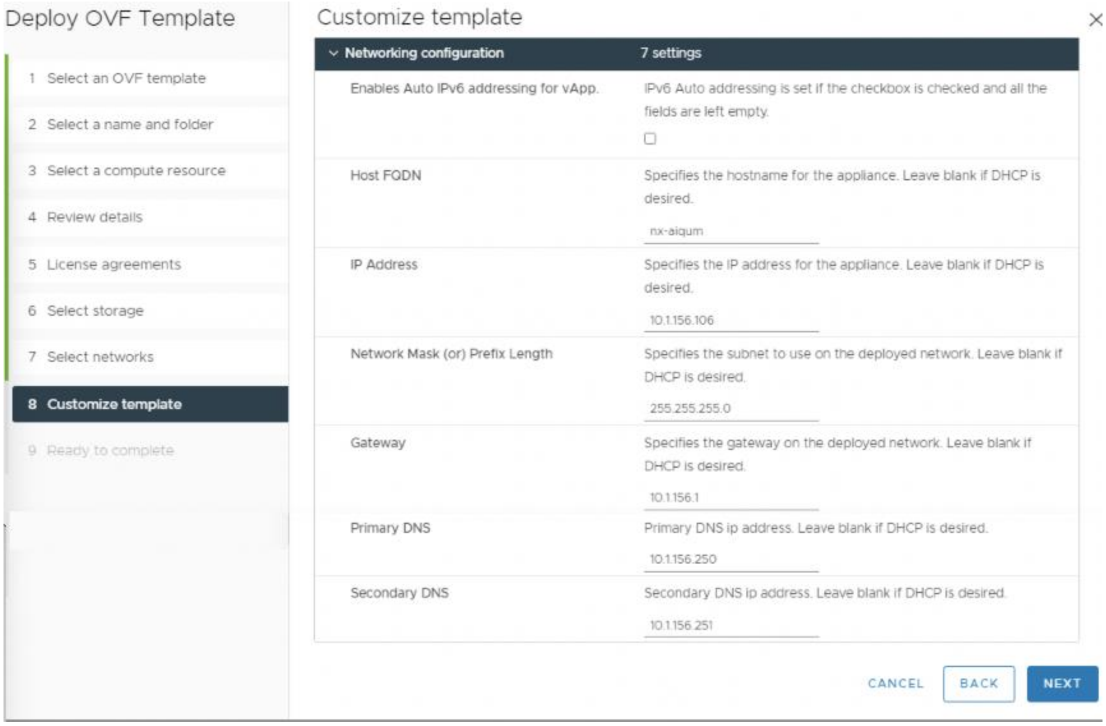
7 items

Compatibility

✓ Compatibility checks succeeded.

9. On the Select networks page, select a source network, and map it to a destination network, and then click NEXT.

10. On the Customize template page, provide network details.

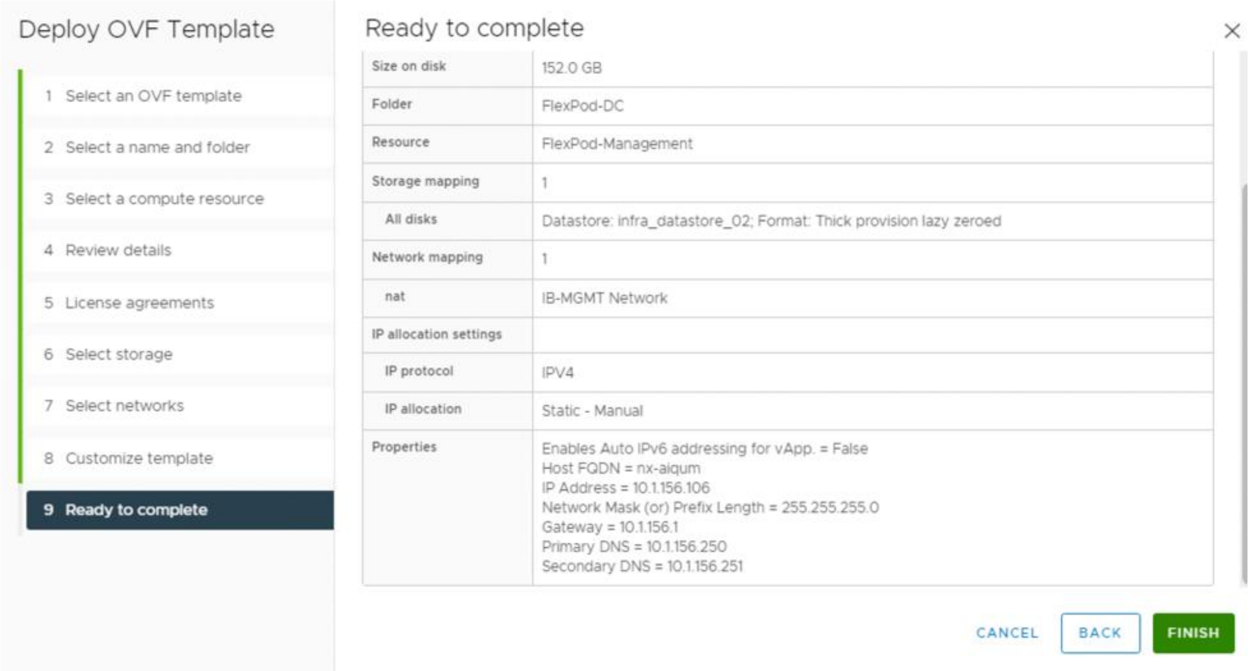


Customize template

Networking configuration	7 settings
Enables Auto IPv6 addressing for vApp.	IPv6 Auto addressing is set if the checkbox is checked and all the fields are left empty. ☐
Host FQDN	Specifies the hostname for the appliance. Leave blank if DHCP is desired. nx-aiqum
IP Address	Specifies the IP address for the appliance. Leave blank if DHCP is desired. 10.1.156.106
Network Mask (or) Prefix Length	Specifies the subnet to use on the deployed network. Leave blank if DHCP is desired. 255.255.255.0
Gateway	Specifies the gateway on the deployed network. Leave blank if DHCP is desired. 10.1.156.1
Primary DNS	Primary DNS ip address. Leave blank if DHCP is desired. 10.1.156.250
Secondary DNS	Secondary DNS ip address. Leave blank if DHCP is desired. 10.1.156.251

Scroll through the customization template to ensure all required values are entered.

11. On the Ready to complete page, review the page and click FINISH.

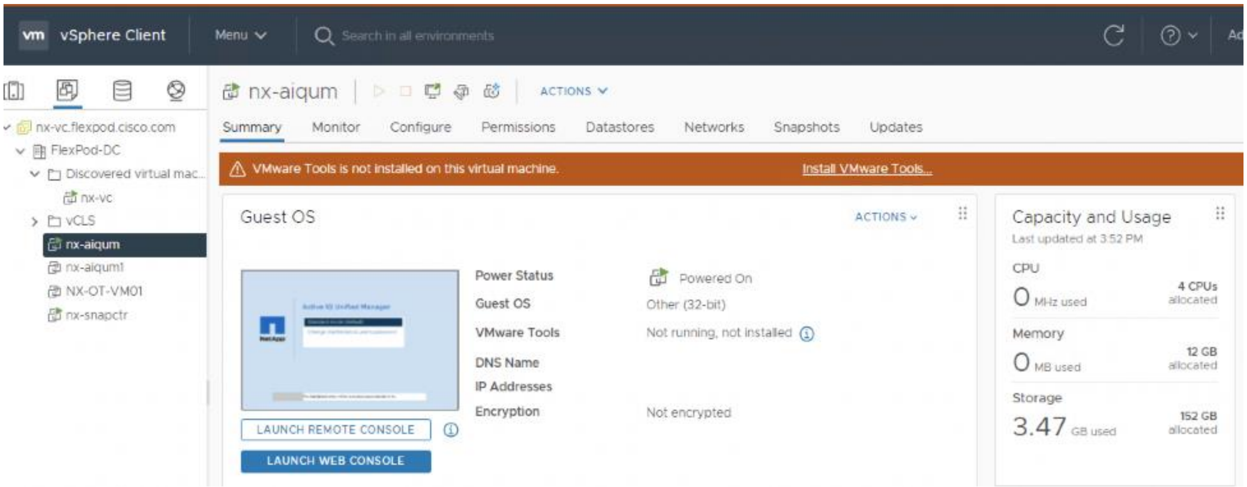


Ready to complete

Size on disk	152.0 GB
Folder	FlexPod-DC
Resource	FlexPod-Management
Storage mapping	1
All disks	Datastore: infra_datastore_02; Format: Thick provision lazy zeroed
Network mapping	1
nat	IB-MGMT Network
IP allocation settings	
IP protocol	IPV4
IP allocation	Static - Manual
Properties	Enables Auto IPv6 addressing for vApp. = False Host FQDN = nx-aiqum IP Address = 10.1.156.106 Network Mask (or) Prefix Length = 255.255.255.0 Gateway = 10.1.156.1 Primary DNS = 10.1.156.250 Secondary DNS = 10.1.156.251

12. Choose the newly created Active IQ Unified Manager VM, right-click it and choose Power > Power On to start the virtual machine.

13. While the virtual machine is powering on, click the prompt in the yellow banner to Install VMware tools.

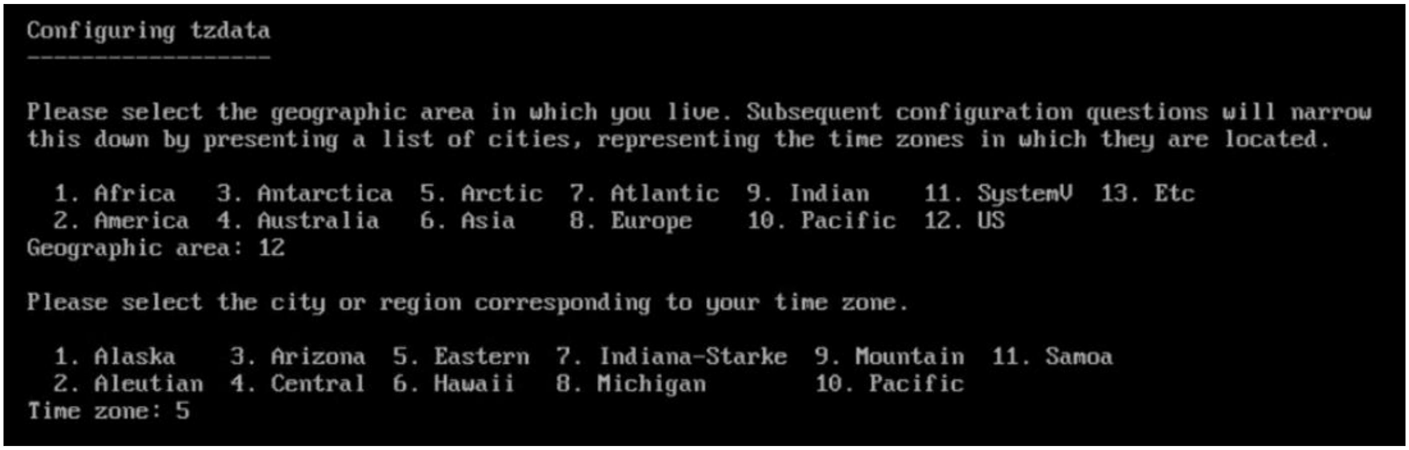


VMware Tools is not installed on this virtual machine. Install VMware Tools...

Power Status: Powered On
Guest OS: Other (32-bit)
VMware Tools: Not running, not installed
DNS Name:
IP Addresses:
Encryption: Not encrypted

CPU: 0 MHz used, 4 CPUs allocated
Memory: 0 MB used, 12 GB allocated
Storage: 3.47 GB used, 152 GB allocated

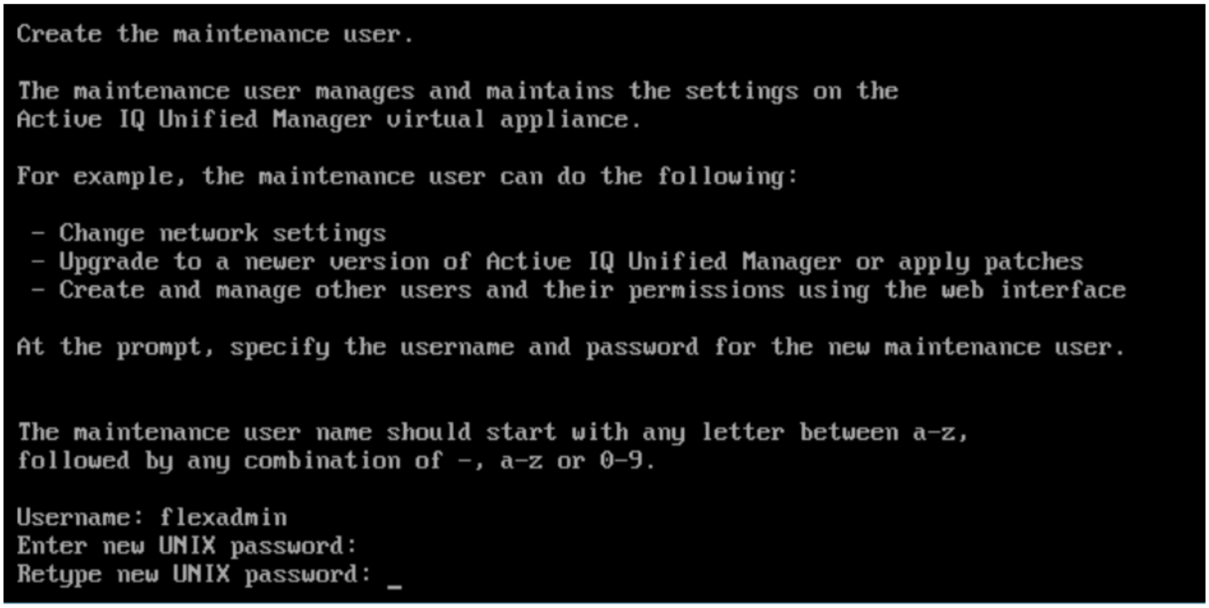
14. Open a console session to the Active IQ Unified Manager appliance and configure the time zone information when displayed.



```
Configuring tzdata
------------------

Please select the geographic area in which you live. Subsequent configuration questions will narrow
this down by presenting a list of cities, representing the time zones in which they are located.

  1. Africa    3. Antarctica  5. Arctic  7. Atlantic  9. Indian    11. SystemV  13. Etc
  2. America   4. Australia   6. Asia    8. Europe    10. Pacific  12. US
Geographic area: 12

Please select the city or region corresponding to your time zone.

  1. Alaska    3. Arizona  5. Eastern  7. Indiana-Starke  9. Mountain  11. Samoa
  2. Aleutian  4. Central  6. Hawaii   8. Michigan        10. Pacific
Time zone: 5
```

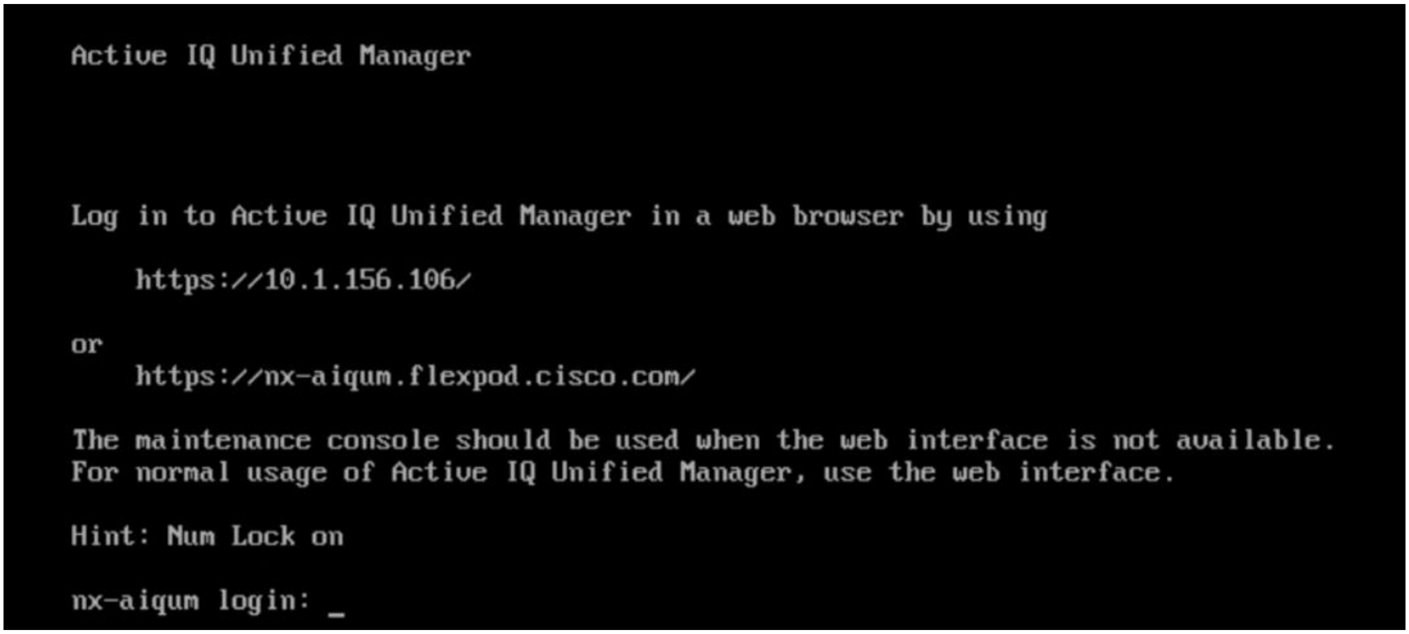
15. Create the maintenance user account when prompted by specifying a user account name and password.

Store the maintenance user account and password in a secure location. It is required for the initial GUI login and to make any configuration changes to the appliance settings that may be needed in the future.



```
Create the maintenance user.

The maintenance user manages and maintains the settings on the
Active IQ Unified Manager virtual appliance.

For example, the maintenance user can do the following:

 - Change network settings
 - Upgrade to a newer version of Active IQ Unified Manager or apply patches
 - Create and manage other users and their permissions using the web interface

At the prompt, specify the username and password for the new maintenance user.


The maintenance user name should start with any letter between a-z,
followed by any combination of -, a-z or 0-9.

Username: flexadmin
Enter new UNIX password:
Retype new UNIX password: _
```

16. Log into NetApp Active IQ Unified Manager using the IP address or URL displayed on the deployment screen and the maintenance user credentials you created in the previous step.

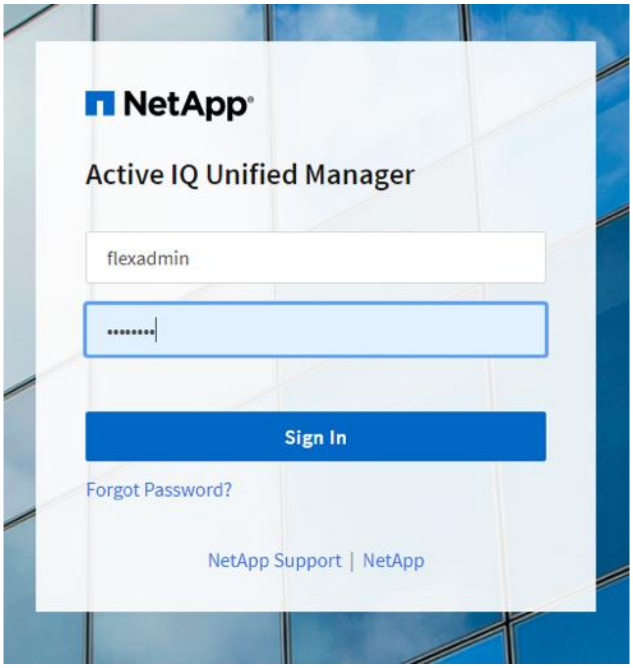


```
Active IQ Unified Manager



Log in to Active IQ Unified Manager in a web browser by using

    https://10.1.156.106/

or
    https://nx-aiqum.flexpod.cisco.com/

The maintenance console should be used when the web interface is not available.
For normal usage of Active IQ Unified Manager, use the web interface.

Hint: Num Lock on

nx-aiqum login: _
```

Configure Active IQ Unified Manager

To configure Active IQ Unified Manager and add a storage system for monitoring, follow these steps:

1. Launch a web browser and log into Active IQ Unified Manger.



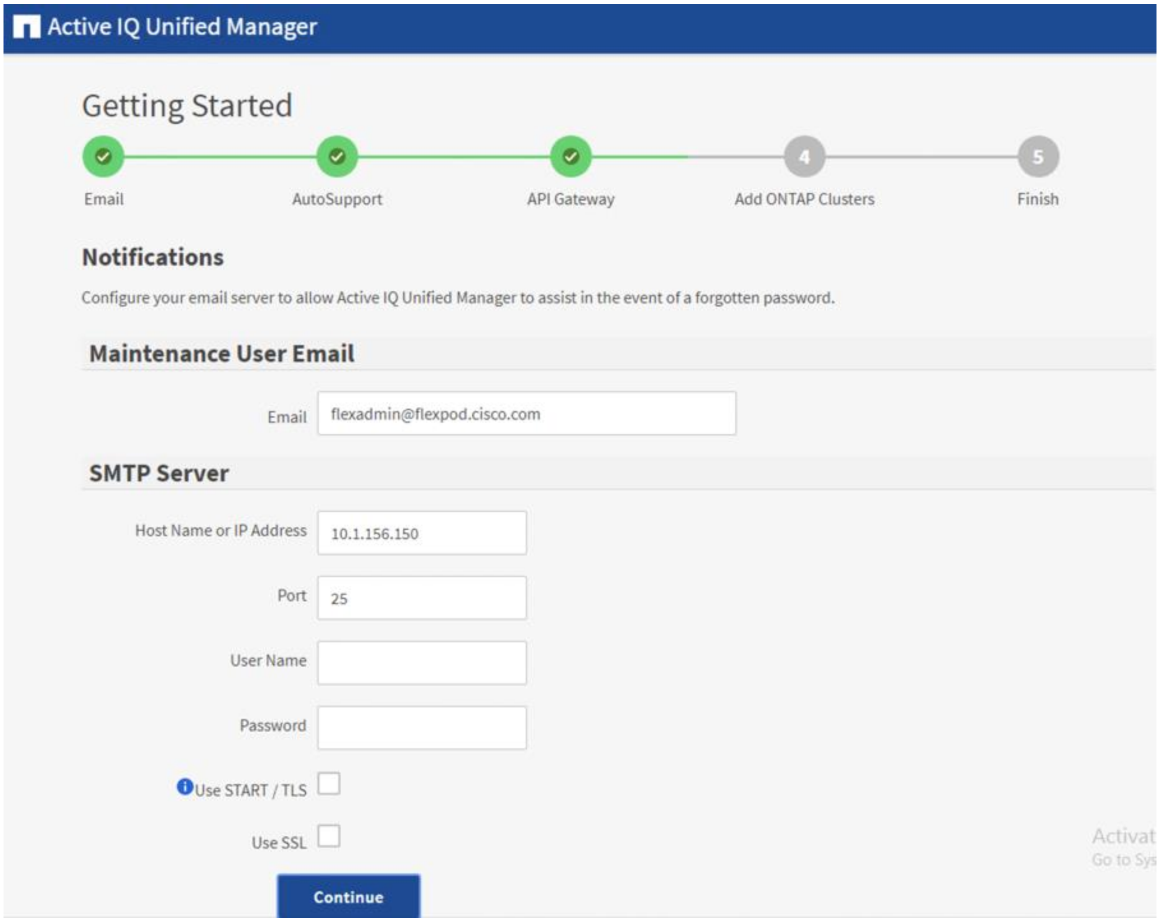
NetApp

Active IQ Unified Manager

flexadmin

••••••••

2. Enter the email address that Unified Manager will use to send alerts, enter the mail server configuration, and the IP address or hostname of the NTP server. Choose Continue and complete the AutoSupport configuration.



Active IQ Unified Manager

Getting Started

Notifications

Configure your email server to allow Active IQ Unified Manager to assist in the event of a forgotten password.

Maintenance User Email

Email: flexadmin@flexpod.cisco.com

SMTP Server

Host Name or IP Address: 10.1.156.150

Port: 25

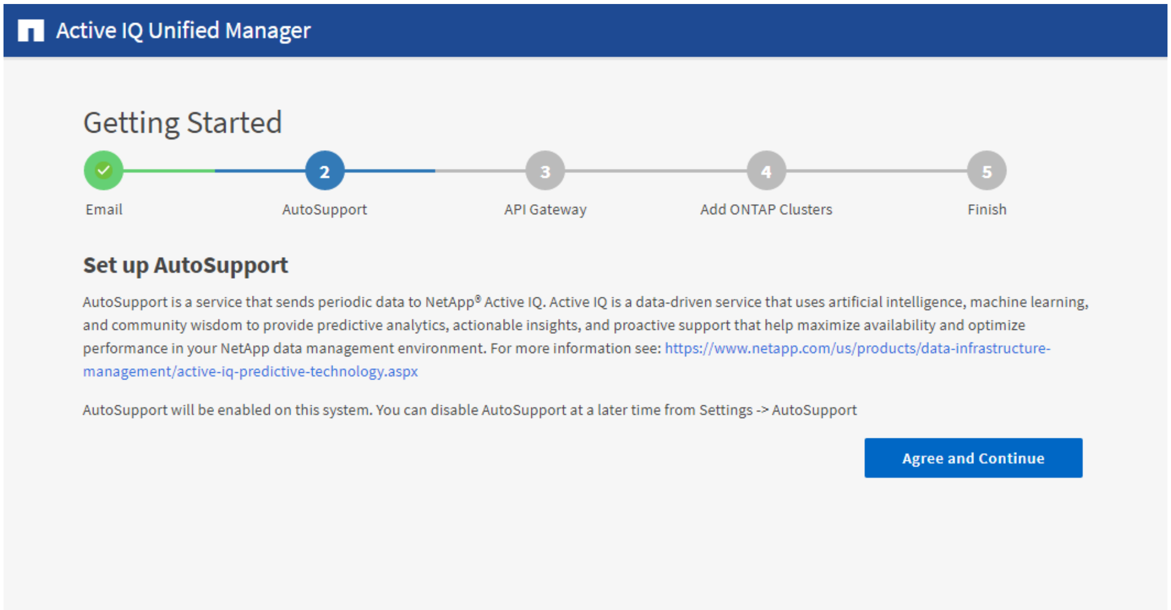
User Name:

Password:

Use START / TLS ☐

Use SSL ☐

3. Configure AutoSupport for Unified Manager by clicking Agree and Continue.



Active IQ Unified Manager

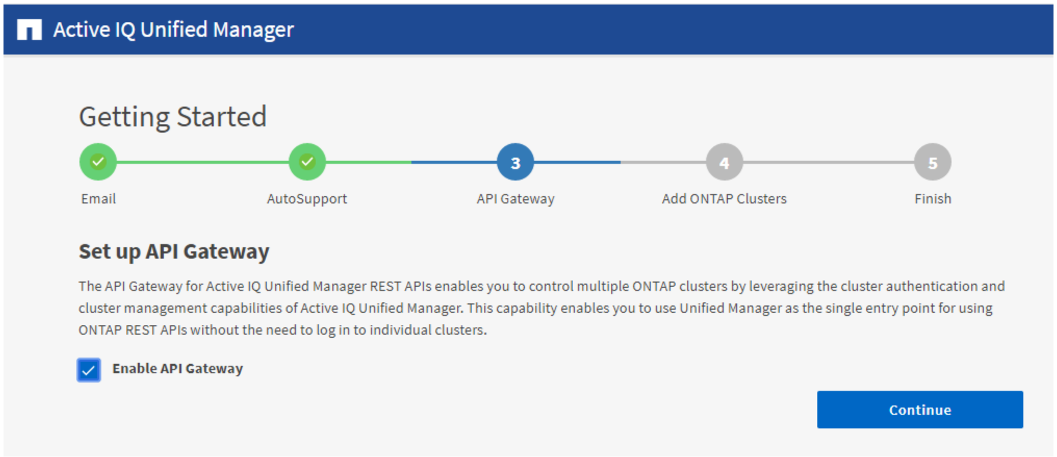
Getting Started

Set up AutoSupport

AutoSupport is a service that sends periodic data to NetApp® Active IQ. Active IQ is a data-driven service that uses artificial intelligence, machine learning, and community wisdom to provide predictive analytics, actionable insights, and proactive support that help maximize availability and optimize performance in your NetApp data management environment. For more information see: https://www.netapp.com/us/products/data-infrastructure-management/active-iq-predictive-technology.aspx

AutoSupport will be enabled on this system. You can disable AutoSupport at a later time from Settings -> AutoSupport

4. Check the box for Enable API Gateway and click Continue to setup the API gateway for Active IQ Unified Manager.



Active IQ Unified Manager

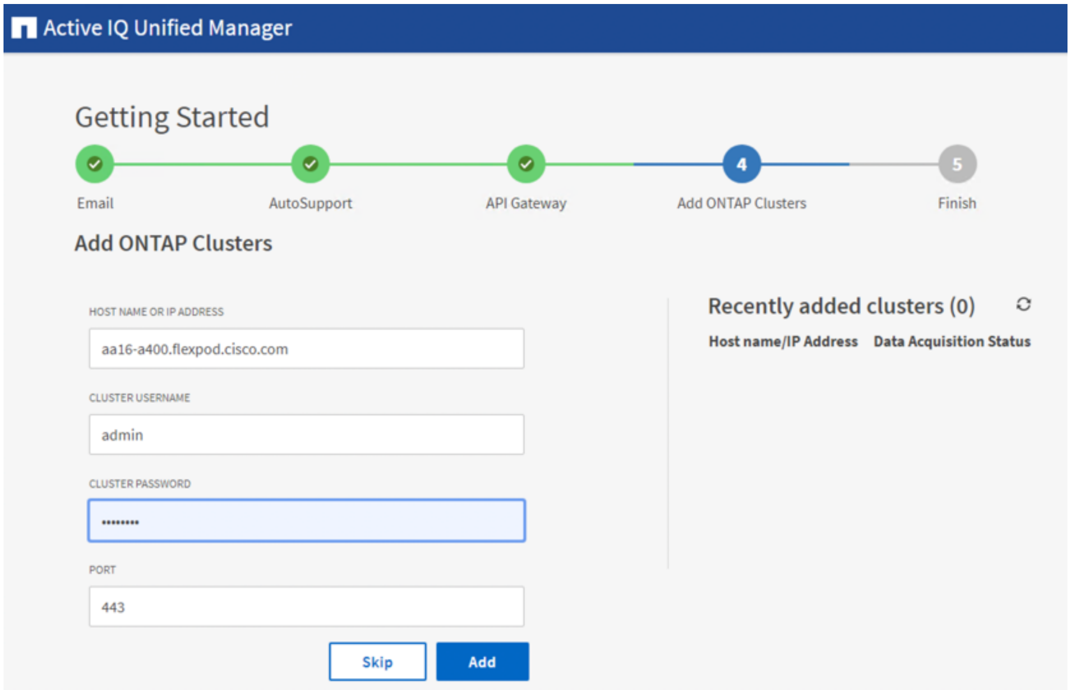
Getting Started

Set up API Gateway

The API Gateway for Active IQ Unified Manager REST APIs enables you to control multiple ONTAP clusters by leveraging the cluster authentication and cluster management capabilities of Active IQ Unified Manager. This capability enables you to use Unified Manager as the single entry point for using ONTAP REST APIs without the need to log in to individual clusters.

☑ Enable API Gateway

5. Enter the ONTAP cluster hostname or IP address and the admin login credentials then click Add.



Active IQ Unified Manager

Getting Started

Add ONTAP Clusters

HOST NAME OR IP ADDRESS: aa16-a400.flexpod.cisco.com

CLUSTER USERNAME: admin

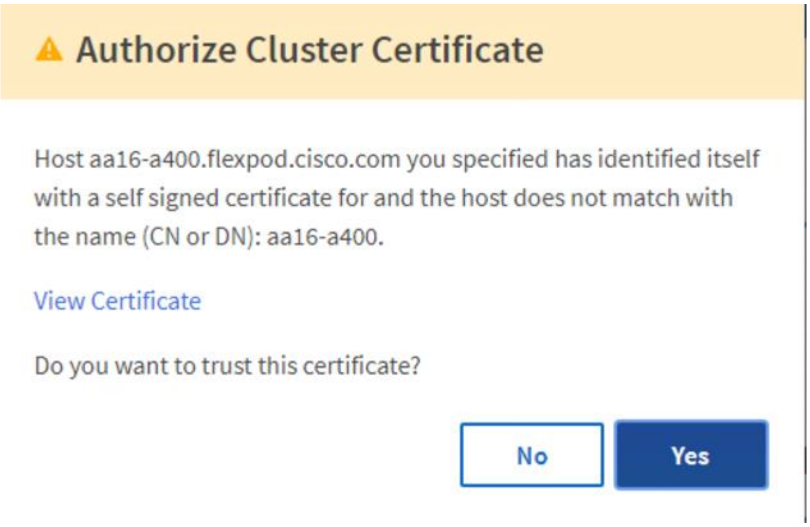
CLUSTER PASSWORD: ••••••••

PORT: 443

Recently added clusters (0)

Host name/IP Address	Data Acquisition Status

6. A security prompt will be displayed to authorize the cluster certificate. Choose Yes to trust the certificate.



Authorize Cluster Certificate

Host aa16-a400.flexpod.cisco.com you specified has identified itself with a self signed certificate for and the host does not match with the name (CN or DN): aa16-a400.

View Certificate

Do you want to trust this certificate?

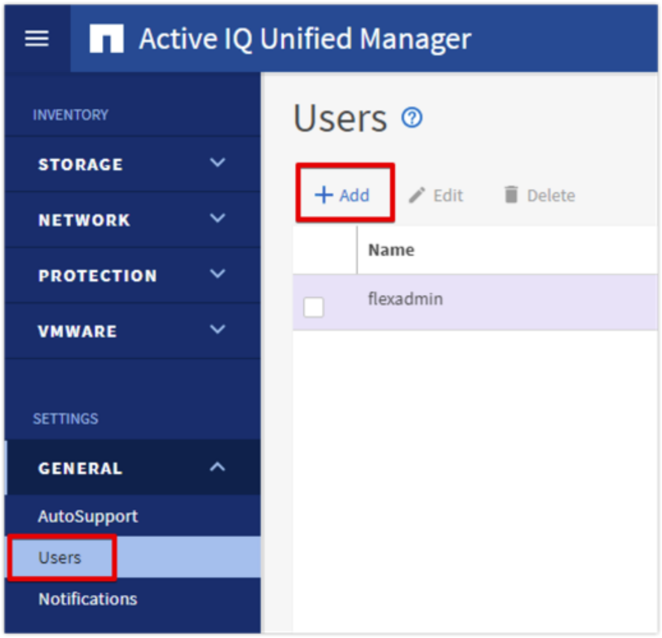
7. When prompted to trust the self-signed certificate from Active IQ Unified Manager, click Yes to finish and add the storage system.

The initial discovery process can take up to 15 minutes to complete.

Add Local Users to Active IQ Unified Manager

To add a local user to Active IQ Unified Manager, follow these steps:

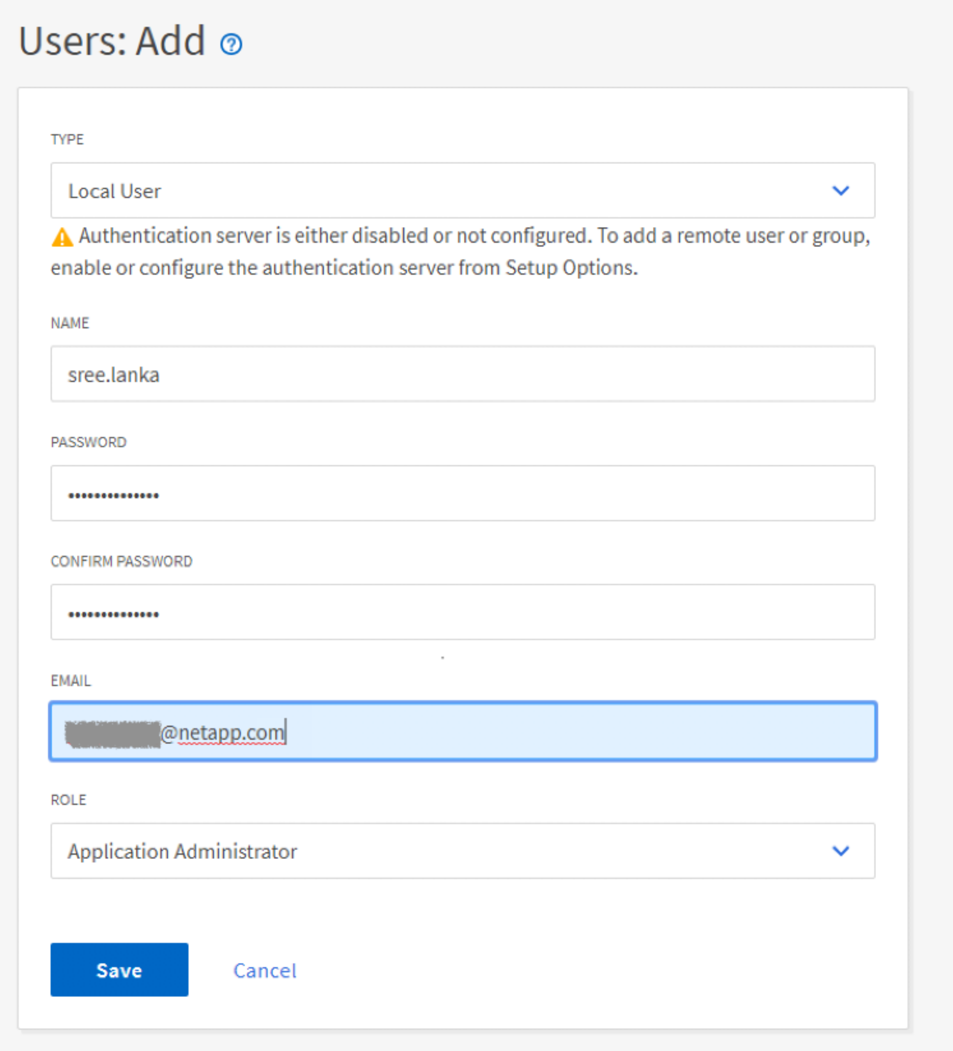
1. Navigate to the General section and click Users.



2. Click Add and complete the requested information:

   a. Choose Local User for the Type.
   b. Enter a username and password.
   c. Add the user’s email address.
   d. Choose the appropriate role for the new user.

3. Click Save to add the new user to Active IQ Unified Manager.



Users: Add

TYPE: Local User

⚠ Authentication server is either disabled or not configured. To add a remote user or group, enable or configure the authentication server from Setup Options.

NAME: sree.lanka

PASSWORD: ••••••••••••••

CONFIRM PASSWORD: ••••••••••••••

EMAIL: [redacted]@netapp.com

ROLE: Application Administrator

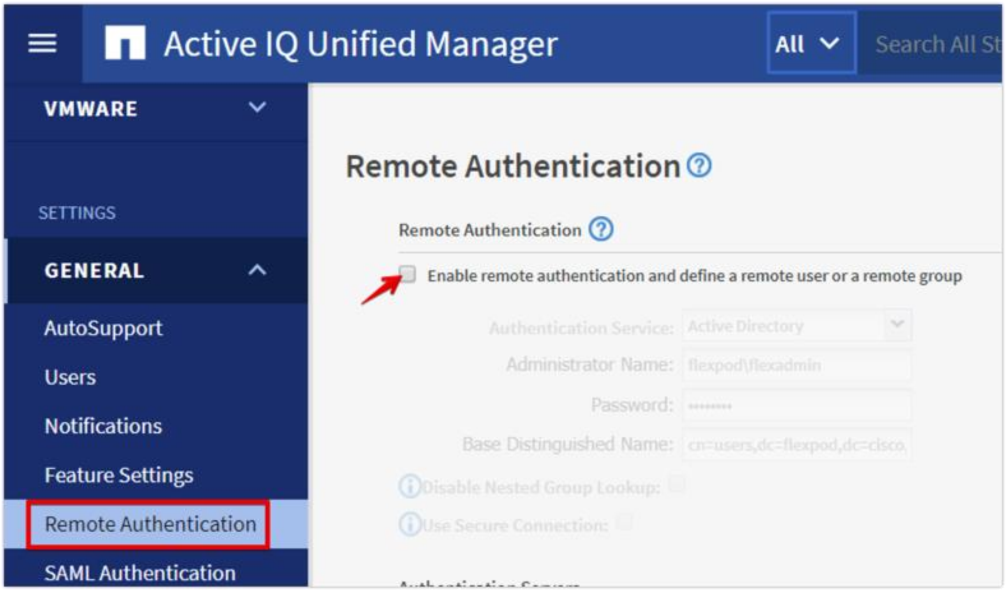
Configure Remote Authentication

Simplify user management and authentication for Active IQ Unified Manager by integrating it with Microsoft Active Directory. To connect Active IQ Unified Manager to Active Directory and perform user authentication with the Active Directory domain, follow these steps:

> You must be logged on as the maintenance user created during the installation or another user with Application Administrator privileges to configure remote authentication.

1. Navigate to the General section and choose Remote Authentication.

2. Choose the option to Enable remote authentication and define a remote user or remote group.



Remote Authentication

Remote Authentication

□ Enable remote authentication and define a remote user or a remote group

Authentication Service: Active Directory

Administrator Name: flexpod\flexadmin

Password: ••••••••

Base Distinguished Name: cn=users,dc=flexpod,dc=cisco

Disable Nested Group Lookup: □

Use Secure Connection: □

3. Choose Active Directory from the authentication service list.

4. Enter the Active Directory service account name and password. The account name can be in the format of domain\user or user@domain.

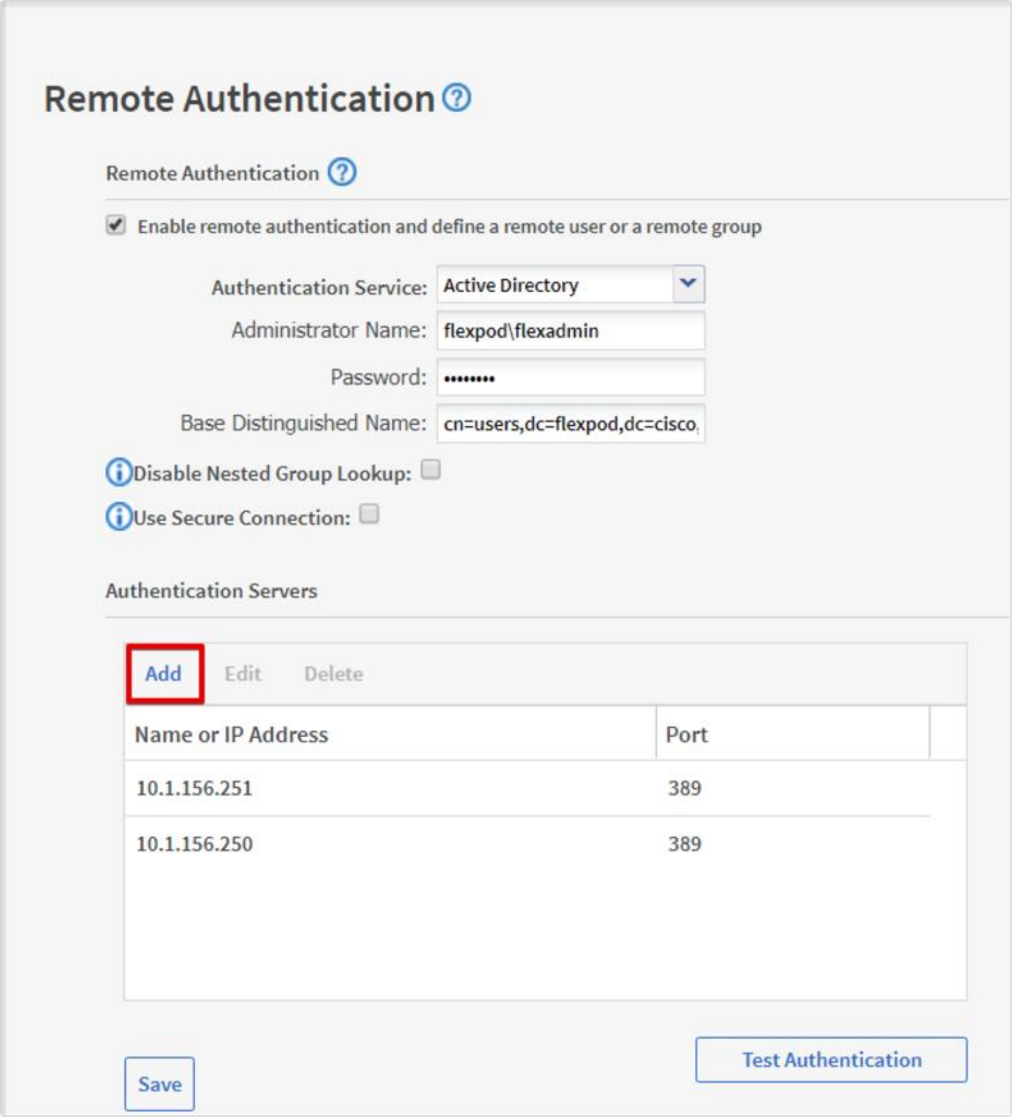
5. Enter the base DN where your Active Directory users reside.

6. If Active Directory LDAP communications are protected via SSL enable the Use Secure Connection option.

7. Add one or more Active Directory domain controllers by clicking Add and entering the IP or FQDN of the domain controller.

8. Click Save to enable the configuration.

If you don’t know the base DN to your Active Directory user organizational unit, contact the Active Directory administrator at your organization to provide this information.



Remote Authentication

Remote Authentication

☑ Enable remote authentication and define a remote user or a remote group

Authentication Service: Active Directory

Administrator Name: flexpod\flexadmin

Password: ••••••••

Base Distinguished Name: cn=users,dc=flexpod,dc=cisco,

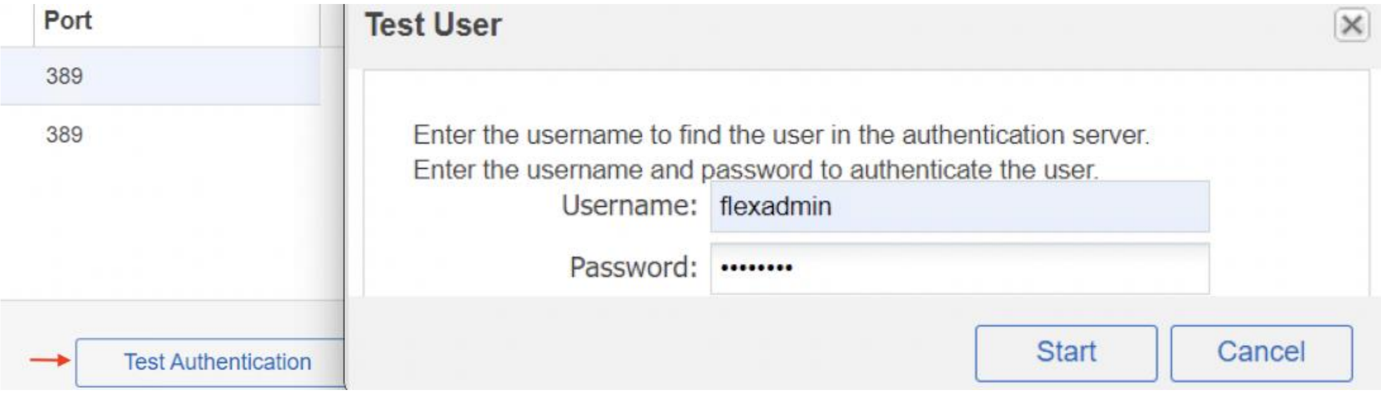
Disable Nested Group Lookup: □

Use Secure Connection: □

Authentication Servers

Name or IP Address	Port
10.1.156.251	389
10.1.156.250	389

9. Click Test Authentication and enter an Active Directory username and password to test authentication with the Active Directory authentication servers.



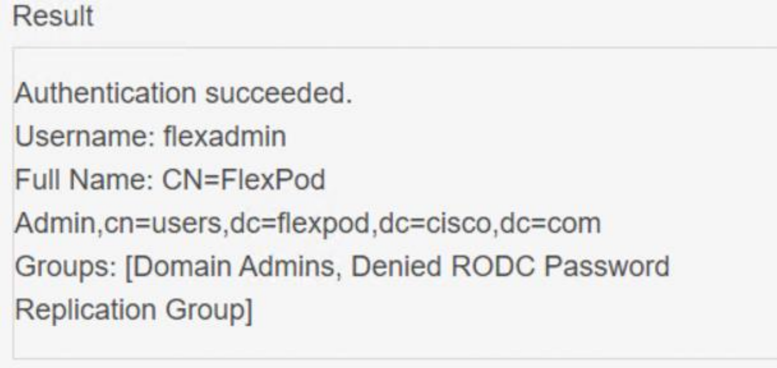
Test User

Enter the username to find the user in the authentication server.
Enter the username and password to authenticate the user.

Username: flexadmin

Password: •••••••••

A result message displays indicating authentication was successful:



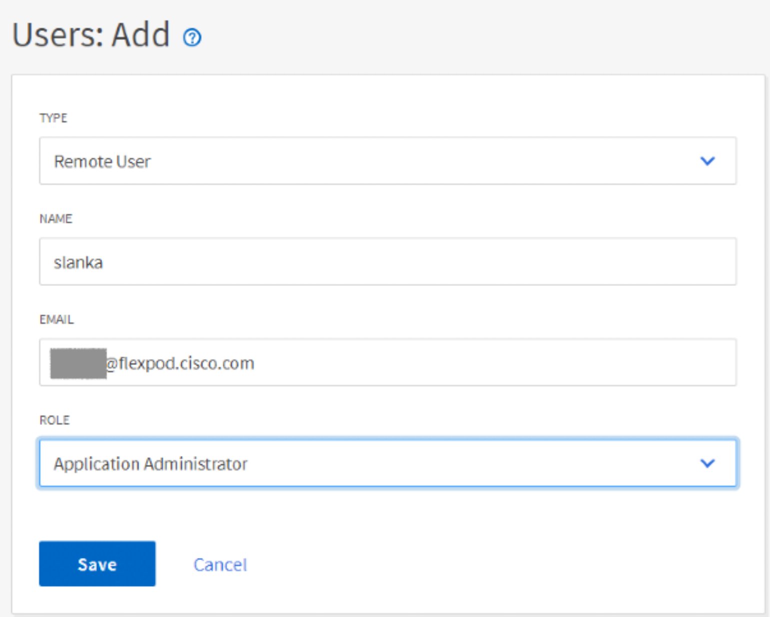
Result

```
Authentication succeeded.
Username: flexadmin
Full Name: CN=FlexPod
Admin,cn=users,dc=flexpod,dc=cisco,dc=com
Groups: [Domain Admins, Denied RODC Password
Replication Group]
```

Add a Remote User to Active IQ Unified Manager

To add remote users that need to access Active IQ Unified Manager and authenticate with the Active Directory servers, follow these steps:

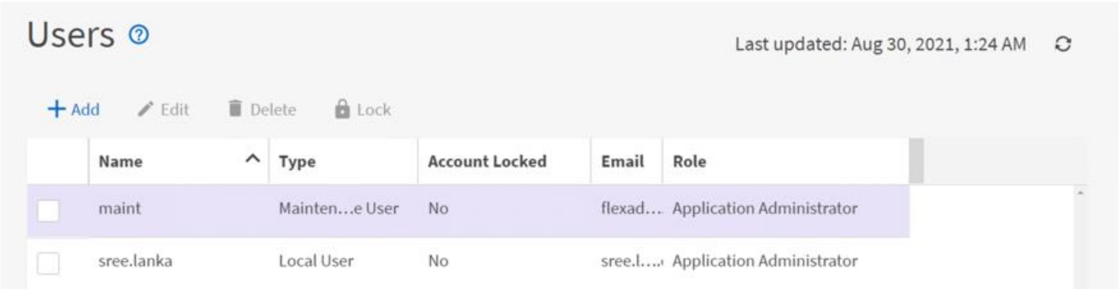
1. Navigate to the General section and choose Users.
2. Click Add and choose Remote User from the Type drop-down list.



Users: Add

TYPE	Remote User
NAME	slanka
EMAIL	[redacted]@flexpod.cisco.com
ROLE	Application Administrator

3. Enter the following information into the form:
   a. The username of the Active Directory user.
   b. Email address of the user.
   c. Choose the appropriate role for the user
4. Click Save when finished to add the remote user to Active IQ Unified Manager.



Users

Last updated: Aug 30, 2021, 1:24 AM

	Name	Type	Account Locked	Email	Role
□	maint	Mainten…e User	No	flexad…	Application Administrator
□	sree.lanka	Local User	No	sree.l….	Application Administrator

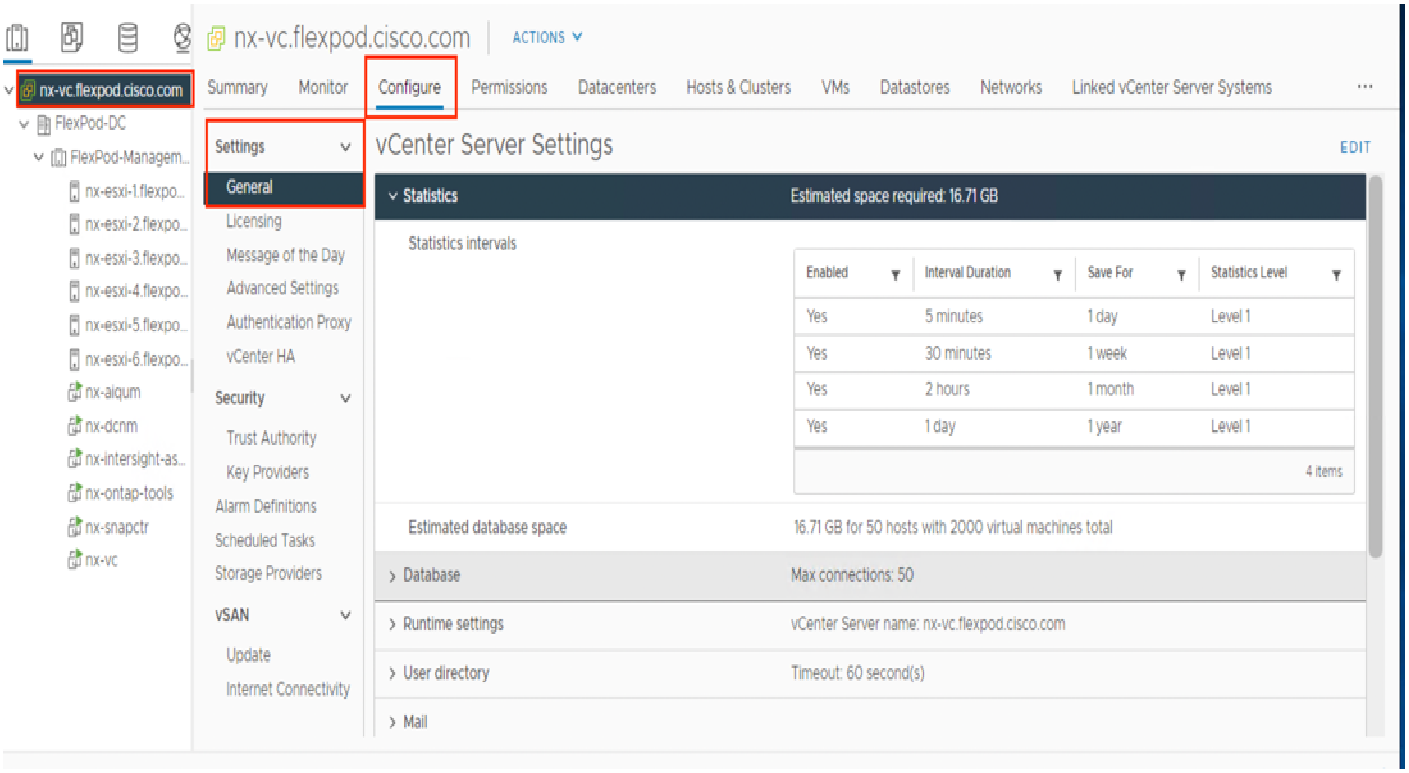
Add the vCenter Server to Active IQ Unified Manager

Active IQ Unified Manager provides visibility into vCenter and the virtual machines running inside the datastores backed by ONTAP storage. Virtual machines and storage are monitored to enable fast identification of performance issues within the various components of the virtual infrastructure stack.

Before adding vCenter into Active IQ Unified Manager, the log level of the vCenter server must be changed by following these steps:

1. In the vSphere client navigate to VMs and Templates and choose the vCenter instance from the top of the object tree.

2. Click the Configure tab, expand the settings, and choose General.



vCenter Server Settings

Statistics — Estimated space required: 16.71 GB

Statistics intervals

Enabled	Interval Duration	Save For	Statistics Level
Yes	5 minutes	1 day	Level 1
Yes	30 minutes	1 week	Level 1
Yes	2 hours	1 month	Level 1
Yes	1 day	1 year	Level 1

4 items

Estimated database space: 16.71 GB for 50 hosts with 2000 virtual machines total

Database: Max connections: 50

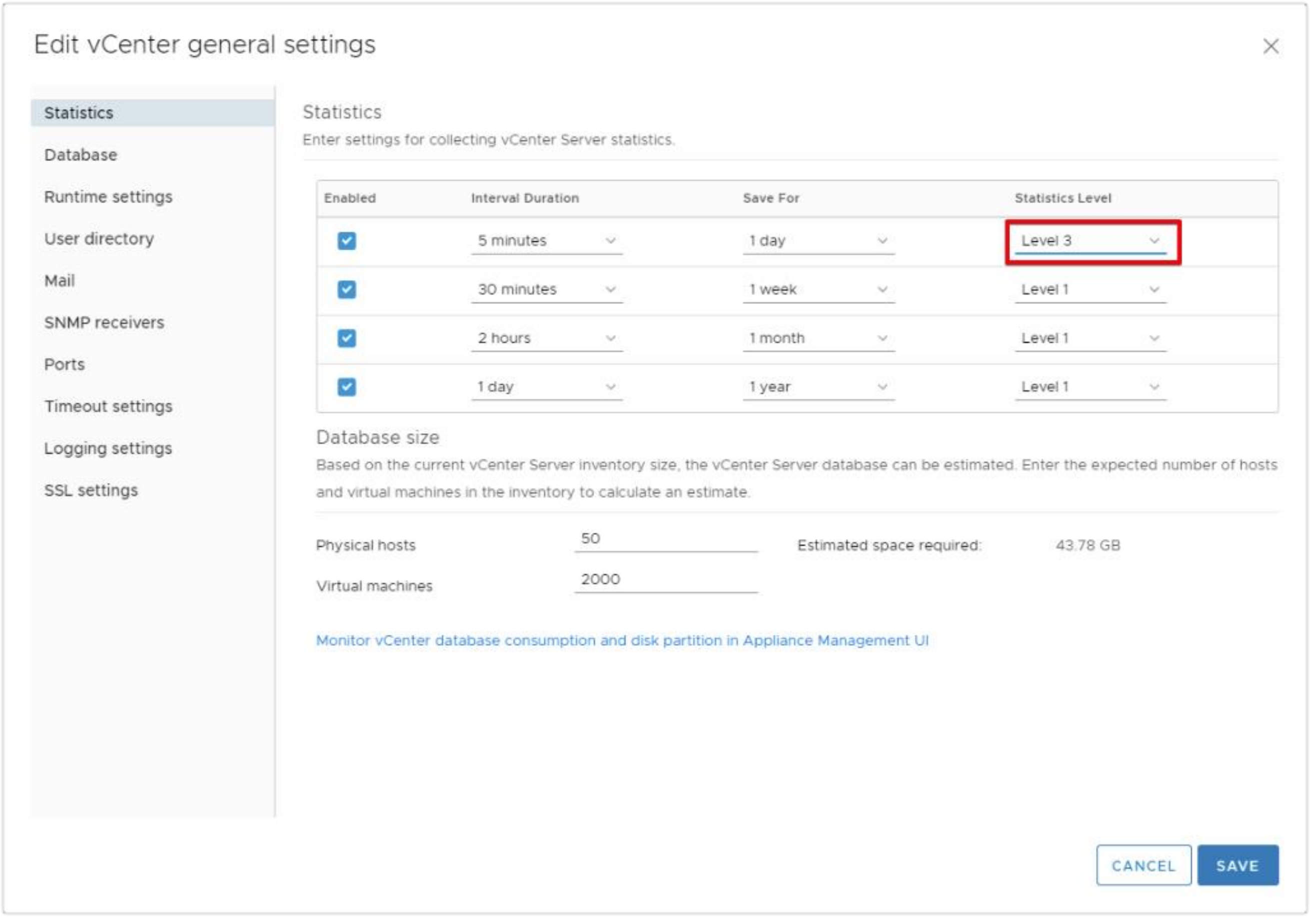
Runtime settings: vCenter Server name: nx-vc.flexpod.cisco.com

User directory: Timeout: 60 second(s)

Mail

3. Click EDIT.

4. In the pop-up window under Statistics, locate the 5 minutes Interval Duration row and change the setting to Level 3 under the Statistics Level column. Click SAVE.



Edit vCenter general settings

Statistics

Enter settings for collecting vCenter Server statistics.

Enabled	Interval Duration	Save For	Statistics Level
☑	5 minutes	1 day	Level 3
☑	30 minutes	1 week	Level 1
☑	2 hours	1 month	Level 1
☑	1 day	1 year	Level 1

Database size

Based on the current vCenter Server inventory size, the vCenter Server database can be estimated. Enter the expected number of hosts and virtual machines in the inventory to calculate an estimate.

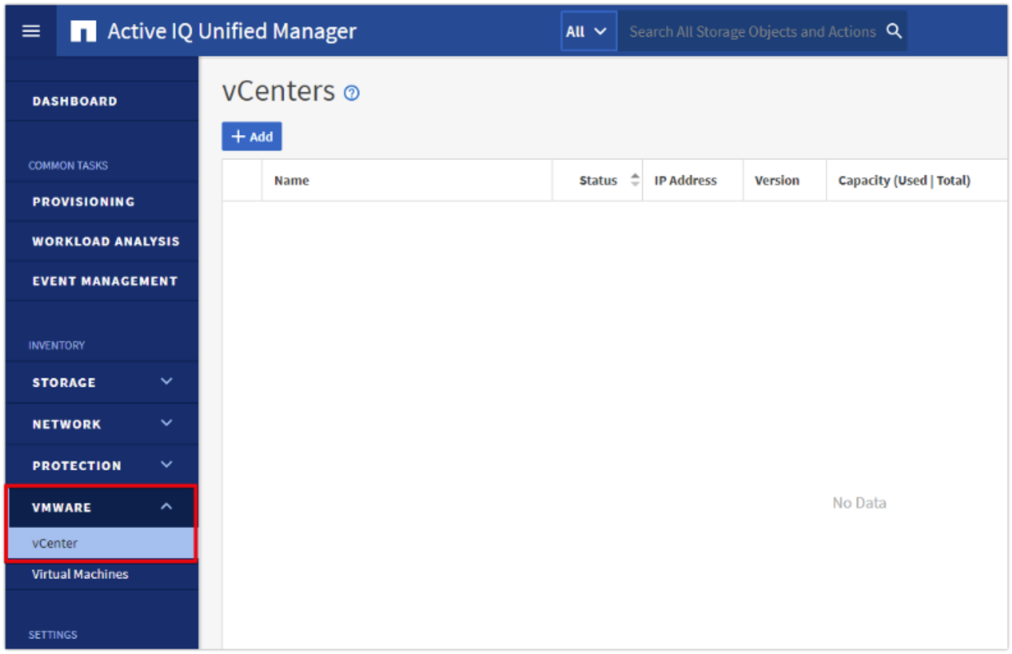
Physical hosts: 50

Estimated space required: 43.78 GB

Virtual machines: 2000

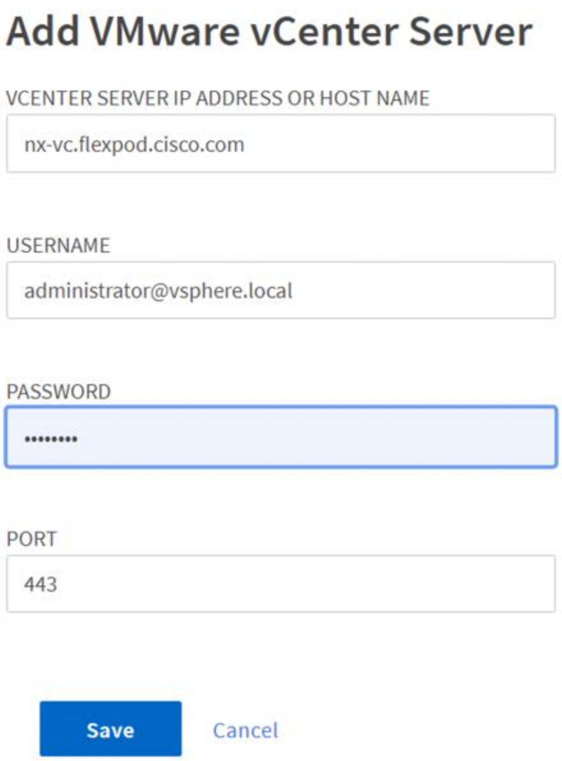
Monitor vCenter database consumption and disk partition in Appliance Management UI

5. Return to Active IQ Unified Manager and navigate to the VMware section located under Inventory.



6. Expand the section and choose vCenter and click Add.

7. Enter the VMware vCenter server details and click Save.



Add VMware vCenter Server

VCENTER SERVER IP ADDRESS OR HOST NAME

nx-vc.flexpod.cisco.com

USERNAME

administrator@vsphere.local

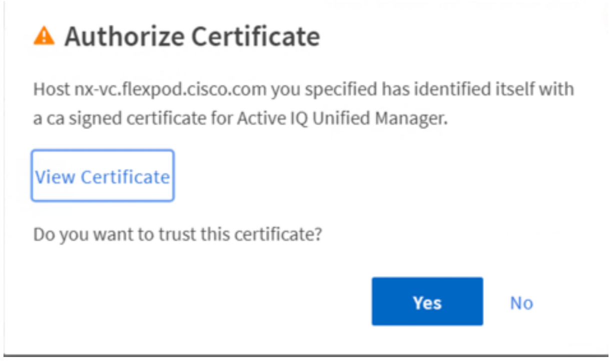
PASSWORD

••••••••

PORT

443

8. A dialog box will appear asking to authorize the certificate. Click Yes to accept the certificate and add the vCenter server.



⚠ Authorize Certificate

Host nx-vc.flexpod.cisco.com you specified has identified itself with a ca signed certificate for Active IQ Unified Manager.

Do you want to trust this certificate?

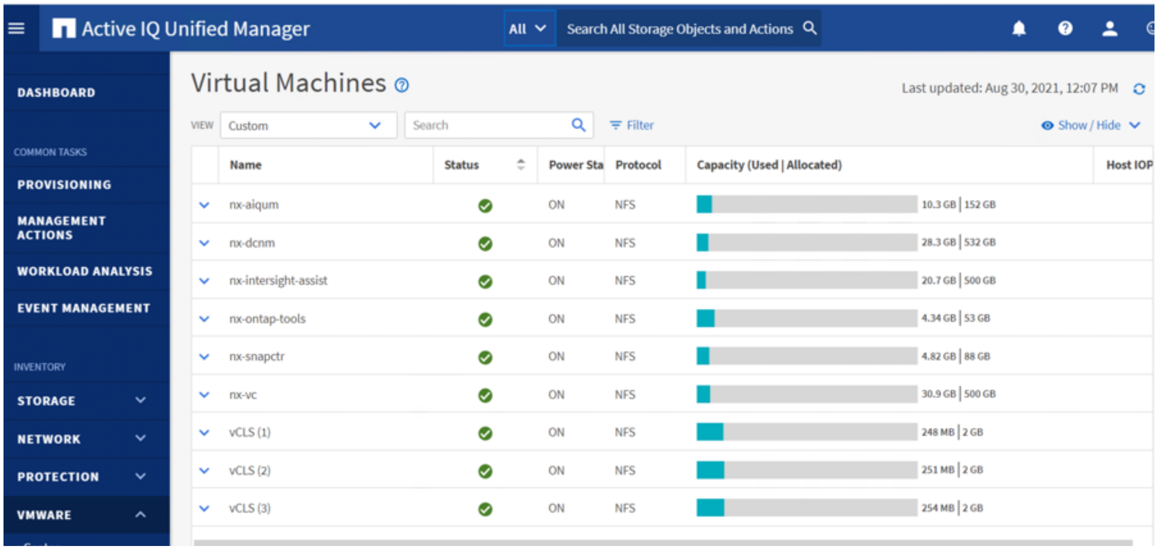
It may take up to 15 minutes to discover the vCenter server. Performance data can take up to an hour after discovery to become available.

View Virtual Machine Inventory

The virtual machine inventory is automatically added to Active IQ Unified Manager during discovery of the vCenter server. Virtual machines can be viewed in a hierarchical display detailing storage capacity, IOPS and latency for each component in the virtual infrastructure to troubleshoot the source of any performance related issues.

To review the virtual machine topology and statics, follow these steps:

1. Navigate to the VMware section located under Inventory, expand the section, and click Virtual Machines.



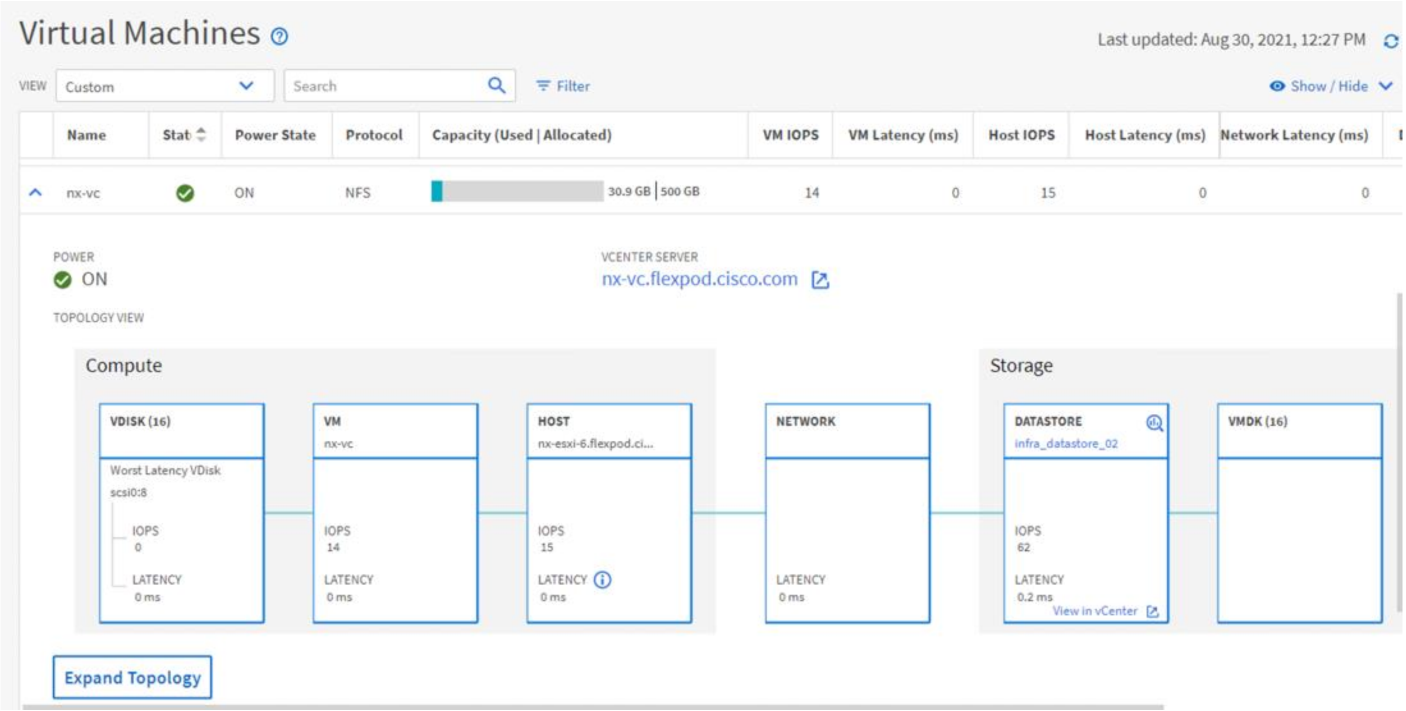
Virtual Machines

Last updated: Aug 30, 2021, 12:07 PM

VIEW Custom

Name	Status	Power Sta	Protocol	Capacity (Used | Allocated)	Host IOP
nx-aiqum	✓	ON	NFS	10.3 GB | 152 GB	
nx-dcnm	✓	ON	NFS	28.3 GB | 532 GB	
nx-intersight-assist	✓	ON	NFS	20.7 GB | 500 GB	
nx-ontap-tools	✓	ON	NFS	4.34 GB | 53 GB	
nx-snapctr	✓	ON	NFS	4.82 GB | 88 GB	
nx-vc	✓	ON	NFS	30.9 GB | 500 GB	
vCLS (1)	✓	ON	NFS	248 MB | 2 GB	
vCLS (2)	✓	ON	NFS	251 MB | 2 GB	
vCLS (3)	✓	ON	NFS	254 MB | 2 GB	

2. Choose a VM and click the blue caret to expose the topology view. Review the compute, network, and storage components and their associated IOPS and latency statistics.



Virtual Machines

Last updated: Aug 30, 2021, 12:27 PM

VIEW Custom

	Name	Stat	Power State	Protocol	Capacity (Used | Allocated)	VM IOPS	VM Latency (ms)	Host IOPS	Host Latency (ms)	Network Latency (ms)
^	nx-vc	✓	ON	NFS	30.9 GB | 500 GB	14	0	15	0	0

POWER
✓ ON

VCENTER SERVER
nx-vc.flexpod.cisco.com

TOPOLOGY VIEW

Compute

VDISK (16)
Worst Latency VDisk
scsi0:8
IOPS
0
LATENCY
0 ms

VM
nx-vc
IOPS
14
LATENCY
0 ms

HOST
nx-esxi-6.flexpod.ci...
IOPS
15
LATENCY
0 ms

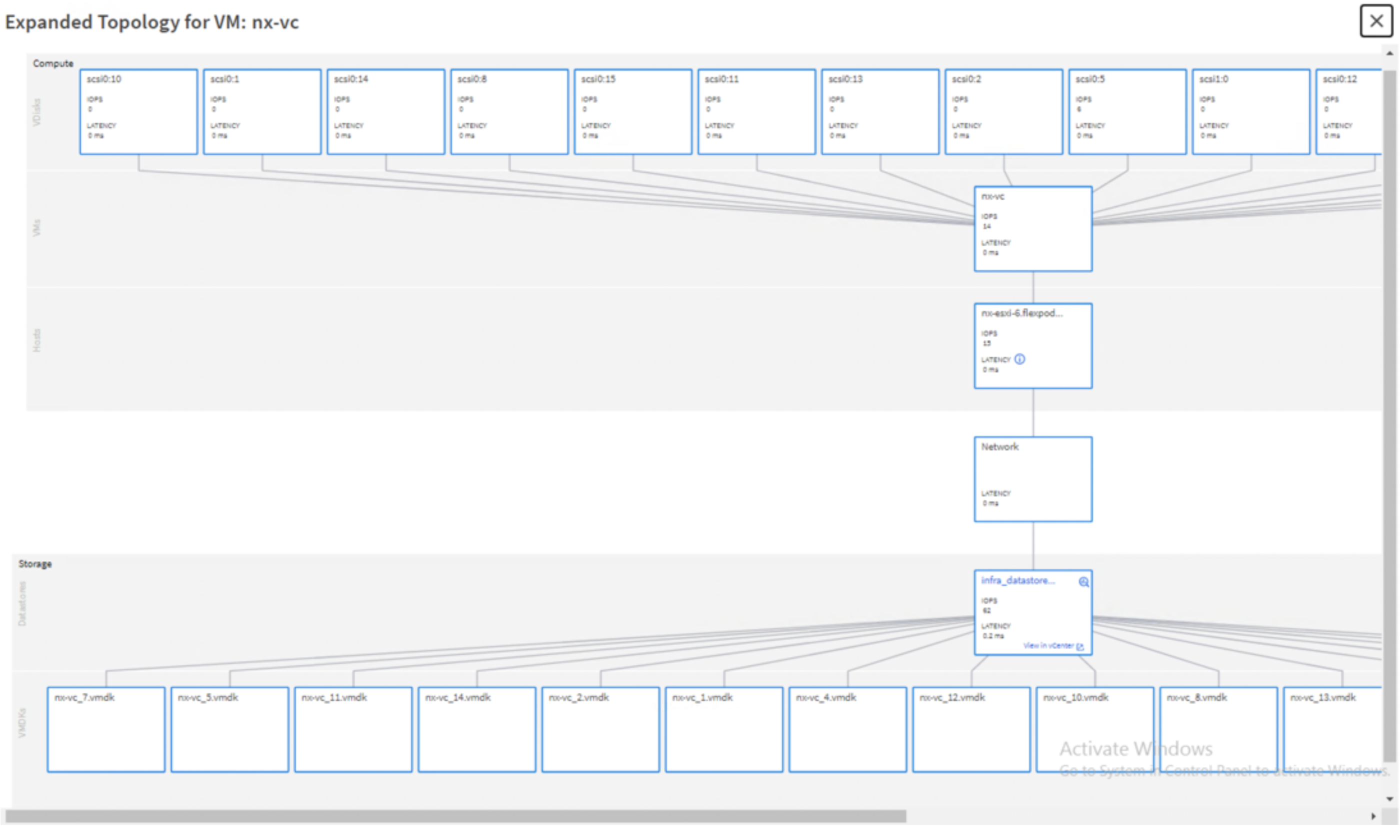
NETWORK
LATENCY
0 ms

Storage

DATASTORE
infra_datastore_02
IOPS
62
LATENCY
0.2 ms

VMDK (16)

3. Click Expand Topology to see the entire hierarchy of the virtual machine and its virtual disks as it is connected through the virtual infrastructure stack. The VM components are mapped from vSphere and compute through the network to the storage.



Review Security Compliance with Active IQ Unified Manager

Active IQ Unified Manager identifies issues and makes recommendations to improve the security posture of ONTAP. Active IQ Unified Manager evaluates ONTAP storage based on recommendations made in the Security Hardening Guide for ONTAP 9. Items are identified according to their level of compliance with the recommendations. All events identified do not inherently apply to all environments, for example, FIPS compliance. Review the Security Hardening Guide for NetApp ONTAP 9 (TR-4569) for additional information and recommendations for securing ONTAP 9.

The status icons in the security cards have the following meanings in relation to their compliance:

- ✓ - The parameter is configured as recommended.
- ⚠ - The parameter is not configured as recommended.
- ℹ - Either the functionality is not enabled on the cluster, or the parameter is not configured as recommended, but this parameter does not contribute to the compliance of the object.

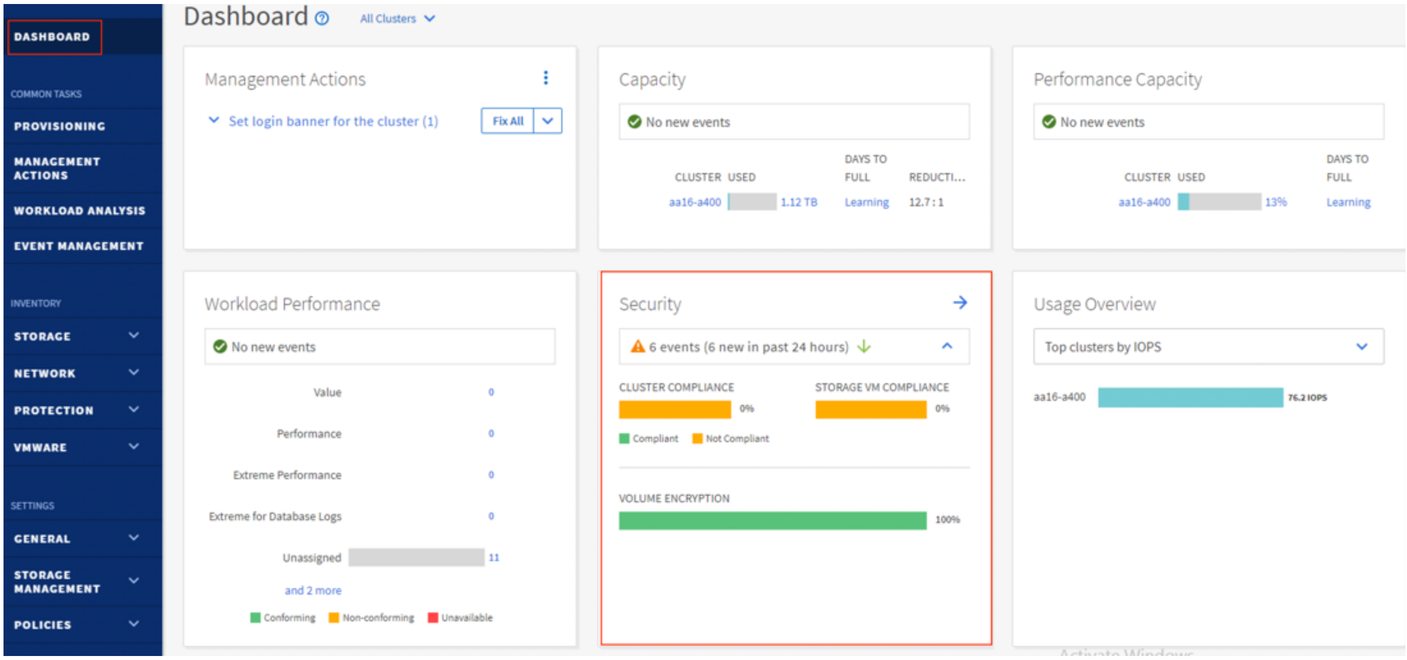
Note that volume encryption status does not contribute to whether the cluster or SVM are considered compliant.

To identify security events in Active IQ Unified Manager, follow these steps:

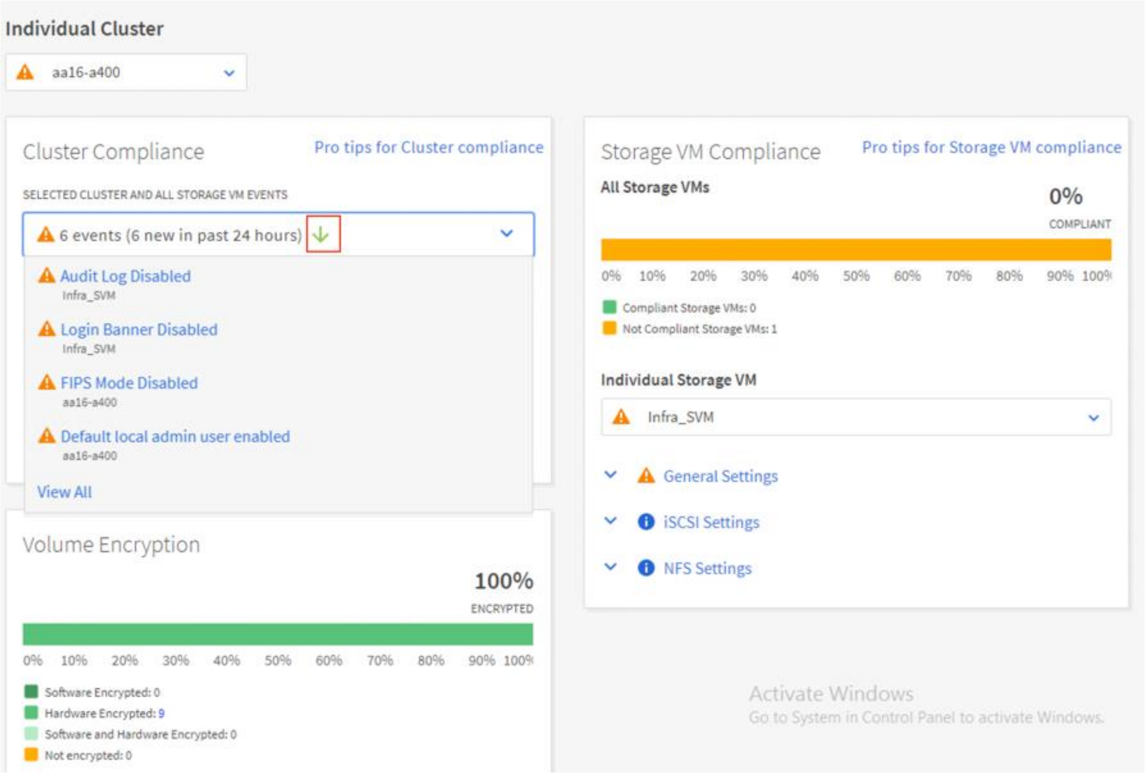
1. Navigate to the URL of the Active IQ Unified Manager installation and login.

2. Choose the Dashboard from the left menu bar in Active IQ Unified Manager.

3. Locate the Security card and note the compliance level of the cluster and SVM. Click the blue arrow to expand the findings.



4. Locate Individual Cluster section and the Cluster Compliance card. From the drop-down list choose View All.



Individual Cluster

aa16-a400

Cluster Compliance — Pro tips for Cluster compliance

SELECTED CLUSTER AND ALL STORAGE VM EVENTS

6 events (6 new in past 24 hours)

- Audit Log Disabled — Infra_SVM
- Login Banner Disabled — Infra_SVM
- FIPS Mode Disabled — aa16-a400
- Default local admin user enabled — aa16-a400

View All

Volume Encryption

100% ENCRYPTED

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

- Software Encrypted: 0
- Hardware Encrypted: 9
- Software and Hardware Encrypted: 0
- Not encrypted: 0

Storage VM Compliance — Pro tips for Storage VM compliance

All Storage VMs

0% COMPLIANT

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

- Compliant Storage VMs: 0
- Not Compliant Storage VMs: 1

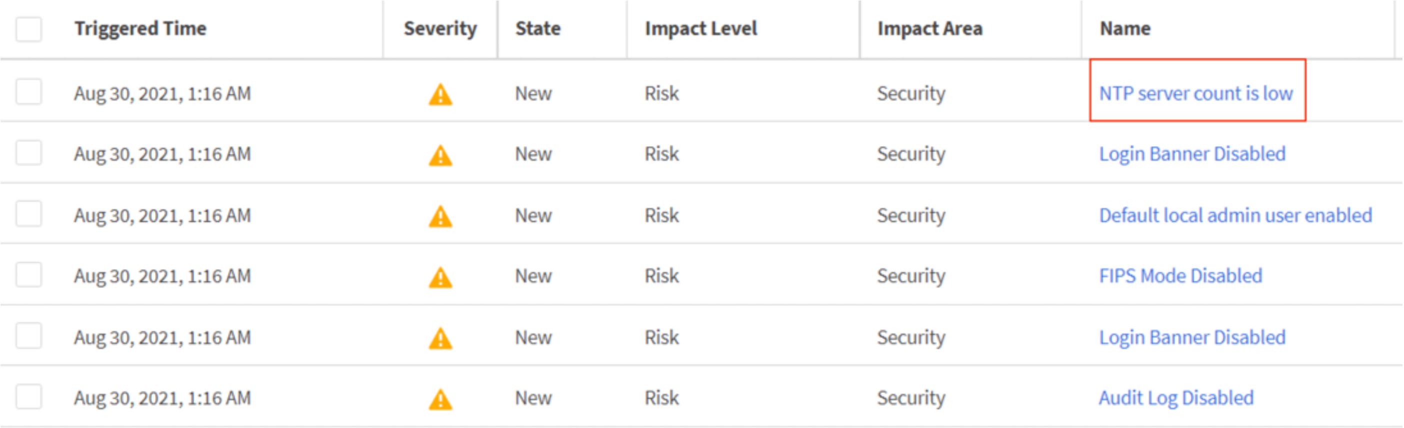
Individual Storage VM

Infra_SVM

- General Settings
- iSCSI Settings
- NFS Settings

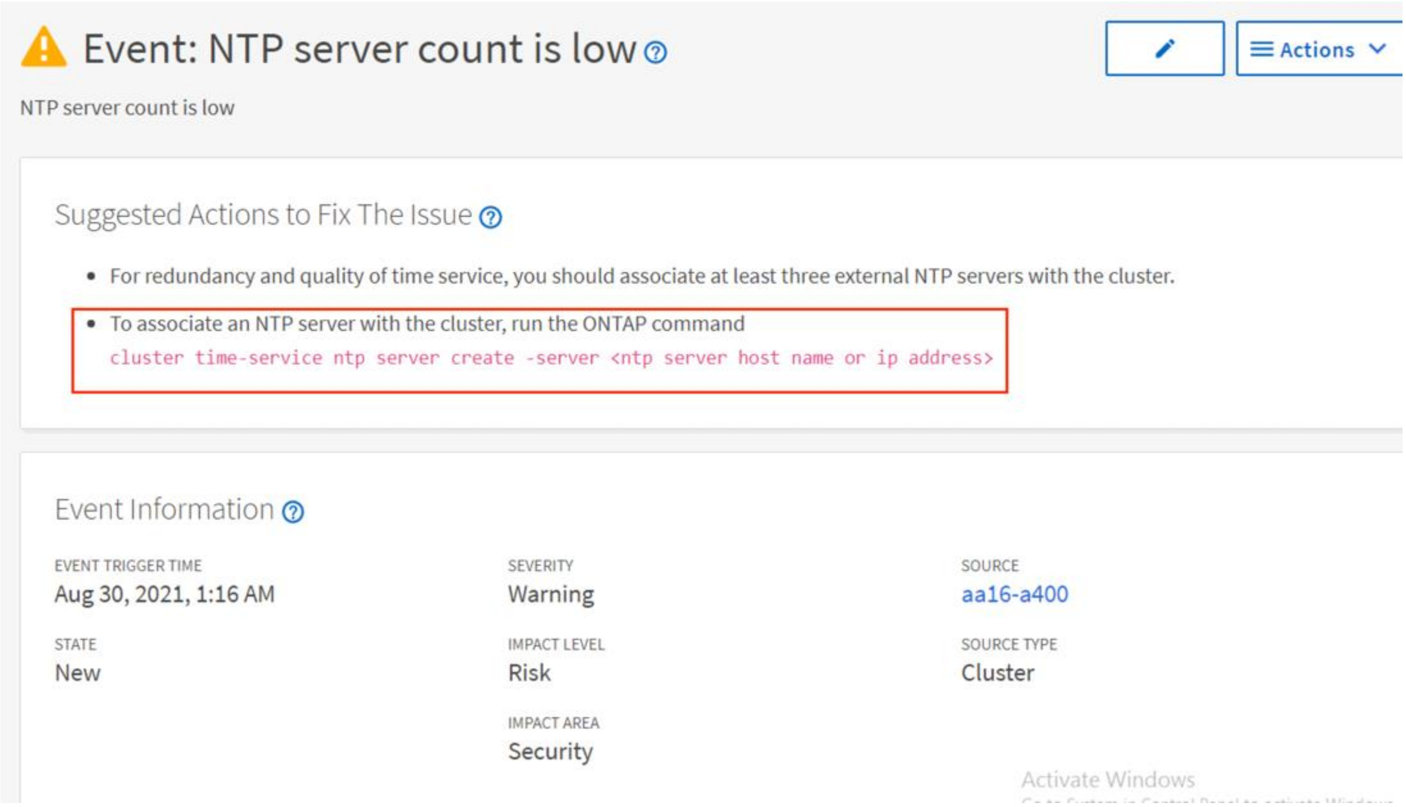
Activate Windows
Go to System in Control Panel to activate Windows.

5. Choose an event from the list and click the name of the event to view the remediation steps.



□	Triggered Time	Severity	State	Impact Level	Impact Area	Name
□	Aug 30, 2021, 1:16 AM	⚠	New	Risk	Security	NTP server count is low
□	Aug 30, 2021, 1:16 AM	⚠	New	Risk	Security	Login Banner Disabled
□	Aug 30, 2021, 1:16 AM	⚠	New	Risk	Security	Default local admin user enabled
□	Aug 30, 2021, 1:16 AM	⚠	New	Risk	Security	FIPS Mode Disabled
□	Aug 30, 2021, 1:16 AM	⚠	New	Risk	Security	Login Banner Disabled
□	Aug 30, 2021, 1:16 AM	⚠	New	Risk	Security	Audit Log Disabled

6. Remediate the risk if desired and perform the suggested actions to fix the issue.



Event: NTP server count is low

NTP server count is low

Suggested Actions to Fix The Issue

- For redundancy and quality of time service, you should associate at least three external NTP servers with the cluster.
- To associate an NTP server with the cluster, run the ONTAP command `cluster time-service ntp server create -server <ntp server host name or ip address>`

Event Information

EVENT TRIGGER TIME Aug 30, 2021, 1:16 AM	SEVERITY Warning	SOURCE aa16-a400
STATE New	IMPACT LEVEL Risk	SOURCE TYPE Cluster
	IMPACT AREA Security	

Remediate Security Compliance Findings

Active IQ identifies several security compliance risks after installation that can be immediately corrected to improve the security posture of ONTAP.

Correct Cluster Risks

To correct cluster risks, follow these steps:

1. To associate an NTP server with the cluster, run the ONTAP command:

```
cluster time-service ntp server create -server <ntp server host name or ip address>
```

2. Enable the login banner on the cluster:

```
security login banner modify -vserver <clustername> -message "Access restricted to authorized users"
```

users"

NetApp Active IQ

NetApp Active IQ is a data-driven service that leverages artificial intelligence and machine learning to provide analytics and actionable intelligence for ONTAP storage systems. Active IQ uses AutoSupport data to deliver proactive guidance and best practices recommendations to optimize storage performance and minimize risk.

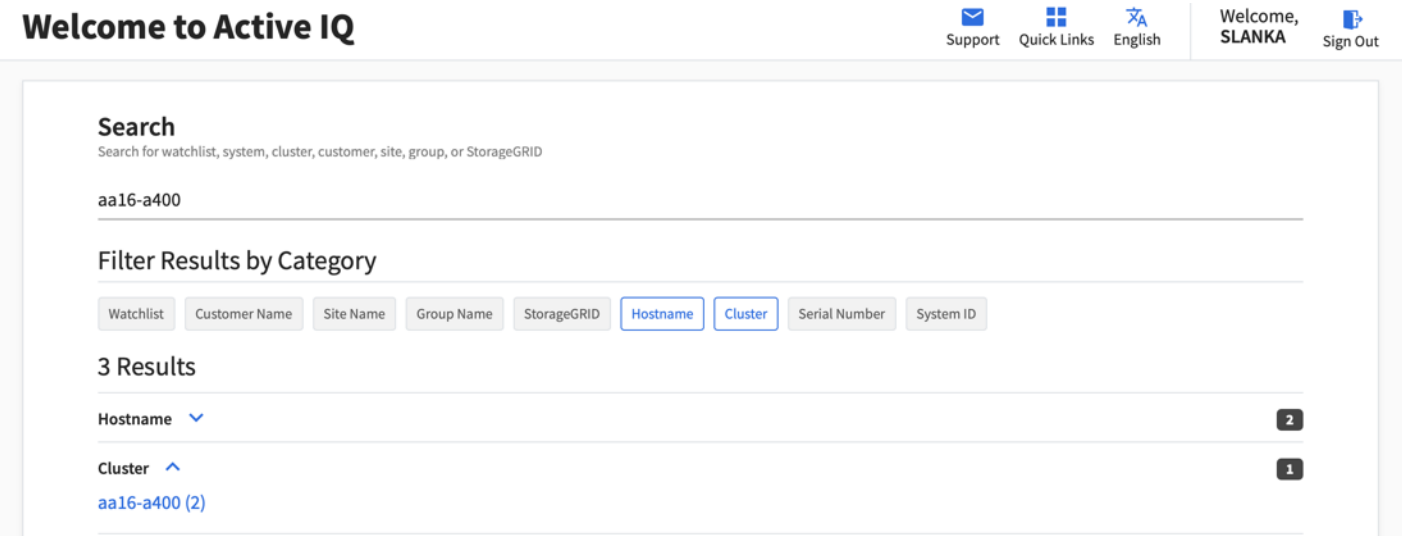
Additional Active IQ documentation is available on the [Active IQ Documentation Resources]() web page.

Active IQ is automatically enabled when you configure AutoSupport on the ONTAP storage controllers. To get started with Active IQ, follow these steps:

1. Obtain the controller serial numbers from your ONTAP system with the following command:

   ```
   system node show -fields serialnumber
   ```

2. Navigate to the Active IQ portal at https://activeiq.netapp.com/
3. Login with you NetApp support account ID
4. At the welcome screen enter the cluster name or one of controller serial numbers in the search box. Active IQ will automatically begin searching for the cluster and display results below.



Welcome to Active IQ

Search
Search for watchlist, system, cluster, customer, site, group, or StorageGRID

aa16-a400

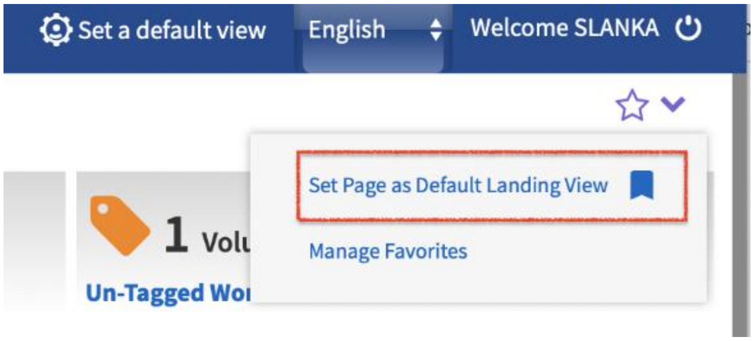
Filter Results by Category

3 Results

Hostname 2

Cluster 1
aa16-a400 (2)

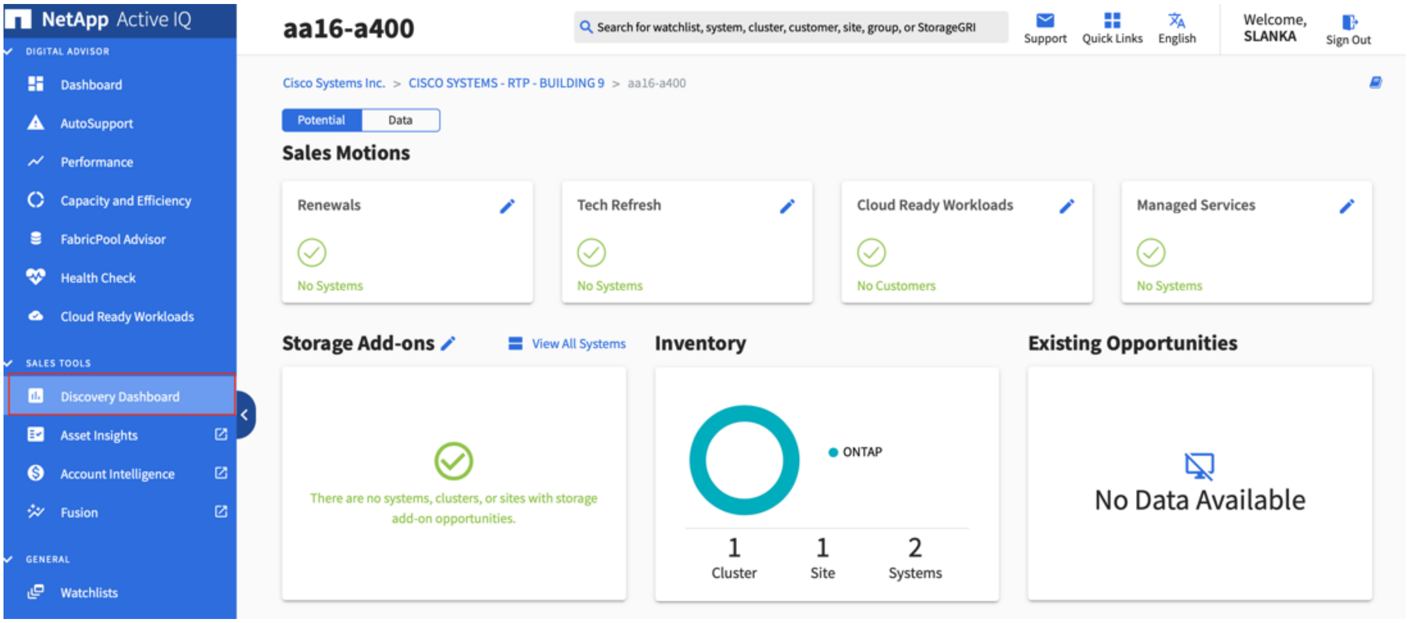
5. Choose the cluster name to launch the main dashboard.
6. From the drop-down list select Set Page as Default Landing View.



Add a Watchlist to the Discovery Dashboard

The system level dashboard is the default view for systems in Active IQ. To create a watchlist for the quick access cluster to cluster health and risk information, follow these steps:

1. Click Discovery Dashboard in the toolbar at the top of the Active IQ screen.



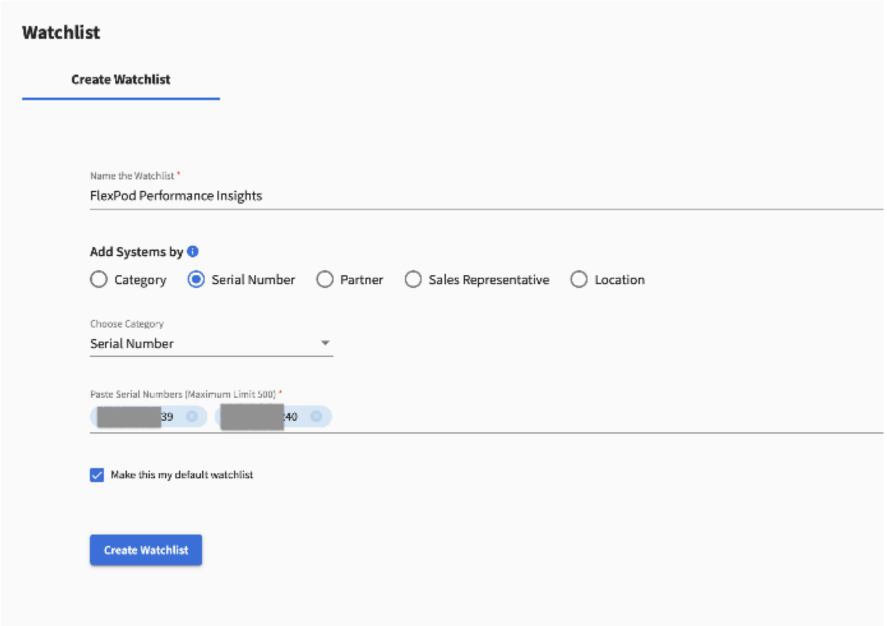
There are no systems, clusters, or sites with storage add-on opportunities.

No Data Available

2. Click Create Watchlist and enter a name for the watchlist.

3. Choose the radio button to add systems by serial number and enter the cluster serial numbers to the watchlist.

4. Check the box for Make this my default watchlist if desired and click Create Watchlist.



Name the Watchlist *
FlexPod Performance Insights

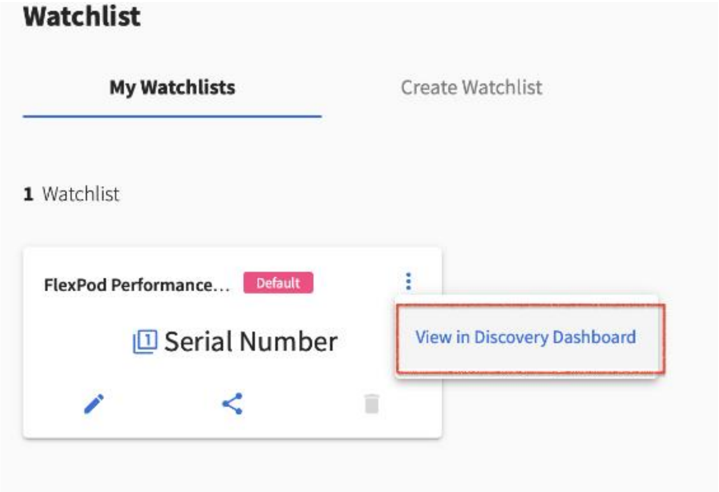
Add Systems by
○ Category ● Serial Number ○ Partner ○ Sales Representative ○ Location

Choose Category
Serial Number

Paste Serial Numbers (Maximum Limit 500) *
[redacted]39 [redacted]40

☑ Make this my default watchlist

5. Click Manage watchlists and then click the ellipsis on the cluster watchlist card you created and click View in Discovery Dashboard.



1 Watchlist

FlexPod Performance... Default
Serial Number

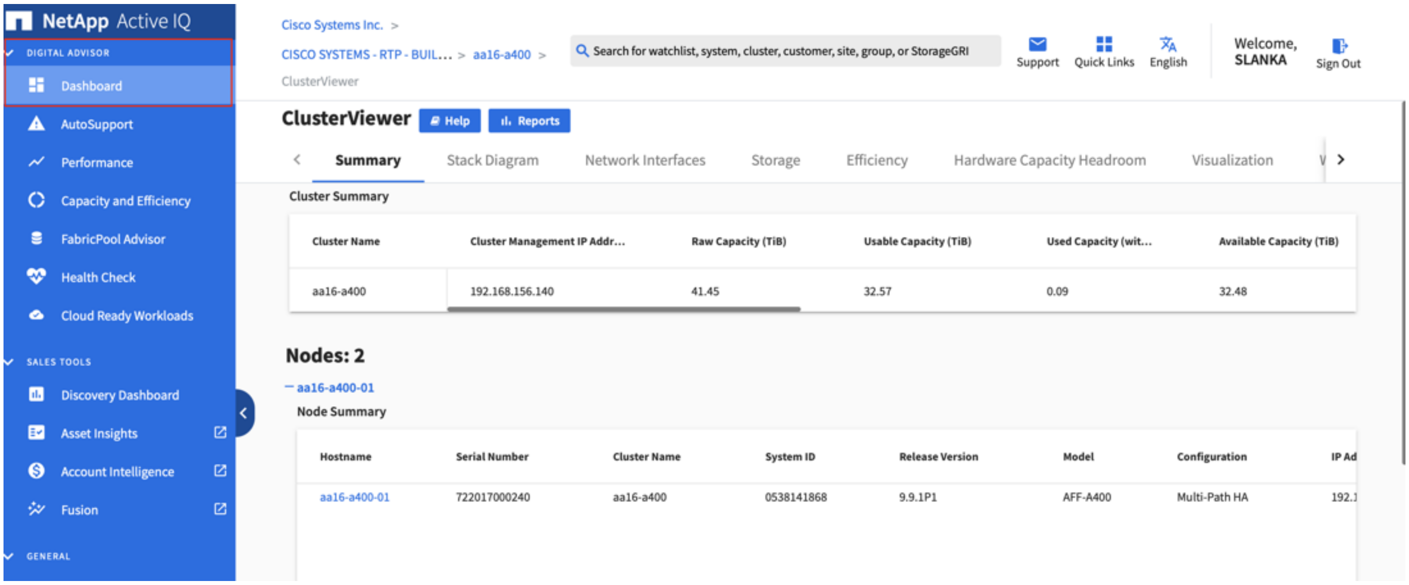
6. View the health and risk overview for the cluster.

Create Active IQ Digital Advisor Dashboard

The Active IQ Digital advisor provides a summary dashboard and system wellness score based on the health and risks that Active IQ have identified. The dashboard provides a quick way to identify and get proactive recommendations on how to mitigate risks in the storage environment including links to technical reports and mitigation plans.

To create an Active IQ Digital Advisor dashboard, follow these steps:

1. At the cluster dashboard, click Active IQ Digital Advisor from the top menu.



ClusterViewer

Cluster Summary

Cluster Name	Cluster Management IP Addr...	Raw Capacity (TiB)	Usable Capacity (TiB)	Used Capacity (wit...	Available Capacity (TiB)
aa16-a400	192.168.156.140	41.45	32.57	0.09	32.48

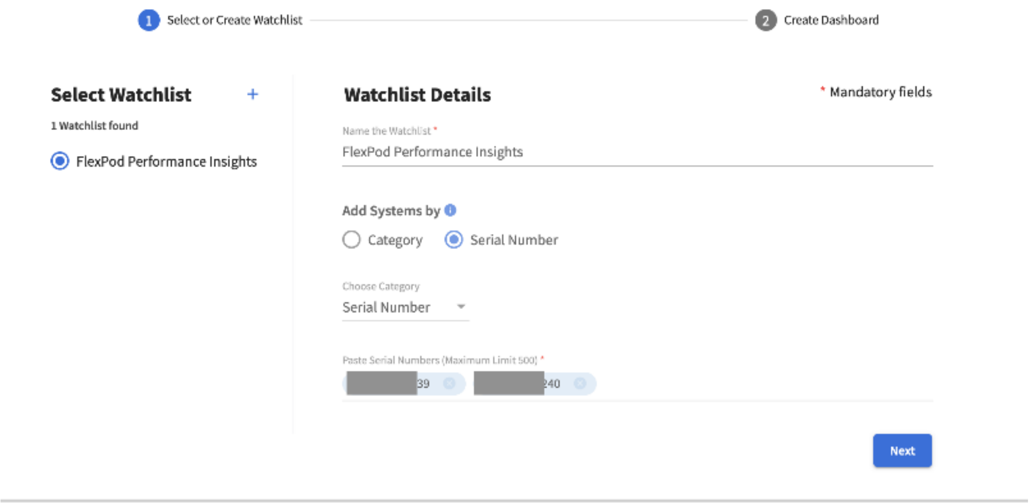
Nodes: 2

— aa16-a400-01

Node Summary

Hostname	Serial Number	Cluster Name	System ID	Release Version	Model	Configuration	IP Ad
aa16-a400-01	722017000240	aa16-a400	0538141868	9.9.1P1	AFF-A400	Multi-Path HA	192.1

2. Choose the watchlist created in the previous step and click Next.



1 Watchlist found

● FlexPod Performance Insights

Watchlist Details

* Mandatory fields

Name the Watchlist *
FlexPod Performance Insights

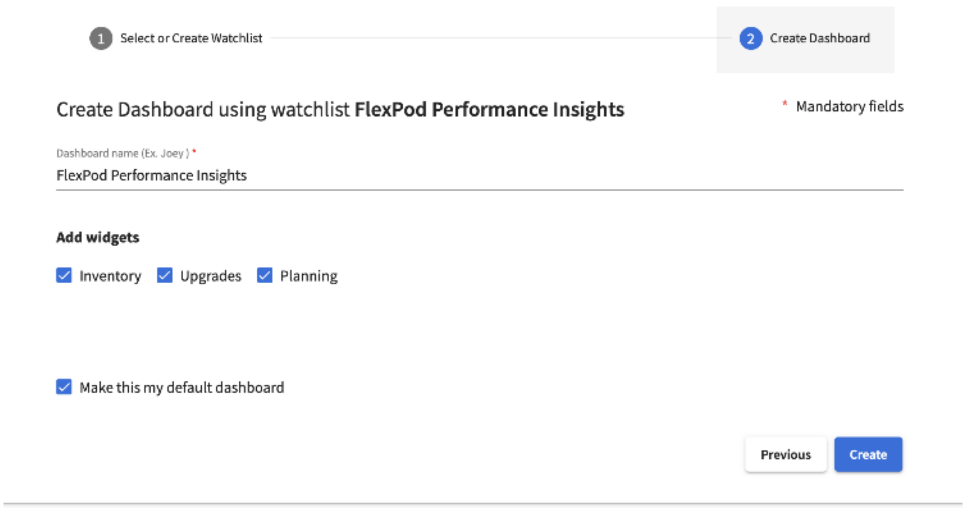
Add Systems by
○ Category ● Serial Number

Choose Category
Serial Number

Paste Serial Numbers (Maximum Limit 500) *
[redacted]39 [redacted]240

3. Accept the dashboard default name and choose all the available widgets.

4. Check the box Make this the default dashboard and click Create.



1 Select or Create Watchlist

2 Create Dashboard

Create Dashboard using watchlist **FlexPod Performance Insights**

* Mandatory fields

Dashboard name (Ex. Joey) *
FlexPod Performance Insights

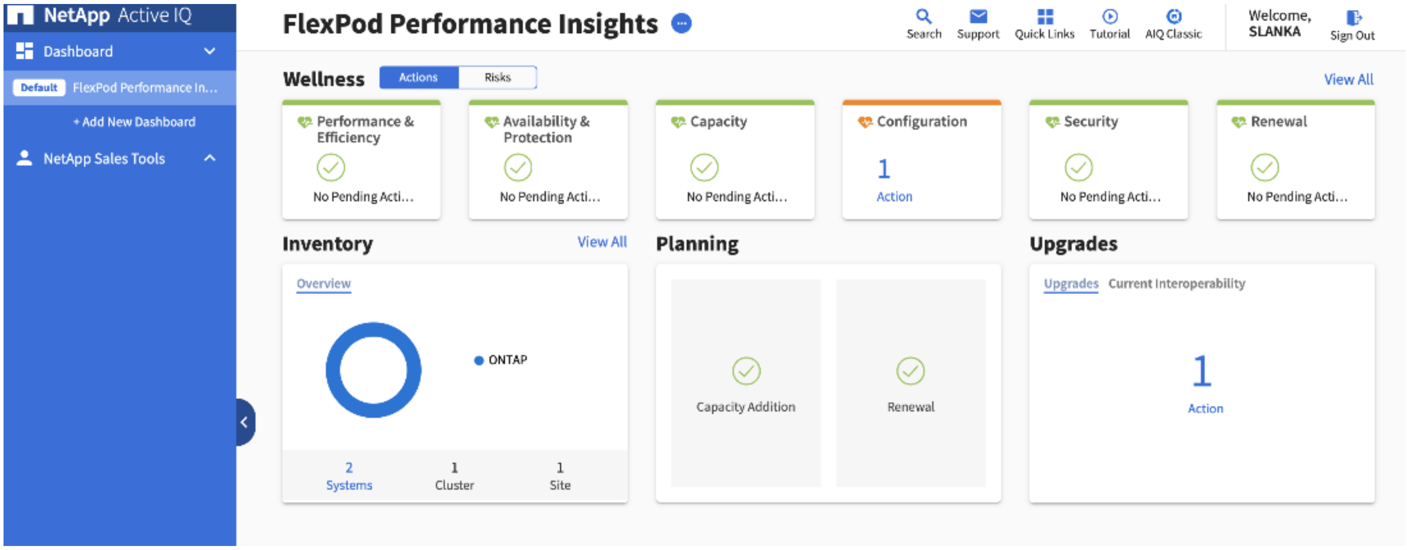
Add widgets

☑ Inventory ☑ Upgrades ☑ Planning

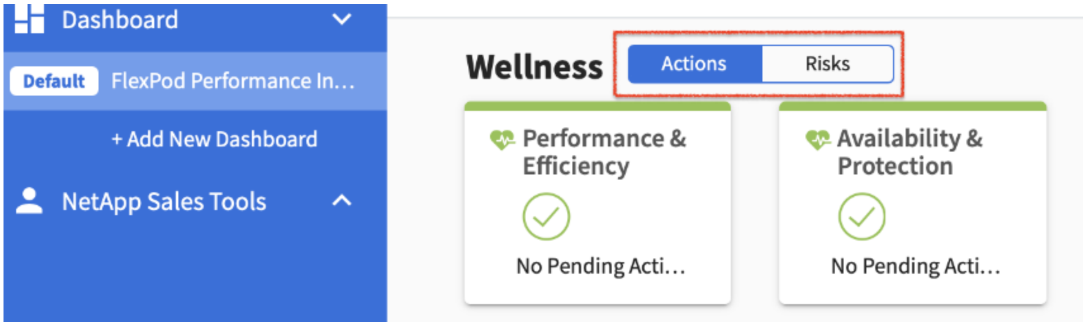
☑ Make this my default dashboard

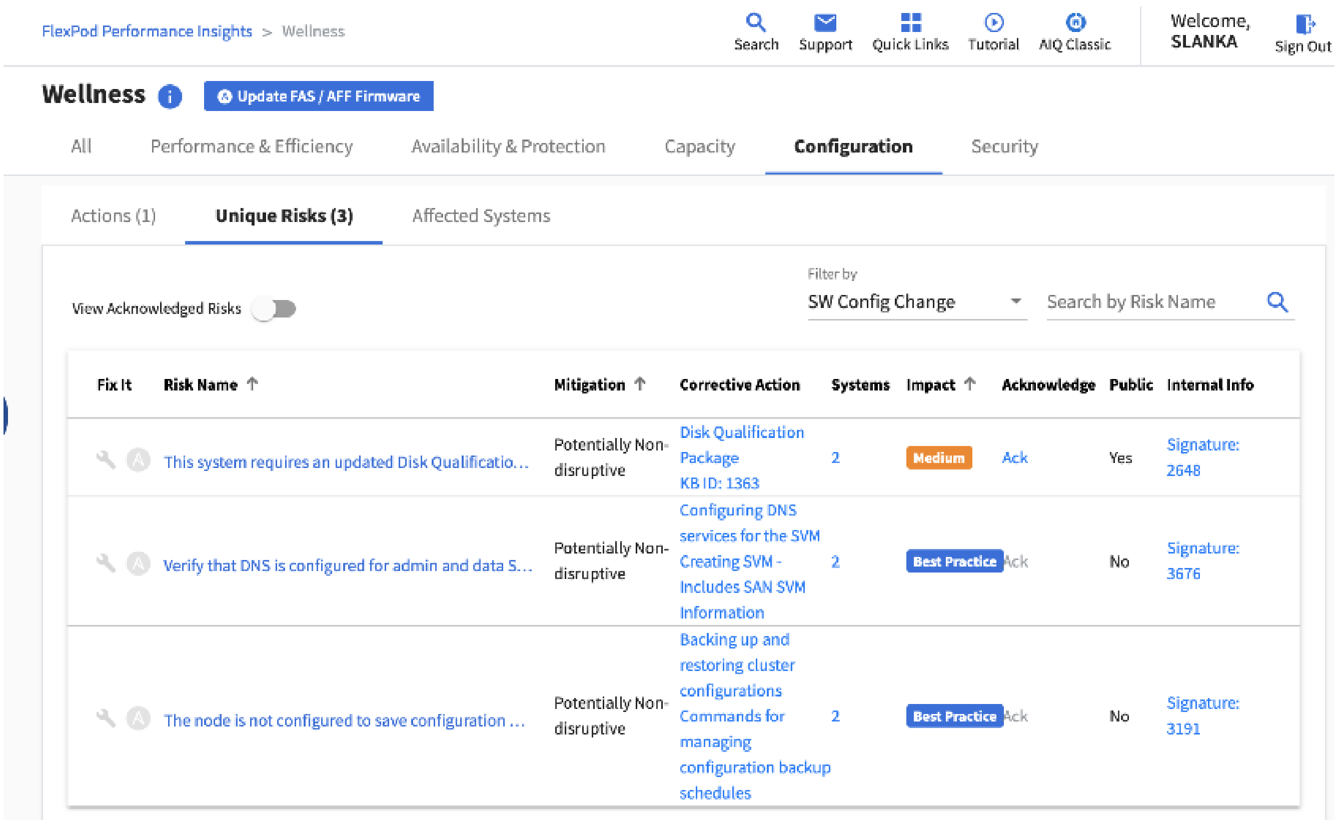
Previous Create

5. Review the enhanced dashboard including the Wellness Score and any recommended actions or risks.



6. Switch between the Actions and Risks tabs to view the risks broken down by category or a list of all risks with their impact and links to corrective actions.





Fix It	Risk Name	Mitigation	Corrective Action	Systems	Impact	Acknowledge	Public	Internal Info
	This system requires an updated Disk Qualificatio…	Potentially Non-disruptive	Disk Qualification Package KB ID: 1363	2	Medium	Ack	Yes	Signature: 2648
	Verify that DNS is configured for admin and data S…	Potentially Non-disruptive	Configuring DNS services for the SVM Creating SVM - Includes SAN SVM Information	2	Best Practice	Ack	No	Signature: 3676
	The node is not configured to save configuration …	Potentially Non-disruptive	Backing up and restoring cluster configurations Commands for managing configuration backup schedules	2	Best Practice	Ack	No	Signature: 3191

7. Click the link in the Corrective Action column to read the bug information or knowledge base article about how to remediate the risk.

Additional tutorials and video walk-throughs of Active IQ features can be viewed on the Active IQ documentation web page.

Cisco Intersight

Cisco Intersight™ is a management platform delivered as a service with embedded analytics for your Cisco and third-party IT infrastructure. This platform offers an intelligent level of management that enables IT organizations to analyze, simplify, and automate their environments in more advanced ways than the prior generations of tools. Cisco Intersight provides an integrated and intuitive management experience for resources in the traditional data center and at the edge. With flexible deployment options to address complex security needs, getting started with Intersight is quick and easy.

Cisco Intersight offers flexible deployment either as Software as a Service (SaaS) on Intersight.com or running on your premises as Cisco Intersight Virtual Appliance. The virtual appliance provides the benefits of Cisco Intersight while allowing more flexibility for those with additional data locality and security requirements. The remainder of this section details Intersight deployment as SaaS on Intersight.com. To learn more about the virtual appliance, see the Cisco Intersight Virtual Appliance Getting Started Guide.

To configure Cisco Intersight, follow these steps:

1. If you do not already have a Cisco Intersight account, to claim your Cisco UCS system into a new account on Cisco Intersight, connect to https://intersight.com. If you have an existing Intersight account, connect to https://intersight.com and sign in with your Cisco ID, select the appropriate account, and skip to step 6.

2. Click Create an account.

3. Sign in with your Cisco ID.

4. Read, scroll through, and accept the End User License Agreement and click Next.

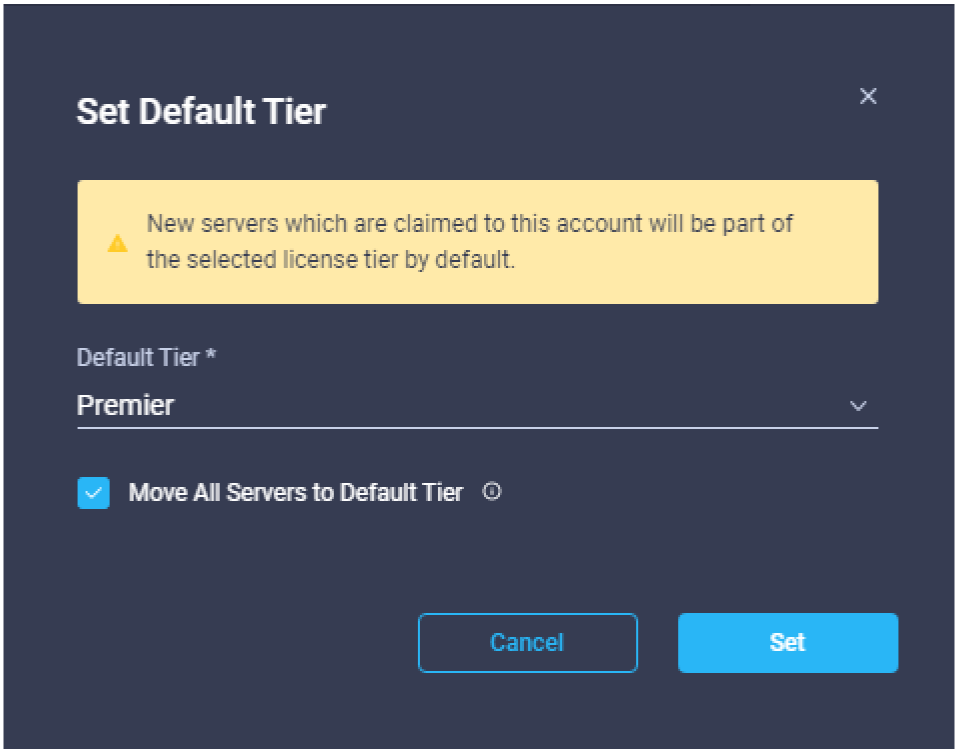
5. Enter an Account Name and click Create.

6. Choose ADMIN > Targets. Click Claim Target. Select Cisco UCS Domain (UCSM Managed) and click Start. Fill in the Device ID and Claim Code and click Claim. The Device ID and Claim Code can be obtained by connecting to Cisco UCS Manager and selecting Admin > All > Device Connector. The Device ID and Claim Code are on the right.

7. To claim your Cisco UCS system into an existing Intersight account, log into the account at https://Intersight.com. Choose Administration > Devices. Click Claim a New Device. Under Direct Claim, fill in the Device ID and Claim Code and click Claim. The Device ID and Claim Code can be obtained by connecting to Cisco UCS Manager and selecting Admin > All > Device Connector. The Device ID and Claim Code are on the right.

8. From the Cisco Intersight window, click ⚙ and then click Licensing. If this is a new account, all servers connected to the UCS Domain will appear under the Base license Tier. If you have purchased Cisco Intersight licenses and have them in your Cisco Smart Account, click Register and follow the prompts to register this Cisco Intersight account to your Cisco Smart Account. Cisco Intersight also offers a one-time 90-day trial of Premier licensing for new accounts. Click Start Trial and then Start to begin this evaluation. The remainder of this section will assume Premier licensing.

9. From the Licensing Window, click Set Default Tier. From the drop-down list choose Premier for Tier and click Set.



Set Default Tier

New servers which are claimed to this account will be part of the selected license tier by default.

Default Tier *

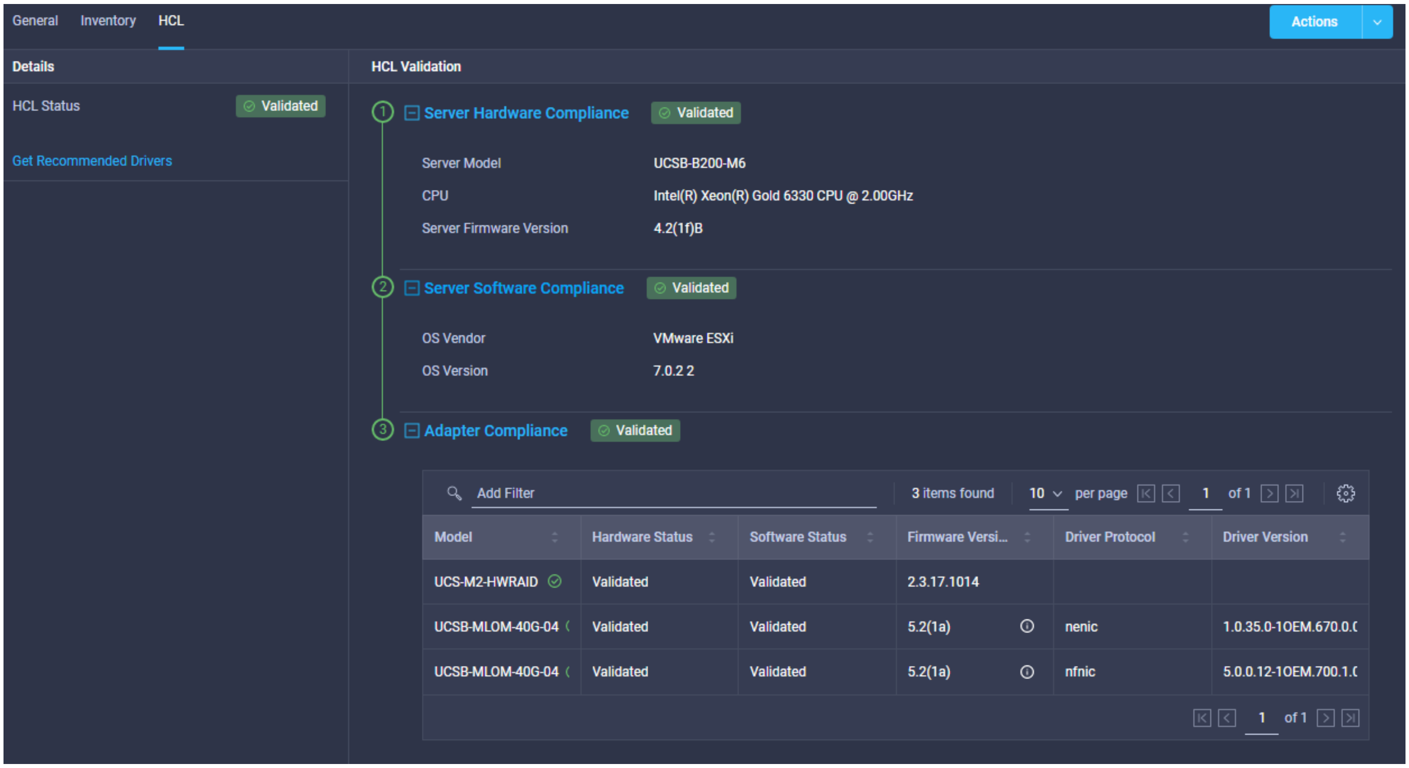
Premier

☑ Move All Servers to Default Tier

10. Click Refresh to refresh the Intersight window with Premier, Advantage, and Essentials features added.

11. Click ? in the Intersight window and click Guided Help > Site Tour. Follow the prompts for a tour of Cisco Intersight.

12. The Essentials tier of Cisco Intersight includes a Cisco driver check against the Cisco Hardware Compatibility List (HCL). In the Servers list, choose one of the servers in your VMware FlexPod-Management cluster by clicking the server name. Review the detailed General and Inventory information for the server. Click the HCL tab. Review the server information, the version of VMware ESXi, and the Cisco VIC driver versions.



Details

HCL Status: Validated

Get Recommended Drivers

HCL Validation

1. Server Hardware Compliance: Validated

Server Model	UCSB-B200-M6
CPU	Intel(R) Xeon(R) Gold 6330 CPU @ 2.00GHz
Server Firmware Version	4.2(1f)B

2. Server Software Compliance: Validated

OS Vendor	VMware ESXi
OS Version	7.0.2 2

3. Adapter Compliance: Validated

3 items found 10 per page 1 of 1

Model	Hardware Status	Software Status	Firmware Versi...	Driver Protocol	Driver Version
UCS-M2-HWRAID ✓	Validated	Validated	2.3.17.1014		
UCSB-MLOM-40G-04 (	Validated	Validated	5.2(1a) ⓘ	nenic	1.0.35.0-1OEM.670.0.(
UCSB-MLOM-40G-04 (	Validated	Validated	5.2(1a) ⓘ	nfnic	5.0.0.12-1OEM.700.1.(

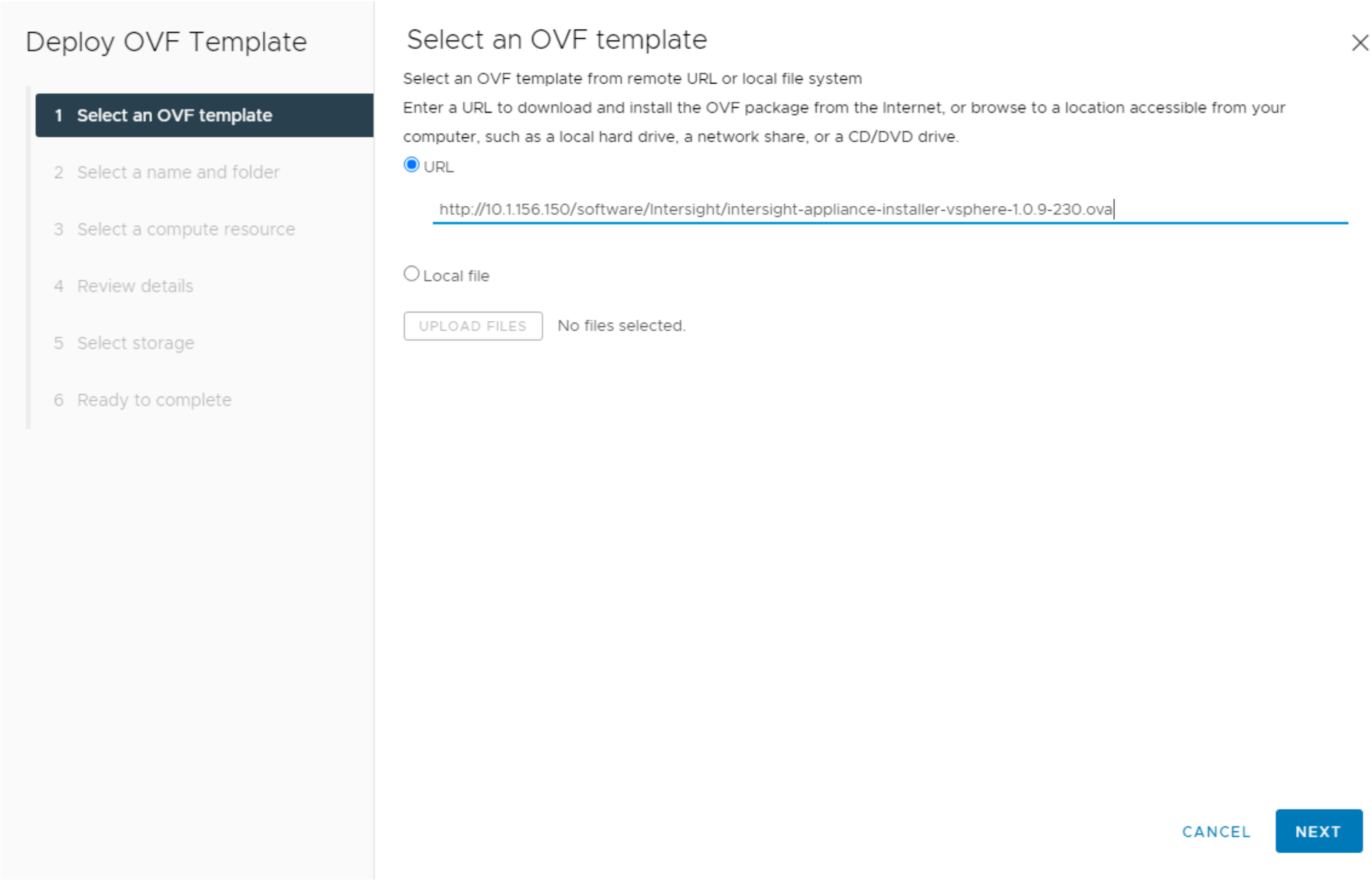
1 of 1

13. Using the Intersight Assist personality of the Cisco Intersight Virtual Appliance, VMware vCenter and NetApp Storage can be monitored (Advantage Licensing Tier) and configured (Premier Licensing Tier). To install Intersight Assist from an Open Virtual Appliance (OVA) in your VMware FlexPod-Management Cluster, first download the latest release of the Cisco Intersight Virtual Appliance for vSphere OVA from https://software.cisco.com/download/home/286319499/type/286323047/release/1.0.9-230?catid=268439477.

Refer to https://www.cisco.com/c/en/us/td/docs/unified_computing/Intersight/b_Cisco_Intersight_Appliance_Getting_Started_Guide/b_Cisco_Intersight_Appliance_Install_and_Upgrade_Guide_chapter_00.html and set up the DNS entries for the Intersight Assist hostname as specified under Before you begin.

14. From Hosts and Clusters in the VMware vCenter HTML5 client, right-click the FlexPod-Management cluster and click Deploy OVF Template.

15. Specify a URL or either browse to the intersight-appliance-installer-vsphere-1.0.9-230.ova or latest release file. Click NEXT.



Select an OVF template

Select an OVF template from remote URL or local file system

Enter a URL to download and install the OVF package from the Internet, or browse to a location accessible from your computer, such as a local hard drive, a network share, or a CD/DVD drive.

● URL

http://10.1.156.150/software/Intersight/intersight-appliance-installer-vsphere-1.0.9-230.ova

○ Local file

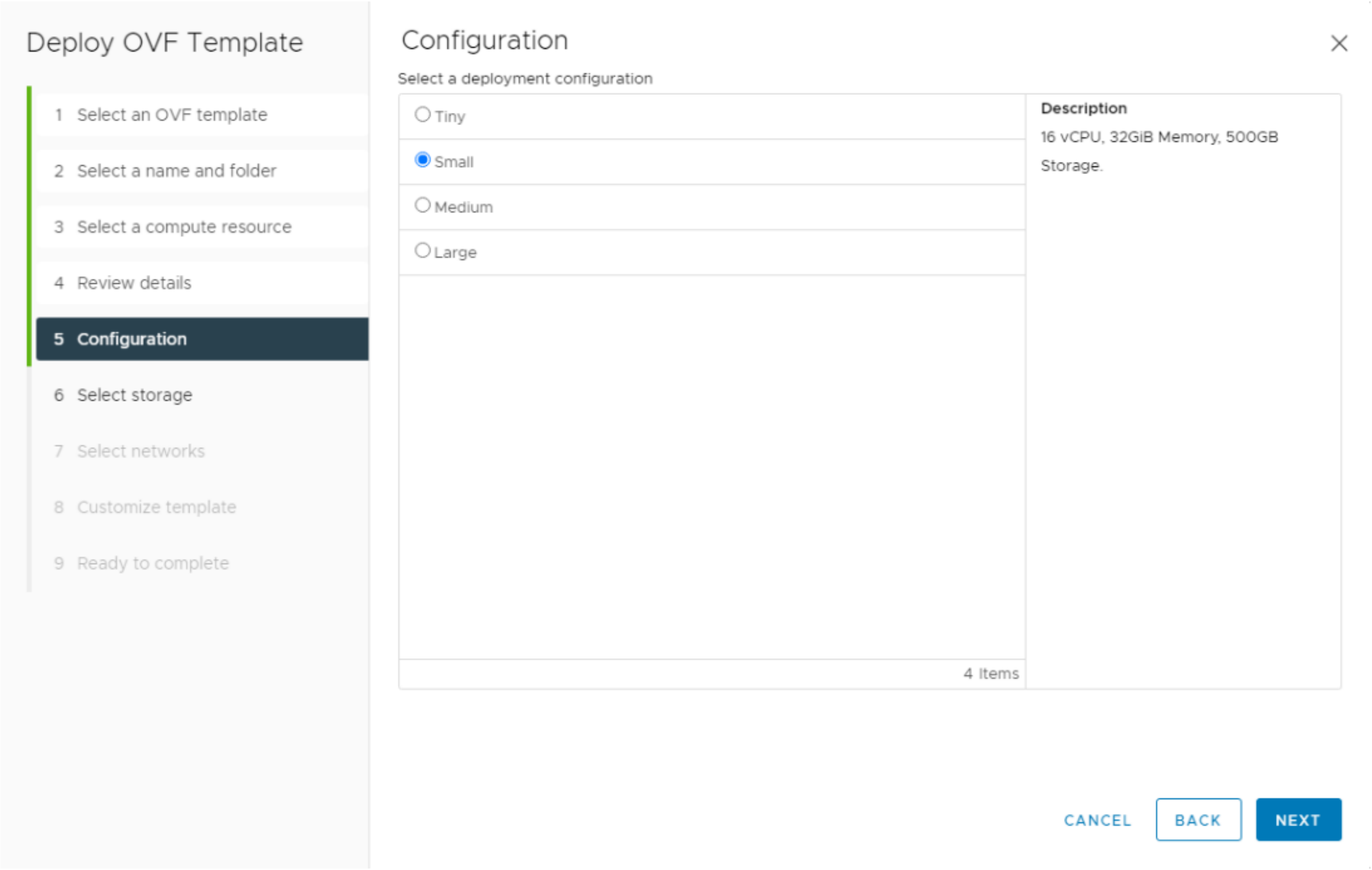
UPLOAD FILES No files selected.

16. Name the Intersight Assist VM and choose the location. Click NEXT.

17. Choose the FlexPod-Management cluster and click NEXT.

18. Review details, click Ignore, and click NEXT.

19. Choose a deployment configuration (Tiny for just Intersight Assist, Small for Intersight Assist and IWO) and click NEXT.



Configuration

Select a deployment configuration

○ Tiny

● Small

○ Medium

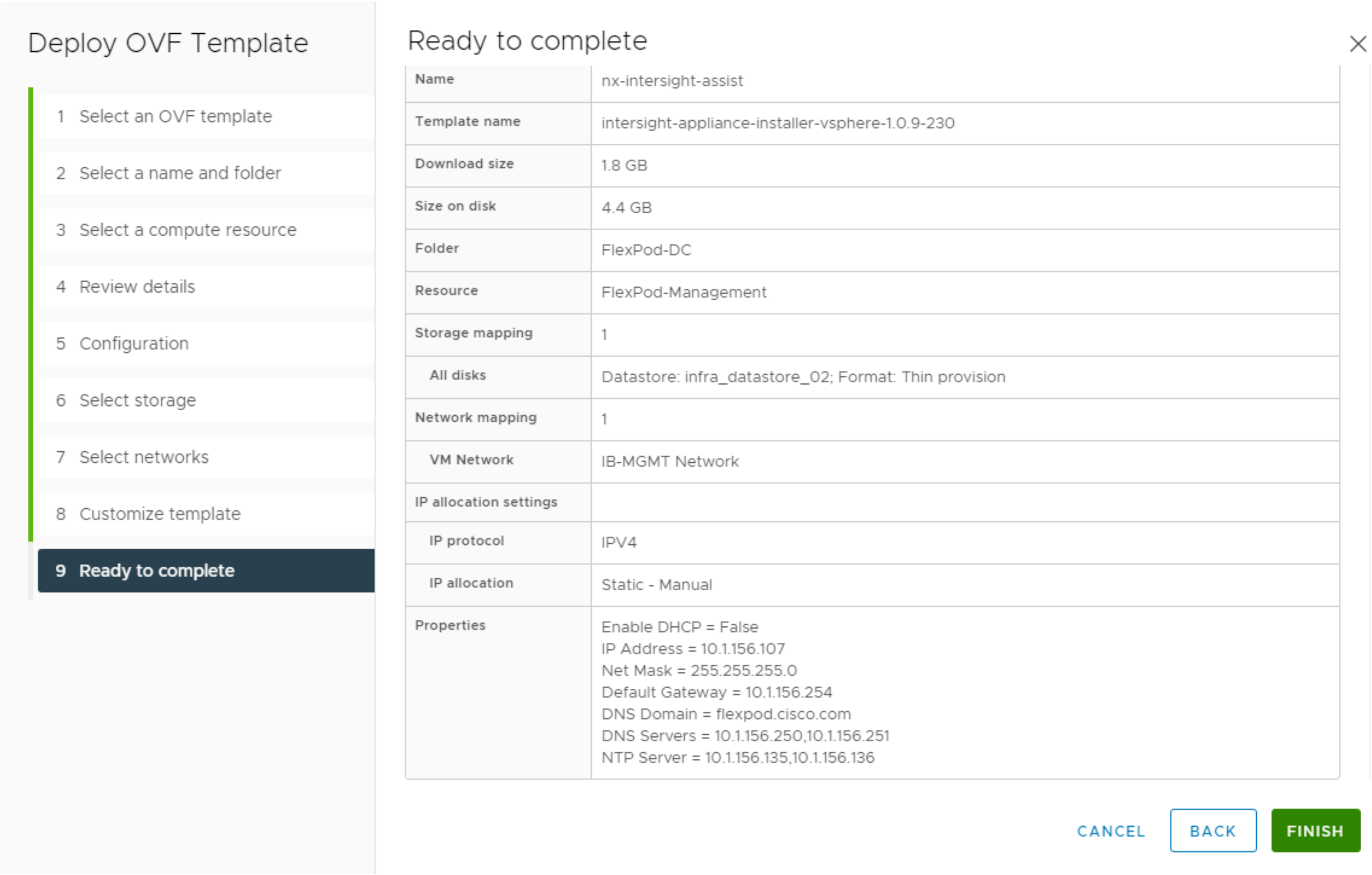
○ Large

4 Items

Description

16 vCPU, 32GiB Memory, 500GB Storage.

20. Choose infra_datastore_02 for storage and choose the Thin Provision virtual disk format. Click NEXT.
21. Choose IB-MGMT Network for the VM Network. Click NEXT.
22. Fill in all values to customize the template. Click NEXT.
23. Review the deployment information and click FINISH to deploy the appliance.



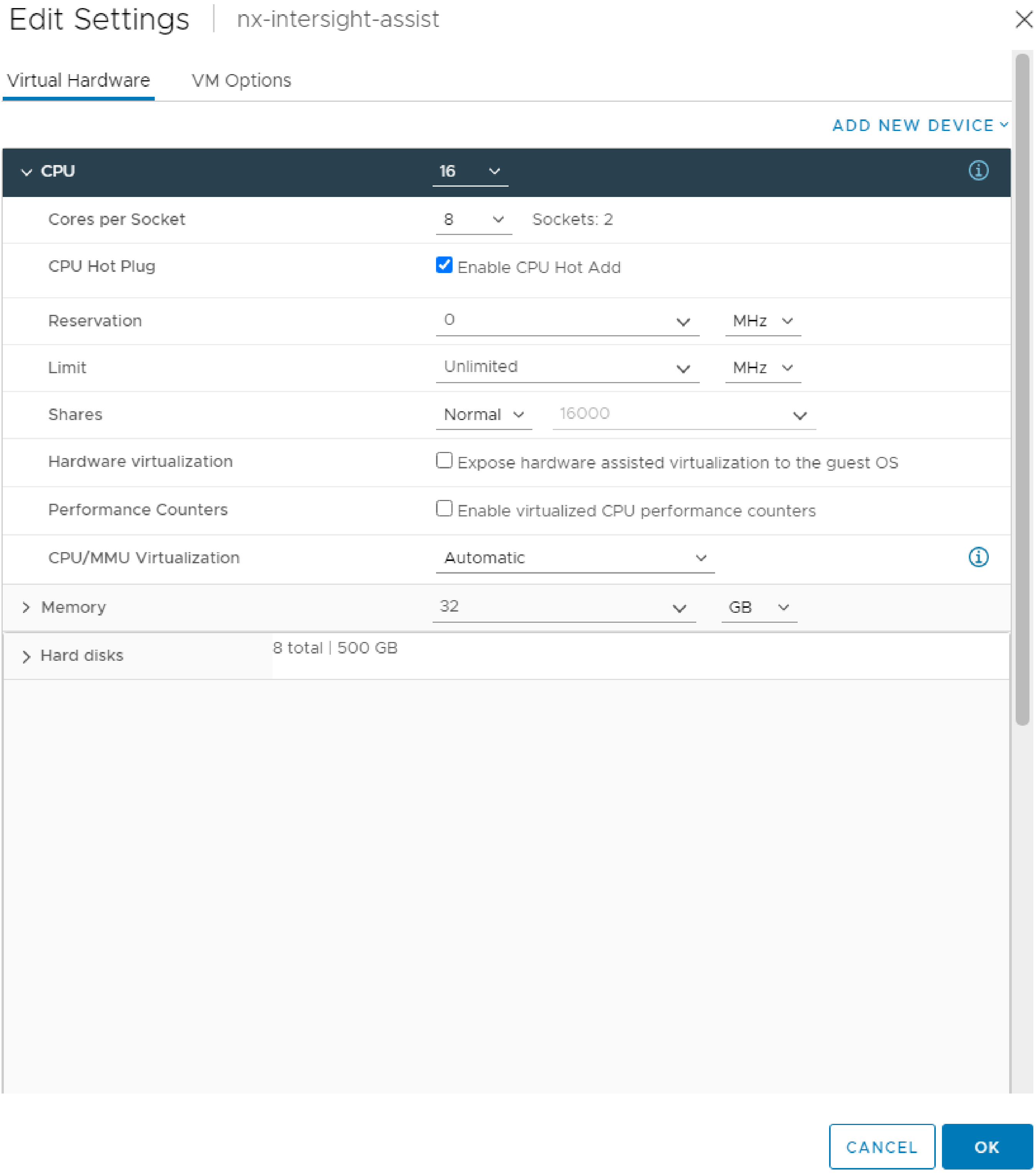
Deploy OVF Template

Ready to complete

Name	nx-intersight-assist
Template name	intersight-appliance-installer-vsphere-1.0.9-230
Download size	1.8 GB
Size on disk	4.4 GB
Folder	FlexPod-DC
Resource	FlexPod-Management
Storage mapping	1
All disks	Datastore: infra_datastore_02; Format: Thin provision
Network mapping	1
VM Network	IB-MGMT Network
IP allocation settings	
IP protocol	IPV4
IP allocation	Static - Manual
Properties	Enable DHCP = False IP Address = 10.1.156.107 Net Mask = 255.255.255.0 Default Gateway = 10.1.156.254 DNS Domain = flexpod.cisco.com DNS Servers = 10.1.156.250,10.1.156.251 NTP Server = 10.1.156.135,10.1.156.136

24. Once the OVA deployment is complete, right-click the Intersight Assist VM and click Edit Settings.

25. Expand CPU and adjust the Cores per Socket so that the number of Sockets matches your server CPU configuration. In this example 2 Sockets are shown. Click OK.



Edit Settings | nx-intersight-assist

Virtual Hardware | VM Options

CPU	16	
Cores per Socket	8	Sockets: 2
CPU Hot Plug	☑ Enable CPU Hot Add	
Reservation	0	MHz
Limit	Unlimited	MHz
Shares	Normal	16000
Hardware virtualization	□ Expose hardware assisted virtualization to the guest OS	
Performance Counters	□ Enable virtualized CPU performance counters	
CPU/MMU Virtualization	Automatic	
Memory	32	GB
Hard disks	8 total | 500 GB	

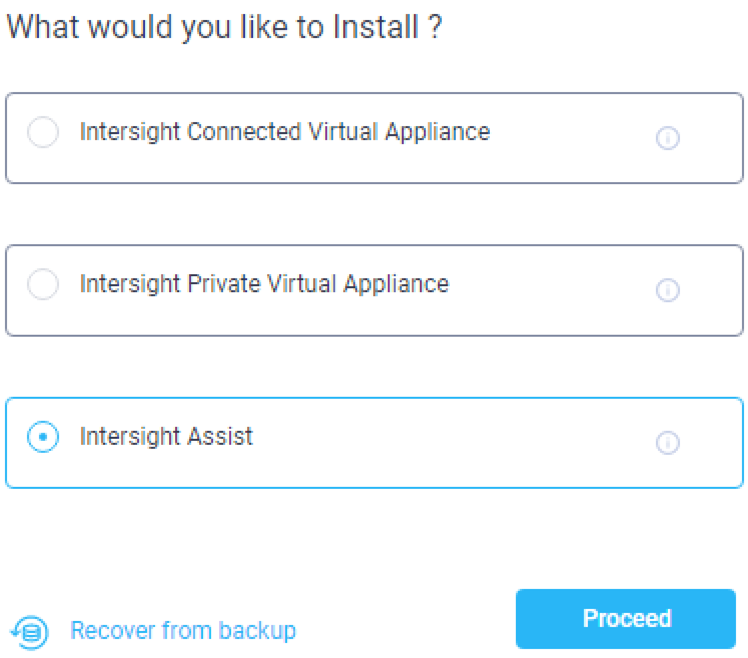
26. Right-click the Intersight Assist VM and choose Open Remote Console.

27. Click ▶ to power on the VM.

28. When you see the login prompt, close the Remote Console and connect to https://intersight-assist-fqdn.

It may take a few minutes for https://intersight-assist-fqdn to respond.

29. Navigate the security prompts and select Intersight Assist. Click Proceed.



What would you like to Install ?

○ Intersight Connected Virtual Appliance

○ Intersight Private Virtual Appliance

● Intersight Assist

30. From Cisco Intersight, click ADMIN > Targets. Click Claim Target. Select Cisco Intersight Assist and click Start. Click OK on the warning. Copy and paste the Device ID and Claim Code shown in the Intersight Assist web interface to the Cisco Intersight Device Claim Direct Claim window. In Cisco Intersight, click Claim. Intersight Assist will now appear as a claimed device.

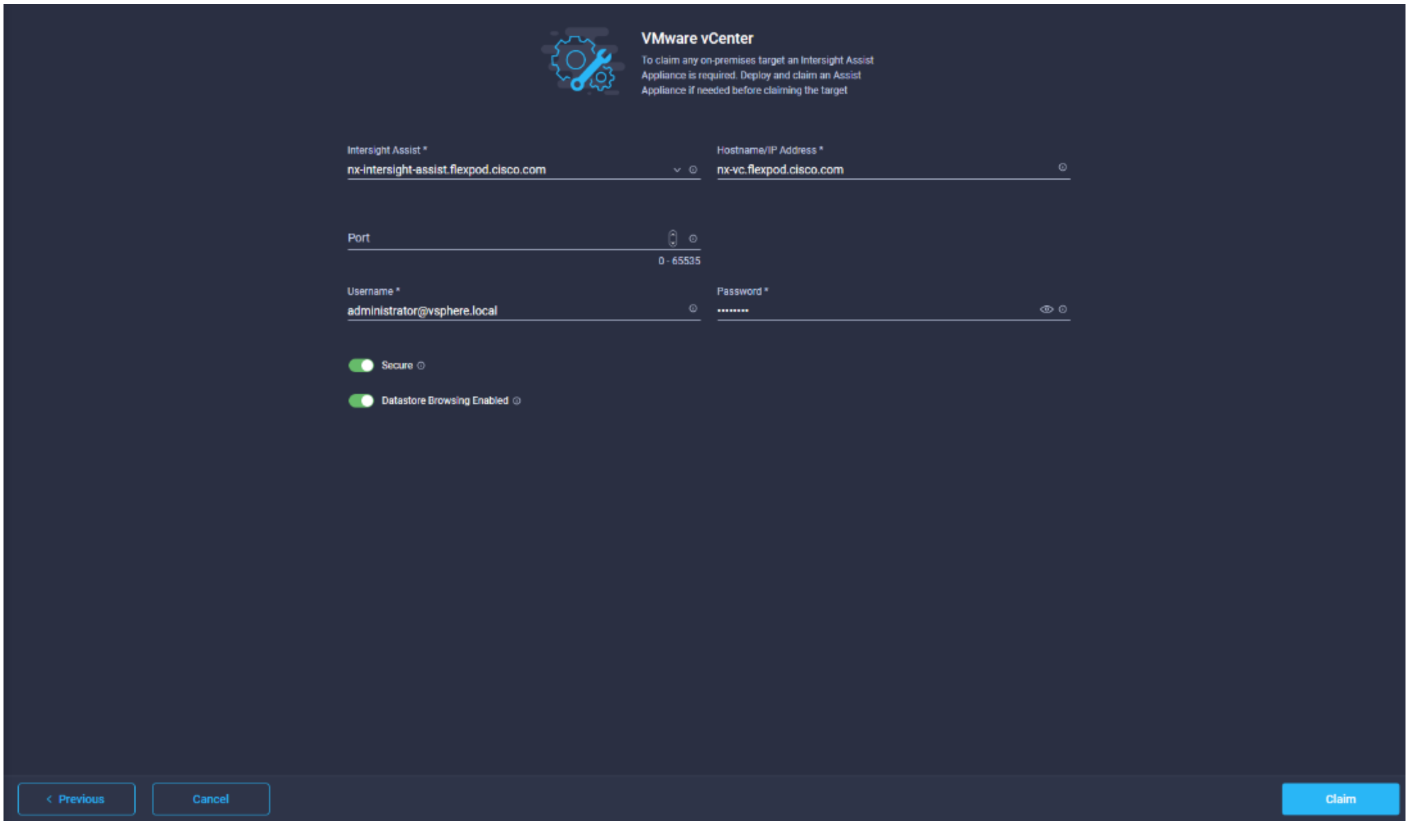
31. In the Intersight Assist web interface, verify that Intersight Assist is Connected Successfully, and click Continue.

The Intersight Assist software will now be downloaded and installed into the Intersight Assist VM. This can take up to an hour to complete.

The Intersight Assist VM will reboot during the software download process. It will be necessary to refresh the Web Browser after the reboot is complete to follow the status of the download process.

32. When the software download is complete, an Intersight Assist login screen will appear. Log into Intersight Assist with the admin user and the password supplied in the OVA installation. Check the Intersight Assist status and log out of Intersight Assist.

33. To claim the vCenter, from Cisco Intersight, click ADMIN > Targets. Click Claim Target. In the Select Target Type window, select VMware vCenter under Hypervisor and click Start. In the VMware vCenter window, make sure the Intersight Assist is correctly selected, fill in the vCenter information. If Intersight Workflow Optimizer (IWO) will be used, turn on Datastore Browsing Enabled and click Claim.



VMware vCenter

To claim any on-premises target an Intersight Assist Appliance is required. Deploy and claim an Assist Appliance if needed before claiming the target

Intersight Assist * nx-intersight-assist.flexpod.cisco.com

Hostname/IP Address * nx-vc.flexpod.cisco.com

Port

0 - 65535

Username * administrator@vsphere.local

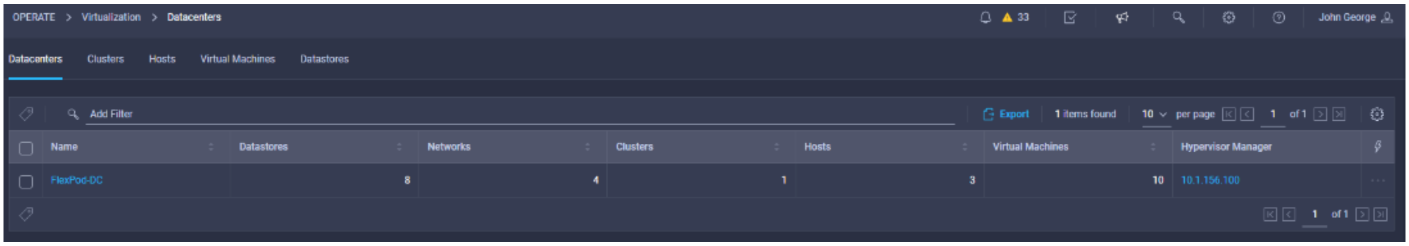
Password * •••••••••

● Secure

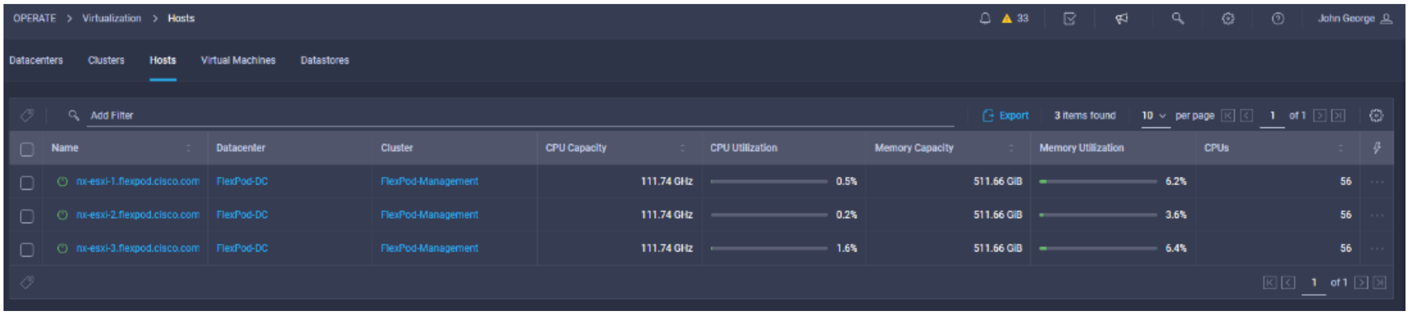
● Datastore Browsing Enabled

34. After a few minutes, the VMware vCenter will appear in the Devices list. It also can be viewed by clicking Intersight Assist in the Devices list.

35. Detailed information obtained from the vCenter can now be viewed by clicking Virtualization from the menu.

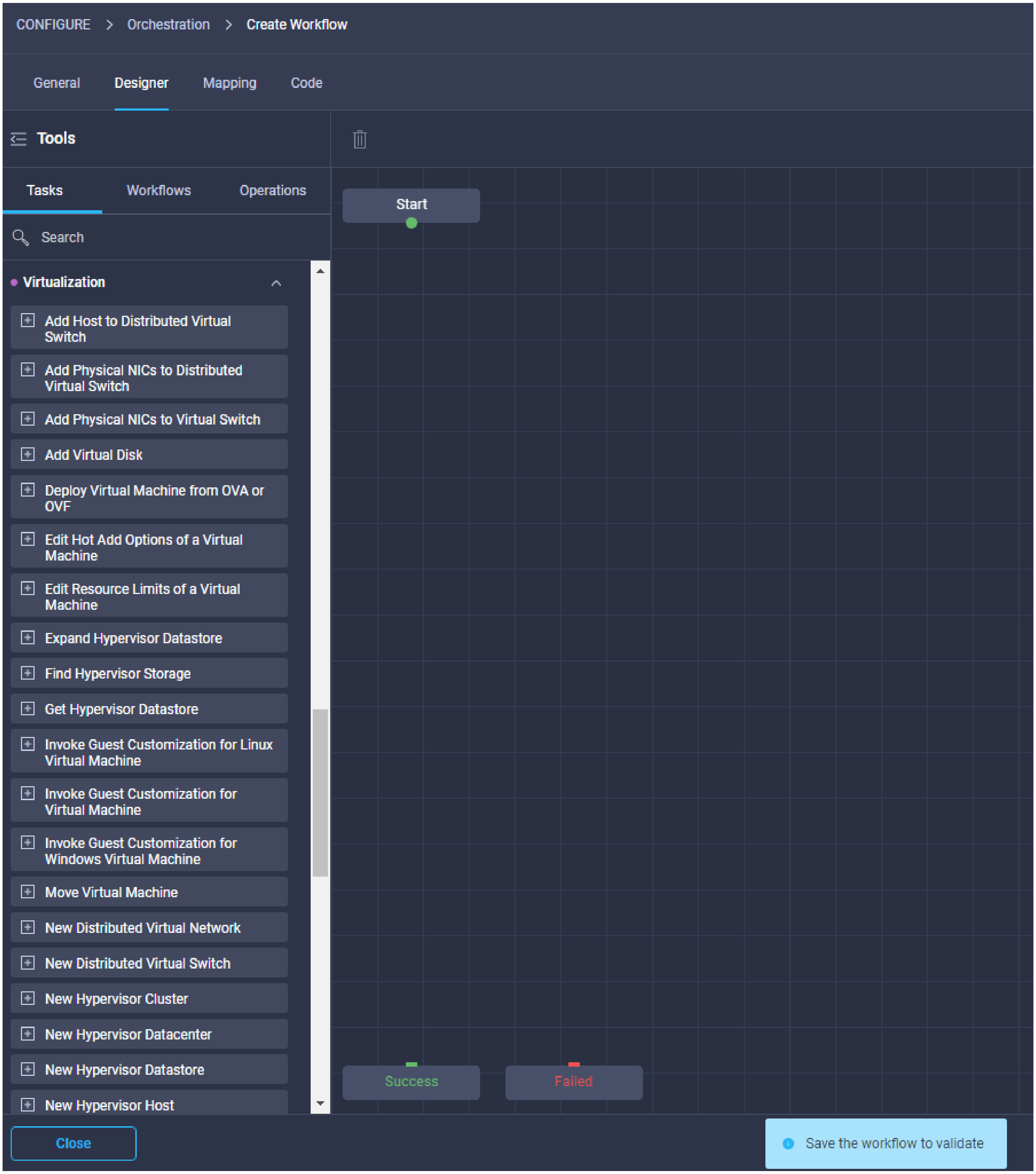


Name	Datastores	Networks	Clusters	Hosts	Virtual Machines	Hypervisor Manager
FlexPod-DC	8	4	1	3	10	10.1.156.100



Name	Datacenter	Cluster	CPU Capacity	CPU Utilization	Memory Capacity	Memory Utilization	CPUs
nx-esxi-1.flexpod.cisco.com	FlexPod-DC	FlexPod-Management	111.74 GHz	0.5%	511.66 GiB	6.2%	56
nx-esxi-2.flexpod.cisco.com	FlexPod-DC	FlexPod-Management	111.74 GHz	0.2%	511.66 GiB	3.6%	56
nx-esxi-3.flexpod.cisco.com	FlexPod-DC	FlexPod-Management	111.74 GHz	1.6%	511.66 GiB	6.4%	56

36. If Intersight Premier Licensing is enabled, VMware Virtualization tasks are also defined that can be used to create workflows under Orchestration.



CONFIGURE > Orchestration > Create Workflow

General | Designer | Mapping | Code

Tools

Tasks | Workflows | Operations

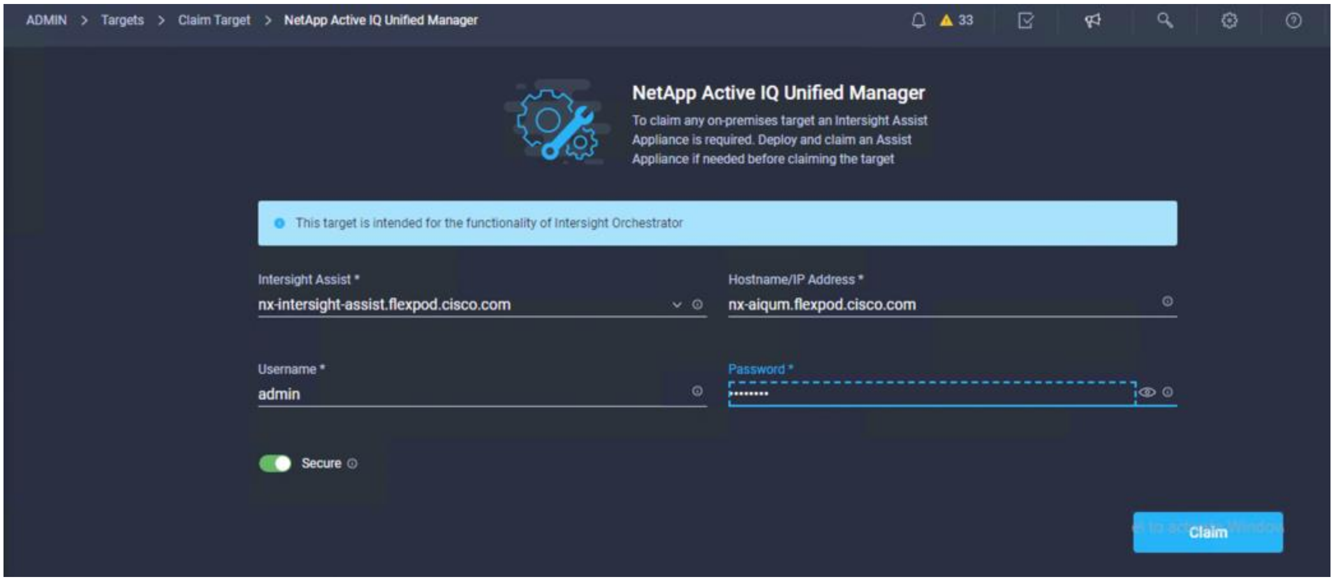
Search

● Virtualization

- Add Host to Distributed Virtual Switch
- Add Physical NICs to Distributed Virtual Switch
- Add Physical NICs to Virtual Switch
- Add Virtual Disk
- Deploy Virtual Machine from OVA or OVF
- Edit Hot Add Options of a Virtual Machine
- Edit Resource Limits of a Virtual Machine
- Expand Hypervisor Datastore
- Find Hypervisor Storage
- Get Hypervisor Datastore
- Invoke Guest Customization for Linux Virtual Machine
- Invoke Guest Customization for Virtual Machine
- Invoke Guest Customization for Windows Virtual Machine
- Move Virtual Machine
- New Distributed Virtual Network
- New Distributed Virtual Switch
- New Hypervisor Cluster
- New Hypervisor Datacenter
- New Hypervisor Datastore
- New Hypervisor Host

Save the workflow to validate

37. To claim the NetApp AIQ UM, from Cisco Intersight, click ADMIN > Targets. Click Claim a New Target. In the Select Target Type window, select NetApp Active IQ Unified Manager under Storage and click Start. In the VMware vCenter window, make sure the Intersight Assist is correctly selected, fill in the AIQ UM information, and click Claim.



ADMIN > Targets > Claim Target > NetApp Active IQ Unified Manager
33
NetApp Active IQ Unified Manager
To claim any on-premises target an Intersight Assist Appliance is required. Deploy and claim an Assist Appliance if needed before claiming the target
This target is intended for the functionality of Intersight Orchestrator
Claim

Intersight Assist * nx-intersight-assist.flexpod.cisco.com

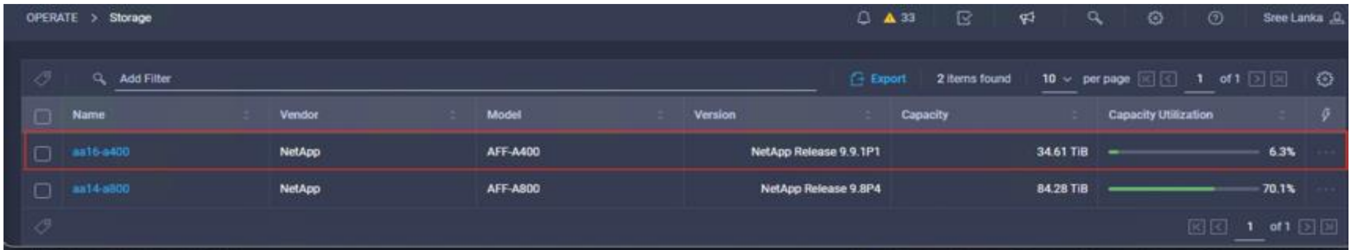
Hostname/IP Address * nx-aiqum.flexpod.cisco.com

Username * admin

Password * ••••••••

Secure

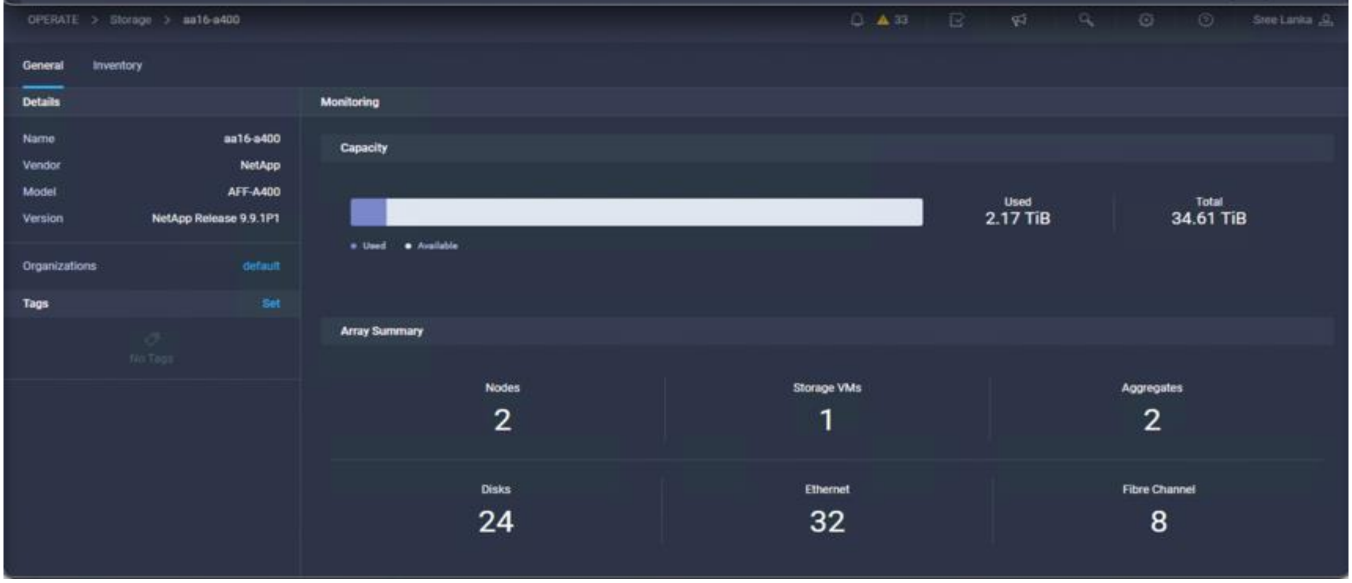
38. After a few minutes, the NetApp ONTAP Storage will appear in the Storage tab. The storage dashboard widgets can also be viewed from Monitoring tab.



OPERATE > Storage

2 items found

Name	Vendor	Model	Version	Capacity	Capacity Utilization
aa16-a400	NetApp	AFF-A400	NetApp Release 9.9.1P1	34.61 TiB	6.3%
aa14-a800	NetApp	AFF-A800	NetApp Release 9.8P4	84.28 TiB	70.1%



OPERATE > Storage > aa16-a400

General · Inventory

Details

Name	aa16-a400
Vendor	NetApp
Model	AFF-A400
Version	NetApp Release 9.9.1P1
Organizations	default
Tags	Set

No Tags

Monitoring

Capacity

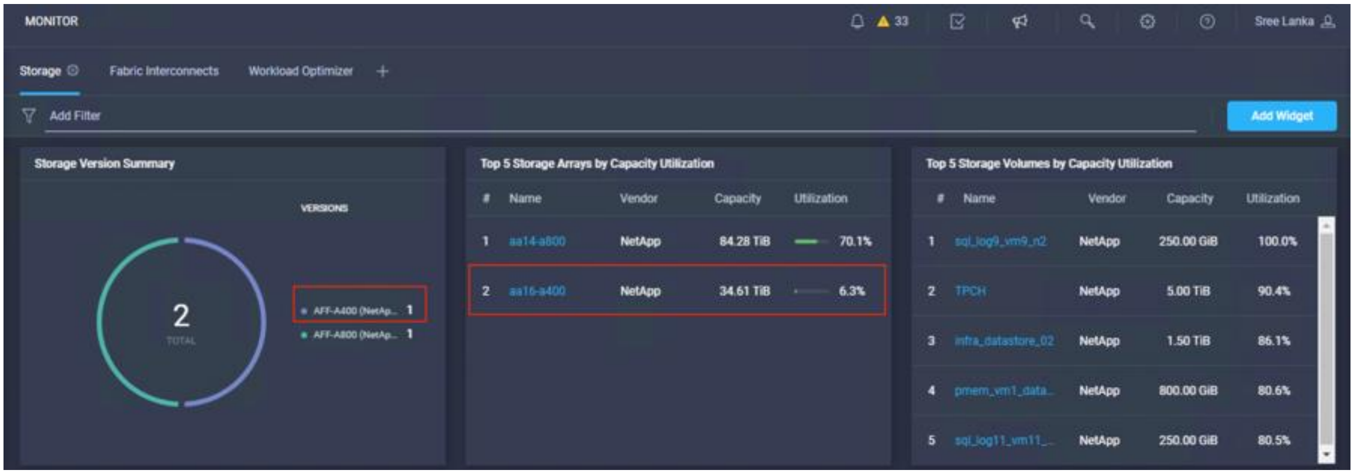
Used 2.17 TiB

Total 34.61 TiB

Array Summary

Nodes	Storage VMs	Aggregates
2	1	2

Disks	Ethernet	Fibre Channel
24	32	8



MONITOR

Storage · Fabric Interconnects · Workload Optimizer

Storage Version Summary

2 TOTAL

VERSIONS

AFF-A400 (NetAp...	1
AFF-A800 (NetAp...	1

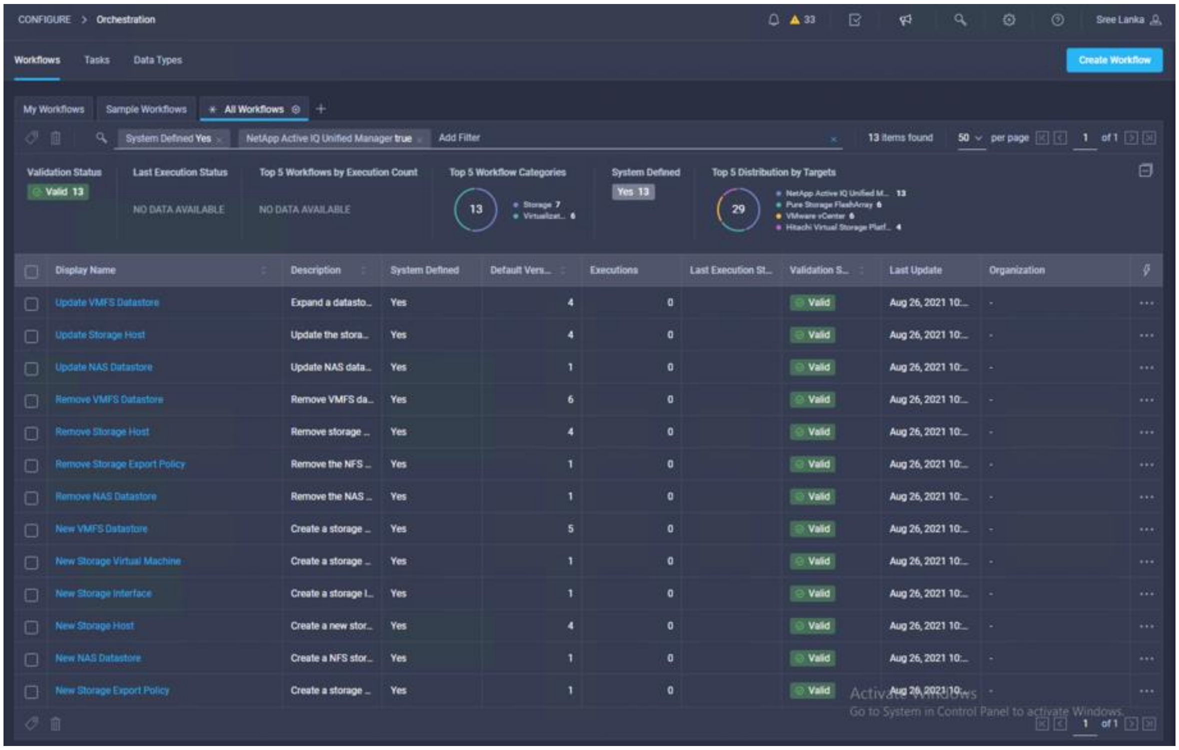
Top 5 Storage Arrays by Capacity Utilization

#	Name	Vendor	Capacity	Utilization
1	aa14-a800	NetApp	84.28 TiB	70.1%
2	aa16-a400	NetApp	34.61 TiB	6.3%

Top 5 Storage Volumes by Capacity Utilization

#	Name	Vendor	Capacity	Utilization
1	sql_log9_vm9_n2	NetApp	250.00 GiB	100.0%
2	TPCH	NetApp	5.00 TiB	90.4%
3	infra_datastore_02	NetApp	1.50 TiB	86.1%
4	pmem_vm1_data...	NetApp	800.00 GiB	80.6%
5	sql_log11_vm11_...	NetApp	250.00 GiB	80.5%

39. Storage and Virtualization tasks and workflows can now be executed from Cisco Intersight Orchestration tab.



☐	Display Name	Description	System Defined	Default Vers...	Executions	Last Execution St...	Validation S...	Last Update	Organization	
☐	Update VMFS Datastore	Expand a datasto...	Yes	4	0		Valid	Aug 26, 2021 10:...	-	...
☐	Update Storage Host	Update the stora...	Yes	4	0		Valid	Aug 26, 2021 10:...	-	...
☐	Update NAS Datastore	Update NAS data...	Yes	1	0		Valid	Aug 26, 2021 10:...	-	...
☐	Remove VMFS Datastore	Remove VMFS da...	Yes	6	0		Valid	Aug 26, 2021 10:...	-	...
☐	Remove Storage Host	Remove storage ...	Yes	4	0		Valid	Aug 26, 2021 10:...	-	...
☐	Remove Storage Export Policy	Remove the NFS ...	Yes	1	0		Valid	Aug 26, 2021 10:...	-	...
☐	Remove NAS Datastore	Remove the NAS ...	Yes	1	0		Valid	Aug 26, 2021 10:...	-	...
☐	New VMFS Datastore	Create a storage ...	Yes	5	0		Valid	Aug 26, 2021 10:...	-	...
☐	New Storage Virtual Machine	Create a storage ...	Yes	1	0		Valid	Aug 26, 2021 10:...	-	...
☐	New Storage Interface	Create a storage I...	Yes	1	0		Valid	Aug 26, 2021 10:...	-	...
☐	New Storage Host	Create a new stor...	Yes	4	0		Valid	Aug 26, 2021 10:...	-	...
☐	New NAS Datastore	Create a NFS stor...	Yes	1	0		Valid	Aug 26, 2021 10:...	-	...
☐	New Storage Export Policy	Create a storage ...	Yes	1	0		Valid	Aug 26, 2021 10:...	-	...

NetApp ONTAP Storage and Virtualization Workflows from Cisco Intersight

Sample Workflow: New NAS Datastore Workflow

This sample workflow creates an NFS storage volume and builds NAS datastores on the volume. It allows you to create an NAS or NFS storage volume by using NetApp storage tasks; then it uses the New NAS Datastore virtualization task to create the NFS datastore on the virtualization hypervisor.

Figure 4. Workflow Designer View

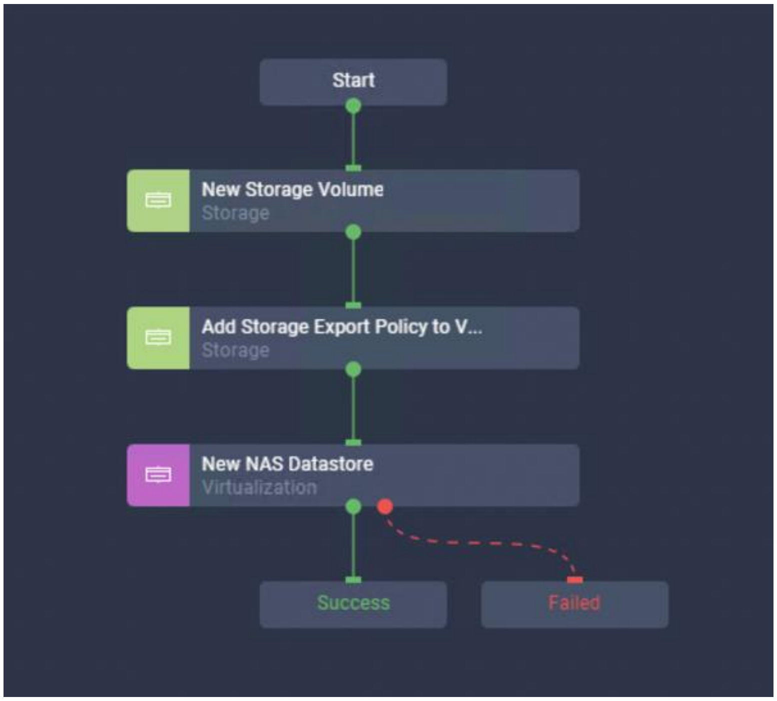


Table 12.Parameters and Values

Parameter name	Input value
Organization	default
Workflow Instance Name	New ONTAP NAS Datastore
Storage Device*	aa16-a400
Storage Vendor Virtual Machine*	Infra_SVM
Aggregate*	aa16_a400_01_NVME_SSD_1
Export Policy*	default
Volume*	Infra_SVM_NFS_datastore_ICO_01
Volume Capacity*	100G
Mount path*	/Infra_SVM_NFS_datastore_ICO_01
Hypervisor Manager*	nx-vc.flexpod.cisco.com
Datacenter*	FlexPod-DC

Parameter name	Input value
Cluster	FlexPod-Management
Datastore Name*	Infra_SVM_NFS_datastore_ICO_01
Datastore Type*	NFS4.1
Remote Host Names*	192.168.50.141, 192.168.50.142

Sample Workflow: Update VMFS Datastore Workflow

Expand a datastore on hypervisor manager by extending the backing storage volume to specified capacity, and then grow the datastore to utilize the additional capacity. This workflow enables single click execution from Cisco Intersight to execute VMware hypervisor and NetApp ONTAP storage tasks and enable you to expand the VMFS or SAN datastore.

Figure 5. Workflow Designer View

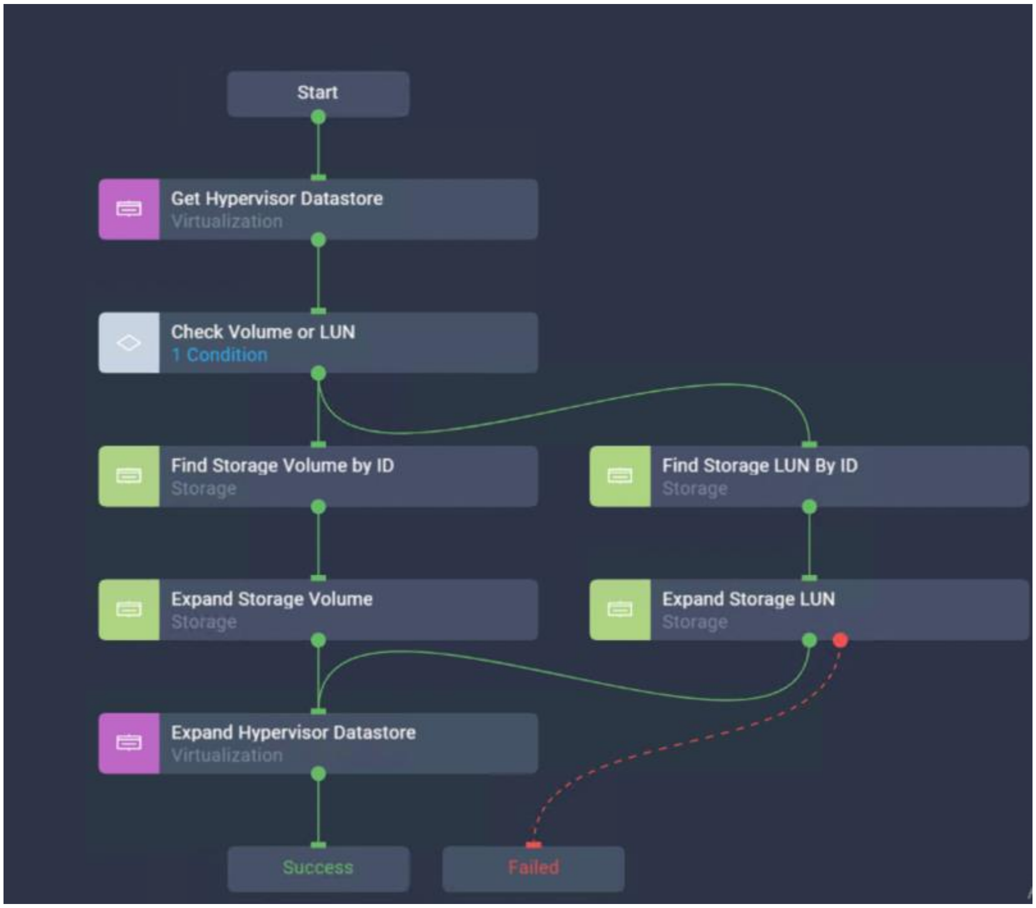
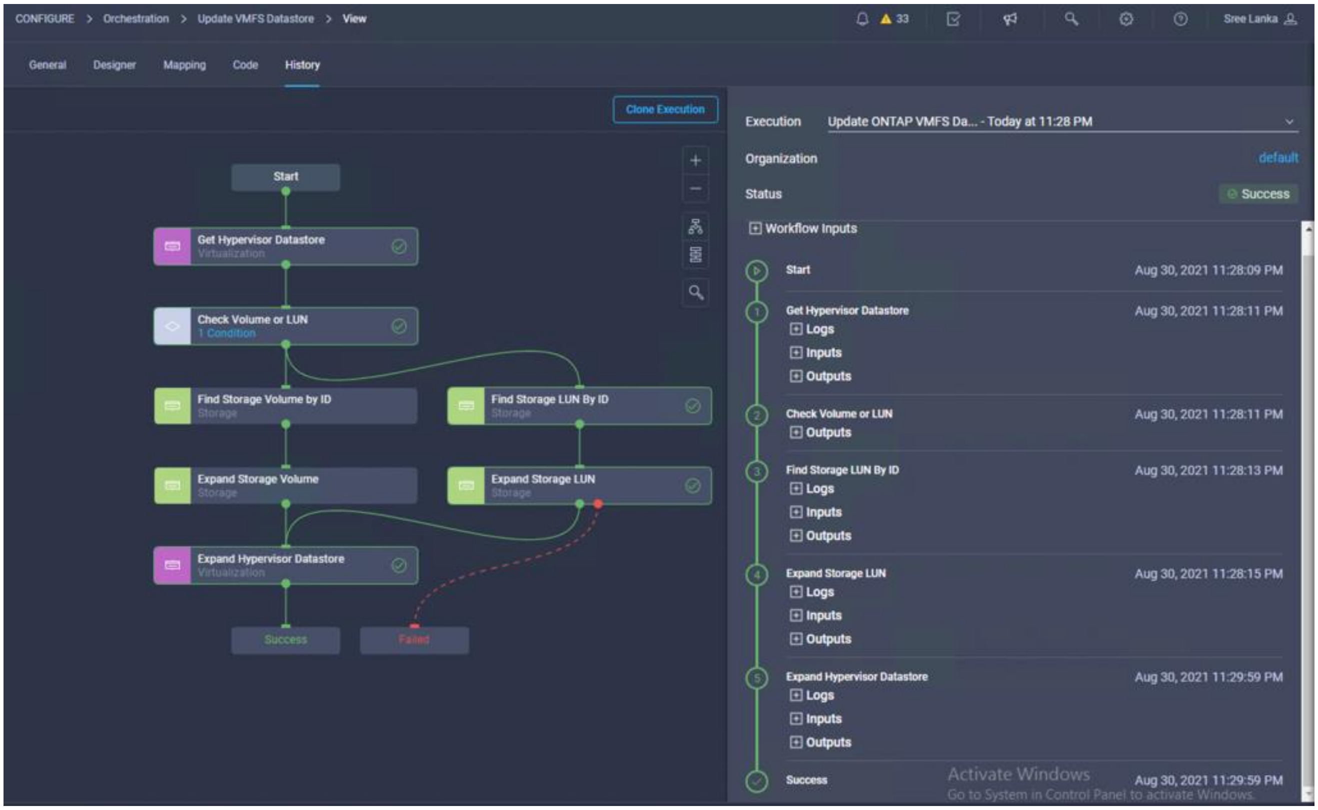


Table 13.Parameters and Values

Parameter name	Input value

Parameter name	Input value
Organization	default
Workflow Instance Name	Update ONTAP VMFS Datastore
Hypervisor Manager*	nx-vc.flexpod.cisco.com
Datacenter*	FlexPod-DC
Cluster	FlexPod-Management
Datastore Name*	Infra_SVM_VMFS_datastore_ICO_01
Storage Device*	aa16-a400
Datastore Size	220G



Execution: Update ONTAP VMFS Da... - Today at 11:28 PM

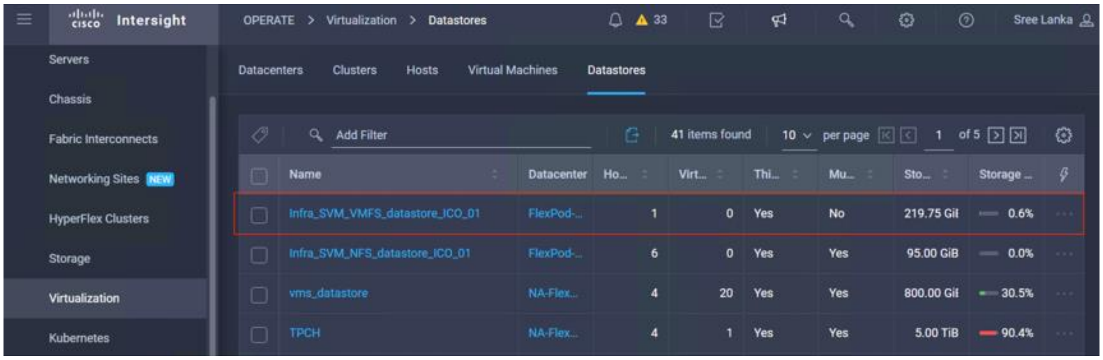
Organization: default

Status: Success

⊞ Workflow Inputs

Start	Aug 30, 2021 11:28:09 PM
Get Hypervisor Datastore ⊞ Logs ⊞ Inputs ⊞ Outputs	Aug 30, 2021 11:28:11 PM
Check Volume or LUN ⊞ Outputs	Aug 30, 2021 11:28:11 PM
Find Storage LUN By ID ⊞ Logs ⊞ Inputs ⊞ Outputs	Aug 30, 2021 11:28:13 PM
Expand Storage LUN ⊞ Logs ⊞ Inputs ⊞ Outputs	Aug 30, 2021 11:28:15 PM
Expand Hypervisor Datastore ⊞ Logs ⊞ Inputs ⊞ Outputs	Aug 30, 2021 11:29:59 PM
Success	Aug 30, 2021 11:29:59 PM

Validate the VMFS Datastore size from Cisco Intersight Virtualization tab.

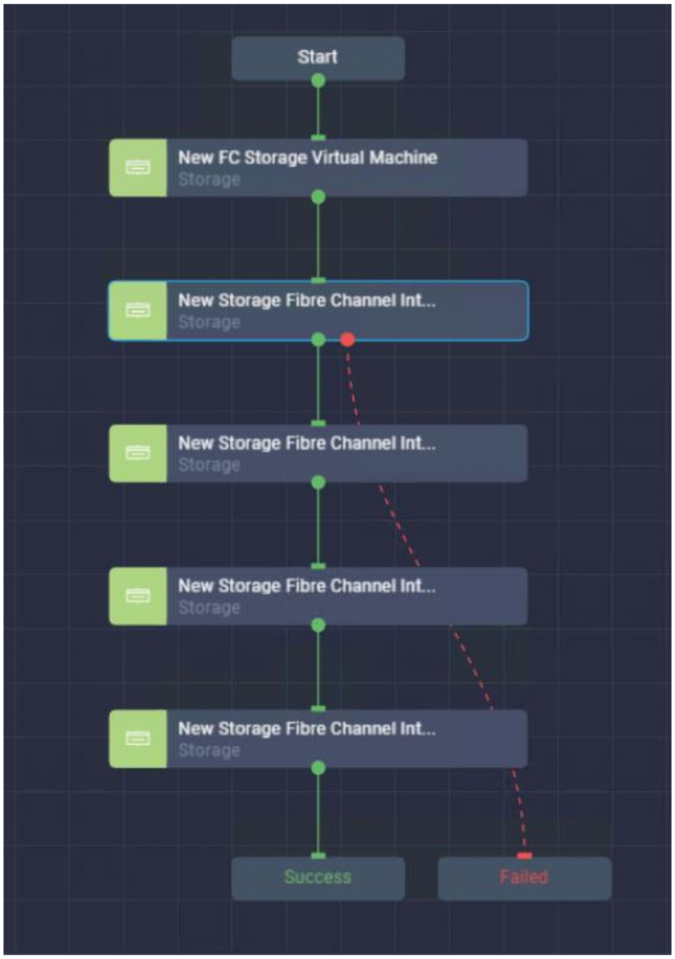


Name	Datacenter	Ho...	Virt...	Thi...	Mu...	Sto...	Storage ...
Infra_SVM_VMFS_datastore_ICO_01	FlexPod-...	1	0	Yes	No	219.75 GiB	0.6%
Infra_SVM_NFS_datastore_ICO_01	FlexPod-...	6	0	Yes	Yes	95.00 GiB	0.0%
vms_datastore	NA-Flex...	4	20	Yes	Yes	800.00 GiB	30.5%
TPCH	NA-Flex...	4	1	Yes	Yes	5.00 TiB	90.4%

Custom Workflow: New FC Storage Virtual Machine and Add 4 FC LIFs

This workflow creates a new FC SVM and 4 new Fibre Channel interfaces. Using the NetApp ONTAP Storage tasks create a workflow to create a new SVM and add 4 new Logical Interface tasks for the Fiber Channel Protocol.

Figure 6. Workflow Designer View



Start
New FC Storage Virtual Machine
Storage
New Storage Fibre Channel Int...
Storage
New Storage Fibre Channel Int...
Storage
New Storage Fibre Channel Int...
Storage
New Storage Fibre Channel Int...
Storage
Success
Failed

Table 14.Parameters and Values

Parameter name	Input value
Organization	default
Display Name	New FC SVM with 4 FC LIFS
Storage Device*	aa16-a400
Storage Vendor Virtual Machine*	Data_SVM_ICO_01
Storage Vendor Virtual Machine Options	Storage VM Protocol: FCcol: FC
Interface Name	Data_SVM_FC_LIF_ICO_01
Interface options	Data Protocol: FCP;Location Port:5a: Location Node Name: aa16-a400-01
Interface Name	Data_SVM_FC_LIF_ICO_02
Interface options	Data Protocol: FCP;Location Port:5b: Location Node Name: aa16-a400-01
Interface Name	Data_SVM_FC_LIF_ICO_03
Interface options	Data Protocol: FCP;Location Port:5a: Location Node Name: aa16-a400-02
Interface Name	Data_SVM_FC_LIF_ICO_04
Interface options	Data Protocol: FCP;Location Port:5b: Location Node Name: aa16-a400-02

Cisco Data Center Network Manager (DCNM)-SAN

Cisco DCNM-SAN can be used to monitor, configure, and analyze Cisco fibre channel fabrics. Cisco DCNM-SAN is deployed as a virtual appliance from an OVA and is managed through a web browser. SAN Analytics can be added to provide insights into your fabric by allowing you to monitor, analyze, identify, and troubleshoot performance issues.

Prerequisites

The following prerequisites need to be configured:

1. Licensing. Cisco DCNM-SAN includes a 60-day server-based trial license that can be used to monitor and configure Cisco MDS Fibre Channel switches and monitor Cisco Nexus switches. Both DCNM server-based and switch-based licenses can be purchased. Additionally, SAN Insights and

SAN Analytics requires an additional switch-based license on each switch. Cisco MDS 32Gbps Fibre Channel switches provide a 120-day grace period to trial SAN Analytics.

If using the Cisco Nexus 93180YC-FX for SAN switching, it does not support SAN Analytics.

2. Passwords. Cisco DCNM-SAN passwords should adhere to the following password requirements:

   - It must be at least eight characters long and contain at least one alphabet and one numeral.
   - It can contain a combination of alphabets, numerals, and special characters.
   - Do not use any of these special characters in the DCNM password for all platforms: <SPACE> " & $ % ' ^ = < > ; : ` \ | / , .*

3. DCNM SNMPv3 user on switches. Each switch (both Cisco MDS and Nexus) needs an SNMPv3 user added for DCNM to use to query and configure the switch. On each switch, enter the following command in configure terminal mode (in the example, the userid is snmpuser):

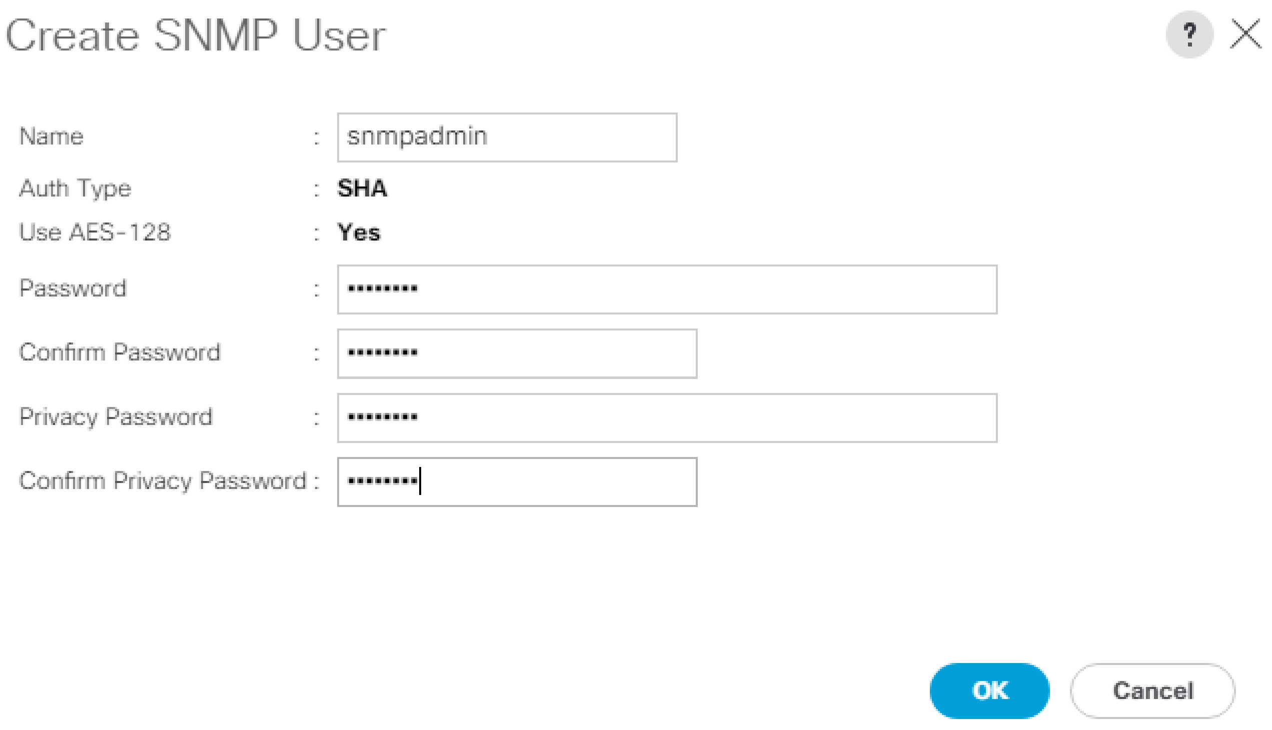
```
snmp-server user snmpadmin network-admin auth sha <password> priv aes-128 <privacy-password>
```

4. On Cisco MDS switches, type show run. If snmpadmin passphrase lifetime 0 is present, enter username snmpadmin passphrase lifetime 99999 warntime 14 gracetime 3.

It is important to use auth type sha and privacy auth aes-128 for both the switch and UCS snmpadmin users.

5. Type “copy run start” on all switches to save the running configuration to the startup configuration.

6. DCNM SNMPv3 user in UCSM. A SNMPv3 user needs to be added to UCSM to allow DCNM to query the LAN side of the fabric interconnects. In Cisco UCS Manager, click Admin. Navigate to All > Communication Management > Communication Services. Under SNMP, click Enabled, click Save Changes, and the click OK. Under SNMP Users, click Add. Enter the user name and enter and confirm the Password and Privacy Password.


Create SNMP User

Name	:	snmpadmin
Auth Type	:	SHA
Use AES-128	:	Yes
Password	:	•••••••••
Confirm Password	:	•••••••••
Privacy Password	:	•••••••••
Confirm Privacy Password	:	•••••••••

7. Click OK and then click OK again to complete adding the user.

Deploy the Cisco DCNM-SAN OVA

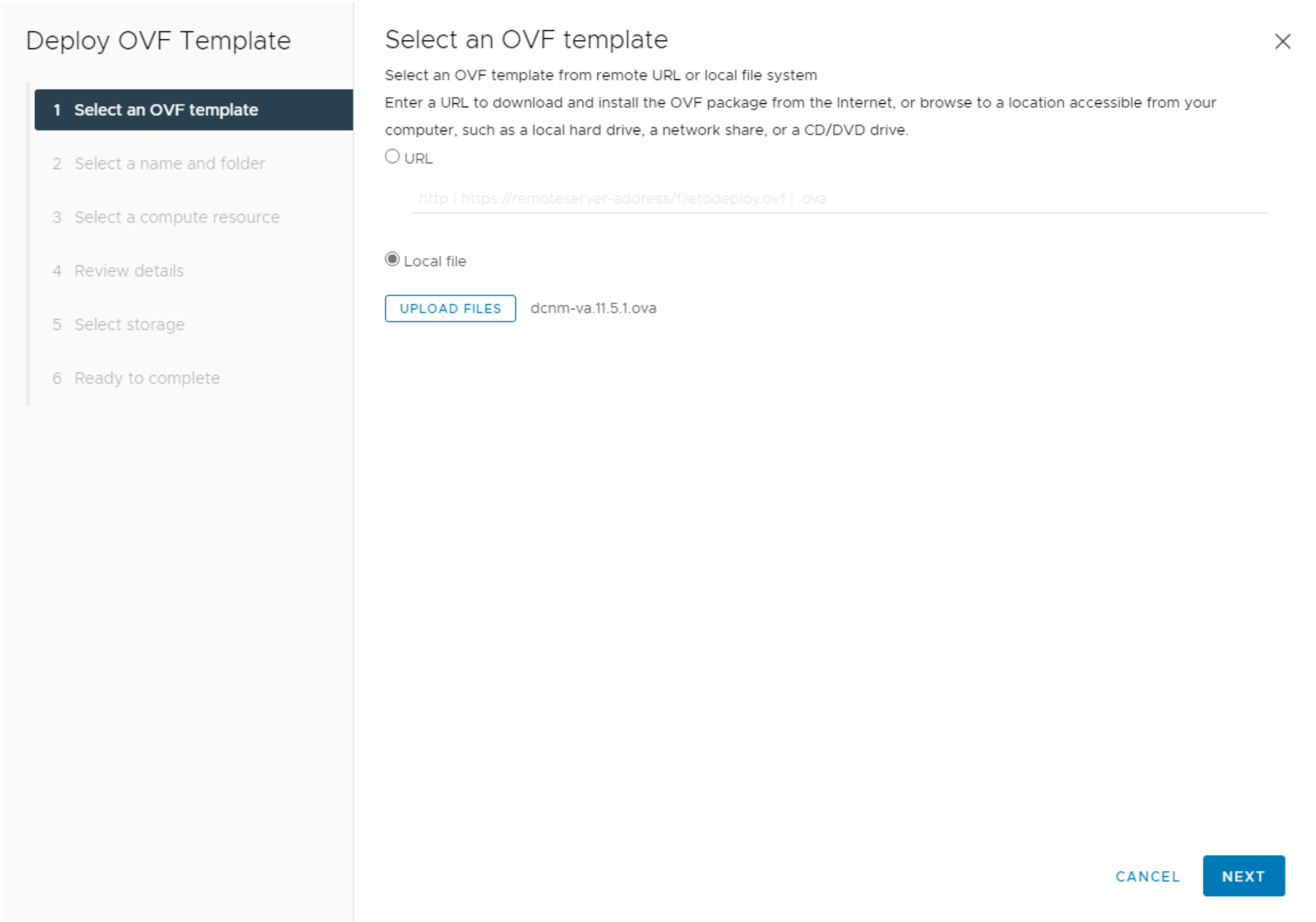
To deploy the Cisco DCNM-SAN OVA, follow these steps:

1. Download the Cisco DCNM 11.5.1 Open Virtual Appliance for VMware from https://software.cisco.com/download/home/281722751/type/282088134/release/11.5(1). Extract dcnm-va.11.5.1.ova from the ZIP file.

2. In the VMware vCenter HTML5 interface, click Menu > Hosts and Clusters.

3. Right-click the FlexPod-Management cluster and select Deploy OVF Template.

4. Choose Local file then click UPLOAD FILES. Navigate to choose dcnm-va.11.5.1.ova and click Open. Click NEXT.



Deploy OVF Template

Select an OVF template

Select an OVF template from remote URL or local file system

Enter a URL to download and install the OVF package from the Internet, or browse to a location accessible from your computer, such as a local hard drive, a network share, or a CD/DVD drive.

○ URL

http | https://remoteserver-address/filetodeploy.ovf | .ova

● Local file

UPLOAD FILES dcnm-va.11.5.1.ova

5. Name the virtual machine and choose the FlexPod-DC datacenter. Click NEXT.

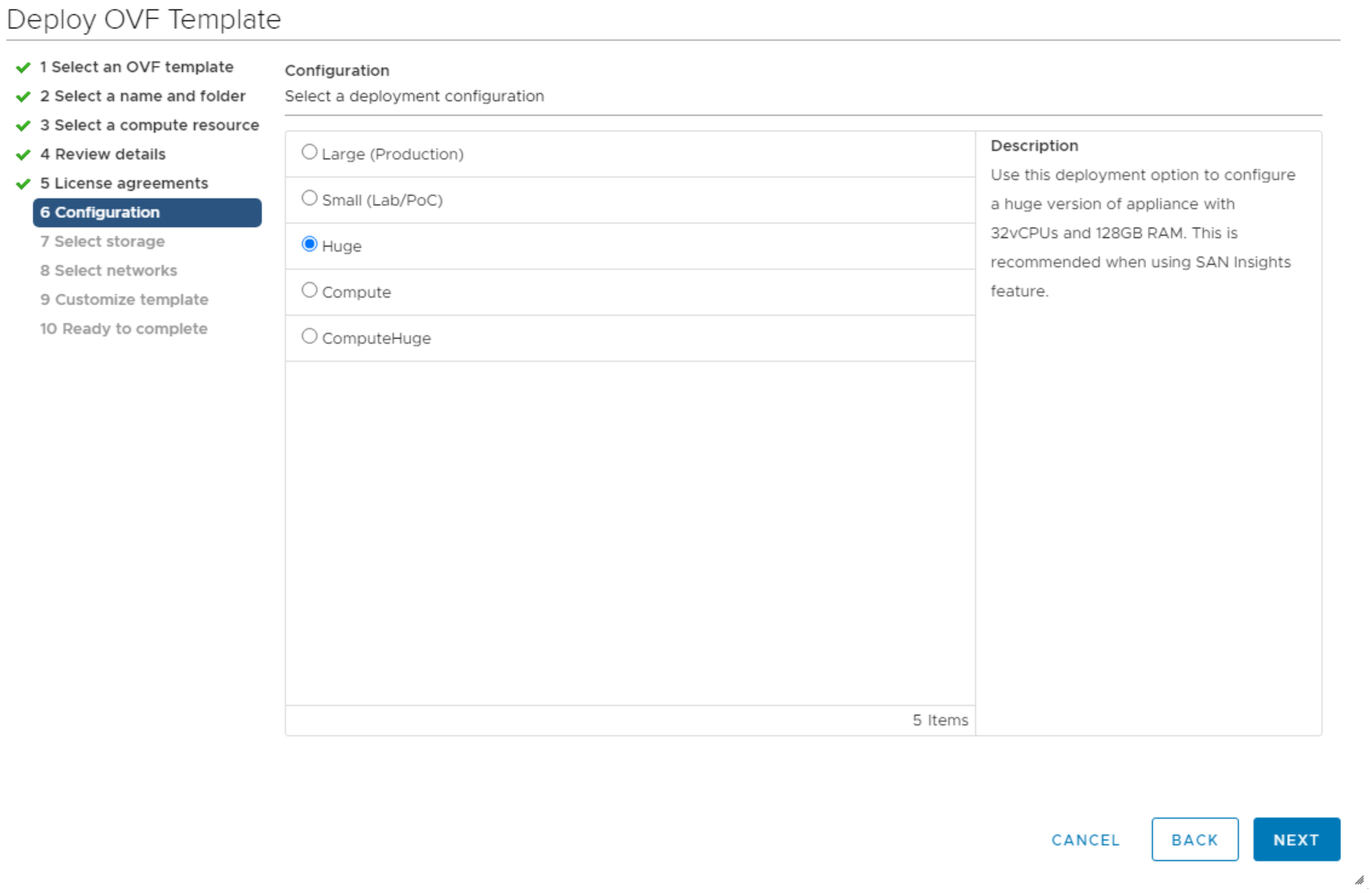
6. Choose the FlexPod-Management cluster and click NEXT.

7. Review the details and click NEXT.

8. Scroll through and accept the license agreements. Click NEXT.

9. Choose the appropriate deployment configuration size and click NEXT.

If using the SAN Insights and SAN Analytics feature, it is recommended to use the Huge size.



Deploy OVF Template

- ✓ 1 Select an OVF template
- ✓ 2 Select a name and folder
- ✓ 3 Select a compute resource
- ✓ 4 Review details
- ✓ 5 License agreements
- 6 Configuration
- 7 Select storage
- 8 Select networks
- 9 Customize template
- 10 Ready to complete

Configuration

Select a deployment configuration

○ Large (Production)

○ Small (Lab/PoC)

● Huge

○ Compute

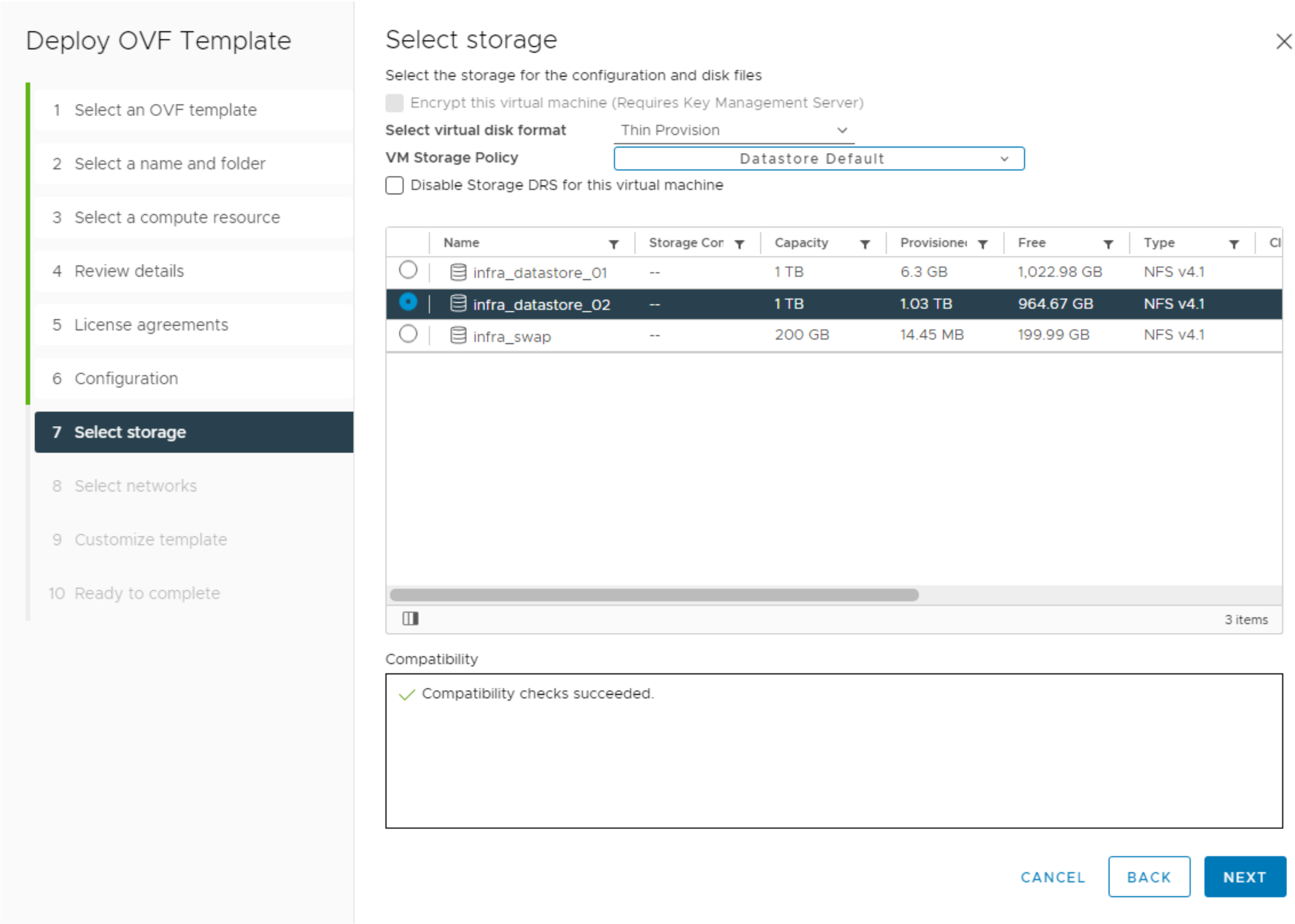
○ ComputeHuge

5 Items

Description

Use this deployment option to configure a huge version of appliance with 32vCPUs and 128GB RAM. This is recommended when using SAN Insights feature.

10. Choose infra_datastore_02 and the Thin Provision virtual disk format. Click NEXT.



Deploy OVF Template

1 Select an OVF template
2 Select a name and folder
3 Select a compute resource
4 Review details
5 License agreements
6 Configuration
7 Select storage
8 Select networks
9 Customize template
10 Ready to complete

Select storage

Select the storage for the configuration and disk files

□ Encrypt this virtual machine (Requires Key Management Server)

Select virtual disk format: Thin Provision

VM Storage Policy: Datastore Default

□ Disable Storage DRS for this virtual machine

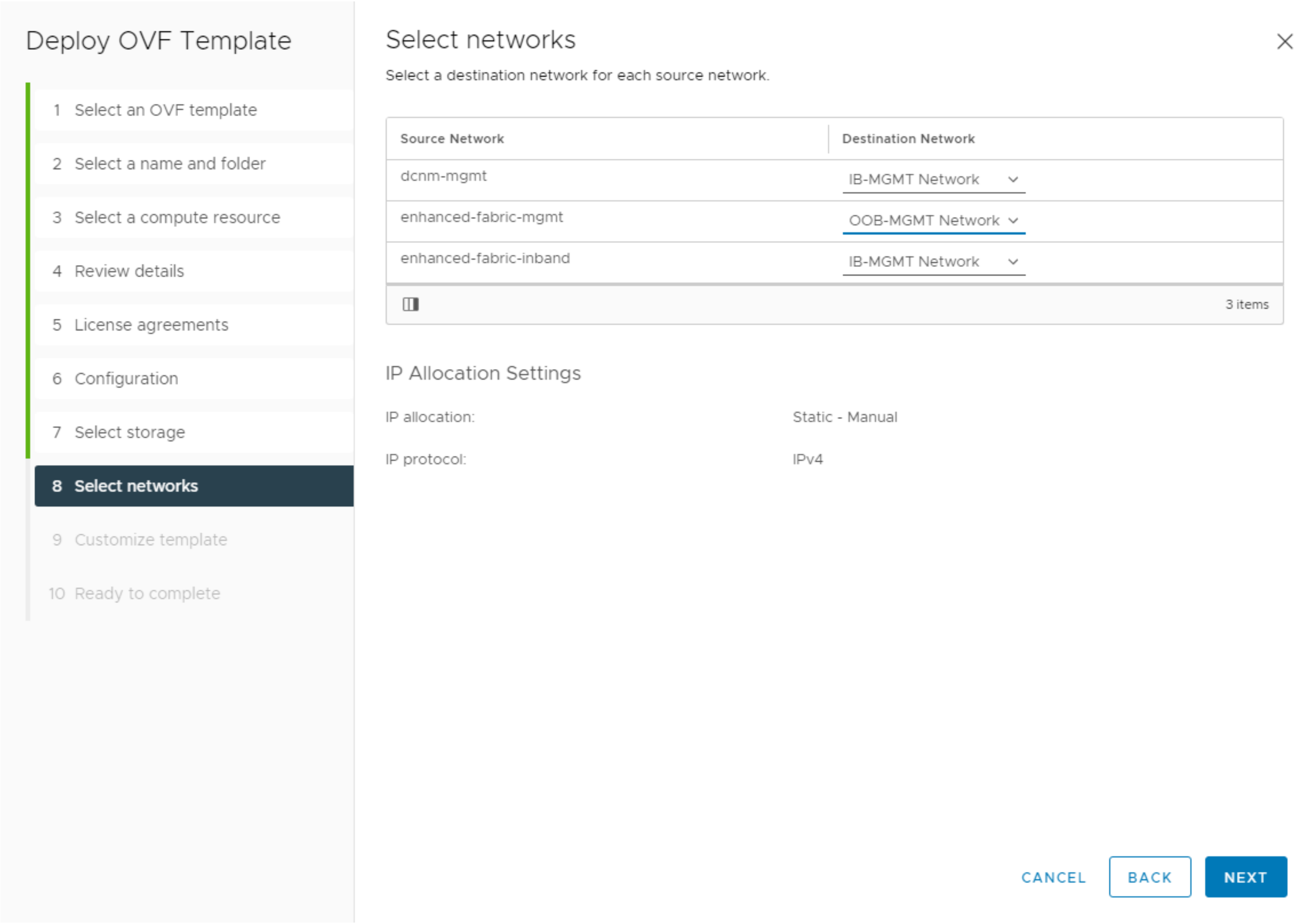
	Name	Storage Cor	Capacity	Provisione	Free	Type	Cl
○	infra_datastore_01	--	1 TB	6.3 GB	1,022.98 GB	NFS v4.1	
●	infra_datastore_02	--	1 TB	1.03 TB	964.67 GB	NFS v4.1	
○	infra_swap	--	200 GB	14.45 MB	199.99 GB	NFS v4.1	

3 items

Compatibility

✓ Compatibility checks succeeded.

11. Choose IB-MGMT Network for the first and third Source Networks. Choose OOB-MGMT Network for the second enhanced-fabric-mgmt Source Network. Click NEXT.



Deploy OVF Template

Select networks

Select a destination network for each source network.

Source Network	Destination Network
dcnm-mgmt	IB-MGMT Network
enhanced-fabric-mgmt	OOB-MGMT Network
enhanced-fabric-inband	IB-MGMT Network

3 items

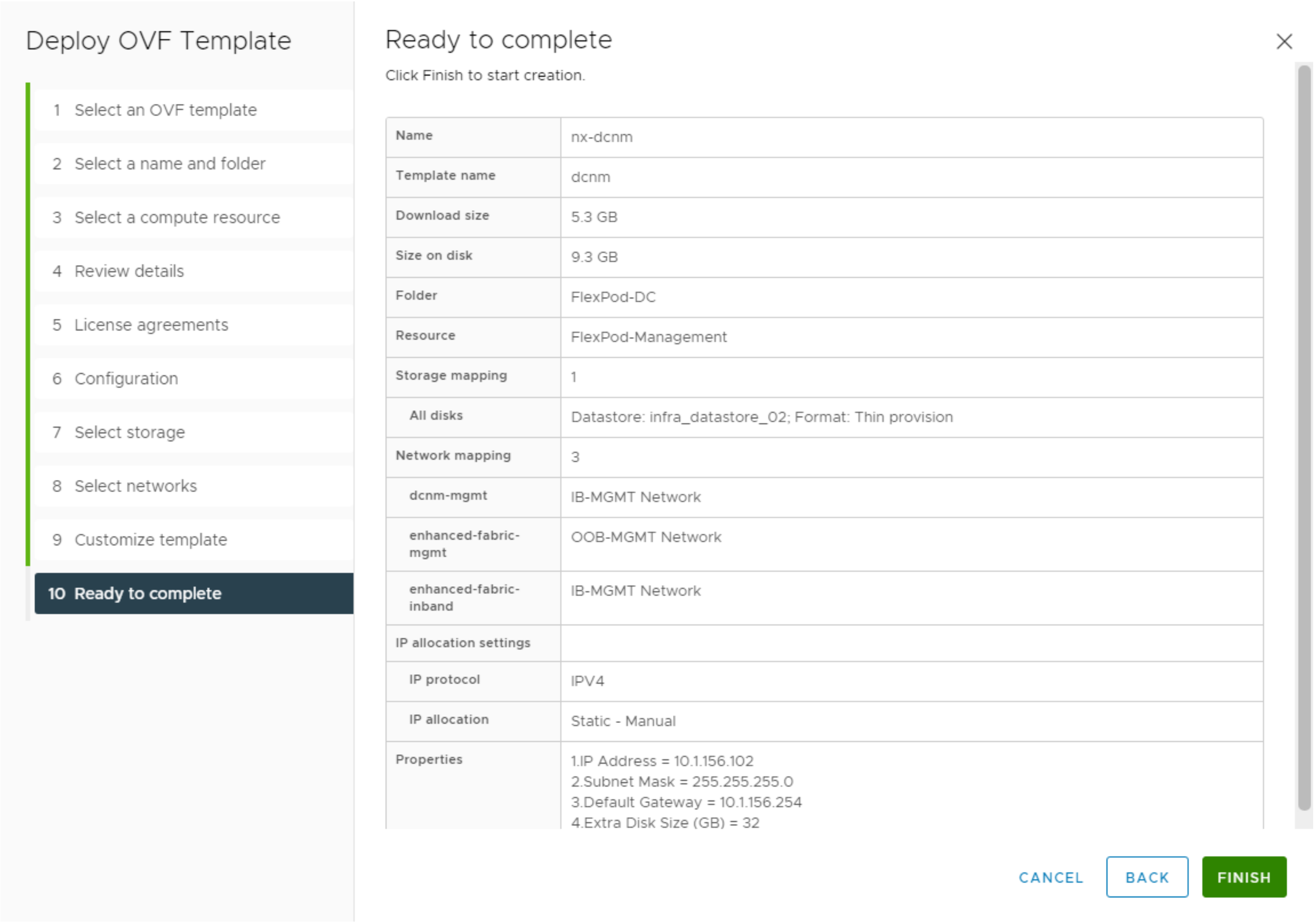
IP Allocation Settings

IP allocation: Static - Manual

IP protocol: IPv4

12. Fill in the management IP address, subnet mask, and gateway. Set the Extra Disk Size according to how many Cisco MDS switches you will be monitoring with this DCNM. If you are only monitoring the two Cisco MDS switches in this FlexPod deployment, set this field to 32. Click NEXT.

13. Review the settings and click FINISH to deploy the OVA.



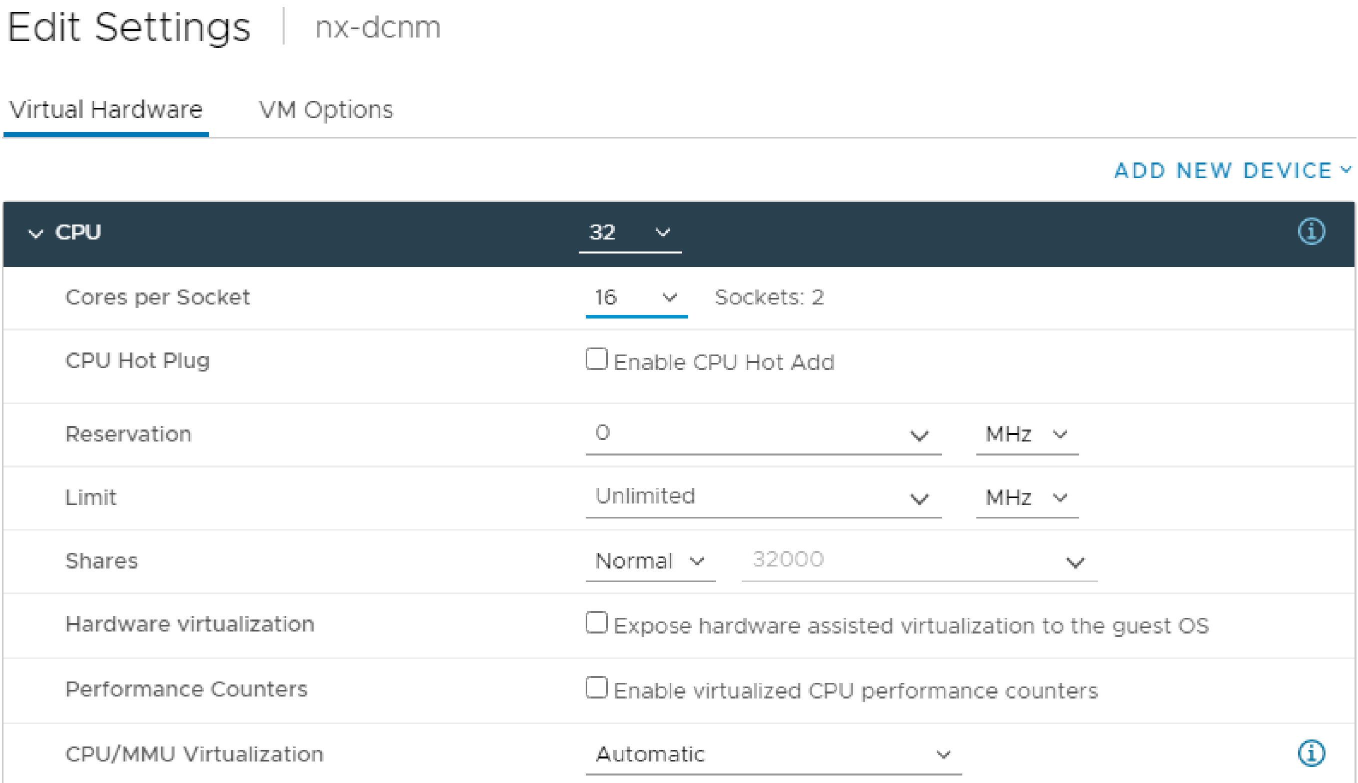
Deploy OVF Template

Ready to complete

Click Finish to start creation.

Name	nx-dcnm
Template name	dcnm
Download size	5.3 GB
Size on disk	9.3 GB
Folder	FlexPod-DC
Resource	FlexPod-Management
Storage mapping	1
All disks	Datastore: infra_datastore_02; Format: Thin provision
Network mapping	3
dcnm-mgmt	IB-MGMT Network
enhanced-fabric-mgmt	OOB-MGMT Network
enhanced-fabric-inband	IB-MGMT Network
IP allocation settings	
IP protocol	IPV4
IP allocation	Static - Manual
Properties	1.IP Address = 10.1.156.102 2.Subnet Mask = 255.255.255.0 3.Default Gateway = 10.1.156.254 4.Extra Disk Size (GB) = 32

14. After deployment is complete, right-click the newly deployed DCNM VM and click Edit Settings. Expand CPU and adjust the Cores per Socket setting until the number of Sockets is set to match the number of CPUs in the UCS servers used in this deployment. The following example shows 2 sockets.



Edit Settings | nx-dcnm

Virtual Hardware | VM Options

ADD NEW DEVICE

CPU: 32

Cores per Socket: 16 Sockets: 2

CPU Hot Plug: □ Enable CPU Hot Add

Reservation: 0 MHz

Limit: Unlimited MHz

Shares: Normal 32000

Hardware virtualization: □ Expose hardware assisted virtualization to the guest OS

Performance Counters: □ Enable virtualized CPU performance counters

CPU/MMU Virtualization: Automatic

15. Click OK to complete the change.

16. Right-click the newly deployed DCNM VM and click Open Remote Console. Once the console is up, click ▶ to power on the VM. Once the VM has powered up, point a web browser to the URL displayed on the console.

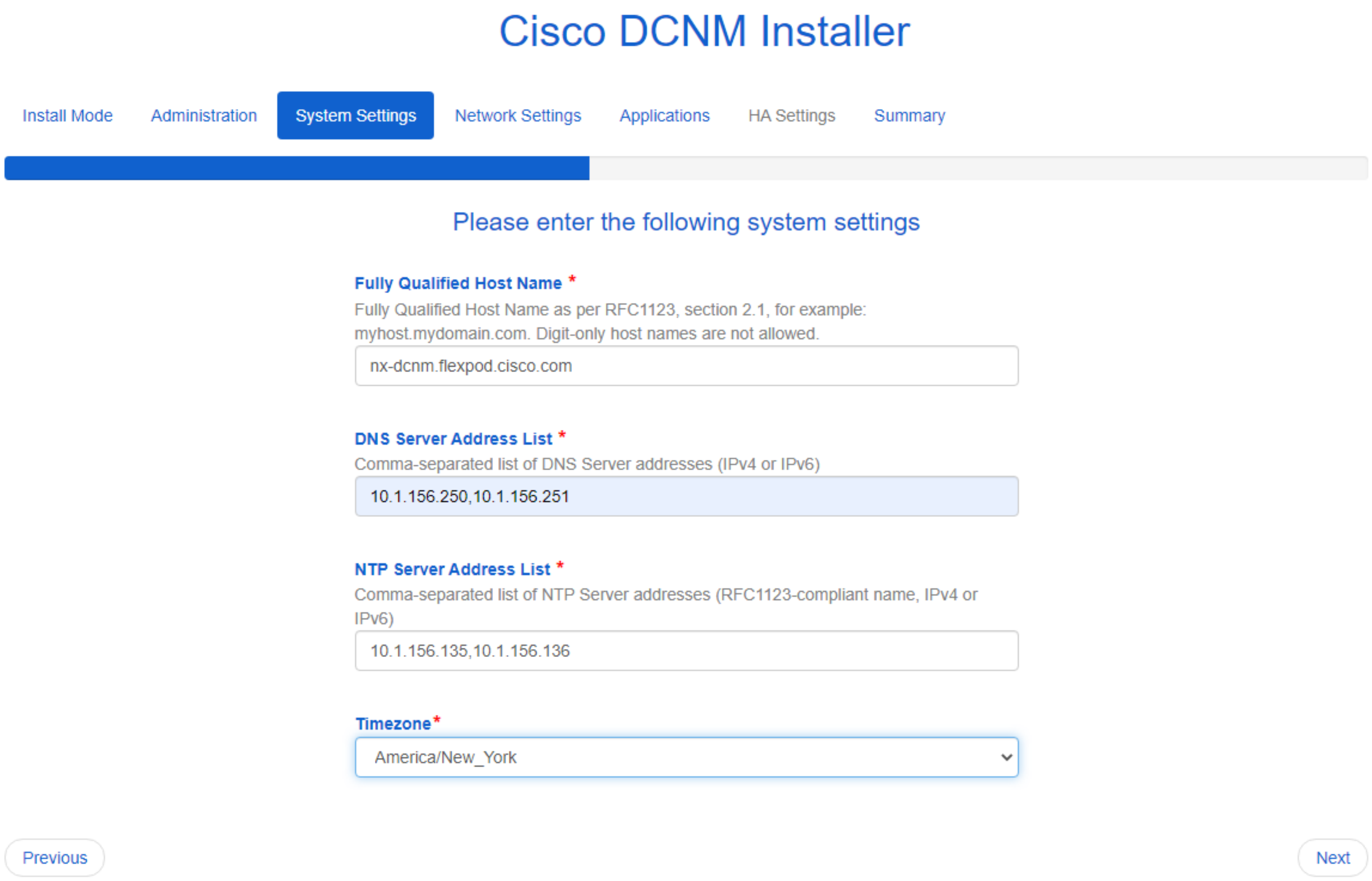
17. Navigate the security prompts and click Get started.

18. Make sure Fresh installation – Standalone is selected and click Continue.

19. Choose SAN only for the Installation mode and leave Cisco Systems, Inc. for the OEM vendor and click Next.

20. Enter and repeat the administrator, database, and root passwords and click Next.

21. Enter the DCNM FQDN, a comma-separated list of DNS servers, a comma-separated list of NTP servers, and select the appropriate time zone. Click Next.


Cisco DCNM Installer

Please enter the following system settings

Fully Qualified Host Name *
Fully Qualified Host Name as per RFC1123, section 2.1, for example: myhost.mydomain.com. Digit-only host names are not allowed.
nx-dcnm.flexpod.cisco.com

DNS Server Address List *
Comma-separated list of DNS Server addresses (IPv4 or IPv6)
10.1.156.250,10.1.156.251

NTP Server Address List *
Comma-separated list of NTP Server addresses (RFC1123-compliant name, IPv4 or IPv6)
10.1.156.135,10.1.156.136

Timezone*
America/New_York

22. The Management Network settings should be filled in. For Out-of-Band Network, enter an IP address in the Out-of-Band management subnet. For the Out-of-Band Network, only input the IPV4 address with prefix. Do not put in the Gateway IPv4 Address. Do not enter any information for the In-Band Network. Scroll down and click Next.

23. If necessary, enter data for the Device connector configuration. Leave Internal Application Services Network set at the default setting and click Next.

24. Review the Summary details and click Start installation.

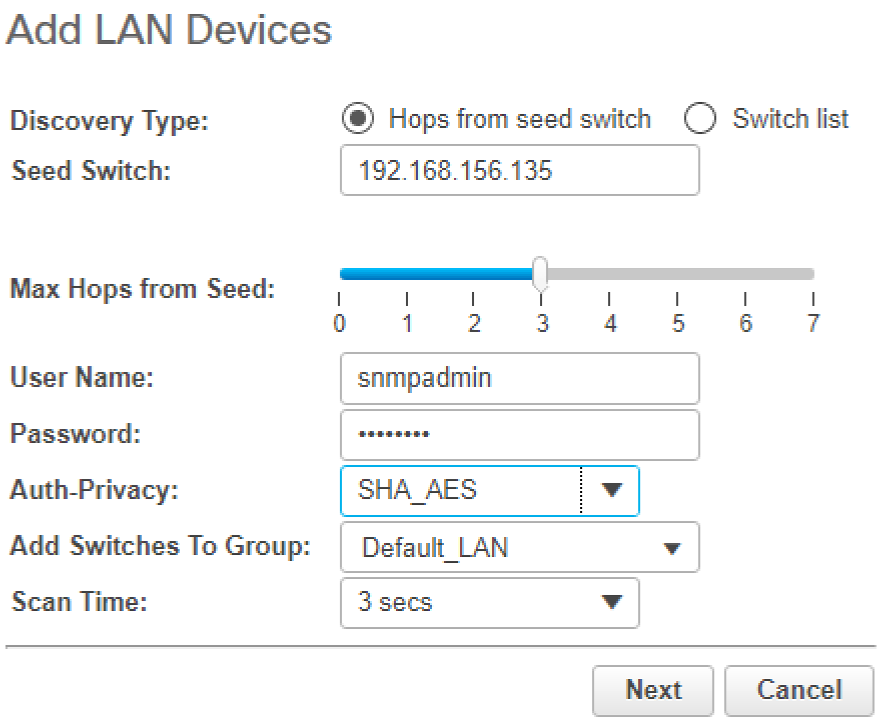
25. When the Installation status is complete, click Continue.

26. In the vCenter HTML5 client under Hosts and Clusters, choose the DCNM VM and click the Summary tab. If an alert is present that states “A newer version of VMware Tools is available for this virtual machine.”, click Upgrade VMware Tools. Choose Automatic Upgrade and click UPGRADE. Wait for the VMware Tools upgrade to complete.

Configure DCNM-SAN

To configure the DCNM-SAN, follow these steps:

1. When the DCNM installation is complete, the browser should redirect to the DCNM management URL.
2. Log in as admin with the password previously entered.
3. On the message that appears, choose Do not show this message again and click No.
4. If you have purchased DCNM server-based or switch-based licenses, follow the instructions that came with the licenses to install them. A new DCNM installation also has a 60-day trial license.
5. In the menu on the left, click Inventory > Discovery > LAN Switches.
6. Click + to add LAN switches. In the Add LAN Devices window, enter the mgmt0 IP address of the Nexus switch A in the Seed Switch box. Enter the snmpadmin user name and password set up in the Prerequisites section above. Set Auth-Privacy to SHA_AES. Click Next.



Add LAN Devices

Discovery Type: ● Hops from seed switch ○ Switch list

Seed Switch: 192.168.156.135

Max Hops from Seed: 3

User Name: snmpadmin

Password: •••••••••

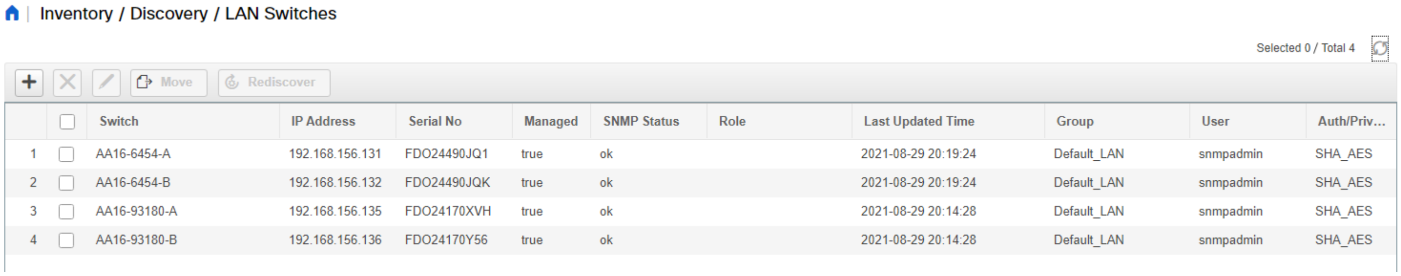
Auth-Privacy: SHA_AES

Add Switches To Group: Default_LAN

Scan Time: 3 secs

7. LAN switch discovery will take a few minutes. In the LAN Discovery list that appears, the two Nexus switches and two Fabric Interconnects that are part of this FlexPod should appear with a status of “manageable.” Using the checkboxes on the left, select the two Nexus switches and two Fabric Interconnects that are part of this FlexPod. Click Add.

8. After a few minutes (hit the Refresh icon in the upper right-hand corner), the two Nexus switches and two Fabric Interconnects that are part of this FlexPod will appear with detailed information.



Inventory / Discovery / LAN Switches

Selected 0 / Total 4

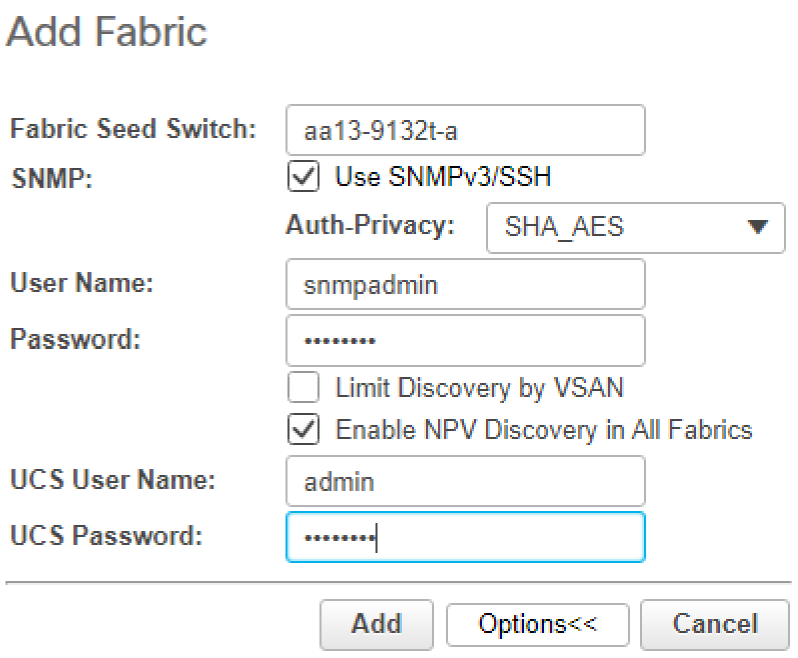
	□	Switch	IP Address	Serial No	Managed	SNMP Status	Role	Last Updated Time	Group	User	Auth/Priv...
1	□	AA16-6454-A	192.168.156.131	FDO24490JQ1	true	ok		2021-08-29 20:19:24	Default_LAN	snmpadmin	SHA_AES
2	□	AA16-6454-B	192.168.156.132	FDO24490JQK	true	ok		2021-08-29 20:19:24	Default_LAN	snmpadmin	SHA_AES
3	□	AA16-93180-A	192.168.156.135	FDO24170XVH	true	ok		2021-08-29 20:14:28	Default_LAN	snmpadmin	SHA_AES
4	□	AA16-93180-B	192.168.156.136	FDO24170Y56	true	ok		2021-08-29 20:14:28	Default_LAN	snmpadmin	SHA_AES

9. In the menu on the left, click Inventory > Discovery > SAN Switches.

10. Click + to add a switching fabric.

11. Enter either the IP address or hostname of the first Cisco MDS 9132T switch. Leave Use SNMPv3/SSH selected. Set Auth-Privacy to SHA_AES. Enter the snmpadmin user name and password set up in the Prerequisites section above. Click Options>>. Enter the UCS admin user name and password. Click Add.

If Cisco Nexus 93180YC-FX switches are being used for SAN switching, substitute them here for MDS 9132Ts. They will need to be added again under SAN switches since LAN and SAN switching are handled separately in DCNM.

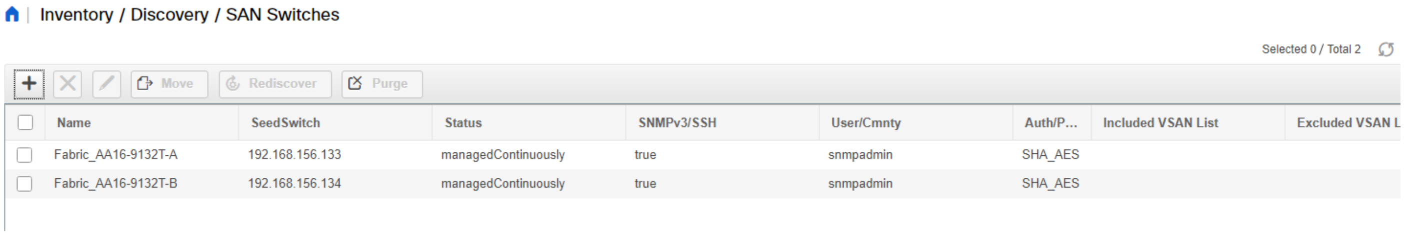


Add Fabric

Fabric Seed Switch:	aa13-9132t-a
SNMP:	☑ Use SNMPv3/SSH
Auth-Privacy:	SHA_AES
User Name:	snmpadmin
Password:	•••••••••
	□ Limit Discovery by VSAN
	☑ Enable NPV Discovery in All Fabrics
UCS User Name:	admin
UCS Password:	••••••••

12. Repeat steps 9-11 to add the second Cisco MDS 9132T and Fabric Interconnect.

13. The two SAN fabrics should now appear in the Inventory.



Inventory / Discovery / SAN Switches

Selected 0 / Total 2

□	Name	SeedSwitch	Status	SNMPv3/SSH	User/Cmnty	Auth/P...	Included VSAN List	Excluded VSAN L
□	Fabric_AA16-9132T-A	192.168.156.133	managedContinuously	true	snmpadmin	SHA_AES		
□	Fabric_AA16-9132T-B	192.168.156.134	managedContinuously	true	snmpadmin	SHA_AES		

14. Choose Inventory > Discovery > Virtual Machine Manager.

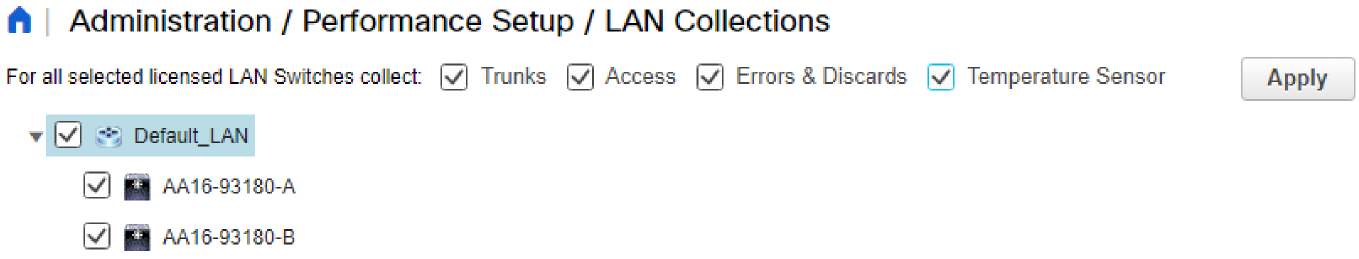
15. Click + to add the vCenter.

16. In the Add VCenter window, enter the IP address of the vCenter VCSA. Enter the administrator@vsphere.local user name and password. Click Add. The vCenter should now appear in the inventory.

17. Choose Inventory > Switches. All LAN and SAN switches should now appear in the inventory.

18. Choose Administration > Performance Setup > LAN Collections.

19. Choose the Default_LAN group and all information you would like to collect. Click Apply. Click Yes to restart the Performance Collector.



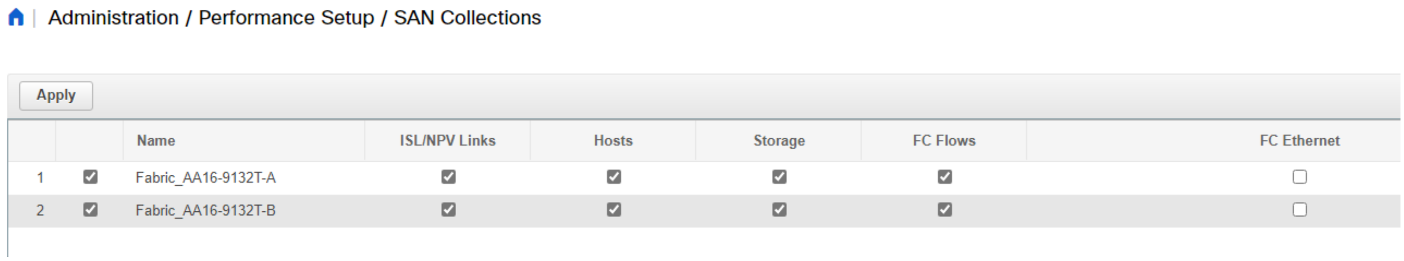
Administration / Performance Setup / LAN Collections

For all selected licensed LAN Switches collect: ☑ Trunks ☑ Access ☑ Errors & Discards ☑ Temperature Sensor

☑ Default_LAN
- ☑ AA16-93180-A
- ☑ AA16-93180-B

20. Choose Administration > Performance Setup > SAN Collections.

21. Choose both fabrics. Choose all information you would like to collect and click Apply. Click Yes to restart the Performance Collector.



Administration / Performance Setup / SAN Collections

		Name	ISL/NPV Links	Hosts	Storage	FC Flows	FC Ethernet
1	☑	Fabric_AA16-9132T-A	☑	☑	☑	☑	☐
2	☑	Fabric_AA16-9132T-B	☑	☑	☑	☑	☐

22. Choose Configure > SAN > Device Alias. Since device-alias mode enhanced was configured in the Cisco MDS 9132T switches, Device Aliases can be created and deleted from DCNM and pushed to the MDS switches.

23. Choose Configure > SAN > Zoning. Just as Device Aliases can be created and deleted from DCNM, zones can be created, deleted, and modified in DCNM and pushed to the MDS switches. Remember to enable Smart Zoning and to Zone by Device Alias.

You can now explore all of the different options and information provided by DCNM SAN. See Cisco DCNM SAN Management for OVA and ISO Deployments Configuration Guide, Release 11.5(1).

Configure SAN Insights in DCNM SAN

The SAN Insights feature enables you to configure, monitor, and view the flow analytics in fabrics. Cisco DCNM enables you to visually see health-related indicators in the interface so that you can quickly identify issues in fabrics. Also, the health indicators enable you to understand the problems in fabrics. The SAN Insights feature also provides more comprehensive end-to-end flow-based data from host to LUN.

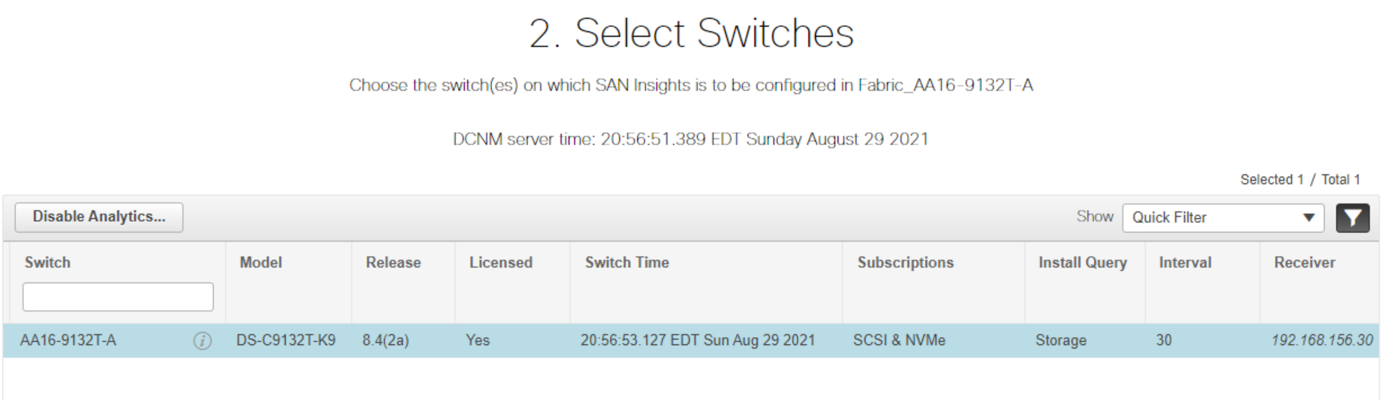
- Ensure that the time configurations set above, including daylight savings settings are consistent across the MDS switches and Cisco DCNM.
- SAN Insights requires installation of a switch-based SAN Analytics license on each switch. To trial the feature, each switch includes a one-time 120-day grace period for SAN Analytics from the time the feature is first enabled.
- SAN Insights supports current Fibre Channel Protocol (SCSI) and NVMe over Fibre Channel (NVMe).
- SAN Insights works by enabling SAN Analytics and Telemetry Streaming on each switch. The switches then stream the SAN Analytics data to DCNM, which collects, correlates, and displays statistics. All configurations can be done from DCNM.
- Only Cisco MDS switches support SAN Analytics. Cisco Nexus 93180YC-FX switches do not support SAN Analytics.
- For more information on SAN Insights, see the SAN Insights sections of Cisco DCNM SAN Management for OVA and ISO Deployments Configuration Guide, Release 11.5(1).
- For more information on SAN Analytics, see https://www.cisco.com/c/en/us/td/docs/switches/datacenter/mds9000/sw/8_x/config/san_analytics/cisco-mds9000-san-analytics-telemetry-streaming-config-guide-8x.html.

To configure SAN Insights in DCNM SAN, follow these steps:

1. Click Configure > SAN > SAN Insights. Click Continue.

2. Choose Fabric A. Click Continue.

3. Choose the Fabric A Cisco MDS switch. Under Install Query click None and from the drop-down list click Storage. Under Subscriptions, choose SCSI & NVMe or whatever you have currently installed. Optionally, under Receiver, choose the IP address in the Out-of-Band Management subnet configured for DCNM. Click Save, then click Continue.



2. Select Switches

Choose the switch(es) on which SAN Insights is to be configured in Fabric_AA16-9132T-A

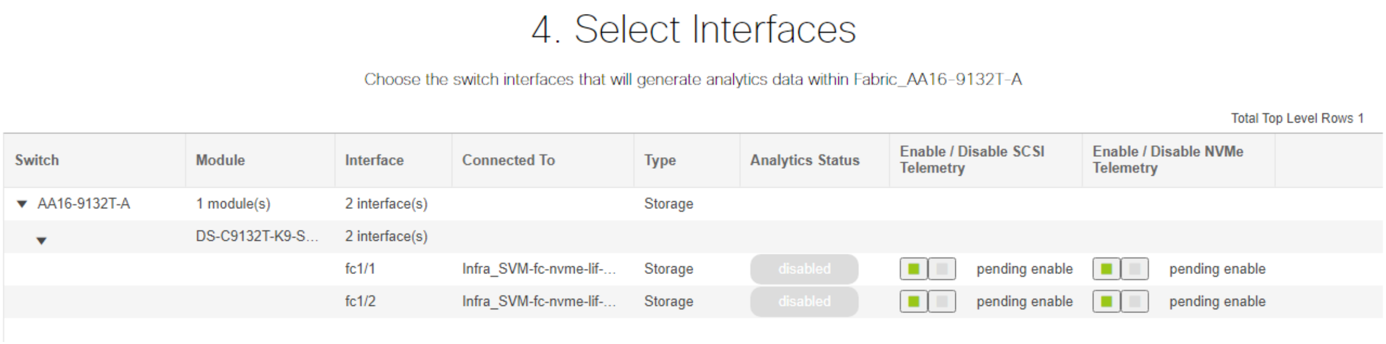
DCNM server time: 20:56:51.389 EDT Sunday August 29 2021

Selected 1 / Total 1

Switch	Model	Release	Licensed	Switch Time	Subscriptions	Install Query	Interval	Receiver
AA16-9132T-A	DS-C9132T-K9	8.4(2a)	Yes	20:56:53.127 EDT Sun Aug 29 2021	SCSI & NVMe	Storage	30	*192.168.156.30*

4. Review the information and click Continue.

5. Expand the switch and then the module. Under Enable / Disable SCSI Telemetry, click the left icon to enable telemetry on the ports connected to the NetApp AFF A400. Under Enable / Disable NVMe Telemetry, click the left icon to enable telemetry on the ports connected to the NetApp AFF A400. Click Continue.



4. Select Interfaces

Choose the switch interfaces that will generate analytics data within Fabric_AA16-9132T-A

Total Top Level Rows 1

Switch	Module	Interface	Connected To	Type	Analytics Status	Enable / Disable SCSI Telemetry	Enable / Disable NVMe Telemetry
▼ AA16-9132T-A	1 module(s)	2 interface(s)		Storage			
▼	DS-C9132T-K9-S...	2 interface(s)					
		fc1/1	Infra_SVM-fc-nvme-lif-...	Storage	disabled	🟩 □ pending enable	🟩 □ pending enable
		fc1/2	Infra_SVM-fc-nvme-lif-...	Storage	disabled	🟩 □ pending enable	🟩 □ pending enable

6. Review the information and click Commit to push the configuration to the Cisco MDS switch.

7. Ensure that the two operations were successful and click Close.

8. Repeat steps 1 - 7 to install SAN Analytics and Telemetry on the Fabric B switch.

9. After approximately two hours, you can view SAN Analytics data under the Dashboard and Monitor.

Sample Tenant Provisioning

Provision a Sample Application Tenant

This section describes a sample procedure for provisioning an application tenant. The procedure refers to previous sections of this document and can be used as a guide and modified as needed when provisioning an application tenant. Follow these steps:

1. Plan your application tenant and determine what storage protocols will be provided in the tenant. In the architecture explained in this document, fibre channel, NFS, iSCSI, and CIFS/SMB (CIFS/SMB have not been discussed in this document) can be provided to the tenant. Also, plan what network VLANs the tenant will use. It is recommended to have a VLAN for virtual machine management traffic. One or two VLANs (iSCSI needs two if VMware RDM LUNs or iSCSI datastores will be provisioned) are also needed for each storage protocol used except fibre channel. If the infrastructure NFS VLAN will be used in the tenant, consider migrating the infrastructure NFS VMkernel port on each host to the vDS to take advantage of Ethernet adapter policy queuing. Fibre channel will have new storage LIFs defined with the same VSANs configured for the FlexPod Infrastructure.

2. In the Cisco Nexus switches, declare all added VLANs and configure the VM VLAN as an allowed VLAN on the Cisco UCS port channels and the vPC peer link. Also, Layer 3 with HSRP or VRRP can be configured in the Cisco Nexus switches to provide this VLAN access to the outside. Layer 3 setup is not explained in this document but is explained in the Nexus 9000 documentation. Configure the storage VLANs on the Cisco UCS and storage port channels, and on the vPC peer link. The VM VLAN can also be added to the storage port channels in order to configure the tenant SVM management interface on this VLAN.

3. In the storage cluster:

    a. Create a broadcast domain with MTU 1500 for the tenant SVM management interface. Create a broadcast domain with MTU 9000 for each tenant storage protocol except fibre channel.

    b. Create VLAN interface ports on the node interface group on each node for tenant SVM management (VM VLAN) and for the VLAN for each storage protocol except fibre channel. Add these VLAN ports to the appropriate broadcast domains.

    c. Create the tenant SVM and follow all procedures in that section.

    d. Create Load-Sharing Mirrors for the tenant SVM.

    e. Create the FC or iSCSI service for the tenant SVM if fibre channel or iSCSI is being deployed in this tenant.

    f. Optionally, create a self-signed security certificate for the tenant SVM.

    g. Configure NFSv3 for the tenant SVM.

    h. Create a VM datastore volume in the tenant SVM.

i. If fibre channel is being deployed in this tenant, configure four FCP LIFs in the tenant SVM on the same fibre channel ports as in the Infrastructure SVM.

j. If iSCSI is being deployed in this tenant, configure four iSCSI LIFs in the tenant SVM on the iSCSI VLAN interfaces.

k. Create an NFS LIF in the tenant SVM on each storage node.

l. Create a boot LUN in the esxi_boot volume in the Infra-SVM for each tenant VMware ESXi host.

m. Add the tenant SVM Administrator, SVM management LIF on the SVM management VLAN port, and default route for the SVM.

4. In Cisco UCS, one method of tenant setup is to dedicate a VMware ESXi cluster and set of UCS servers to each tenant. Service profiles will be generated for at least two tenant ESXi hosts. These hosts can boot from LUNs from the esxi_boot volume in the Infra-SVM but will also have access to FC storage in the tenant SVM.

5. Create a Server Pool for the tenant ESXi host servers.

6. Create all tenant VLANs in the LAN Cloud.

7. Add the tenant VLANs to the vDS vNIC templates.

8. Generate service profiles from the service profile template with the vMedia policy for the tenant ESXi hosts. Remember to bind these service profiles to the service profile template without the vMedia policy after VMware ESXi installation.

9. In the Cisco MDS 9132T switches:

   a. Create device aliases for the tenant ESXi host vHBAs and the FC LIFs in the tenant storage SVM.

   b. Add the tenant host initiators to the Infra-SVM zone.

10. Create a zone for the tenant SVM with fibre channel targets from the tenant SVM.

11. Add these zones to the Fabric zoneset and activate the zoneset.

12. In the storage cluster:

    a. Create igroups for the tenant ESXi hosts in both the Infra-SVM and tenant SVM. Also, create an igroup in the tenant SVM that includes the WWPNs for all tenant ESXi hosts to support shared storage from the tenant SVM.

13. In Infra-SVM, map the boot LUNs created earlier to the tenant ESXi hosts. Tenant FC or iSCSI storage can be created later using NetApp VSC.

14. Install and configure VMware ESXi on all tenant host servers. It is not necessary to map infra_datastore unless you want the tenant ESXi hosts to have access to VMs or VM templates in these datastores.

15. In VMware vCenter, create a cluster for the tenant ESXi hosts. Add the hosts to the cluster.

16. Using the vCenter HTML5 Client, add the tenant hosts to vDS0 or create a tenant vDS and add the hosts to it. In vDS0, add port-profiles for the tenant VLANs. When migrating the hosts to the vDS, leave only the ESXi management interfaces on vSwitch0.

17. Back in vCenter, add in any necessary VMkernel ports for storage interfaces remembering to set the MTU correctly on these interfaces. Mount the tenant NFS datastore on the tenant cluster if one was created. Tenant iSCSI VMkernel ports can be created on the vDS with the port groups pinned to the appropriate fabric.

18. Using the NetApp VSC plugin to the vCenter HTML5 Client, set recommended values for all tenant ESXi hosts. Ensure the NetApp NFS Plug-in for VMware VAAI is installed on all tenant hosts and reboot each host.

19. You can now begin provisioning virtual machines on the tenant cluster. The NetApp VSC plugin can be used to provision fibre channel, iSCSI, and NFS datastores.

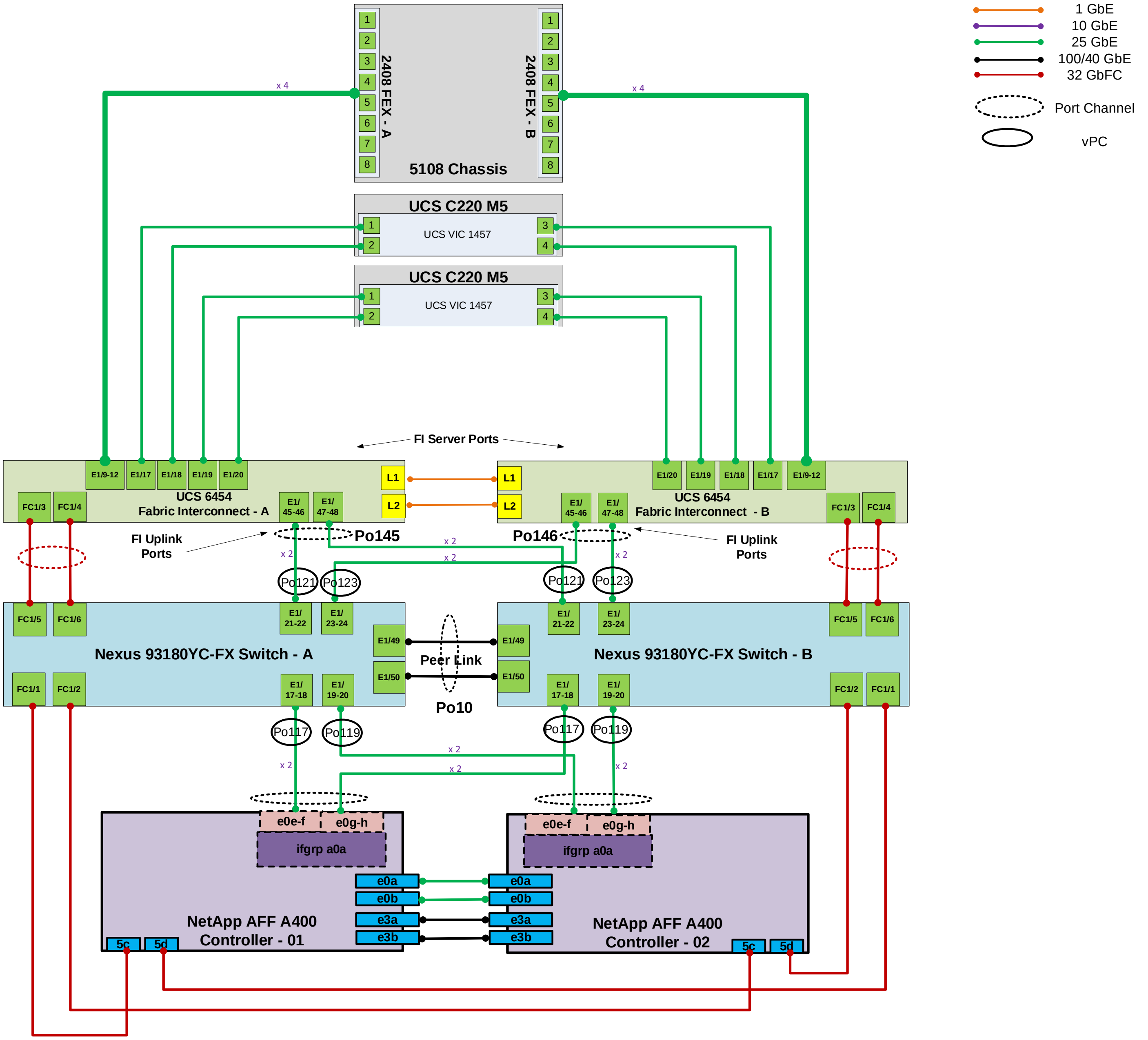
20. Optionally, use NetApp SnapCenter to provision backups of tenant virtual machines.

Appendix

FlexPod with Cisco Nexus 93180YC-FX SAN Switching Configuration – Part 1

If the Cisco Nexus switches are to be used for both LAN and SAN switching in the FlexPod configuration, either an automated configuration with Ansible or a manual configuration can be done. For either configuration method, the following base switch setup must be done manually. Figure 7 shows the validation lab cabling for this setup.

Figure 7. FlexPod Cabling for Cisco Nexus 93180YC-FX SAN Switching



FlexPod Cisco Nexus 93180YC-FX SAN Switching Base Configuration

The following procedures describe how to configure the Cisco Nexus 93180YC-FX switches for use in a base FlexPod environment that uses the switches for both LAN and SAN switching. This procedure assumes you’re using Cisco Nexus 9000 9.3(7), the Cisco suggested Nexus switch release at the time of this validation.

Set Up Initial Configuration in Cisco Nexus 93180YC-FX A

To set up the initial configuration for the Cisco Nexus A switch on <nexus-A-hostname>, follow these steps:

1. Configure the switch:

> On initial boot and connection to the serial or console port of the switch, the NX-OS setup should automatically start and attempt to enter Power on Auto Provisioning.

```
Abort Power On Auto Provisioning [yes - continue with normal setup, skip - bypass password
and basic configuration, no - continue with Power On Auto Provisioning] (yes/skip/no)[no]:
yes
Disabling POAP.......Disabling POAP
poap: Rolling back, please wait... (This may take 5-15 minutes)

         ---- System Admin Account Setup ----

Do you want to enforce secure password standard (yes/no) [y]: Enter
Enter the password for "admin": <password>
Confirm the password for "admin": <password>
Would you like to enter the basic configuration dialog (yes/no): yes
Create another login account (yes/no) [n]: Enter
Configure read-only SNMP community string (yes/no) [n]: Enter
Configure read-write SNMP community string (yes/no) [n]: Enter
Enter the switch name: <nexus-A-hostname>
Continue with Out-of-band (mgmt0) management configuration? (yes/no) [y]: Enter
Mgmt0 IPv4 address: <nexus-A-mgmt0-ip>
Mgmt0 IPv4 netmask: <nexus-A-mgmt0-netmask>
Configure the default gateway? (yes/no) [y]: Enter
IPv4 address of the default gateway: <nexus-A-mgmt0-gw>
Configure advanced IP options? (yes/no) [n]: Enter
Enable the telnet service? (yes/no) [n]: Enter
Enable the ssh service? (yes/no) [y]: Enter
Type of ssh key you would like to generate (dsa/rsa) [rsa]: Enter
```

```
Number of rsa key bits <1024-2048> [1024]: Enter

Configure the ntp server? (yes/no) [n]: Enter

Configure default interface layer (L3/L2) [L2]: Enter

Configure default switchport interface state (shut/noshut) [noshut]: shut
Enter basic FC configurations (yes/no) [n]: y
Configure default physical FC switchport interface state (shut/noshut) [shut]: Enter
Configure default switchport trunk mode (on/off/auto) [on]: auto
Configure default zone policy (permit/deny) [deny]: Enter
Enable full zoneset distribution? (yes/no) [n]: y
Configure CoPP system profile (strict/moderate/lenient/dense) [strict]: Enter

Would you like to edit the configuration? (yes/no) [n]: Enter
```

2. Review the configuration summary before enabling the configuration:

```
Use this configuration and save it? (yes/no) [y]: Enter
```

Set Up Initial Configuration in Cisco Nexus 93180YC-FX B

To set up the initial configuration for the Cisco Nexus B switch on <nexus-B-hostname>, follow these steps:

1. Configure the switch:

On initial boot and connection to the serial or console port of the switch, the NX-OS setup should automatically start and attempt to enter Power on Auto Provisioning.

```
Abort Power On Auto Provisioning [yes - continue with normal setup, skip - bypass password
and basic configuration, no - continue with Power On Auto Provisioning] (yes/skip/no)[no]:
yes

Disabling POAP.......Disabling POAP

poap: Rolling back, please wait... (This may take 5-15 minutes)


         ---- System Admin Account Setup ----


Do you want to enforce secure password standard (yes/no) [y]: Enter

Enter the password for "admin": <password>

Confirm the password for "admin": <password>

Would you like to enter the basic configuration dialog (yes/no): yes

Create another login account (yes/no) [n]: Enter

Configure read-only SNMP community string (yes/no) [n]: Enter

Configure read-write SNMP community string (yes/no) [n]: Enter

Enter the switch name: <nexus-B-hostname>

Continue with Out-of-band (mgmt0) management configuration? (yes/no) [y]: Enter

Mgmt0 IPv4 address: <nexus-B-mgmt0-ip>
```

```
Mgmt0 IPv4 netmask: <nexus-B-mgmt0-netmask>
Configure the default gateway? (yes/no) [y]: Enter
IPv4 address of the default gateway: <nexus-B-mgmt0-gw>
Configure advanced IP options? (yes/no) [n]: Enter
Enable the telnet service? (yes/no) [n]: Enter
Enable the ssh service? (yes/no) [y]: Enter
Type of ssh key you would like to generate (dsa/rsa) [rsa]: Enter
Number of rsa key bits <1024-2048> [1024]: Enter
Configure the ntp server? (yes/no) [n]: Enter
Configure default interface layer (L3/L2) [L2]: Enter
Configure default switchport interface state (shut/noshut) [noshut]: shut
Enter basic FC configurations (yes/no) [n]: y
Configure default physical FC switchport interface state (shut/noshut) [shut]: Enter
Configure default switchport trunk mode (on/off/auto) [on]: auto
Configure default zone policy (permit/deny) [deny]: Enter
Enable full zoneset distribution? (yes/no) [n]: y
Configure CoPP system profile (strict/moderate/lenient/dense) [strict]: Enter
Would you like to edit the configuration? (yes/no) [n]: Enter
```

2. Review the configuration summary before enabling the configuration:

```
Use this configuration and save it? (yes/no) [y]: Enter
```

SAN switching requires both the SAN_ENTERPRISE_PKG and FC_PORT_ACTIVATION_PKG licenses. Ensure these licenses are installed on each Nexus 93180YC-FX switch.

This section is structured as a green field switch setup. If existing switches that are switching active traffic are being setup, execute this procedure down through Perform TCAM Carving and Configure Unified Ports in Cisco Nexus 93180YC-FX A and B first on one switch and then when that is completed, execute on the other switch.

Install feature-set fcoe in Cisco Nexus 93180YC-FX A and B

To add the fcoe feature-set, follow this step on both switches:

1. Run the following commands to set global configurations:

```
config t
install feature-set fcoe
feature-set fcoe
system default switchport trunk mode auto
system default switchport mode F
```

These steps are provided in case the basic FC configurations were not configured in the switch setup script detailed in the previous section.

Set System-Wide QoS Configurations in Cisco Nexus 93180YC-FX A and B

To set system-wide QoS configurations for FCoE for no-drop traffic support, follow this step on both switches:

1. Run the following commands to set global configurations:

```
config t
system qos
service-policy type queuing input default-fcoe-in-que-policy
service-policy type queuing output default-fcoe-8q-out-policy
service-policy type network-qos default-fcoe-8q-nq-policy
copy run start
```

Perform TCAM Carving and Configure Unified Ports in Cisco Nexus 93180YC-FX A and B

SAN switching requires TCAM carving for lossless fibre channel no-drop support. Also, unified ports need to be converted to fc ports. To perform TCAM carving on the Cisco Nexus switches and to convert ports 1-16 to fc, follow these steps:

1. Run the following commands:

```
hardware access-list tcam region ing-racl 1536
hardware access-list tcam region ing-ifacl 256
hardware access-list tcam region ing-redirect 256
slot 1
port 1-8 type fc
copy running-config startup-config
reload
This command will reboot the system. (y/n)?  [n] y
```

2. After the switch reboots, log back in as admin. Run the following commands:

```
show hardware access-list tcam region |i i ing-racl
show hardware access-list tcam region |i i ifacl
show hardware access-list tcam region |i i ing-redirect
show int status
```

FlexPod Cisco Nexus 93180YC-FX SAN Switching Ethernet Switching Automated Configuration

For the automated configuration of the Ethernet part of the Cisco Nexus 93180YC-FX switches when using the switches for SAN switching, once the base configuration is set, return to Ansible Nexus Switch Configuration and execute from there.

FlexPod Cisco Nexus 93180YC-FX SAN Switching Ethernet Switching Manual Configuration

For the manual configuration of the Ethernet part of the Cisco Nexus 93180YC-FX switches when using the switches for SAN switching, once the base configuration above is set, return to FlexPod Cisco Nexus Switch Manual Configuration and execute from there.

FlexPod with Cisco Nexus 93180YC-FX SAN Switching Configuration – Part 2

If the Cisco Nexus 93180YC-FX switch is being used for SAN Switching, this section should be completed in place of the Cisco MDS section of this document.

FlexPod Cisco Nexus 93180YC-FX SAN Switching Automated Configuration

To automate the configuration of the SAN part of the Cisco Nexus 93180YC-FX switches when using the switches for SAN switching, follow these steps:

1. Verify Nexus switch ssh keys are in /root/.ssh/known_hosts. Adjust known_hosts as necessary if errors occur.

```
ssh admin@<nexus-A-mgmt0-ip>
exit
ssh admin@<nexus-B-mgmt0-ip>
exit
```

2. Edit the /root/ FlexPod-M6/FlexPod-UCSM-M6/inventory file putting the Nexus A information in for MDS A and the Nexus B information in for MDS B.

3. Edit the following variable files to ensure proper Nexus SAN variables are entered:

- /root/ FlexPod-M6/FlexPod-UCSM-M6/group_vars/all.yml
- /root/ FlexPod-M6/FlexPod-UCSM-M6/host_vars/mdsA.yml
- /root/ FlexPod-M6/FlexPod-UCSM-M6/host_vars/mdsB.yml
- /root/ FlexPod-M6/FlexPod-UCSM-M6/roles/NEXUSSANconfig/defaults/main.yml

The SAN variables and port descriptions from the mdsA.yml and mdsB.yml files will be used for the SAN configuration in the Nexus 93180YC-FX switches.

4. From /root/ FlexPod-M6/FlexPod-UCSM-M6, run the Setup_NexusSAN.yml Ansible playbook.

```
ansible-playbook ./Setup_NexusSAN.yml -i inventory
```

FlexPod Cisco Nexus 93180YC-FX SAN Switching Ethernet Switching Manual Configuration

For the manual configuration of the SAN part of the Cisco Nexus 93180YC-FX switches when using the switches for SAN switching, execute the following:

Enable Features in Cisco Nexus 93180YC-FX A and B

To enable the appropriate features on the Cisco Nexus switches, follow these steps:

1. Log in as admin.

> SAN switching requires both the SAN_ENTERPRISE_PKG and FC_PORT_ACTIVATION_PKG licenses. Make sure these licenses are installed on each Cisco Nexus 93180YC-FX switch.

2. Because basic FC configurations were entered in the setup script, feature-set fcoe has been automatically installed and enabled. Run the following commands:

```
config t
feature npiv
feature fport-channel-trunk
```

Configure Fibre Channel Ports in Cisco Nexus 93180YC-FX A

To configure individual ports and port-channels for switch A, follow this step:

1. From the global configuration mode, run the following commands:

```
interface fc1/1
switchport description <st-clustername>-01:5a
port-license acquire
switchport speed 32000
switchport trunk mode off
no shutdown
exit

interface fc1/2
switchport description <st-clustername>-02:5a
port-license acquire
switchport speed 32000
switchport trunk mode off
no shutdown
exit

interface fc1/5
switchport description <ucs-clustername>-a:1/1
port-license acquire
channel-group 15
no shutdown
exit
```

```
interface fc1/6
switchport description <ucs-clustername>-a:1/2
port-license acquire
channel-group 15
no shutdown
exit

interface san-port-channel15
channel mode active
switchport trunk allowed vsan <vsan-a-id>
switchport description <ucs-clustername>-a
switchport speed 32000
no shutdown
exit
```

If VSAN trunking is not being used between the UCS Fabric Interconnects and the MDS switches, do not enter “switchport trunk allowed vsan <vsan-a-id>” for interface port-channel15. Also, the default setting of switchport trunk mode auto is being used for the port channel.

Configure Fibre Channel Ports in Cisco Nexus 93180YC-FX B

To configure individual ports and port-channels for switch B, follow this step:

1. From the global configuration mode, run the following commands:

```
interface fc1/1
switchport description <st-clustername>-01:5b
port-license acquire
switchport speed 32000
switchport trunk mode off
no shutdown
exit

interface fc1/2
switchport description <st-clustername>-02:5b
port-license acquire
switchport speed 32000
switchport trunk mode off
no shutdown
exit

interface fc1/5
```

```
switchport description <ucs-clustername>-b:1/1
port-license acquire
channel-group 15
no shutdown
exit

interface fc1/6
switchport description <ucs-clustername>-b:1/2
port-license acquire
channel-group 15
no shutdown
exit

interface san-port-channel15
channel mode active
switchport trunk allowed vsan <vsan-b-id>
switchport description <ucs-clustername>-b
switchport speed 32000
no shutdown
exit
```

If VSAN trunking is not being used between the Cisco UCS Fabric Interconnects and the Nexus switches, do not enter “switchport trunk allowed vsan <vsan-b-id>” for interface port-channel15. Also, the default setting of switchport trunk mode auto is being used for the port channel.

Create VSANs in Cisco Nexus 93180YC-FX A

To create the necessary VSANs for fabric A and add ports to them, follow this step:

1. From the global configuration mode, run the following commands:

```
vsan database
vsan <vsan-a-id>
vsan <vsan-a-id> name Fabric-A
vsan <vsan-a-id> interface fc1/1
Traffic on fc1/1 may be impacted. Do you want to continue? (y/n) [n] y
vsan <vsan-a-id> interface fc1/2
Traffic on fc1/2 may be impacted. Do you want to continue? (y/n) [n] y
vsan <vsan-a-id> interface san-port-channel15
exit
zone smart-zoning enable vsan <vsan-a-id>
```

```
zoneset distribute full vsan <vsan-a-id>
copy run start
```

Create VSANs in Cisco Nexus 93180YC-FX B

To create the necessary VSANs for fabric B and add ports to them, follow this step:

1. From the global configuration mode, run the following commands:

```
vsan database

vsan <vsan-b-id>

vsan <vsan-b-id> name Fabric-B

vsan <vsan-b-id> interface fc1/1
Traffic on fc1/1 may be impacted. Do you want to continue? (y/n) [n] y

vsan <vsan-b-id> interface fc1/2
Traffic on fc1/2 may be impacted. Do you want to continue? (y/n) [n] y

vsan <vsan-b-id> interface san-port-channel15

exit

zone smart-zoning enable vsan <vsan-b-id>

zoneset distribute full vsan <vsan-b-id>
copy run start
```

Cisco Nexus 93180YC-FX Zoning

This section explains how to configure Device Aliases, Zoning, and Zonesets in the Cisco Nexus 93180YC-FX switches for use in a FlexPod environment. Follow the steps precisely because failure to do so could result in an improper configuration.

Create Device Aliases in Cisco Nexus 93180YC-FX A

To create device aliases for Fabric A that will be used to create zones, follow this step:

1. Login as admin and from the global configuration mode, run the following commands:

```
config t
device-alias mode enhanced

device-alias database

device-alias name Infra-SVM-fcp-lif01a pwwn <fcp-lif01a-wwpn>

device-alias name Infra-SVM-fcp-lif02a pwwn <fcp-lif02a-wwpn>

device-alias name VM-Host-Infra-01-A pwwn <vm-host-infra-01-wwpna>

device-alias name VM-Host-Infra-02-A pwwn <vm-host-infra-02-wwpna>

device-alias name VM-Host-Infra-03-A pwwn <vm-host-infra-03-wwpna>

device-alias commit
show device-alias database
```

Create Device Aliases in Cisco Nexus 93180YC-FX B

To create device aliases for Fabric B that will be used to create zones, follow this step:

1. Login as admin and from the global configuration mode, run the following commands:

```
config t
device-alias mode enhanced
device-alias database
device-alias name Infra-SVM-fcp-lif01b pwwn <fcp-lif01b-wwpn>
device-alias name Infra-SVM-fcp-lif02b pwwn <fcp-lif02b-wwpn>
device-alias name VM-Host-Infra-01-B pwwn <vm-host-infra-01-wwpnb>
device-alias name VM-Host-Infra-02-B pwwn <vm-host-infra-02-wwpnb>
device-alias name VM-Host-Infra-03-B pwwn <vm-host-infra-03-wwpnb>
device-alias commit
show device-alias database
```

Create Zones and Zoneset in Cisco Nexus 93180YC-FX A

To create the required zones and zoneset on Fabric A, run the following commands:

```
zone name Infra-SVM-Fabric-A vsan <vsan-a-id>
member device-alias VM-Host-Infra-01-A init
member device-alias VM-Host-Infra-02-A init
member device-alias VM-Host-Infra-03-A init
member device-alias Infra-SVM-fcp-lif-01a target
member device-alias Infra-SVM-fcp-lif-02a target
exit
zoneset name Fabric-A vsan <vsan-a-id>
member Infra-SVM-Fabric-A
exit
zoneset activate name Fabric-A vsan <vsan-a-id>
show zoneset active
copy r s
```

Create Zones and Zoneset in Cisco Nexus 93180YC-FX B

To create the required zones and zoneset on Fabric B, run the following commands:

```
zone name Infra-SVM-Fabric-B vsan <vsan-b-id>
member device-alias VM-Host-Infra-01-B init
member device-alias VM-Host-Infra-02-B init
member device-alias VM-Host-Infra-03-B init
member device-alias Infra-SVM-fcp-lif-01b target
member device-alias Infra-SVM-fcp-lif-02b target
```

```
exit
zoneset name Fabric-B vsan <vsan-b-id>
member Infra-SVM-Fabric-B
exit
zoneset activate name Fabric-B vsan <vsan-b-id>
exit
show zoneset active
copy r s
```

Switch Testing Commands

The following commands can be used to check for correct switch configuration:

> Some of these commands need to run after further configuration of the FlexPod components are complete to see complete results.

```
show run
show run int
show int
show int status
show int brief
show flogi database
show device-alias database
show zone
show zoneset
show zoneset active
```

FlexPod iSCSI Addition

Except for storage, the following sections describe the additional manual steps for building a FlexPod with iSCSI boot. The Cisco Nexus, Cisco UCS, and VMware Ansible scripts have a configure_iSCSI parameter that when set, completes the iSCSI configuration.

Cisco Nexus Switch Configuration

This section is a delta section for adding infrastructure iSCSI to the Cisco Nexus switches. This section should be executed after the Cisco Nexus Switch Configuration section in the main document is completed.

Create Infrastructure iSCSI VLANs on Cisco Nexus A and Cisco Nexus B

To create the necessary virtual local area networks (VLANs), follow this step on both switches:

1. From the global configuration mode, run the following commands:

```
config t
vlan <infra-iscsi-a-vlan-id>
```

```
name Infra-iSCSI-A-VLAN
vlan <infra-iscsi-b-vlan-id>
name Infra-iSCSI-B-VLAN
exit
```

Add Infrastructure iSCSI VLANs to Port-Channels on Cisco Nexus A and Cisco Nexus B

To create the necessary virtual local area networks (VLANs), follow this step on both switches:

1. From the global configuration mode, run the following commands:

```
port-profile type port-channel vPC-Peer-Link
switchport trunk allowed vlan add <infra-iscsi-a-vlan-id>,<infra-iscsi-b-vlan-id>
exit
port-profile type port-channel FP-ONTAP-Storage
switchport trunk allowed vlan add <infra-iscsi-a-vlan-id>,<infra-iscsi-b-vlan-id>
exit
port-profile type port-channel FP-UCS
switchport trunk allowed vlan add <infra-iscsi-a-vlan-id>,<infra-iscsi-b-vlan-id>
exit
copy run start
```

NetApp Storage Configuration – Part 1

You can use Ansible scripts to configure the iSCSI protocol for the storage configurations.

To configure the storage, follow these steps:

1. Edit the following variable files to ensure proper ONTAP Storage variables are entered:
   - FlexPod-M6/FlexPod-UCSM-M6/inventory
   - FlexPod-M6/FlexPod-UCSM-M6/group_vars/all.yml
   - FlexPod-M6/FlexPod-UCSM-M6/group_vars/ontap
   - FlexPod-M6/FlexPod-UCSM-M6/vars/ontap_main.yml
     - under the #SVM specific variables > svm specs: > allowed protocols: iscsi
     - Update all the iscsi parameters
2. From /root/ FlexPod-M6/FlexPod-UCSM-M6, run the Setup_ONTAP.yml Ansible playbook:

```
ansible-playbook -i inventory Setup_ONTAP.yml -t ontap_config_part_1
```

Use the -vvv tag to see detailed execution output log.

If the iSCSI license was not installed during the cluster configuration, make sure to install the license before creating the iSCSI service.

Create Block Protocol (iSCSI) Service

To create the block protocol iSCSI service, follow these steps:

If the FCP protocol is not being used in the environment it should be removed from the vserver configured in a previous step. If FCP will be used in addition to iSCSI or in the future, step 1 can be omitted.

1. Remove FCP protocol from the vserver:

```
vserver remove-protocols -vserver <infra-data-svm> -protocols fcp
```

2. Enable the iSCSI protocol on the vserver:

```
vserver add-protocols -vserver <infra-data-svm>  -protocols iscsi
```

3. Create the iSCSI block service:

```
vserver iscsi create -vserver <infra-data-svm>
vserver iscsi show
```

Create iSCSI Broadcast Domains

To create the broadcast domains for each of the iSCSI VLANs, run the following commands:

```
network port broadcast-domain create -broadcast-domain Infra-iSCSI-A -mtu 9000
network port broadcast-domain create -broadcast-domain Infra-iSCSI-B -mtu 9000
```

Create iSCSI VLANs

To create iSCSI VLANs, follow these steps:

1. Modify the MTU size on the parent interface group hosting the iSCSI traffic using the following commands:

```
network port modify -node <st-node01> -port a0a -mtu 9000
network port modify -node <st-node02> -port a0a -mtu 9000
```

2. Create VLAN ports for the iSCSI LIFs on each storage controller:

```
network port vlan create -node <st-node01> -vlan-name a0a-<infra-iscsi-a-vlan-id>
network port vlan create -node <st-node01> -vlan-name a0a-<infra-iscsi-b-vlan-id>

network port vlan create -node <st-node02> -vlan-name a0a-<infra-iscsi-a-vlan-id>
network port vlan create -node <st-node02> -vlan-name a0a-<infra-iscsi-b-vlan-id>
```

Add VLANs to iSCSI Broadcast Domains

To add each of the iSCSI VLAN ports to the corresponding broadcast domain, run the following commands:

```
network port broadcast-domain add-ports -broadcast-domain Infra-iSCSI-A -ports <st-node01>:a0a-<infra-iscsi-a-vlan-id>

network port broadcast-domain add-ports -broadcast-domain Infra-iSCSI-B -ports <st-node01>:a0a-<infra-iscsi-b-vlan-id>

network port broadcast-domain add-ports -broadcast-domain Infra-iSCSI-A -ports <st-node02>:a0a-<infra-iscsi-a-vlan-id>

network port broadcast-domain add-ports -broadcast-domain Infra-iSCSI-B -ports <st-node02>:a0a-<infra-iscsi-b-vlan-id>

network port broadcast-domain show
```

Create iSCSI LIFs

To create four iSCSI LIFs, run the following commands (two on each node):

```
network interface create -vserver <infra-data-svm> -lif iscsi-lif-01a -role data -data-protocol iscsi -home-node <st-node01> -home-port a0a-<infra-iscsi-a-vlan-id> -address <st-node01-infra-iscsi-a-ip> -netmask <infra-iscsi-a-mask> -status-admin up

network interface create -vserver <infra-data-svm> -lif iscsi-lif-01b -role data -data-protocol iscsi -home-node <st-node01> -home-port a0a-<infra-iscsi-b-vlan-id> -address <st-node01-infra-iscsi-b-ip> -netmask <infra-iscsi-b-mask> -status-admin up

network interface create -vserver <infra-data-svm> -lif iscsi-lif-02a -role data -data-protocol iscsi -home-node <st-node02> -home-port a0a-<infra-iscsi-a-vlan-id> -address <st-node02-infra-iscsi-a-ip> -netmask <infra-iscsi-a-mask> -status-admin up

network interface create -vserver <infra-data-svm> -lif iscsi-lif-02b -role data -data-protocol iscsi -home-node <st-node02> -home-port a0a-<infra-iscsi-b-vlan-id> -address <st-node02-infra-iscsi-b-ip> -netmask <infra-iscsi-b-mask> -status-admin up

network interface show
```

Cisco UCS iSCSI Configuration

The following sections can be completed to add infrastructure iSCSI to the Cisco UCS. These section can be completed in place of the sections found in Cisco UCS Configuration labeled (FCP), or they can be completed in addition to the FCP sections to have the option of FCP or iSCSI boot.

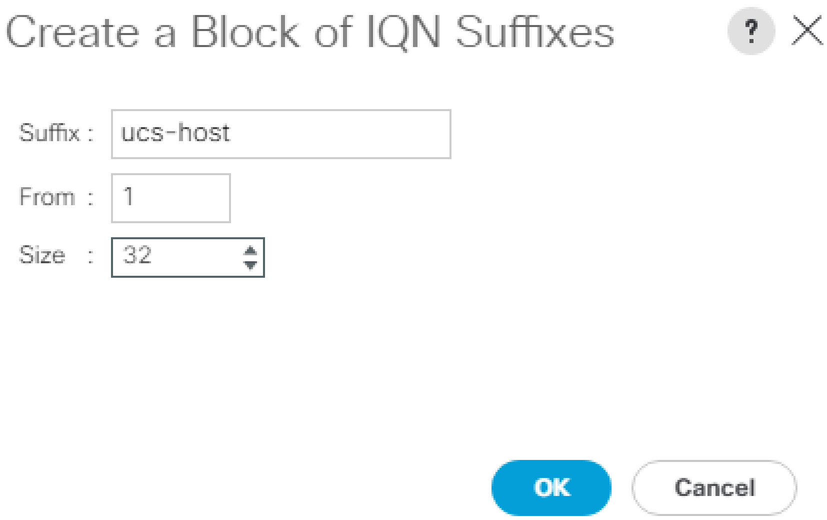
Create IQN Pools for iSCSI Boot

To configure the necessary IQN pools for the Cisco UCS environment, follow these steps:

1. In Cisco UCS Manager, click SAN.
2. Expand Pools > root.
3. Right-click IQN Pools.
4. Choose Create IQN Suffix Pool to create the IQN pool.
5. Enter IQN-Pool for the name of the IQN pool.
6. Optional: Enter a description for the IQN pool.
7. Enter iqn.2010-11.com.flexpod as the prefix.
8. Choose Sequential for Assignment Order.
9. Click Next.
10. Click Add.
11. Enter ucs-host as the suffix.

If multiple Cisco UCS domains are being used, a more specific IQN suffix may need to be used.

12. Enter 1 in the From field.
13. Specify the size of the IQN block sufficient to support the available server resources.



Suffix : ucs-host

From : 1

Size : 32

14. Click OK.

15. Click Finish and OK to complete creating the IQN pool.

Create IP Pools for iSCSI Boot

To configure the necessary IP pools for iSCSI boot for the Cisco UCS environment, follow these steps:

> The IP Pools for iSCSI Boot are created here in the root organization, assuming that all UCS servers will be booted from the NetApp Infrastructure SVM. If servers will be booted from tenant SVMs with UCS tenant organizations, consider creating the IP Pools for iSCSI Boot in the tenant organization.

1. In Cisco UCS Manager, click LAN.

2. Expand Pools > root.

3. Right-click IP Pools.

4. Choose Create IP Pool.

5. Enter iSCSI-IP-Pool-A as the name of IP pool.

6. Optional: Enter a description for the IP pool.

7. Choose Sequential for the assignment order.

8. Click Next.

9. Click Add to add a block of IP addresses.

10. In the From field, enter the beginning of the range to assign as iSCSI boot IP addresses on Fabric A.

11. Set the size to enough addresses to accommodate the servers.

12. Enter the appropriate Subnet Mask.

13. Click OK.

14. Click Next.

15. Click Finish and OK to complete creating the Fabric A iSCSI IP Pool.

16. Right-click IP Pools.

17. Choose Create IP Pool.

18. Enter iSCSI-IP-Pool-B as the name of IP pool.

19. Optional: Enter a description for the IP pool.

20. Choose Sequential for the assignment order.

21. Click Next.

22. Click Add to add a block of IP addresses.

23. In the From field, enter the beginning of the range to assign as iSCSI IP addresses on Fabric B.

24. Set the size to enough addresses to accommodate the servers.

25. Enter the appropriate Subnet Mask.

26. Click OK.

27. Click Next.

28. Click Finish and OK to complete creating the Fabric B iSCSI IP Pool.

Create iSCSI VLANs

To configure the necessary iSCSI virtual local area networks (VLANs) for the Cisco UCS environment, follow these steps:

1. In Cisco UCS Manager, click LAN.

2. Expand LAN > LAN Cloud.

3. Right-click VLANs.

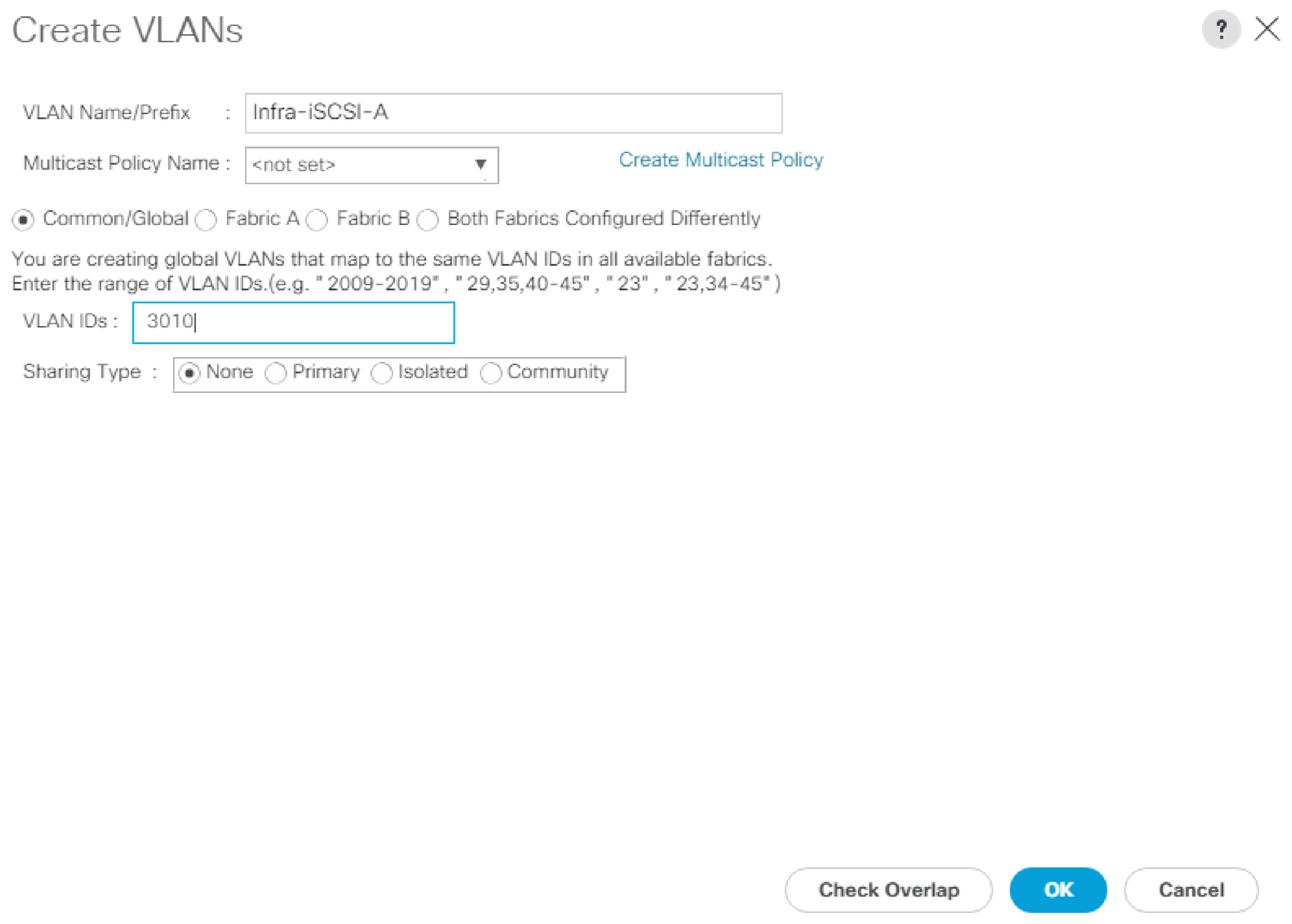
4. Choose Create VLANs.

5. Enter Infra-iSCSI-A as the name of the VLAN to be used for iSCSI-A.

6. Keep the Common/Global option selected for the scope of the VLAN.

7. Enter the Infra-iSCSI-A VLAN ID.

8. Keep the Sharing Type as None.



Create VLANs

VLAN Name/Prefix : Infra-iSCSI-A

Multicast Policy Name : <not set>

● 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 : 3010

Sharing Type : ● None ○ Primary ○ Isolated ○ Community

9. Click OK and then click OK again.

10. Right-click VLANs.

11. Choose Create VLANs.

12. Enter Infra-iSCSI-B as the name of the VLAN to be used for iSCSI-B.

13. Keep the Common/Global option selected for the scope of the VLAN.

14. Enter the iSCSI-B VLAN ID.

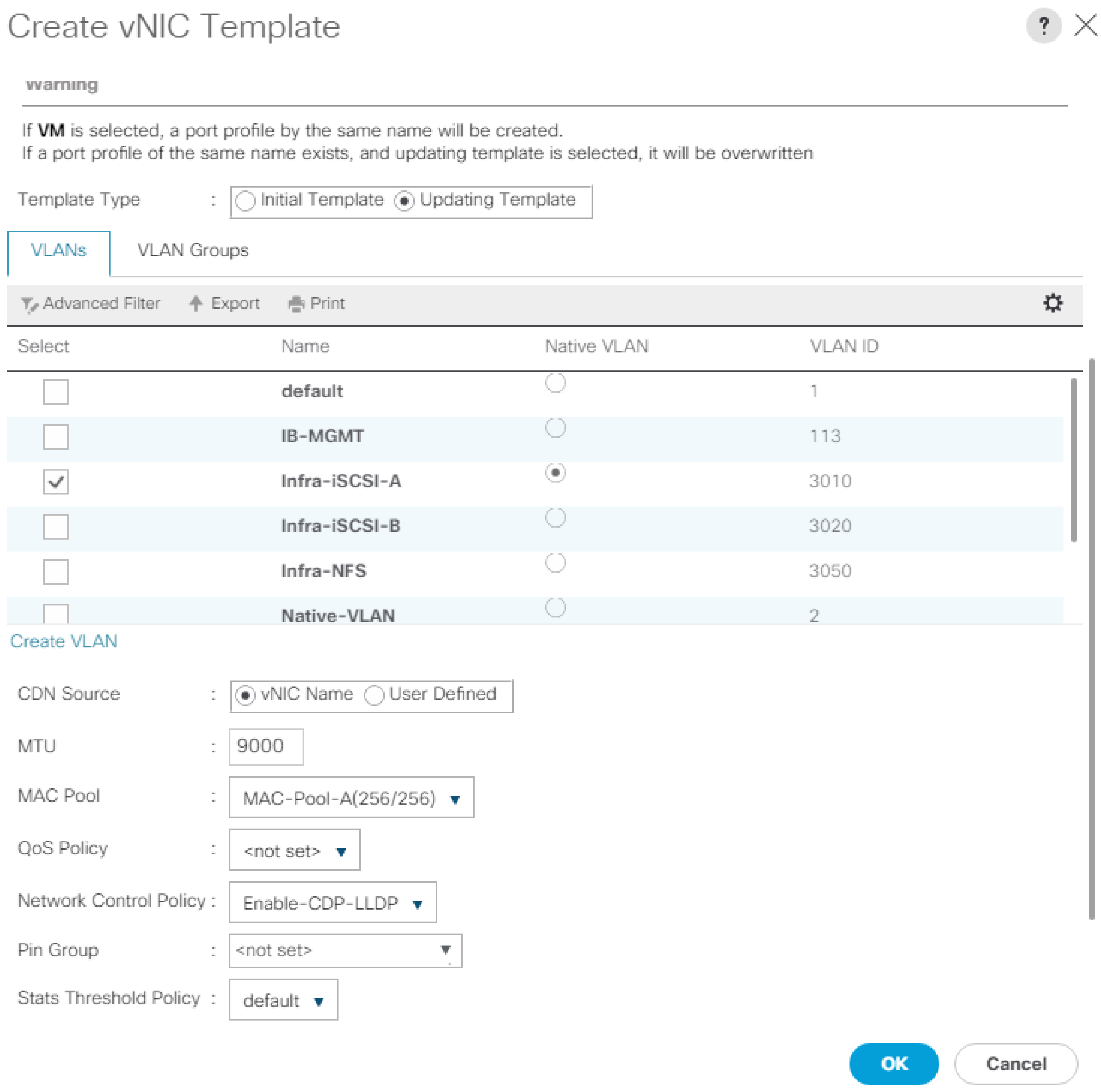
15. Keep the Sharing Type as None.

16. Click OK and then click OK again.

Create iSCSI vNIC Templates

To create iSCSI virtual network interface card (vNIC) templates for the Cisco UCS environment within the FlexPod Organization, follow these steps:

1. Choose LAN.
2. Expand Policies > root > Sub-Organizations > FlexPod Organization.
3. Right-click vNIC Templates under the FlexPod Organization.
4. Choose Create vNIC Template.
5. Enter iSCSI-A as the vNIC template name.
6. Choose Fabric A. Do not choose the Enable Failover checkbox.
7. Leave Redundancy Type set at No Redundancy.
8. Under Target, make sure that only the Adapter checkbox is selected.
9. Choose Updating Template for Template Type.
10. Under VLANs, choose only Infra-iSCSI-A.
11. Choose Infra-iSCSI-A as the native VLAN.
12. Leave vNIC Name set for the CDN Source.
13. Under MTU, enter 9000.
14. From the MAC Pool list, choose MAC-Pool-A.
15. From the Network Control Policy list, choose Enable-CDP-LLDP.



Create vNIC Template

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 | VLAN Groups

Select	Name	Native VLAN	VLAN ID
□	**default**	○	1
□	**IB-MGMT**	○	113
☑	**Infra-iSCSI-A**	●	3010
□	**Infra-iSCSI-B**	○	3020
□	**Infra-NFS**	○	3050
□	**Native-VLAN**	○	2

CDN Source : ● vNIC Name ○ User Defined

MTU : 9000

MAC Pool : MAC-Pool-A(256/256)

QoS Policy : <not set>

Network Control Policy : Enable-CDP-LLDP

Pin Group : <not set>

Stats Threshold Policy : default

16. Click OK to complete creating the vNIC template.

17. Click OK.

18. Right-click vNIC Templates.

19. Choose Create vNIC Template.

20. Enter iSCSI-B as the vNIC template name.

21. Choose Fabric B. Do not choose the Enable Failover checkbox.

22. Leave Redundancy Type set at No Redundancy.

23. Under Target, make sure that only the Adapter checkbox is selected.

24. Choose Updating Template for Template Type.

25. Under VLANs, choose only Infra-iSCSI-B.

26. Choose Infra-iSCSI-B as the native VLAN.

27. Leave vNIC Name set for the CDN Source.

28. Under MTU, enter 9000.

29. From the MAC Pool list, choose MAC-Pool-B.

30. From the Network Control Policy list, choose Enable-CDP-LLDP.

31. Click OK to complete creating the vNIC template.

32. Click OK.

Create LAN Connectivity Policy for iSCSI Boot

To configure the necessary Infrastructure LAN Connectivity Policy within the FlexPod Organization, follow these steps:

1. In Cisco UCS Manager, click LAN.

2. Expand LAN > Policies > root > Sub-Organizations > FlexPod Organization.

3. Right-click LAN Connectivity Policies under the FlexPod Organization.

4. Choose Create LAN Connectivity Policy.

5. Enter iSCSI-Boot as the name of the policy.

6. Click OK then OK again to create the policy.

7. On the left under LAN > Policies > root > Sub-Organizations > FlexPod Organization > LAN Connectivity Policies, choose iSCSI-Boot.

8. Click Add to add a vNIC.

9. In the Create vNIC dialog box, enter 00-vSwitch0-A as the name of the vNIC.

10. Check the box for Use vNIC Template.

11. In the vNIC Template list, choose vSwitch0-A.

12. In the Adapter Policy list, choose VMWare.

13. Click OK to add this vNIC to the policy.

14. Click Save Changes and OK.

15. Click Add to add another vNIC to the policy.

16. In the Create vNIC box, enter 01-vSwitch0-B as the name of the vNIC.

17. Check the box for Use vNIC Template.

18. In the vNIC Template list, choose vSwitch0-B.

19. In the Adapter Policy list, choose VMWare.

20. Click OK to add the vNIC to the policy.

21. Click Save Changes and OK.

22. Click Add to add a vNIC.

23. In the Create vNIC dialog box, enter 02-vDS0-A as the name of the vNIC.

24. Check the box for Use vNIC Template.

25. In the vNIC Template list, choose vDS0-A.

26. In the Adapter Policy list, choose VMWare-HighTrf.

27. Click OK to add this vNIC to the policy.

28. Click Save Changes and OK.

29. Click Add to add another vNIC to the policy.

30. In the Create vNIC box, enter 03-vDS0-B as the name of the vNIC.

31. Check the box for Use vNIC Template.

32. In the vNIC Template list, choose vDS0-B.

33. In the Adapter Policy list, choose VMWare-HighTrf.

34. Click OK to add the vNIC to the policy.

35. Click Save Changes and OK.

36. Click Add to add a vNIC.

37. In the Create vNIC dialog box, enter 04-iSCSI-A as the name of the vNIC.

38. Check the box for Use vNIC Template.

39. In the vNIC Template list, choose iSCSI-A.

40. In the Adapter Policy list, choose VMWare.

41. Click OK to add this vNIC to the policy.

42. Click Save Changes and OK.

43. Click Add to add a vNIC to the policy.

44. In the Create vNIC dialog box, enter 05-iSCSI-B as the name of the vNIC.

45. Check the box for Use vNIC Template.

46. In the vNIC Template list, choose iSCSI-B.

47. In the Adapter Policy list, choose VMWare.

48. Click OK to add this vNIC to the policy.

49. Click Save Changes and OK.

50. Expand Add iSCSI vNICs.

51. Choose Add in the Add iSCSI vNICs section.

52. Set the name to iSCSI-Boot-A.

53. Choose 04-iSCSI-A as the Overlay vNIC.

54. Set the iSCSI Adapter Policy to default.

55. Leave the VLAN set to Infra-iSCSI-A (native).

56. Leave the MAC Address set to None.

57. Click OK.

58. Click Save Changes and OK.

59. Choose Add in the Add iSCSI vNICs section.

60. Set the name to iSCSI-Boot-B.

61. Choose 05-iSCSI-B as the Overlay vNIC.

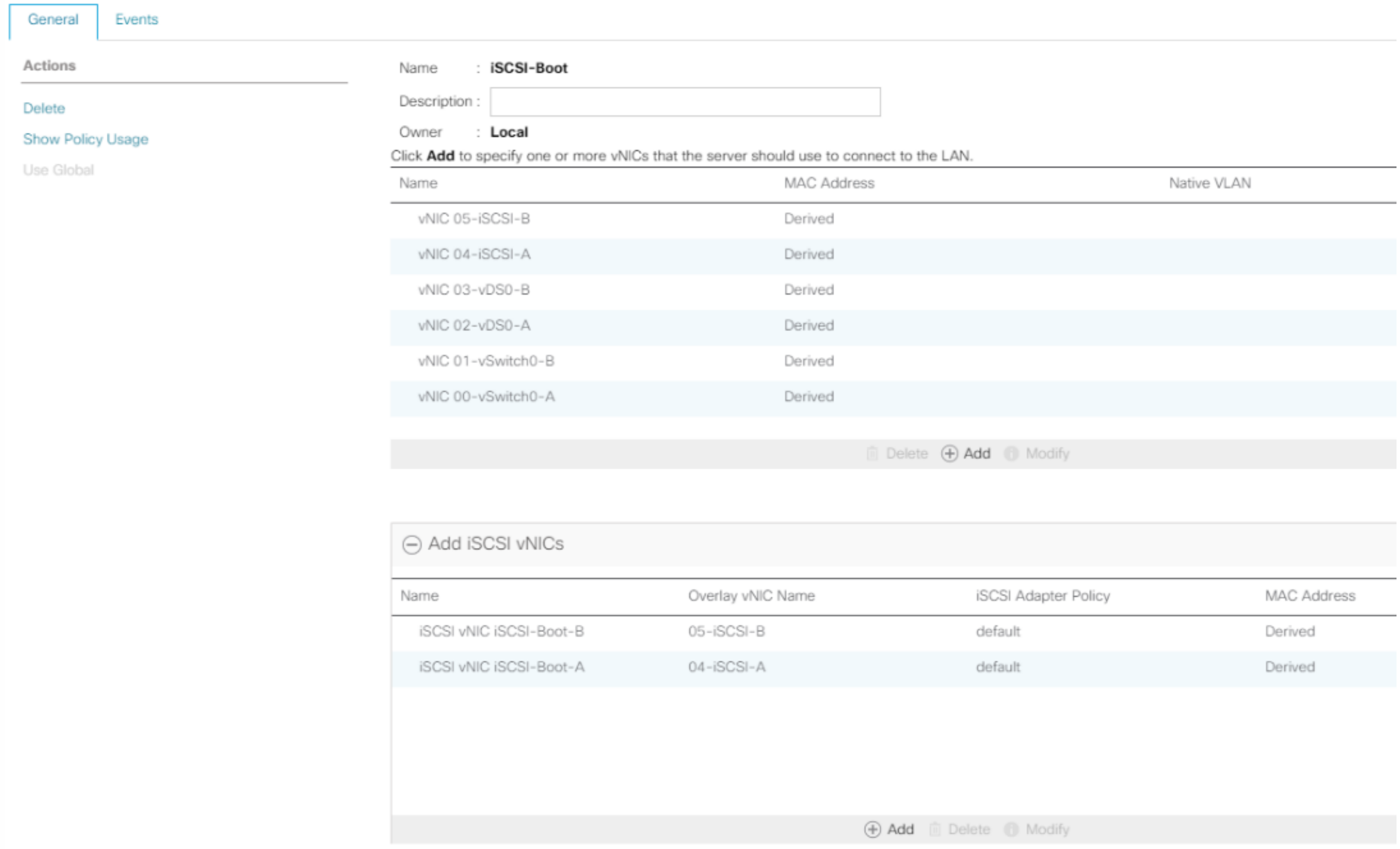
62. Set the iSCSI Adapter Policy to default.

63. Leave the VLAN set to Infra-iSCSI-B (native).

64. Leave the MAC Address set to None.

65. Click OK.

66. Click Save Changes and then click OK.



Name : iSCSI-Boot
Description :
Owner : Local

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

Name	MAC Address	Native VLAN
vNIC 05-iSCSI-B	Derived	
vNIC 04-iSCSI-A	Derived	
vNIC 03-vDS0-B	Derived	
vNIC 02-vDS0-A	Derived	
vNIC 01-vSwitch0-B	Derived	
vNIC 00-vSwitch0-A	Derived	

Add iSCSI vNICs

Name	Overlay vNIC Name	iSCSI Adapter Policy	MAC Address
iSCSI vNIC iSCSI-Boot-B	05-iSCSI-B	default	Derived
iSCSI vNIC iSCSI-Boot-A	04-iSCSI-A	default	Derived

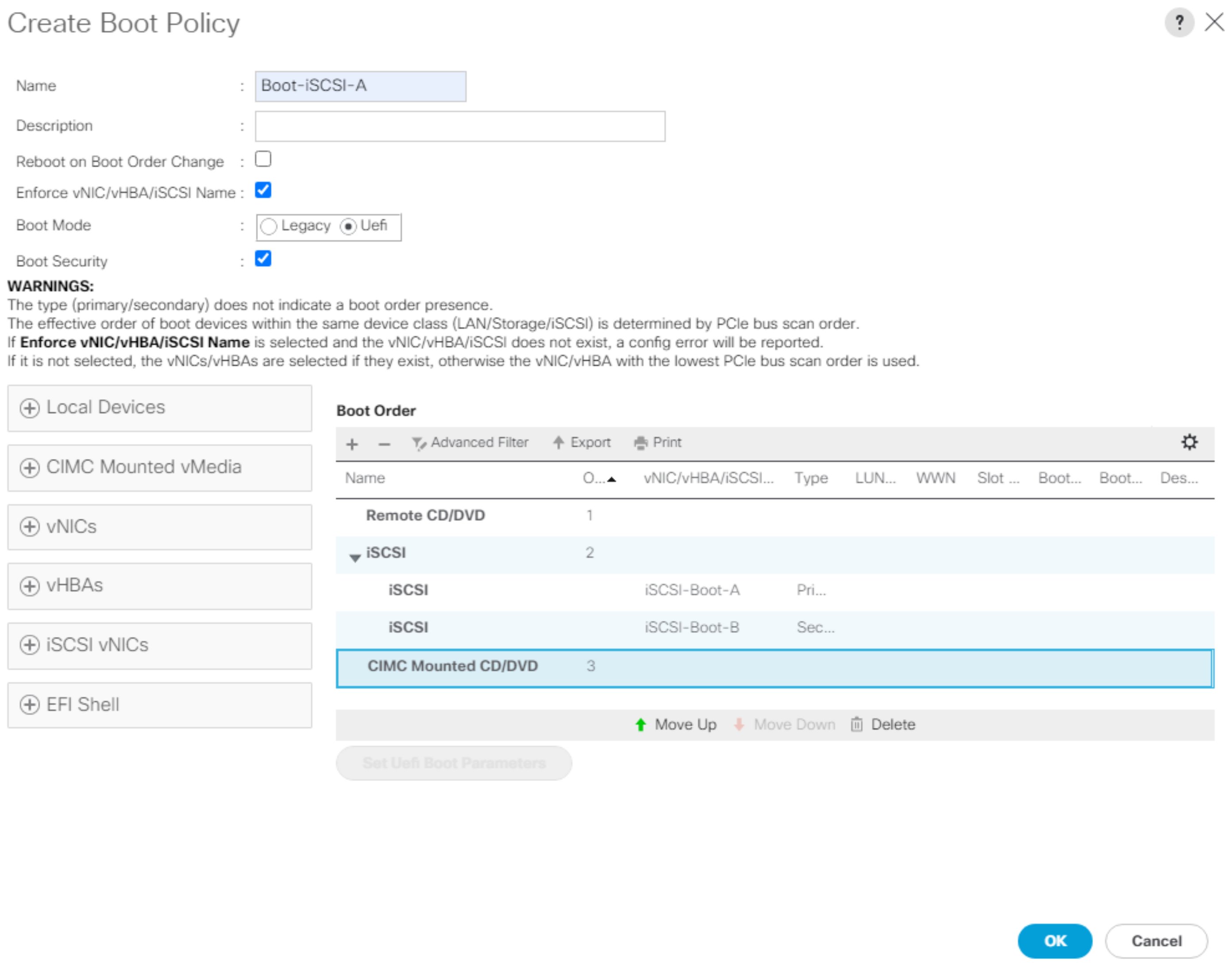
Create iSCSI Boot Policy

This procedure applies to a Cisco UCS environment in which two iSCSI logical interfaces (LIFs) are on cluster node 1 (iscsi-lif-01a and iscsi-lif-01b) and two iSCSI LIFs are on cluster node 2 (iscsi-lif-02a and iscsi-lif-02b). Also, it is assumed that the A LIFs are in the iSCSI-A VLAN and the B LIFs are in the iSCSI-B VLAN.

One boot policy is configured in this procedure. The policy configures the primary target to be iscsi-lif01a.

To create a boot policy for the Cisco UCS environment within the FlexPod Organization, follow these steps:

1. In Cisco UCS Manager, click Servers.
2. Expand Policies > root > Sub-Organizations > FlexPod Organization.
3. Right-click Boot Policies under the FlexPod Organization.
4. Choose Create Boot Policy.
5. Enter Boot-iSCSI-A as the name of the boot policy.
6. Optional: Enter a description for the boot policy.
7. Do not choose the Reboot on Boot Order Change checkbox.
8. Choose the Uefi Boot Mode.
9. Check the box for Boot Security.
10. Expand the Local Devices drop-down menu and click Add Remote CD/DVD.
11. Expand the iSCSI vNICs drop-down menu and click Add iSCSI Boot.
12. In the Add iSCSI Boot dialog box, enter iSCSI-Boot-A.
13. Click OK.
14. Choose Add iSCSI Boot.
15. In the Add iSCSI Boot dialog box, enter iSCSI-Boot-B.
16. Click OK.
17. Expand CIMC Mounted Media and select Add CIMC Mounted CD/DVD.



Create Boot Policy

Name : Boot-iSCSI-A

Description :

Reboot on Boot Order Change : □

Enforce vNIC/vHBA/iSCSI Name : ☑

Boot Mode : ○ Legacy ● Uefi

Boot Security : ☑

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 are selected if they exist, otherwise the vNIC/vHBA with the lowest PCIe bus scan order is used.

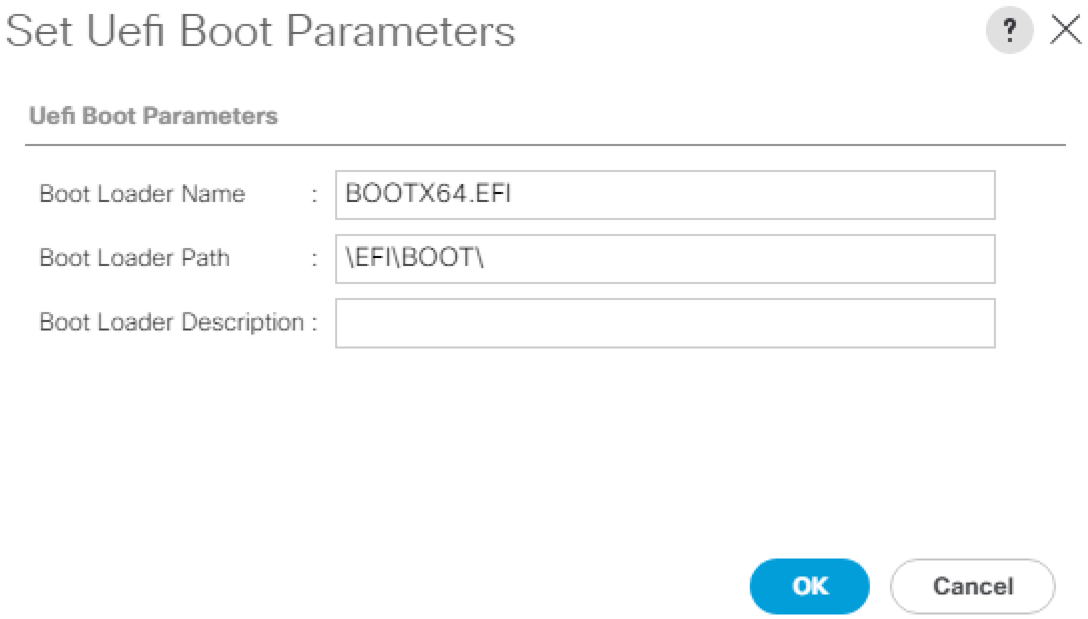
Boot Order

Name	O...	vNIC/vHBA/iSCSI...	Type	LUN...	WWN	Slot ...	Boot...	Boot...	Des...
Remote CD/DVD	1								
iSCSI	2								
iSCSI		iSCSI-Boot-A	Pri...						
iSCSI		iSCSI-Boot-B	Sec...						
CIMC Mounted CD/DVD	3								

18. Expand iSCSI and select iSCSI-Boot-A. Select Set Uefi Boot Parameters.

For Cisco UCS M5 and M6 servers it is not necessary to set the Uefi Boot Parameters. These servers will boot properly with or without these parameters set. However, for Cisco UCS M4 and earlier servers, VMware ESXi 7.0 will not boot with Uefi Secure Boot unless these parameters are set exactly as shown.

19. Fill in the Set Uefi Boot Parameters exactly as shown in the following screenshot:



Boot Loader Name : BOOTX64.EFI

Boot Loader Path : \EFI\BOOT\

Boot Loader Description :

20. Click OK to complete setting the Uefi Boot Parameters for the SAN Boot Target and click OK for the confirmation.

21. Repeat steps 1 - 20 to set Uefi Boot Parameters for each of the 2 iSCSI Boot Targets.

22. Click OK then click OK again to create the policy.

Create iSCSI Boot Service Profile Template

In this procedure, one service profile template for Infrastructure ESXi hosts within the FlexPod Organization is created for Fabric A boot.

To create the service profile template, follow these steps:

1. In Cisco UCS Manager, click Servers.

2. Expand Service Profile Templates > root > Sub-Organizations > FlexPod Organization.

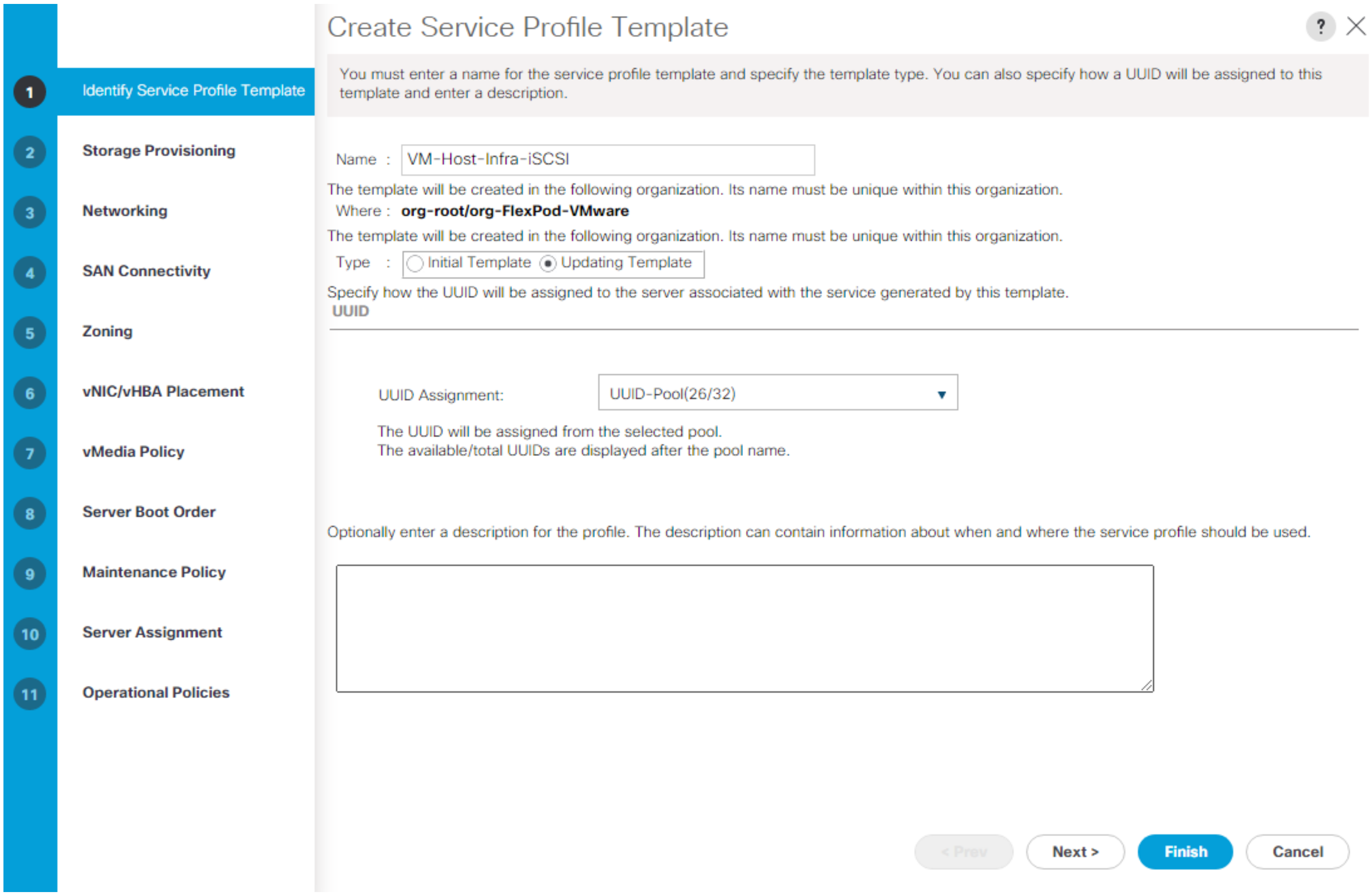
3. Right-click the FlexPod Organization.

4. Choose Create Service Profile Template to open the Create Service Profile Template wizard.

5. Enter VM-Host-Infra-iSCSI as the name of the service profile template.

6. Choose the Updating Template option.

7. Under UUID Assignment, choose UUID_Pool.



Create 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-iSCSI

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

Where : **org-root/org-FlexPod-VMware**

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: UUID-Pool(26/32)

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.

8. Click Next.

Configure Storage Provisioning

To configure the storage provisioning, follow these steps:

1. Click the Local Disk Configuration Policy tab and choose the IgnoreDisk Local Storage Policy.

2. Click Next.

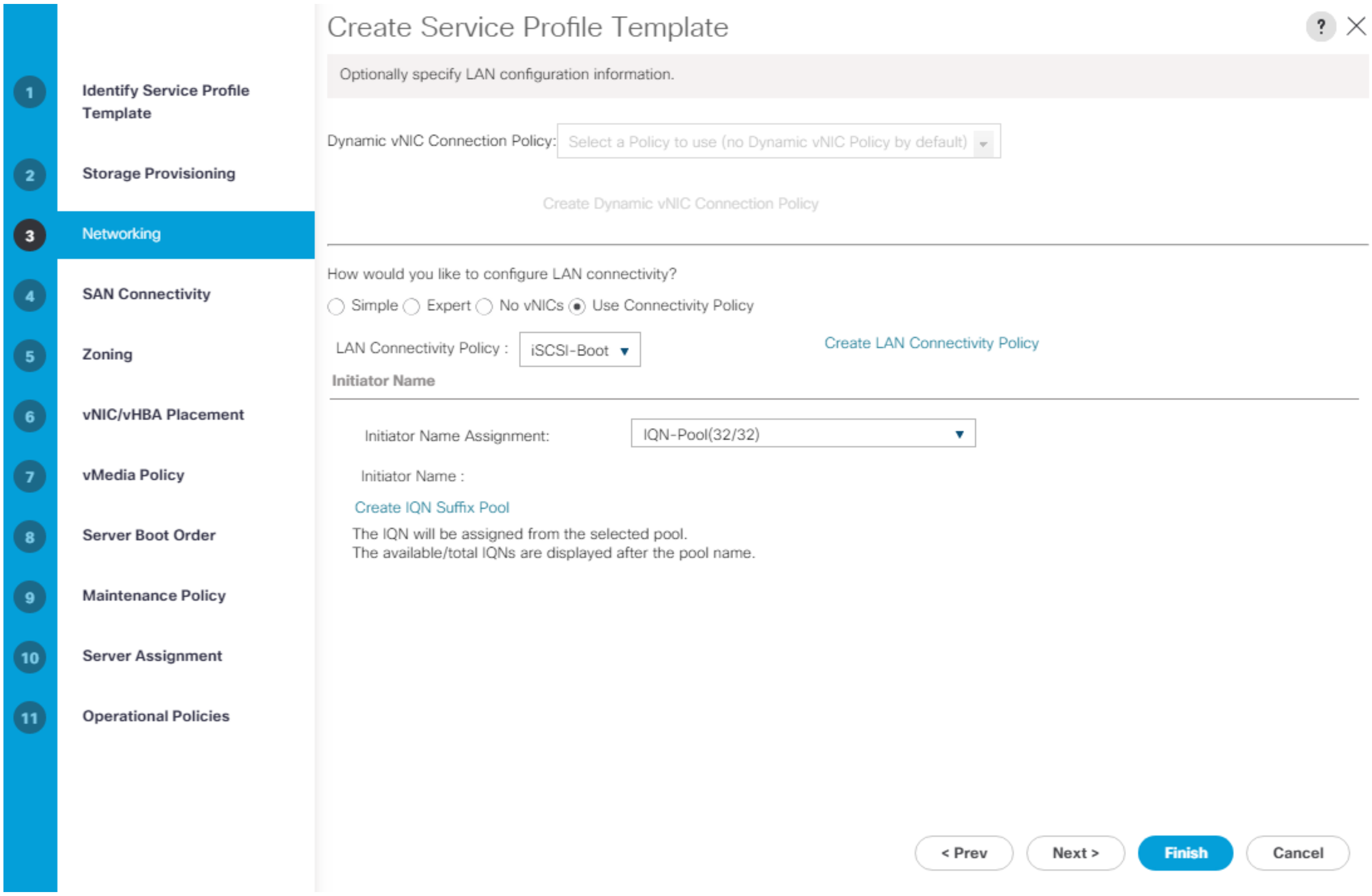
Configure Networking Options

To configure the network options, follow these steps:

1. Choose the “Use Connectivity Policy” option to configure the LAN connectivity.

2. Choose iSCSI-Boot from the LAN Connectivity Policy drop-down list.

3. Choose IQN_Pool in Initiator Name Assignment.



Create Service Profile Template

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 ● Use Connectivity Policy

LAN Connectivity Policy : iSCSI-Boot

Initiator Name

Initiator Name Assignment: IQN-Pool(32/32)

Initiator Name :

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

4. Click Next.

Configure Storage Options

To configure the storage options, follow these steps:

1. Choose No vHBAs for the “How would you like to configure SAN connectivity?” field.

2. Click Next.

Configure Zoning Options

To configure the zoning options, follow this step:

1. Make no changes and click Next.

Configure vNIC/HBA Placement

To configure the vNIC/HBA placement, follow these steps:

2. In the “Select Placement” list, leave the placement policy as “Let System Perform Placement”.

3. Click Next.

Configure vMedia Policy

To configure the vMedia policy, follow these steps:

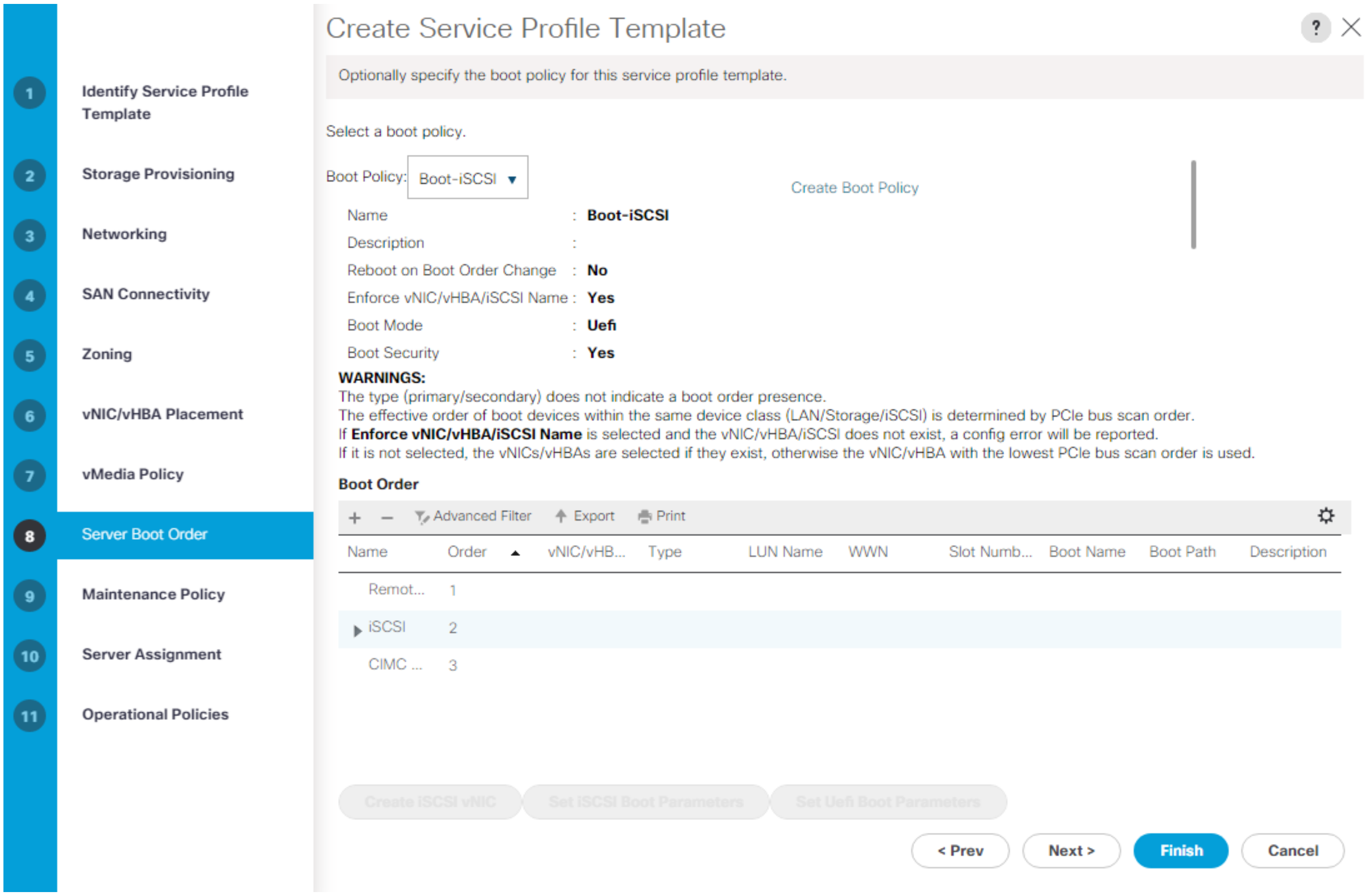
1. Do not select a vMedia Policy.

2. Click Next.

Configure Server Boot Order

To configure the server boot orders, follow these steps:

1. Choose Boot-iSCSI for Boot Policy.



Create Service Profile Template

Optionally specify the boot policy for this service profile template.

Select a boot policy.

Boot Policy: Boot-iSCSI ▼

Create Boot Policy

Name : **Boot-iSCSI**
Description :
Reboot on Boot Order Change : **No**
Enforce vNIC/vHBA/iSCSI Name : **Yes**
Boot Mode : **Uefi**
Boot Security : **Yes**

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 are selected if they exist, otherwise the vNIC/vHBA with the lowest PCIe bus scan order is used.

Boot Order

Name	Order ▲	vNIC/vHB...	Type	LUN Name	WWN	Slot Numb...	Boot Name	Boot Path	Description
Remot...	1								
▸ iSCSI	2								
CIMC ...	3								

2. In the Boot order, expand iSCSI and choose iSCSI-Boot-A.

3. Click Set iSCSI Boot Parameters.

4. In the Set iSCSI Boot Parameters pop-up, leave Authentication Profile to <not set> unless you have in-dependently created one appropriate to your environment.

5. Leave the “Initiator Name Assignment” dialog box <not set> to use the single Service Profile Initiator Name defined in the previous steps.

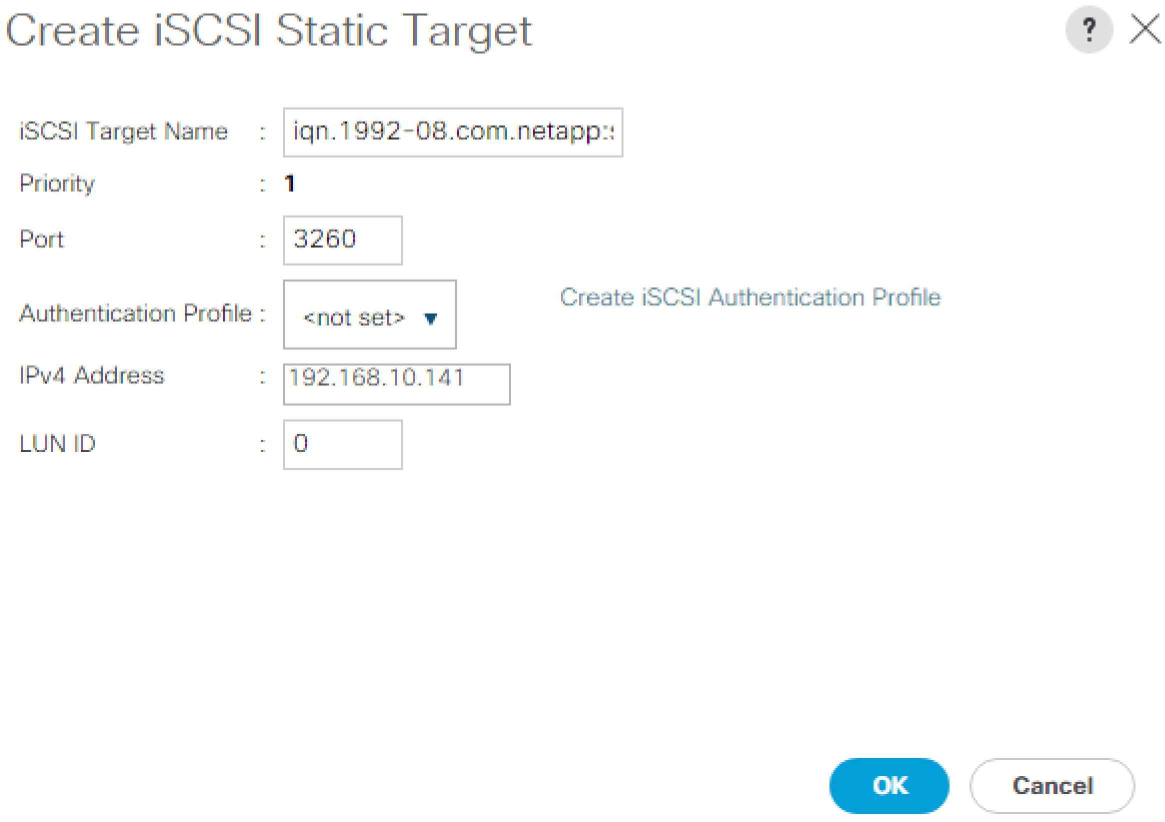
6. Set iSCSI-IP-Pool-A as the “Initiator IP address Policy.”

7. Choose iSCSI Static Target Interface option.

8. Click Add.

9. Enter the iSCSI Target Name. To get the iSCSI target name of Infra-SVM, log into the storage cluster management interface and run the “iscsi show” command”.

10. Enter the IP address of iscsi-lif-01a for the IPv4 Address field.



Create iSCSI Static Target

iSCSI Target Name : iqn.1992-08.com.netapp::

Priority : 1

Port : 3260

Authentication Profile : <not set>

IPv4 Address : 192.168.10.141

LUN ID : 0

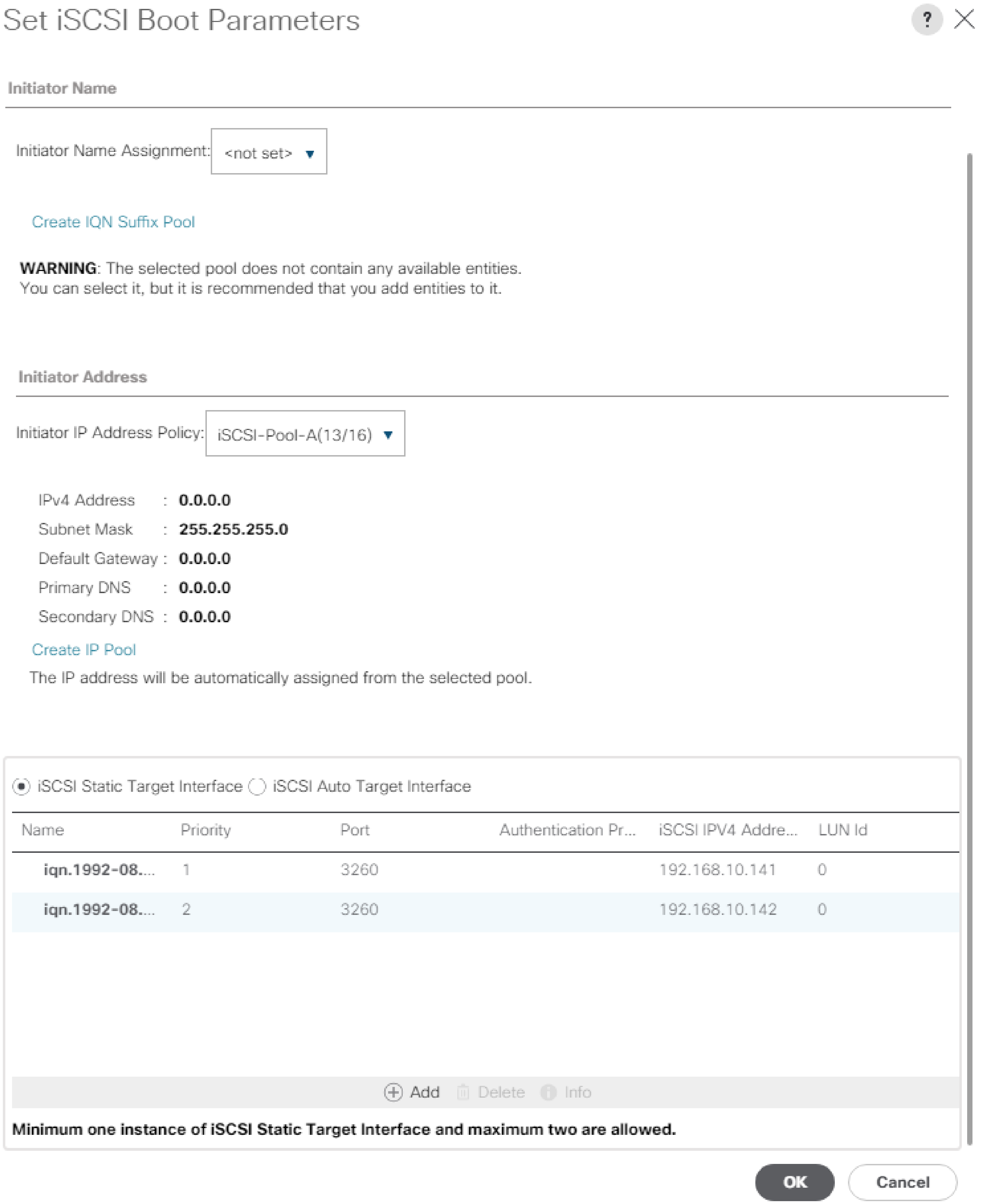
11. Click OK to add the iSCSI static target.

12. Click Add.

13. Enter the iSCSI Target Name.

14. Enter the IP address of iscsi-lif-02a for the IPv4 Address field.

15. Click OK to add the iSCSI static target.



Set iSCSI Boot Parameters

Initiator Name

Initiator Name Assignment: <not set>

Create IQN Suffix Pool

WARNING: The selected pool does not contain any available entities.
You can select it, but it is recommended that you add entities to it.

Initiator Address

Initiator IP Address Policy: iSCSI-Pool-A(13/16)

IPv4 Address	:	**0.0.0.0**
Subnet Mask	:	**255.255.255.0**
Default Gateway	:	**0.0.0.0**
Primary DNS	:	**0.0.0.0**
Secondary DNS	:	**0.0.0.0**

Create IP Pool

The IP address will be automatically assigned from the selected pool.

● iSCSI Static Target Interface ○ iSCSI Auto Target Interface

Name	Priority	Port	Authentication Pr...	iSCSI IPV4 Addre...	LUN Id
iqn.1992-08....	1	3260		192.168.10.141	0
iqn.1992-08....	2	3260		192.168.10.142	0

Minimum one instance of iSCSI Static Target Interface and maximum two are allowed.

16. Click OK to complete setting the iSCSI Boot Parameters.

17. In the Boot order, choose iSCSI-Boot-B.

18. Click Set iSCSI Boot Parameters.

19. In the Set iSCSI Boot Parameters pop-up, leave Authentication Profile to <not set> unless you have in-dependently created one appropriate to your environment.

20. Leave the “Initiator Name Assignment” dialog box <not set> to use the single Service Profile Initiator Name defined in the previous steps.

21. Set iSCSI-IP-Pool-B as the “Initiator IP address Policy”.

22. Choose the iSCSI Static Target Interface option.

23. Click Add.

24. Enter the iSCSI Target Name. To get the iSCSI target name of Infra-SVM, login into storage cluster management interface and run “iscsi show” command”.

25. Enter the IP address of iscsi-lif-01b for the IPv4 Address field.

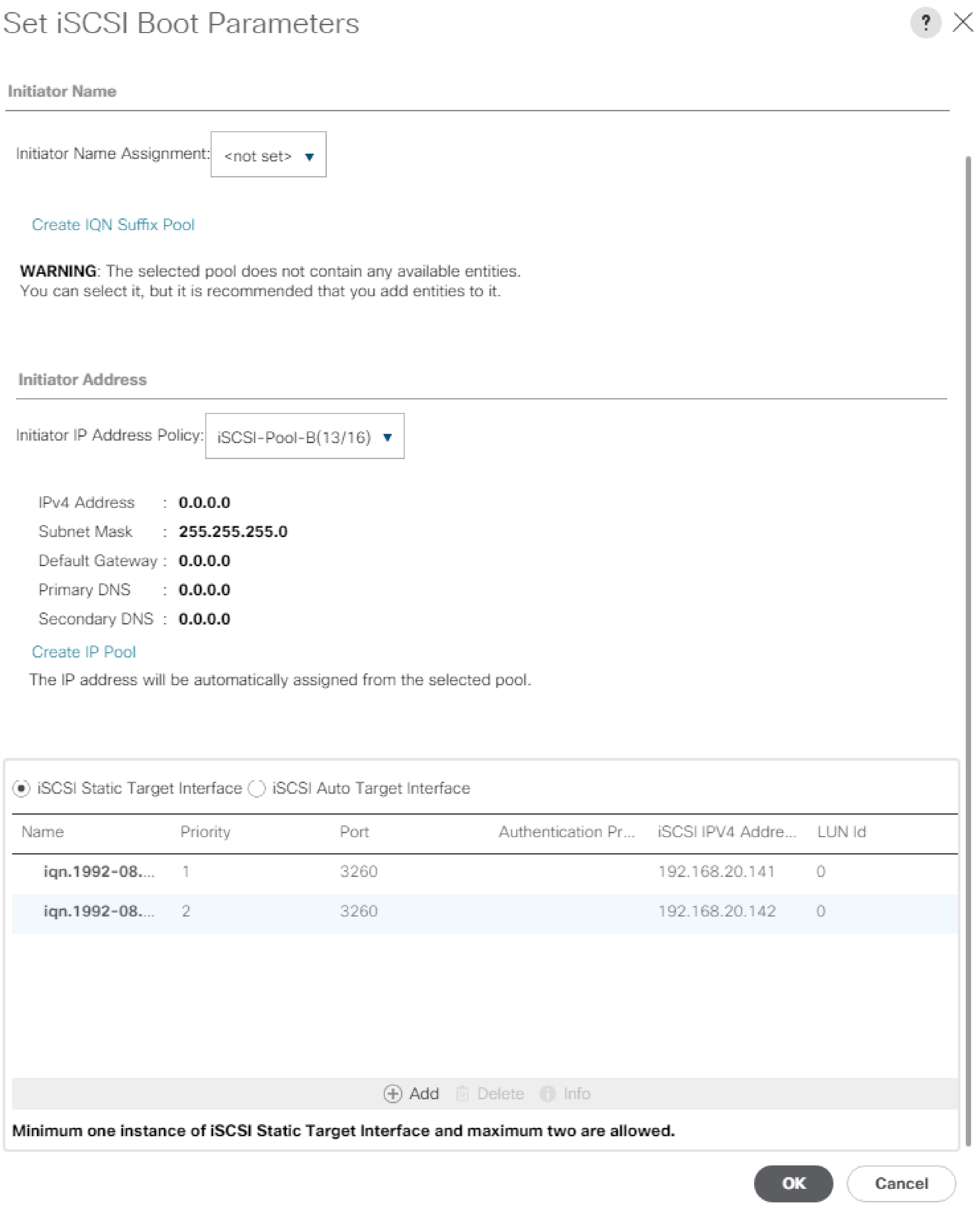
26. Click OK to add the iSCSI static target.

27. Click Add.

28. Enter the iSCSI Target Name.

29. Enter the IP address of iscsi-lif-02b for the IPv4 Address field.

30. Click OK to add the iSCSI static target.



Set iSCSI Boot Parameters

Initiator Name

Initiator Name Assignment: <not set> ▾

Create IQN Suffix Pool

WARNING: The selected pool does not contain any available entities.
You can select it, but it is recommended that you add entities to it.

Initiator Address

Initiator IP Address Policy: iSCSI-Pool-B(13/16) ▾

IPv4 Address	:	**0.0.0.0**
Subnet Mask	:	**255.255.255.0**
Default Gateway	:	**0.0.0.0**
Primary DNS	:	**0.0.0.0**
Secondary DNS	:	**0.0.0.0**

Create IP Pool

The IP address will be automatically assigned from the selected pool.

● iSCSI Static Target Interface ○ iSCSI Auto Target Interface

Name	Priority	Port	Authentication Pr...	iSCSI IPV4 Addre...	LUN Id
iqn.1992-08....	1	3260		192.168.20.141	0
iqn.1992-08....	2	3260		192.168.20.142	0

Minimum one instance of iSCSI Static Target Interface and maximum two are allowed.

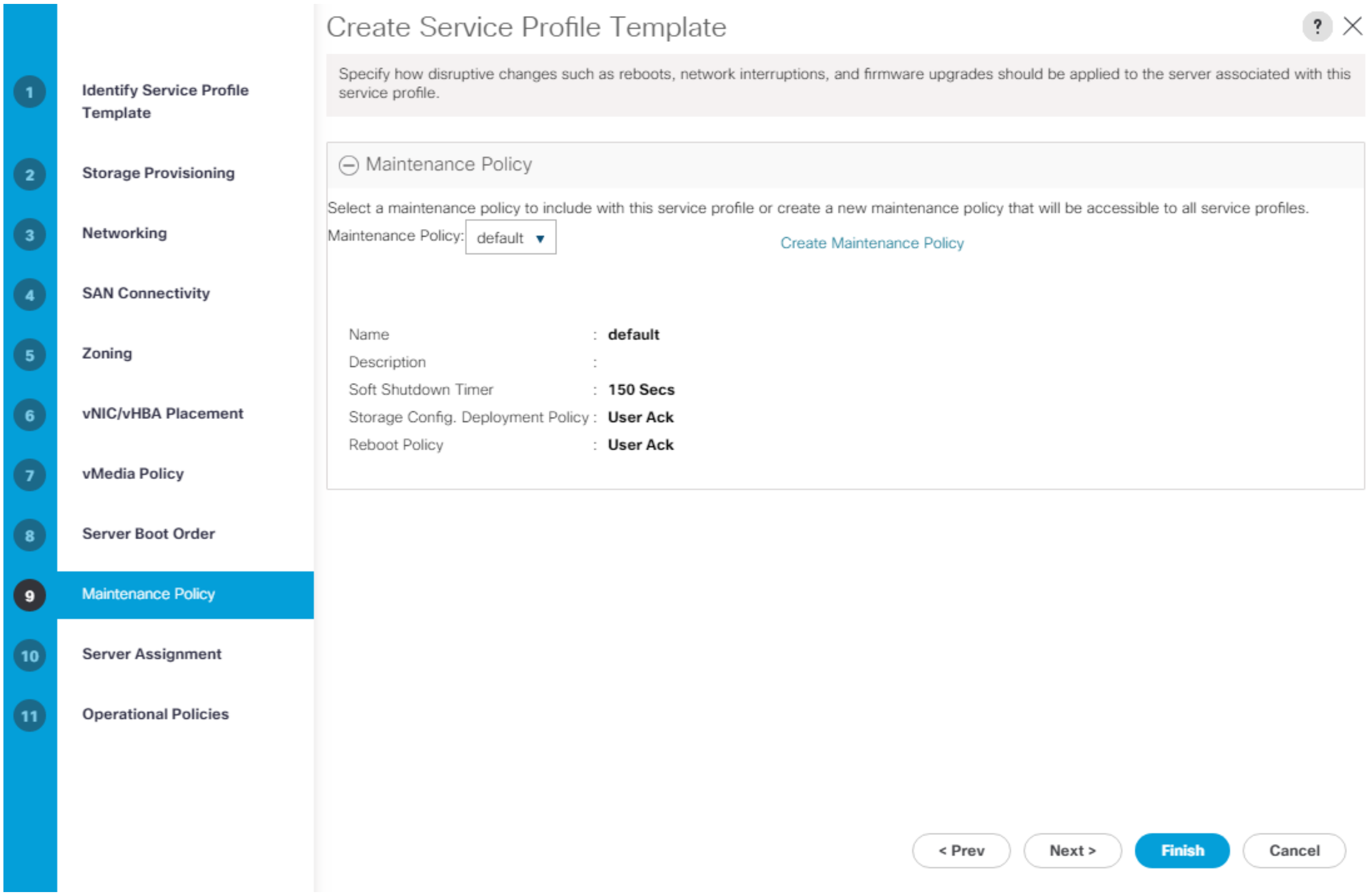
31. Click OK to complete setting the iSCSI Boot Parameters.

32. Click Next.

Configure Maintenance Policy

To configure the maintenance policy, follow these steps:

1. Change the Maintenance Policy to default.



Create Service Profile Template

Specify how disruptive changes such as reboots, network interruptions, and firmware upgrades should be applied to the server associated with this service profile.

Maintenance Policy

Select a maintenance policy to include with this service profile or create a new maintenance policy that will be accessible to all service profiles.

Maintenance Policy: default

Name	:	default
Description	:	
Soft Shutdown Timer	:	150 Secs
Storage Config. Deployment Policy	:	User Ack
Reboot Policy	:	User Ack

2. Click Next.

Configure Server Assignment

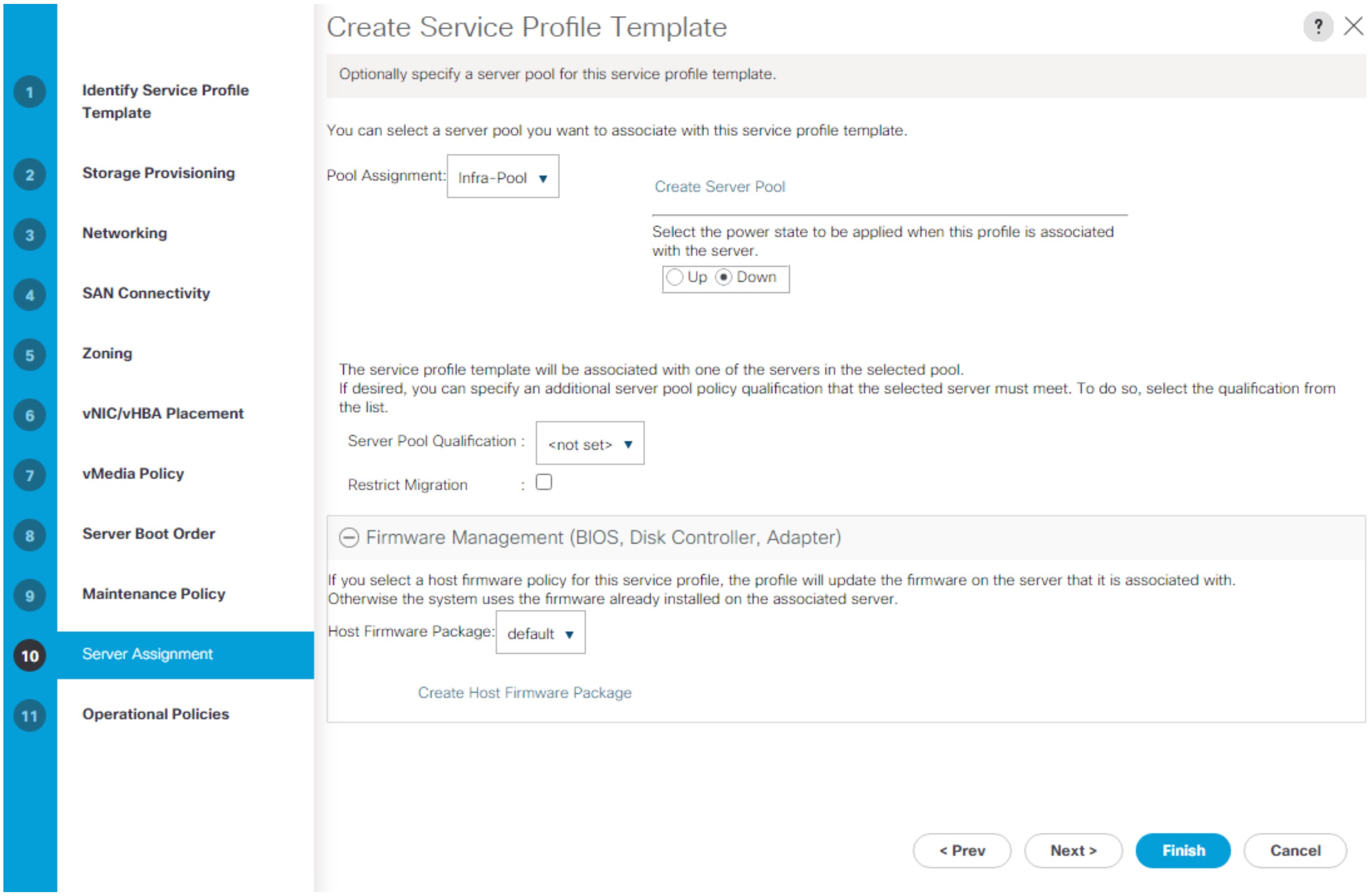
To configure server assignment, follow these steps:

1. In the Pool Assignment list, choose Infra-Pool.

2. Choose Down as the power state to be applied when the profile is associated with the server.

3. Optional: choose “UCS-B200M6” for the Server Pool Qualification to select only UCS B200M6 servers in the pool.

4. Expand Firmware Management at the bottom of the page and choose the default policy.



Create Service Profile Template

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: Infra-Pool

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 : <not set>

Restrict Migration : □

Firmware Management (BIOS, Disk Controller, Adapter)

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

Host Firmware Package: default

5. Click Next.

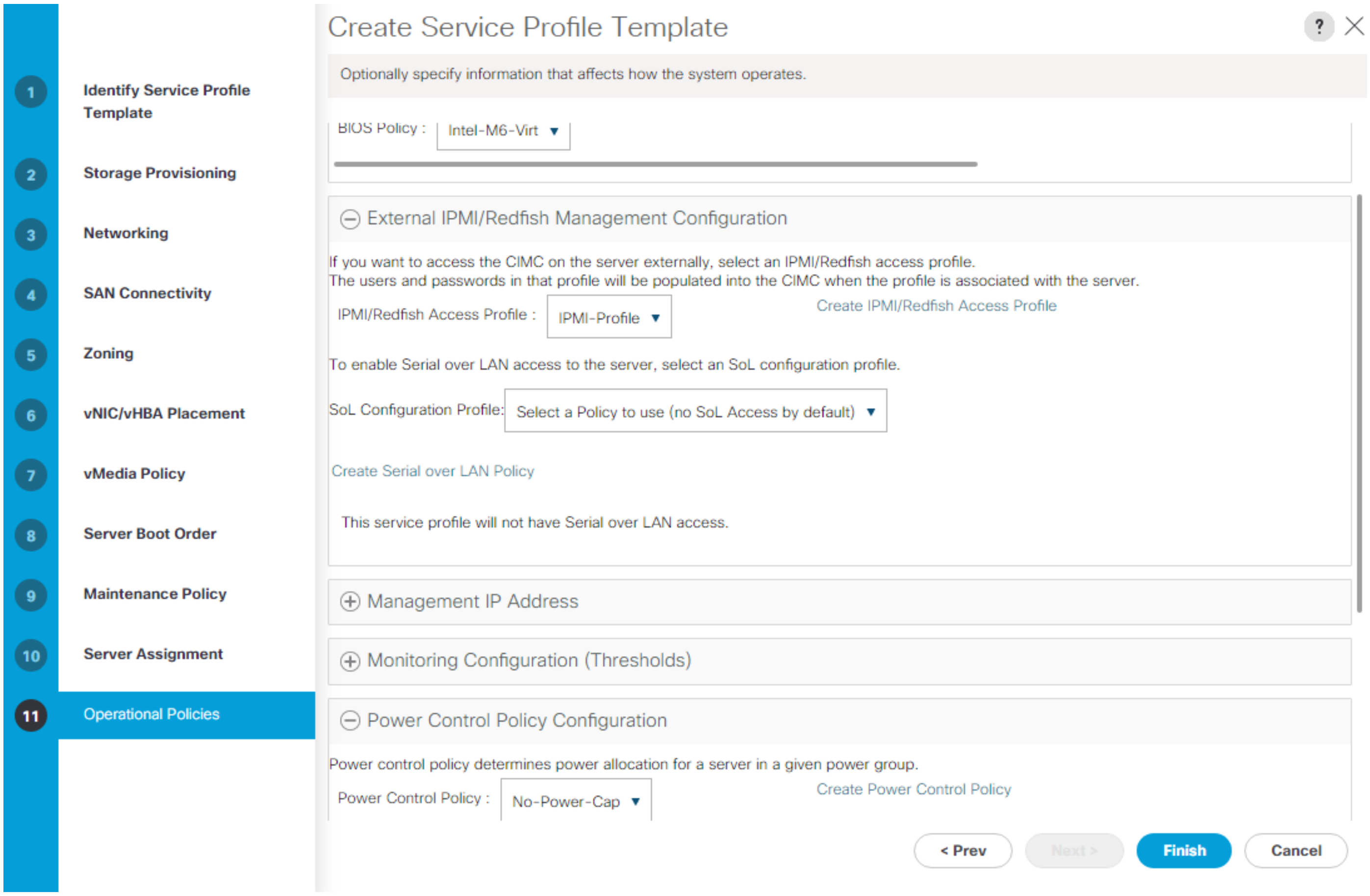
Configure Operational Policies

To configure the operational policies, follow these steps:

1. In the BIOS Policy list, choose the BIOS policy for the type of server that you have.

2. Expand External IPMI/Redfish Management Configuration and select IPMI-Profile for the IPMI/Redfish Access Profile.

3. Expand Power Control Policy Configuration and choose No-Power-Cap in the Power Control Policy list.



Create Service Profile Template

Optionally specify information that affects how the system operates.

BIOS Policy : Intel-M6-Virt ▾

⊖ External IPMI/Redfish Management Configuration

If you want to access the CIMC on the server externally, select an IPMI/Redfish access profile.
The users and passwords in that profile will be populated into the CIMC when the profile is associated with the server.

IPMI/Redfish Access Profile : IPMI-Profile ▾ Create IPMI/Redfish Access Profile

To enable Serial over LAN access to the server, select an SoL configuration profile.

SoL Configuration Profile: Select a Policy to use (no SoL Access by default) ▾

Create Serial over LAN Policy

This service profile will not have Serial over LAN access.

⊕ Management IP Address

⊕ Monitoring Configuration (Thresholds)

⊖ Power Control Policy Configuration

Power control policy determines power allocation for a server in a given power group.

Power Control Policy : No-Power-Cap ▾ Create Power Control Policy

4. Click Finish to create the service profile template.

5. Click OK in the confirmation message.

Create vMedia-Enabled Service Profile Template

To create a service profile template with vMedia enabled, follow these steps:

1. Connect to Cisco UCS Manager and click Servers.

2. Choose Service Profile Templates > root > Sub-Organizations > FlexPod Organization > Service Template VM-Host-Infra-iSCSI.

3. Right-click VM-Host-Infra-iSCSI and click Create a Clone.

4. Name the clone VM-Host-Infra-iSCSI-vM and click OK then click OK again to create the clone.

5. Choose the newly created VM-Host-Infra-iSCSI-vM and choose the vMedia Policy tab.

6. Click Modify vMedia Policy.

7. Choose the ESXi-7U2–CC-HTTP vMedia Policy and click OK.

8. Click OK to confirm.

This same cloning process can be used to create other Service Profile templates that can be modified to accommodate additional features such as Intel Datacenter Persistent Memory (DCPMem) in Memory or App-Direct Mode.

Create Service Profiles

To create service profiles from the service profile template, follow these steps:

1. Connect to Cisco UCS Manager and click Servers.

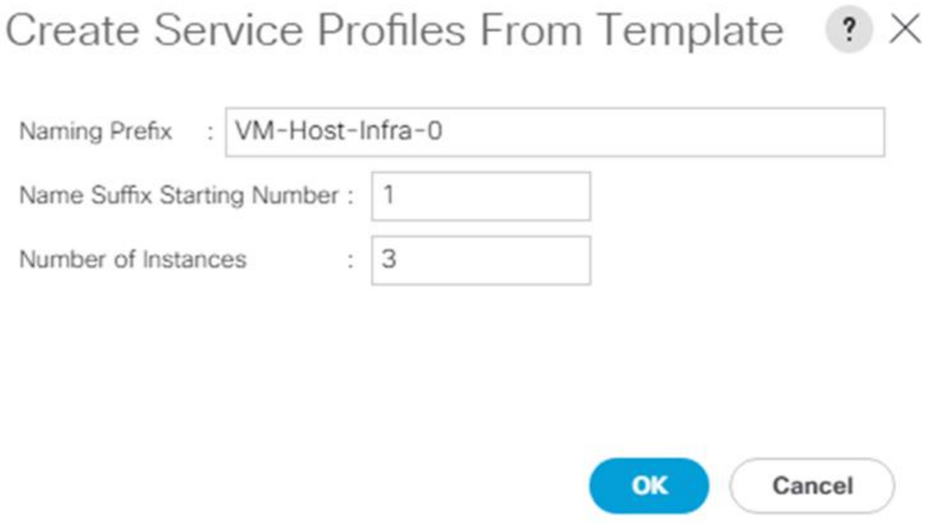
2. Expand Service Profile Templates > root > Sub-Organizations > FlexPod Organization.

3. Right-click the appropriate vMedia-enabled template and choose Create Service Profiles from Template.

4. For Naming Prefix, enter VM-Host-Infra-0.

5. For Name Suffix Starting Number, enter 1.

6. For Number of Instances, enter 3.



Create Service Profiles From Template

Naming Prefix : VM-Host-Infra-0

Name Suffix Starting Number : 1

Number of Instances : 3

7. Click OK to create the service profiles.

8. Click OK in the confirmation message.

When VMware ESXi 7.0U2 has been installed on the hosts, the host Service Profiles can be bound to the corresponding non-vMedia-enabled Service Profile Template to remove the vMedia Mapping from the host.

NetApp Storage Configuration – Part 2

To configure the storage, follow these steps:

1. Edit the following variable file and update the iscsi_igroups variables:

```
FlexPod-M6/FlexPod-UCSM-M6/vars/ontap_main.yml
```

Add the host IQNs in the iscsi iGroup variable for iSCSI SAN Boot.

2. From /root/ FlexPod-M6/FlexPod-UCSM-M6, invoke the ansible scripts for this section use the following command:

```
ansible-playbook -i inventory Setup_ONTAP.yml -t ontap_config_part_2
```

Use the -vvv tag to see detailed execution output log.

Ansible will implement all the Storage configurations tasks in this section. If implementing an Ansible configuration, skip the following manual steps and go to section Vmware vSphere Configuration.

Create igroups

After the boot LUNs have been created for the three ESXi management hosts, create igroups by following these steps:

Table 15.iSCSI IQN for SVM

SVM Name	SVM Target IQN
Infra-SVM	

Table 16.iSCSI vNIC IQN Configuration

Cisco UCS Service Profile Name	iSCSI IQN	Variable
VM-Host-Infra-01		<vm-host-infra-01-iqn>
VM-Host-Infra-02		<vm-host-infra-02-iqn>
VM-Host-Infra-03		<vm-host-infra-03-iqn>

1. To obtain the iSCSI vNIC IQN information in Cisco UCS Manager GUI, go to Servers > Service Profiles > root. Click each service profile and then click the iSCSI vNICs tab. The Initiator Name is displayed at the top of the page under the Service Profile Initiator Name.

2. Create igroups by entering the following commands from the storage cluster management LIF SSH connection:

```
lun igroup create -vserver <infra-data-svm> -igroup VM-Host-Infra-01 -protocol iscsi -ostype vmware -initiator <vm-host-infra-01-iqn>


lun igroup create -vserver <infra-data-svm> -igroup VM-Host-Infra-02 -protocol iscsi -ostype vmware -initiator <vm-host-infra-02-iqn>

lun igroup create -vserver <infra-data-svm> -igroup VM-Host-Infra-03 -protocol iscsi -ostype vmware -initiator <vm-host-infra-03-iqn>
```

Use the values listed in Table 15 and Table 16 for the IQN information.

3. To view the two igroups just created, use the command lun igroup show:

```
lun igroup show -protocol iscsi
```

Map Boot LUNs to igroups

From the storage cluster management LIF SSH connection, run the following commands:

```
lun mapping create -vserver <infra-data-svm> -path /vol/esxi_boot/VM-Host-Infra-01 -igroup VM-Host-Infra-01 -lun-id 0

lun mapping create -vserver <infra-data-svm> -path /vol/esxi_boot/VM-Host-Infra-02 -igroup VM-Host-Infra-02 -lun-id 0

lun mapping create -vserver <infra-data-svm> -path /vol/esxi_boot/VM-Host-Infra-03 -igroup VM-Host-Infra-03 -lun-id 0
```

NetApp Storage Configuration – Part 3

Execute the final Part 3 on NetApp ONTAP Storage configuration.

To invoke the ansible scripts, run the following command:

```
ansible-playbook -i inventory Setup_ONTAP.yml -t ontap_config_part_3
```

Configure DNS

To configure DNS for the Infra_SVM, run the following commands:

```
dns create -vserver <vserver name> -domains <dns-domain> -nameservers <dns-servers>


dns create -vserver Infra_SVM -domains flexpod.cisco.com -nameservers
10.1.156.250,10.1.156.251
```

Delete Residual Default Broadcast Domains (Applicable for 2-node cluster only)

To delete the Default broadcast domains that are not in use, run the following commands:

```
broadcast-domain delete -broadcast-domain <broad-domain-name>
broadcast-domain delete -broadcast-domain Default-1
```

Test AutoSupport

To test the AutoSupport configuration, send a message from all nodes of the cluster, by running the following command:

```
autosupport invoke -node * -type all -message “FlexPod storage configuration completed”
```

VMware vSphere Configuration

Set Up VMkernel Ports and Virtual Switch on ESXi Host VM-Host-Infra-01

To add the iSCSI networking configuration on the first ESXi host, follow the steps at the end of section Set Up VMkernel Ports and Virtual Switch. In this section, the iSCSI Boot vSwitch created during the VMware installation is modified and used to connect to UCS fabric A and a second vSwitch is added to connect to fabric B. Two vSwitches is the simplest, easiest to troubleshoot configuration. Other configurations are also valid, such as moving the iSCSI VMkernel ports to pinned port groups on a virtual distributed switch.

To setup VMkernel ports and virtual switches on ESXi hosts on VM-Host-Infra-01, follow these steps:

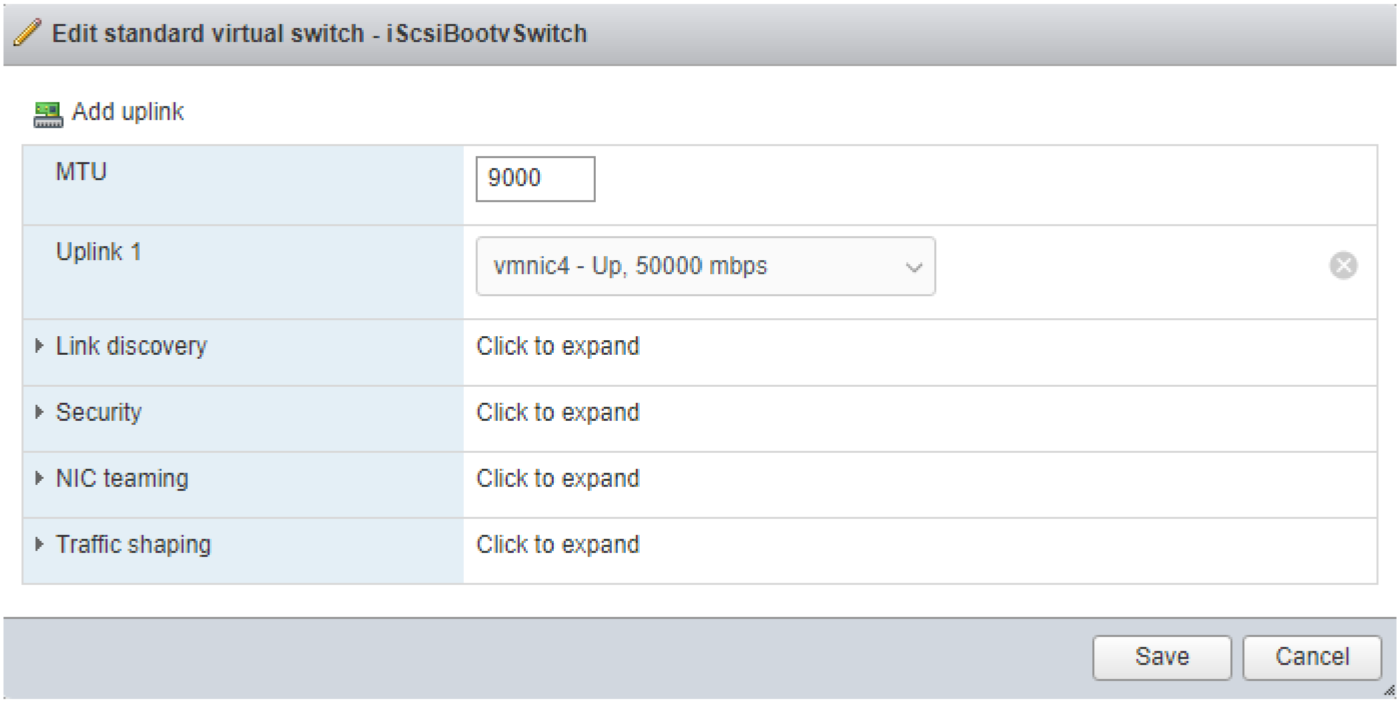
1. From the Host Client Navigator, click Networking.

2. In the center pane, choose the Virtual switches tab.

3. Highlight the iScsiBootvSwitch line.

4. Choose Edit settings.

5. Change the MTU to 9000.



Edit standard virtual switch - iScsiBootvSwitch

MTU	9000
Uplink 1	vmnic4 - Up, 50000 mbps
Link discovery	Click to expand
Security	Click to expand
NIC teaming	Click to expand
Traffic shaping	Click to expand

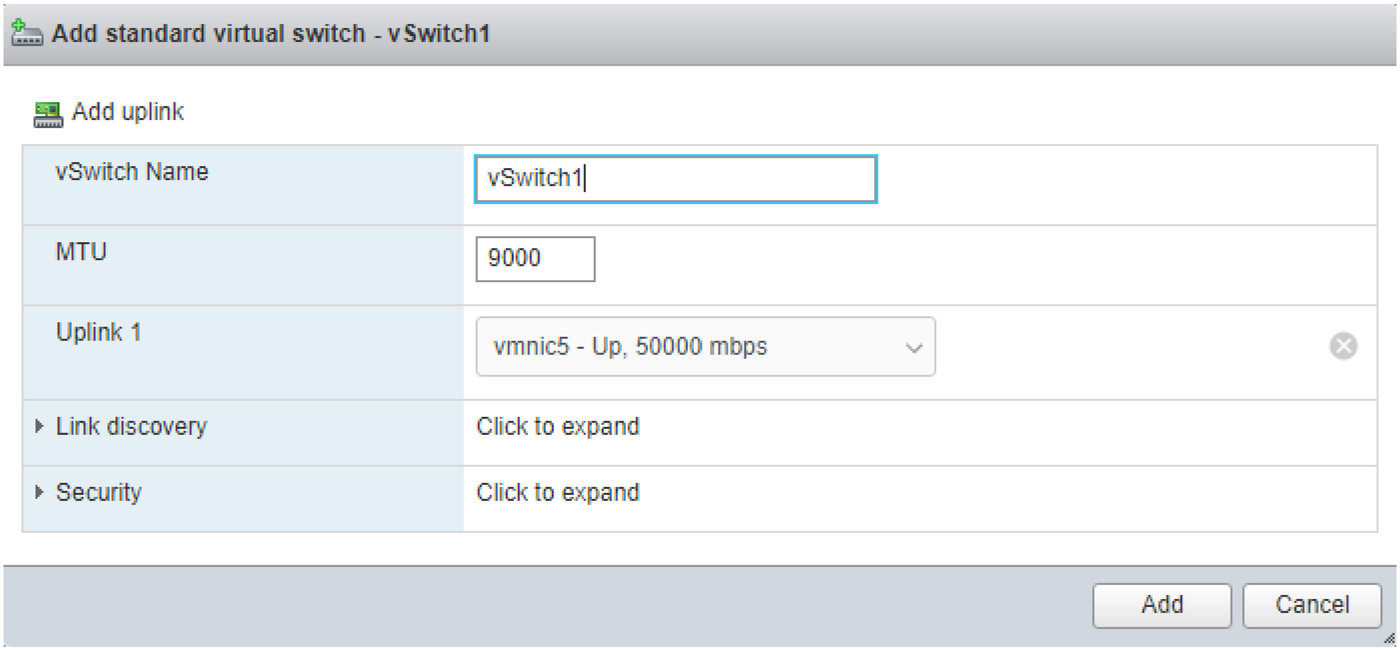
6. Click Save to save the changes to iScsiBootvSwitch.

7. Choose Add standard virtual switch.

8. Name the switch vSwitch1.

9. Change the MTU to 9000.

10. From the drop-down list select vmnic5 for Uplink 1.



Add standard virtual switch - vSwitch1

vSwitch Name	vSwitch1
MTU	9000
Uplink 1	vmnic5 - Up, 50000 mbps
Link discovery	Click to expand
Security	Click to expand

11. Choose Add to add vSwitch1.

12. In the center pane, choose the VMkernel NICs tab.

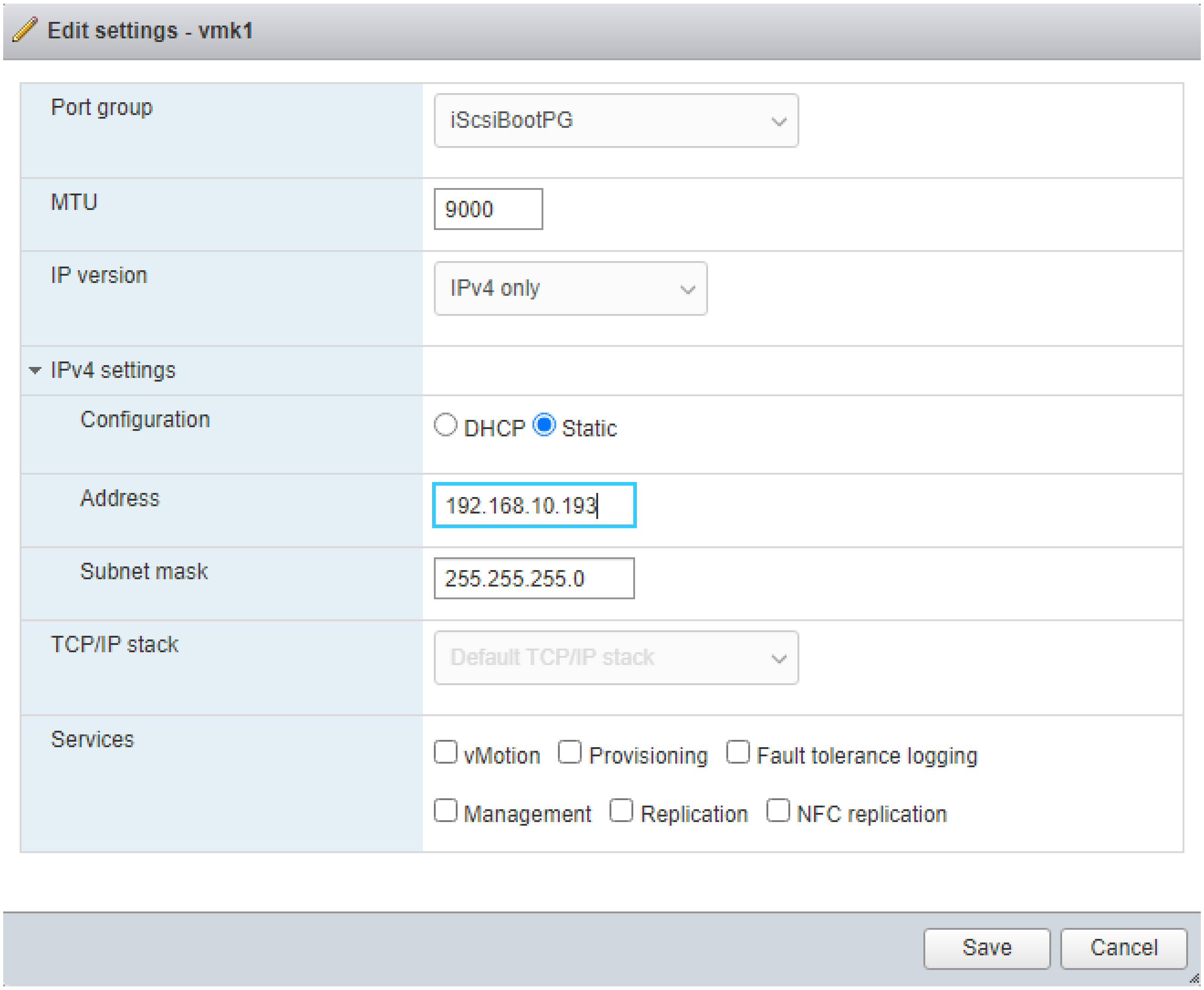
13. Highlight the iScsiBootPG line.

14. Choose Edit settings.

15. Change the MTU to 9000.

16. Expand IPv4 Settings and enter a unique IP address in the Infra-iSCSI-A subnet but outside of the Cisco UCS iSCSI-IP-Pool-A.

It is recommended to enter a unique IP address for this VMkernel port to avoid any issues related to IP Pool reassignments in Cisco UCS.



Edit settings - vmk1

Port group	iScsiBootPG
MTU	9000
IP version	IPv4 only
IPv4 settings	
Configuration	○ DHCP ● Static
Address	192.168.10.193
Subnet mask	255.255.255.0
TCP/IP stack	Default TCP/IP stack
Services	□ vMotion □ Provisioning □ Fault tolerance logging □ Management □ Replication □ NFC replication

17. Click Save to save the changes to iScsiBootPG VMkernel NIC.

18. Choose Add VMkernel NIC.

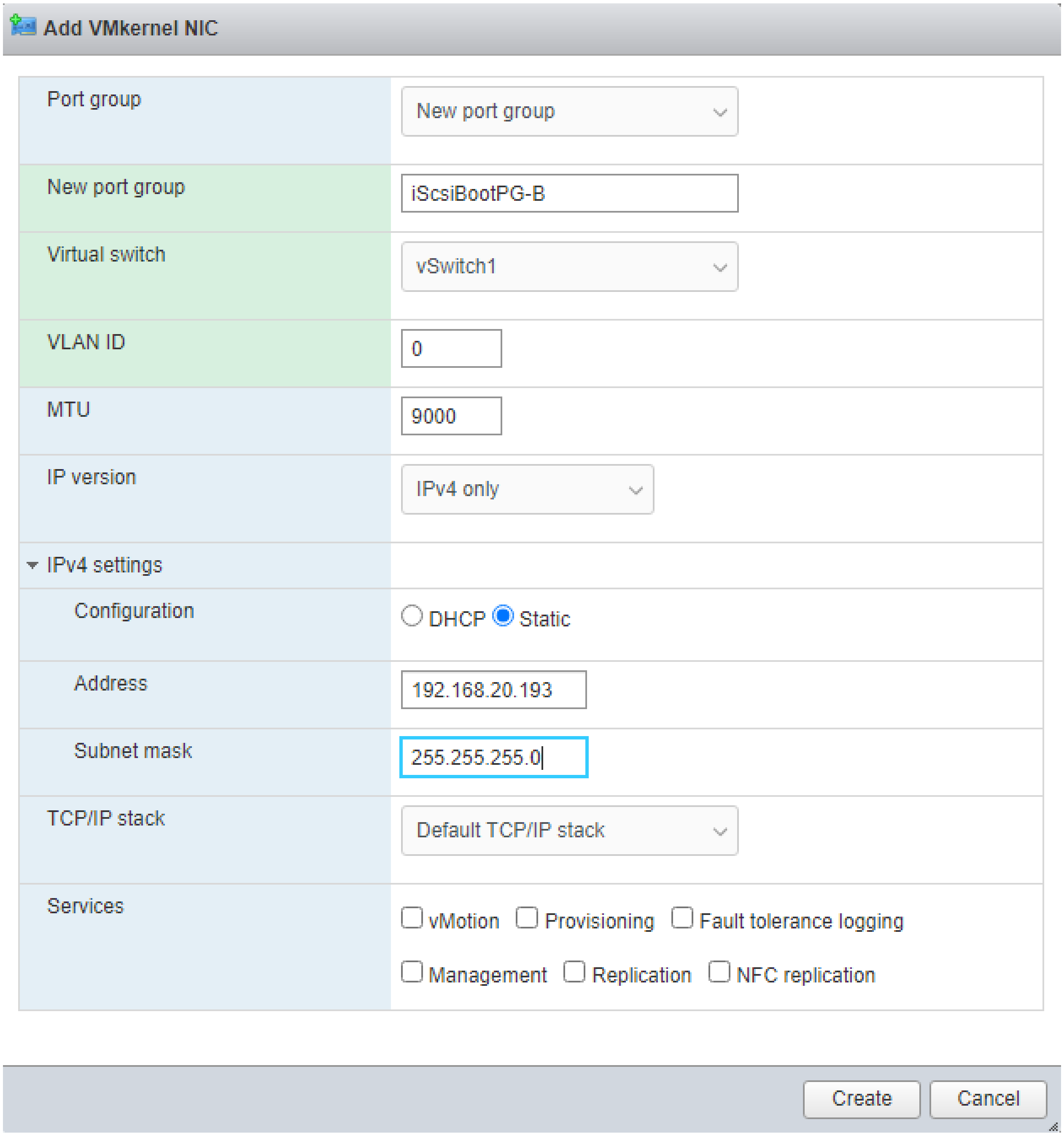
19. For New port group, enter iScsiBootPG-B.

20. For Virtual switch, use the pull-down to choose vSwitch1.

21. Change the MTU to 9000.

22. For IPv4 settings, choose Static.

23. Expand IPv4 Settings and enter a unique IP address in the Infra-iSCSI-B subnet but outside of the Cisco UCS iSCSI-IP-Pool-B.



Add VMkernel NIC

Port group	New port group
New port group	iScsiBootPG-B
Virtual switch	vSwitch1
VLAN ID	0
MTU	9000
IP version	IPv4 only
IPv4 settings	
Configuration	○ DHCP ● Static
Address	192.168.20.193
Subnet mask	255.255.255.0
TCP/IP stack	Default TCP/IP stack
Services	□ vMotion □ Provisioning □ Fault tolerance logging □ Management □ Replication □ NFC replication

24. Click Create to complete creating the VMkernel NIC.

25. In the center pane, choose the Port groups tab.

26. Highlight the iScsiBootPG line.

27. Choose Edit settings.

28. Change the Name to iScsiBootPG-A.

29. Click Save to complete editing the port group name.

30. On the left choose Storage, then in the center pane choose the Adapters tab.

31. Click Software iSCSI to configure software iSCSI for the host.

32. In the Configure iSCSI window, under Dynamic targets, click Add dynamic target.

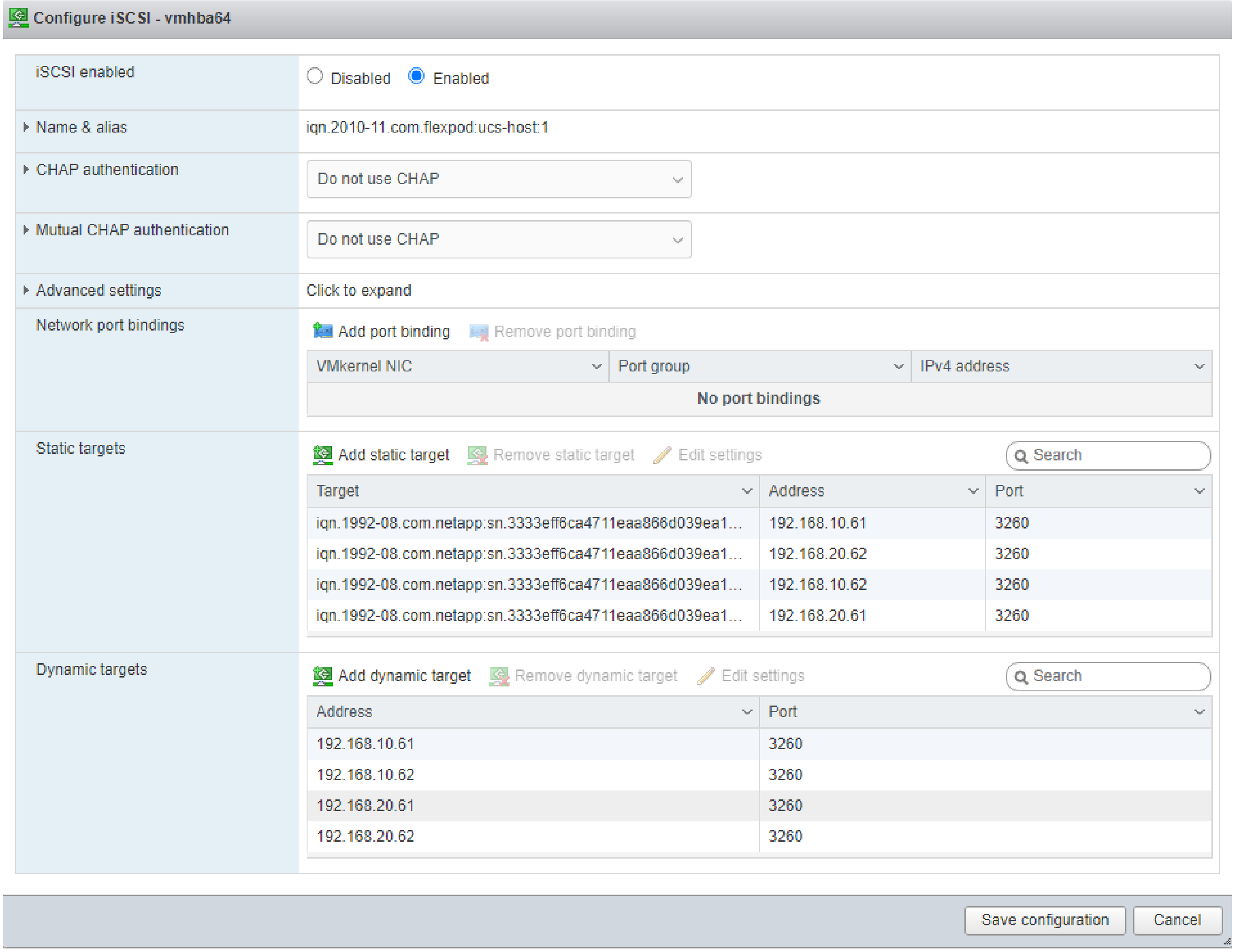
33. Choose to add address and enter the IP address of iscsi-lif-01a from storage SVM Infra-SVM. Press Return.

34. Repeat steps 32-33 to add the IP addresses for iscsi-lif-02a, iscsi-lif-01b, and iscsi-lif-02b.

35. Click Save configuration.

36. Click Software iSCSI to configure software iSCSI for the host.

37. Verify that four static targets and four dynamic targets are listed for the host.



Configure iSCSI - vmhba64

iSCSI enabled	○ Disabled ● Enabled
Name & alias	iqn.2010-11.com.flexpod:ucs-host:1
CHAP authentication	Do not use CHAP
Mutual CHAP authentication	Do not use CHAP
Advanced settings	Click to expand

Network port bindings

VMkernel NIC	Port group	IPv4 address
No port bindings		

Static targets

Target	Address	Port
iqn.1992-08.com.netapp:sn.3333eff6ca4711eaa866d039ea1...	192.168.10.61	3260
iqn.1992-08.com.netapp:sn.3333eff6ca4711eaa866d039ea1...	192.168.20.62	3260
iqn.1992-08.com.netapp:sn.3333eff6ca4711eaa866d039ea1...	192.168.10.62	3260
iqn.1992-08.com.netapp:sn.3333eff6ca4711eaa866d039ea1...	192.168.20.61	3260

Dynamic targets

Address	Port
192.168.10.61	3260
192.168.10.62	3260
192.168.20.61	3260
192.168.20.62	3260

38. Click Cancel to close the window.

If the host shows an alarm stating that connectivity with the boot disk was lost, place the host in Maintenance Mode and reboot the host.

Add iSCSI Configuration to a VMware ESXi Host Added in vCenter

This section details the steps to add iSCSI configuration to an ESXi host added and configured in vCenter. This section assumes the host has been added to vCenter and the basic networking completed, NFS datastores set up, and the time configuration and swap files added.

To add an iSCSI configuration to an ESXi host, follow these steps:

1. In the vSphere HTML5 Client, under Hosts and Clusters, choose the ESXi host.

2. In the center pane, click Configure. In the list under Networking, select Virtual switches.

3. In the center pane, expand iScsiBootvSwitch. Click EDIT to edit settings for the vSwitch.

4. Change the MTU to 9000 and click OK.

5. Choose ... > Edit Settings to the right of iScsiBootPG. Change the Network label to iScsiBootPG-A and click OK.

6. Choose ... > Edit Settings to the right of the VMkernel Port IP address. Change the MTU to 9000.

7. Click IPv4 settings on the left. Change the IP address to a unique IP address in the Infra-iSCSI-A subnet but outside of the Cisco UCS iSCSI-IP-Pool-A.

> It is recommended to enter a unique IP address for this VMkernel port to avoid any issues related to IP Pool reassignments.

8. Click OK.

9. In the upper right-hand corner, choose ADD NETWORKING to add another vSwitch.

10. Make sure VMkernel Network Adapter is selected and click NEXT.

11. Choose New standard switch and change the MTU to 9000. Click NEXT.

12. Choose ➕ to add an adapter. Make sure vmnic5 is highlighted and click OK. vmnic5 should now be under Active adapters. Click NEXT.

13. Enter iScsiBootPG-B for the Network label, leave VLAN ID set to None (0), choose Custom – 9000 for MTU, and click NEXT.

14. Choose Use static IPv4 settings. Enter a unique IP address and netmask in the Infra-iSCSI-B subnet but outside of the Cisco UCS iSCSI-IP-Pool-B. Click NEXT.

15. Click FINISH to complete creating the vSwitch and the VMkernel port.

16. In the list under Storage, choose Storage Adapters.

17. Choose the iSCSI Software Adapter and below, choose the Dynamic Discovery tab.

18. Click Add.

19. Enter the IP address of the storage controller’s Infra-SVM LIF iscsi-lif-01a and click OK.

20. Repeat this process to add the IPs for iscsi-lif-02a, iscsi-lif-01b, and iscsi-lif-02b.

21. Under Storage Adapters, click Rescan Adapter to rescan the iSCSI Software Adapter.

22. Under Static Discovery, four static targets should now be listed.

23. Under Paths, four paths should now be listed with two of the paths having the “Active (I/O)” Status.

Create a FlexPod ESXi Custom ISO using VMware vCenter

In this validation document, the Cisco Custom Image for ESXi 7.0 U2 Install CD was used to install VMware ESXi. After this installation the Cisco UCS VIC drivers, Cisco UCS Tools and the NetApp NFS Plug-in for VMware VAAI had to be installed or updated during the FlexPod deployment. vCenter 7.0U2 or later can be used to produce a FlexPod custom ISO containing the updated UCS VIC drivers, UCS Tools and the NetApp NFS Plug-in for VMware VAAI. This ISO can be used to install VMware ESXi 7.0U2 without having to do any additional driver updates. This ISO can be produced by following these steps:

1. Download the Cisco Custom Image for ESXi 7.0 U2 Offline Bundle. This file (VMware_ESXi_7.0.2_17867351_Custom_Cisco_4.1.3_a_Bundle.zip) can be used to produce the FlexPod ESXi 7.0U2 CD ISO.

2. Download the following listed .zip files:

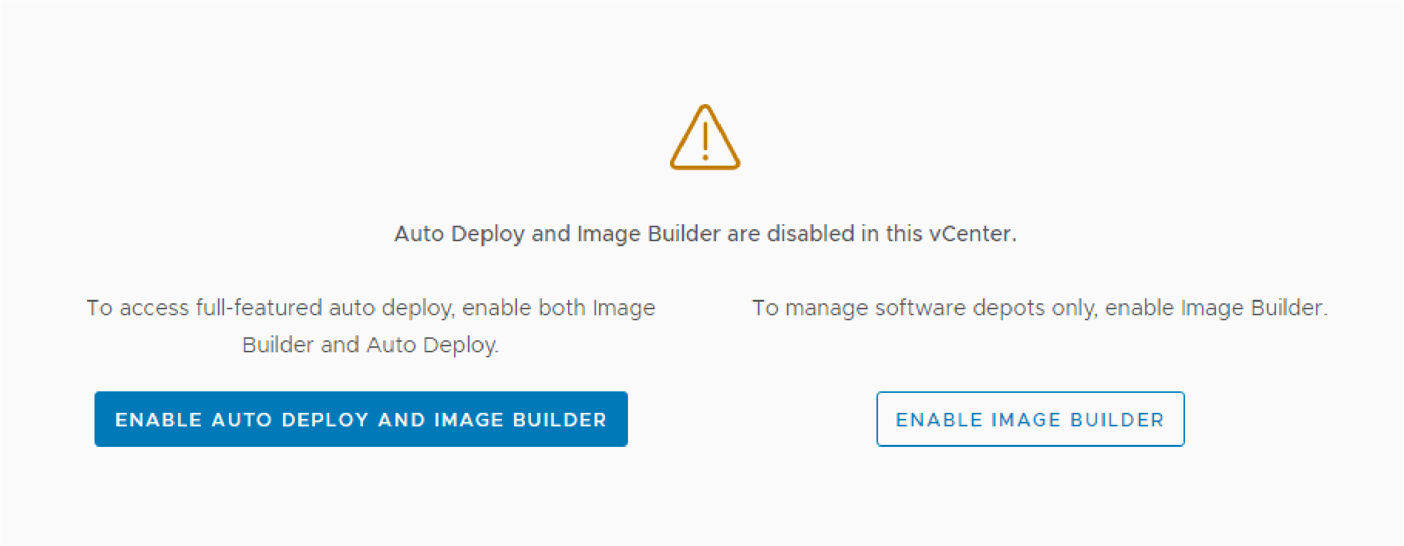
   - VMware ESXi 7.0 nfnic 5.0.0.12 Driver for Cisco VIC Adapters – Cisco-nfnic_5.0.0.12-1OEM.700.1.0.15843807_18369224.zip – extracted from the downloaded zip
   - UCS Tools Component for ESXi 7.0 1.2.1 – ucs-tool-esxi_1.2.1-1OEM.zip
   - NetApp NFS Plug-in for VMware VAAI 2.0 – NetAppNasPluginV2.0.zip

The Cisco VIC nenic driver would also normally be downloaded and added to the FlexPod Custom ISO, but the 1.0.35.0 nenic driver is already included in the Cisco Custom ISO.

3. Log into the VMware vCenter HTML5 Client as administrator@vsphere.local.

4. Under Menu, choose Auto Deploy.

5. If you see the following, choose ENABLE IMAGE BUILDER.



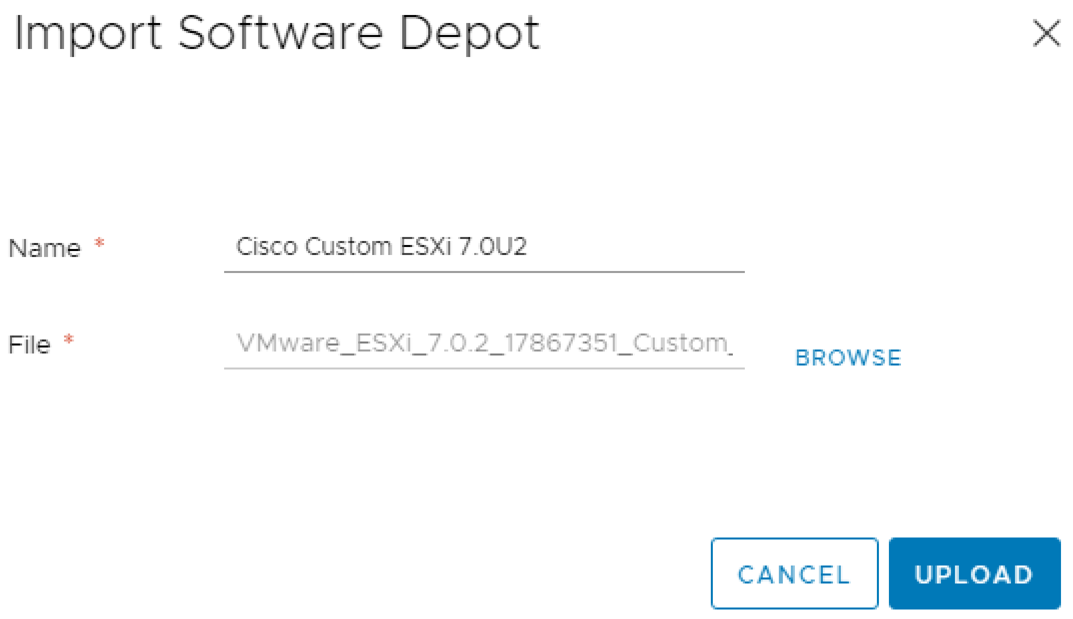
Auto Deploy and Image Builder are disabled in this vCenter.

To access full-featured auto deploy, enable both Image Builder and Auto Deploy.

To manage software depots only, enable Image Builder.

6. Click IMPORT to upload a software depot.

7. Name the depot "Cisco Custom ESXi 7.0U2". Click BROWSE. Browse to the local location of the VMware_ESXi_7.0.2_17867351_Custom_Cisco-4.1.3_a_Bundle.zip file downloaded above, highlight it, and click Open.



Import Software Depot

Name * Cisco Custom ESXi 7.0U2

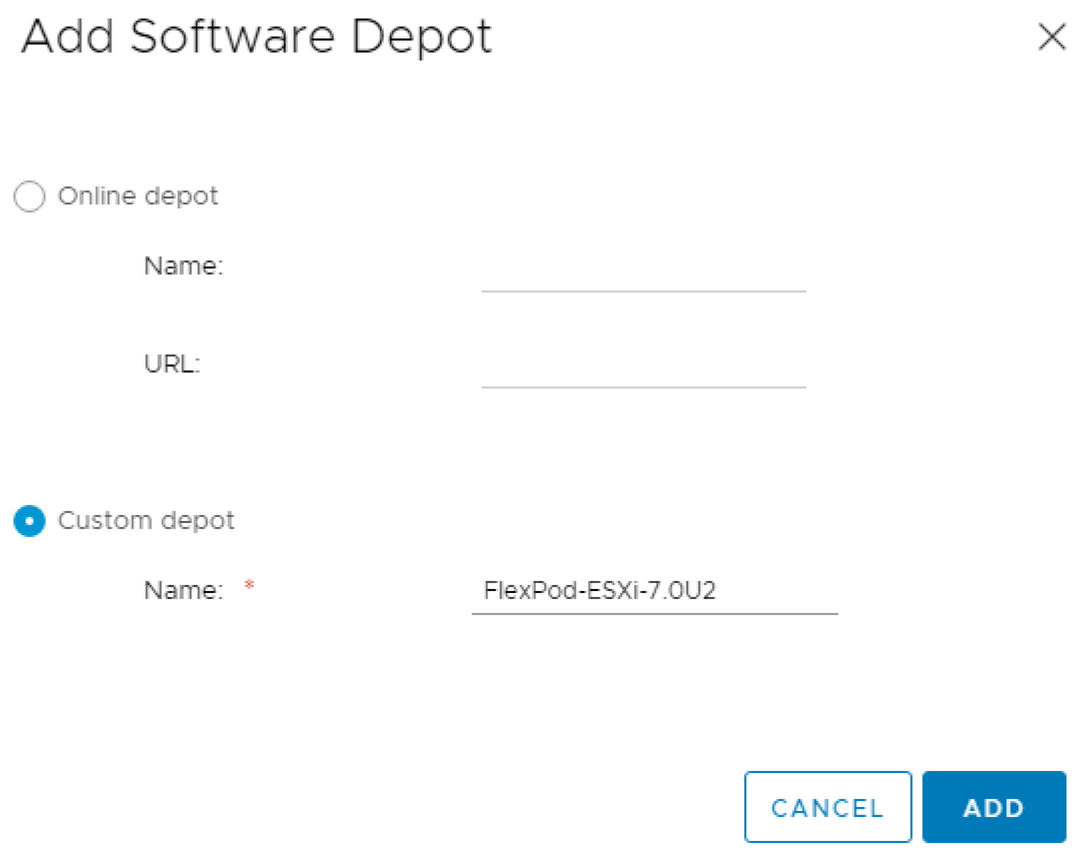
File * VMware_ESXi_7.0.2_17867351_Custom_

8. Click UPLOAD to upload the software depot.

9. Repeat steps 1 - 8 to add software depots for Cisco-nfnic_5.0.0.15-1OEM.700.1.0.15843807_18697950.zip, ucs-tool-esxi_1.2.1-1OEM.zip, and NetAppNasPluginV2.0.zip.

10. Click NEW to add a custom software depot.

11. Choose Custom depot and name the custom depot FlexPod-ESXi-7.0U2.



Add Software Depot

○ Online depot

Name:

URL:

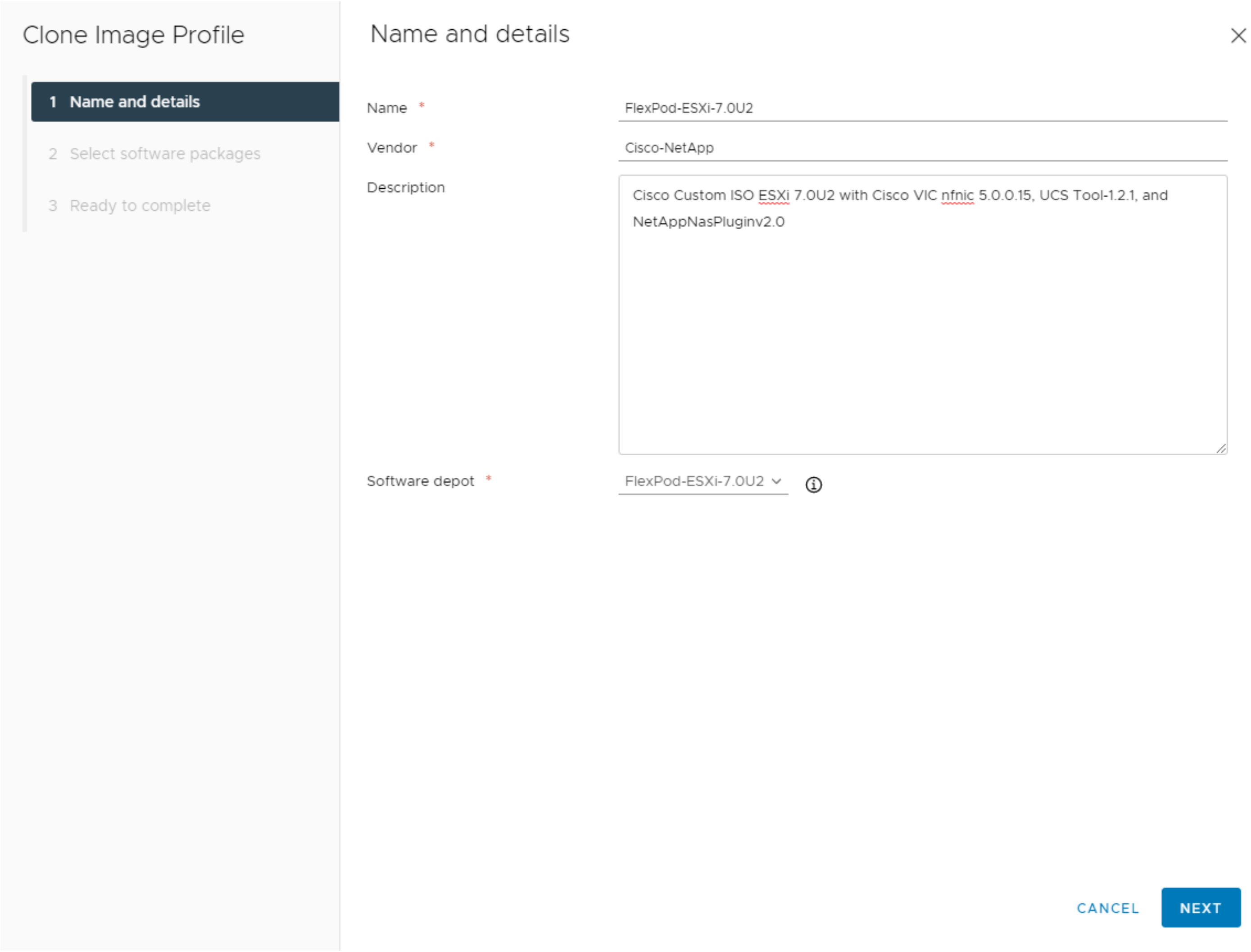
● Custom depot

Name: * FlexPod-ESXi-7.0U2

12. Click ADD to add the custom software depot.

13. From the drop-down list, choose the Cisco Custom ESXi-7.0U2 (ZIP) software depot. Make sure the Image Profiles tab is selected and then click the radio button to select the Cisco-UCS-Custom-ESXi-70U2-17867351_4.1.3-a image profile. Click CLONE to clone the image profile.

14. Name the clone FlexPod-ESXi-7.0U2. For Vendor, enter Cisco-NetApp. For Description, enter "Cisco Custom ISO ESXi 7.0U2 with Cisco VIC nfnic 5.0.0.12, UCS Tool-1.2.1 and NetAppNasPluginv2.0". Choose FlexPod-ESXi-7.0U2 for Software depot.



Name and details

Name * FlexPod-ESXi-7.0U2

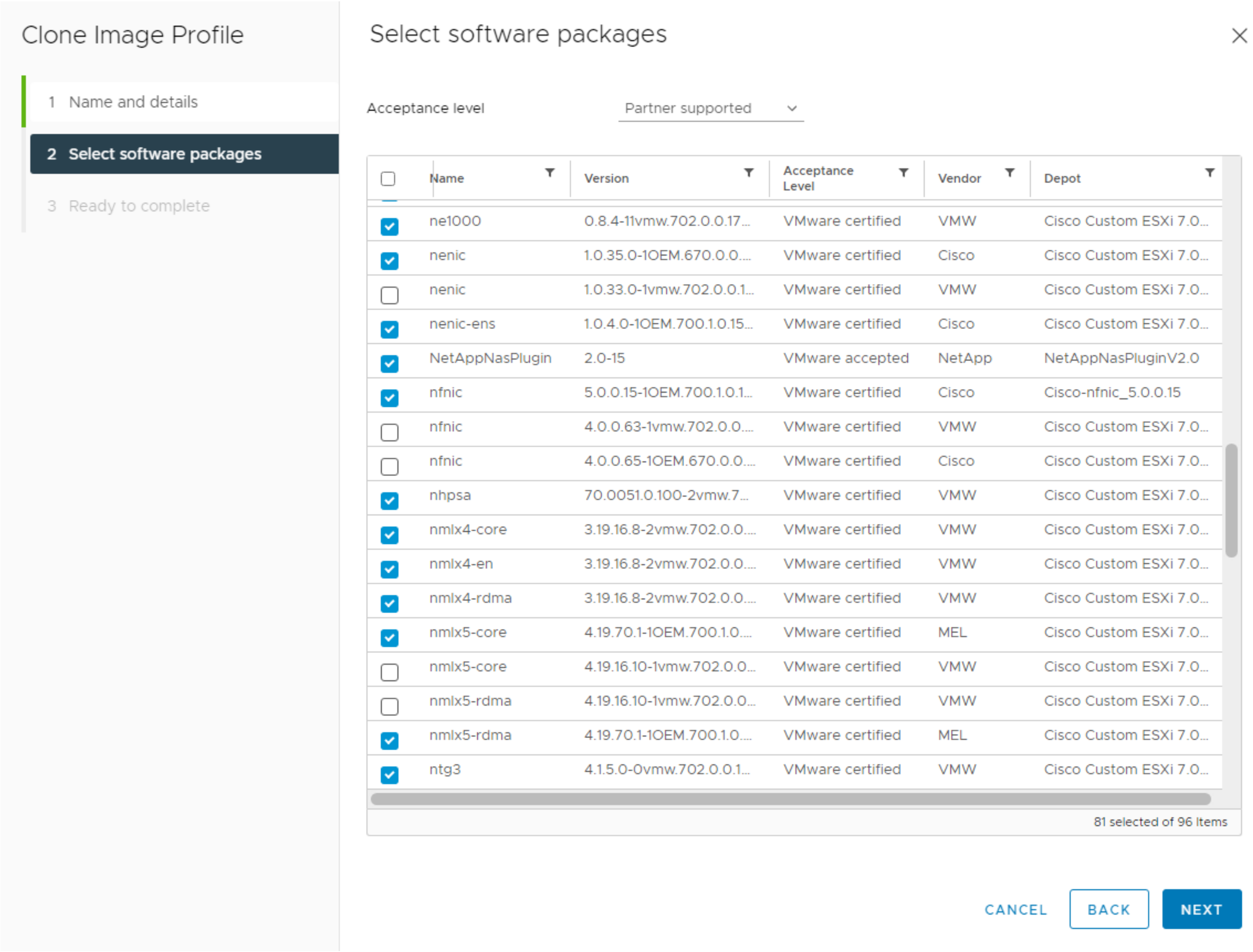
Vendor * Cisco-NetApp

Description: Cisco Custom ISO ESXi 7.0U2 with Cisco VIC nfnic 5.0.0.15, UCS Tool-1.2.1, and NetAppNasPluginv2.0

Software depot * FlexPod-ESXi-7.0U2

15. Click NEXT.

16. Under Available software packages, check NetAppNasPlugin 2.0-15, nfnic 5.0.0.15, and ucs-tool-esxi 1.2.1. Uncheck nfnic 4.0.0.65 and ucs-tool-esxi 1.1.6. Leave the remaining selections unchanged.



Clone Image Profile

1 Name and details

2 Select software packages

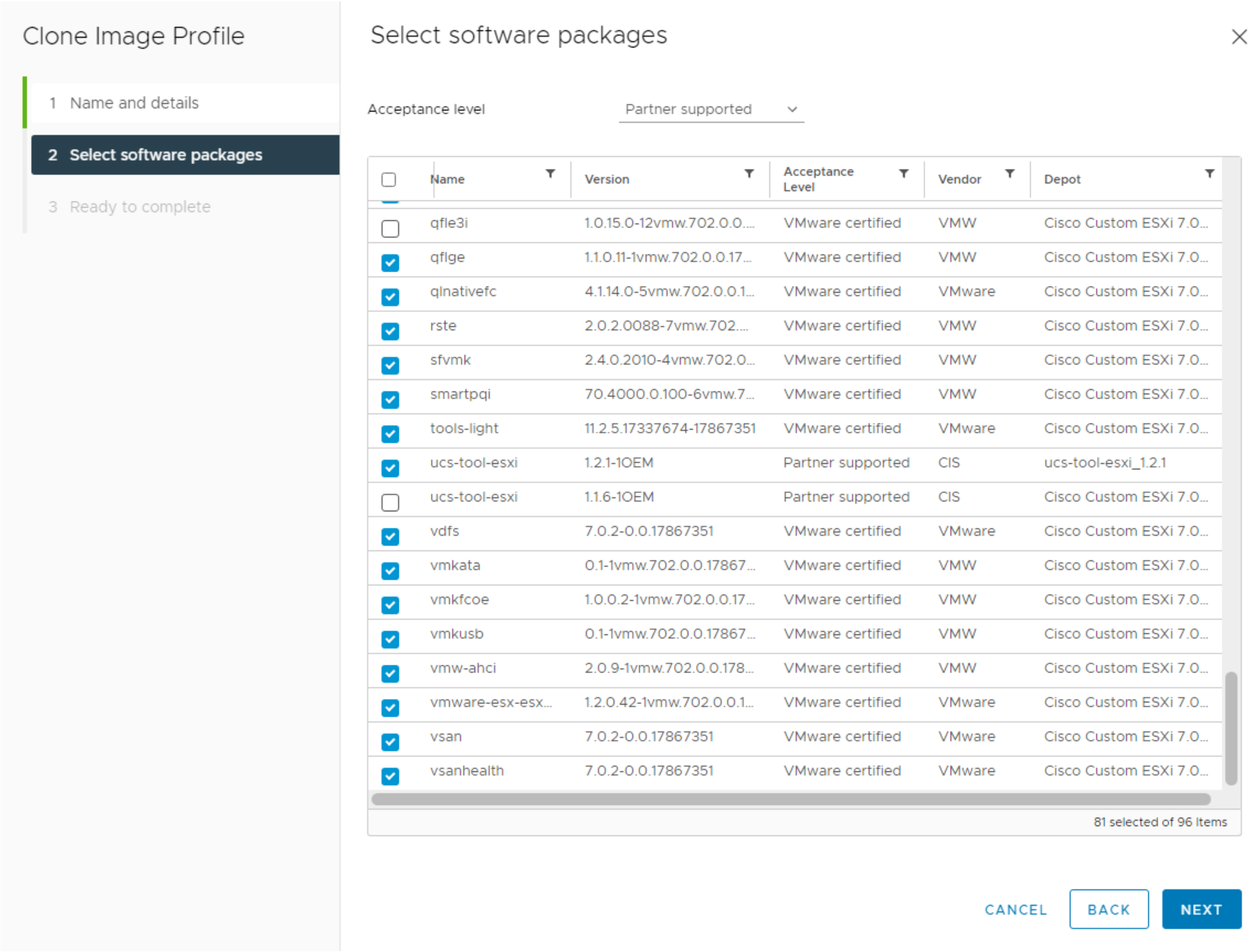
3 Ready to complete

Select software packages

Acceptance level: Partner supported

□	Name	Version	Acceptance Level	Vendor	Depot
☑	ne1000	0.8.4-11vmw.702.0.0.17...	VMware certified	VMW	Cisco Custom ESXi 7.0...
☑	nenic	1.0.35.0-1OEM.670.0.0....	VMware certified	Cisco	Cisco Custom ESXi 7.0...
□	nenic	1.0.33.0-1vmw.702.0.0.1...	VMware certified	VMW	Cisco Custom ESXi 7.0...
☑	nenic-ens	1.0.4.0-1OEM.700.1.0.15...	VMware certified	Cisco	Cisco Custom ESXi 7.0...
☑	NetAppNasPlugin	2.0-15	VMware accepted	NetApp	NetAppNasPluginV2.0
☑	nfnic	5.0.0.15-1OEM.700.1.0.1...	VMware certified	Cisco	Cisco-nfnic_5.0.0.15
□	nfnic	4.0.0.63-1vmw.702.0.0....	VMware certified	VMW	Cisco Custom ESXi 7.0...
□	nfnic	4.0.0.65-1OEM.670.0.0....	VMware certified	Cisco	Cisco Custom ESXi 7.0...
☑	nhpsa	70.0051.0.100-2vmw.7...	VMware certified	VMW	Cisco Custom ESXi 7.0...
☑	nmlx4-core	3.19.16.8-2vmw.702.0.0....	VMware certified	VMW	Cisco Custom ESXi 7.0...
☑	nmlx4-en	3.19.16.8-2vmw.702.0.0....	VMware certified	VMW	Cisco Custom ESXi 7.0...
☑	nmlx4-rdma	3.19.16.8-2vmw.702.0.0....	VMware certified	VMW	Cisco Custom ESXi 7.0...
☑	nmlx5-core	4.19.70.1-1OEM.700.1.0....	VMware certified	MEL	Cisco Custom ESXi 7.0...
□	nmlx5-core	4.19.16.10-1vmw.702.0.0...	VMware certified	VMW	Cisco Custom ESXi 7.0...
□	nmlx5-rdma	4.19.16.10-1vmw.702.0.0...	VMware certified	VMW	Cisco Custom ESXi 7.0...
☑	nmlx5-rdma	4.19.70.1-1OEM.700.1.0....	VMware certified	MEL	Cisco Custom ESXi 7.0...
☑	ntg3	4.1.5.0-0vmw.702.0.0.1...	VMware certified	VMW	Cisco Custom ESXi 7.0...

81 selected of 96 Items



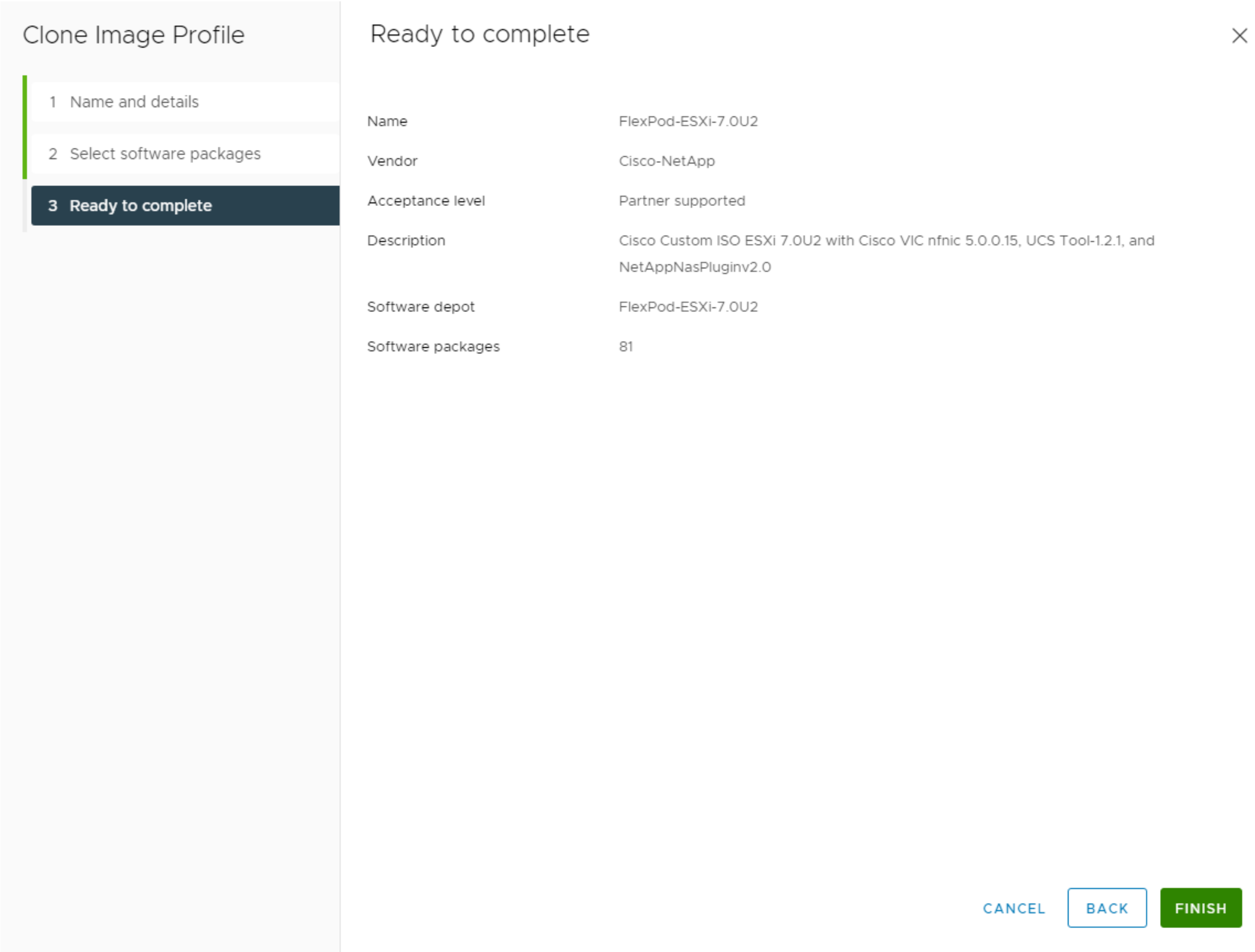
Select software packages

Acceptance level: Partner supported

☐	Name	Version	Acceptance Level	Vendor	Depot
☐	qfle3i	1.0.15.0-12vmw.702.0.0....	VMware certified	VMW	Cisco Custom ESXi 7.0...
☑	qflge	1.1.0.11-1vmw.702.0.0.17...	VMware certified	VMW	Cisco Custom ESXi 7.0...
☑	qlnativefc	4.1.14.0-5vmw.702.0.0.1...	VMware certified	VMware	Cisco Custom ESXi 7.0...
☑	rste	2.0.2.0088-7vmw.702....	VMware certified	VMW	Cisco Custom ESXi 7.0...
☑	sfvmk	2.4.0.2010-4vmw.702.0...	VMware certified	VMW	Cisco Custom ESXi 7.0...
☑	smartpqi	70.4000.0.100-6vmw.7...	VMware certified	VMW	Cisco Custom ESXi 7.0...
☑	tools-light	11.2.5.17337674-17867351	VMware certified	VMware	Cisco Custom ESXi 7.0...
☑	ucs-tool-esxi	1.2.1-1OEM	Partner supported	CIS	ucs-tool-esxi_1.2.1
☐	ucs-tool-esxi	1.1.6-1OEM	Partner supported	CIS	Cisco Custom ESXi 7.0...
☑	vdfs	7.0.2-0.0.17867351	VMware certified	VMware	Cisco Custom ESXi 7.0...
☑	vmkata	0.1-1vmw.702.0.0.17867...	VMware certified	VMW	Cisco Custom ESXi 7.0...
☑	vmkfcoe	1.0.0.2-1vmw.702.0.0.17...	VMware certified	VMW	Cisco Custom ESXi 7.0...
☑	vmkusb	0.1-1vmw.702.0.0.17867...	VMware certified	VMW	Cisco Custom ESXi 7.0...
☑	vmw-ahci	2.0.9-1vmw.702.0.0.178...	VMware certified	VMW	Cisco Custom ESXi 7.0...
☑	vmware-esx-esx...	1.2.0.42-1vmw.702.0.0.1...	VMware certified	VMware	Cisco Custom ESXi 7.0...
☑	vsan	7.0.2-0.0.17867351	VMware certified	VMware	Cisco Custom ESXi 7.0...
☑	vsanhealth	7.0.2-0.0.17867351	VMware certified	VMware	Cisco Custom ESXi 7.0...

81 selected of 96 Items

17. Click NEXT.



Clone Image Profile

Ready to complete

Name	FlexPod-ESXi-7.0U2
Vendor	Cisco-NetApp
Acceptance level	Partner supported
Description	Cisco Custom ISO ESXi 7.0U2 with Cisco VIC nfnic 5.0.0.15, UCS Tool-1.2.1, and NetAppNasPluginv2.0
Software depot	FlexPod-ESXi-7.0U2
Software packages	81

18. Click FINISH.

19. Using the Software Depot pulldown, choose the FlexPod-ESXi-7.0U2 (Custom) software depot. Under Image Profiles choose the FlexPod-ESXi-7.0U2 image profile. Click EXPORT to export an image profile. ISO should be selected. Click OK to generate a bootable ESXi installable image.

20. Once the Image profile export completes, click DOWNLOAD to download the ISO.

21. Once downloaded, you can rename the ISO to a more descriptive name.

22. Optionally, generate the ZIP archive to generate an offline bundle for the FlexPod image using … > Export.

FlexPod Backups

Cisco UCS Backup

Automated backup of the UCS domain is important for recovery of the UCS Domain from issues ranging catastrophic failure to human error. There is a native backup solution within Cisco UCS that allows local or remote backup using FTP/TFTP/SCP/SFTP as options.

Backups created can be a binary file containing the Full State, which can be used for a restore to the original or a replacement pair of fabric interconnects. Alternately create the XML configuration file consisting of All configurations, just System configurations, or just Logical configurations of the UCS Domain. For scheduled backups, options will be Full State or All Configuration, backup of just the System or Logical configurations can be manually initiated.

To configure the backup, using the Cisco UCS Manager GUI, follow these steps:

1. Choose Admin within the Navigation pane and choose All.

2. Click the Policy Backup & Export tab within All.

3. For a Full State Backup, All Configuration Backup, or both, specify the following:

    a. Hostname: <IP or FQDN of host that will receive the backup>

4. Protocol: [FTP/TFTP/SCP/SFTP]

5. User: <account on host to authenticate>

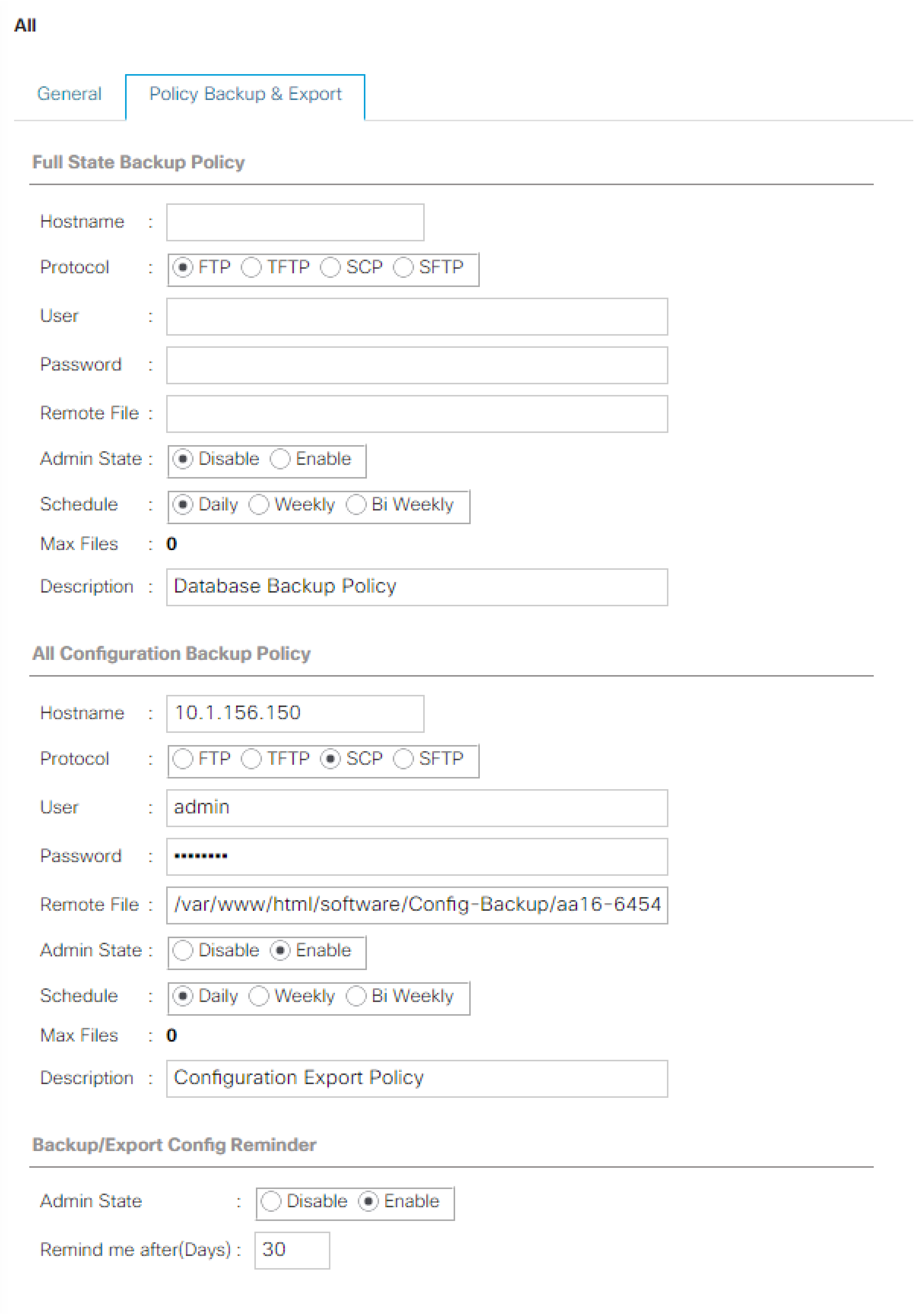
6. Password: <password for account on host>

7. Remote File: <full path and filename prefix for backup file>

Admin State must be Enabled to fill in the Remote File field.

8. Admin State: <choose Enable to activate the schedule on save, Disable to disable schedule on Save>

9. Schedule: [Daily/Weekly/Bi Weekly]



All

Full State Backup Policy

Hostname :

Protocol : ● FTP ○ TFTP ○ SCP ○ SFTP

User :

Password :

Remote File :

Admin State : ● Disable ○ Enable

Schedule : ● Daily ○ Weekly ○ Bi Weekly

Max Files : **0**

Description : Database Backup Policy

All Configuration Backup Policy

Hostname : 10.1.156.150

Protocol : ○ FTP ○ TFTP ● SCP ○ SFTP

User : admin

Password : •••••••••

Remote File : /var/www/html/software/Config-Backup/aa16-6454

Admin State : ○ Disable ● Enable

Schedule : ● Daily ○ Weekly ○ Bi Weekly

Max Files : **0**

Description : Configuration Export Policy

Backup/Export Config Reminder

Admin State : ○ Disable ● Enable

Remind me after(Days) : 30

10. Click Save Changes to create the Policy.

Cisco Nexus and MDS Backups

The configuration of the Cisco Nexus 9000 and Cisco MDS 9132T switches can be backed up manually at any time with the copy command, but automated backups can be put in place with the NX-OS feature scheduler.

An example of setting up automated configuration backups of one of the FlexPod 93180YC-FX switches is shown below:

```
conf t
feature scheduler
scheduler logfile size 1024
scheduler job name backup-cfg
copy running-config tftp://<server-ip>/$(SWITCHNAME)-cfg.$(TIMESTAMP) vrf management
exit
scheduler schedule name daily
job name backup-cfg
time daily 2:00
end
```

On the Cisco MDS 9132T, remove “vrf management” from the copy command.

Show the job that has been setup:

```
show scheduler job
Job Name: backup-cfg
--------------------
copy running-config tftp://10.1.156.150/$(SWITCHNAME)-cfg.$(TIMESTAMP) vrf management

==============================================================================

show scheduler schedule
Schedule Name       : daily
---------------------------
User Name           : admin
Schedule Type       : Run every day at 2 Hrs 0 Mins
Last Execution Time : Yet to be executed
-----------------------------------------------
     Job Name            Last Execution Status
-----------------------------------------------
backup-cfg                            -NA-
```

```
================================================================================
copy r s
```

The documentation for the feature scheduler can be found here: https://www.cisco.com/c/en/us/td/docs/switches/datacenter/nexus9000/sw/93x/system-management/b-cisco-nexus-9000-series-nx-os-system-management-configuration-guide-93x/b-cisco-nexus-9000-series-nx-os-system-management-configuration-guide-93x_chapter_0100001.html

VMware VCSA Backup

Basic scheduled backup for the vCenter Server Appliance is available within the native capabilities of the VCSA. To create a scheduled backup, follow these steps:

1. Connect to the VCSA Console at https://<VCSA IP>:5480 as root.

2. Click Backup in the list to open the Backup Schedule Dialogue.

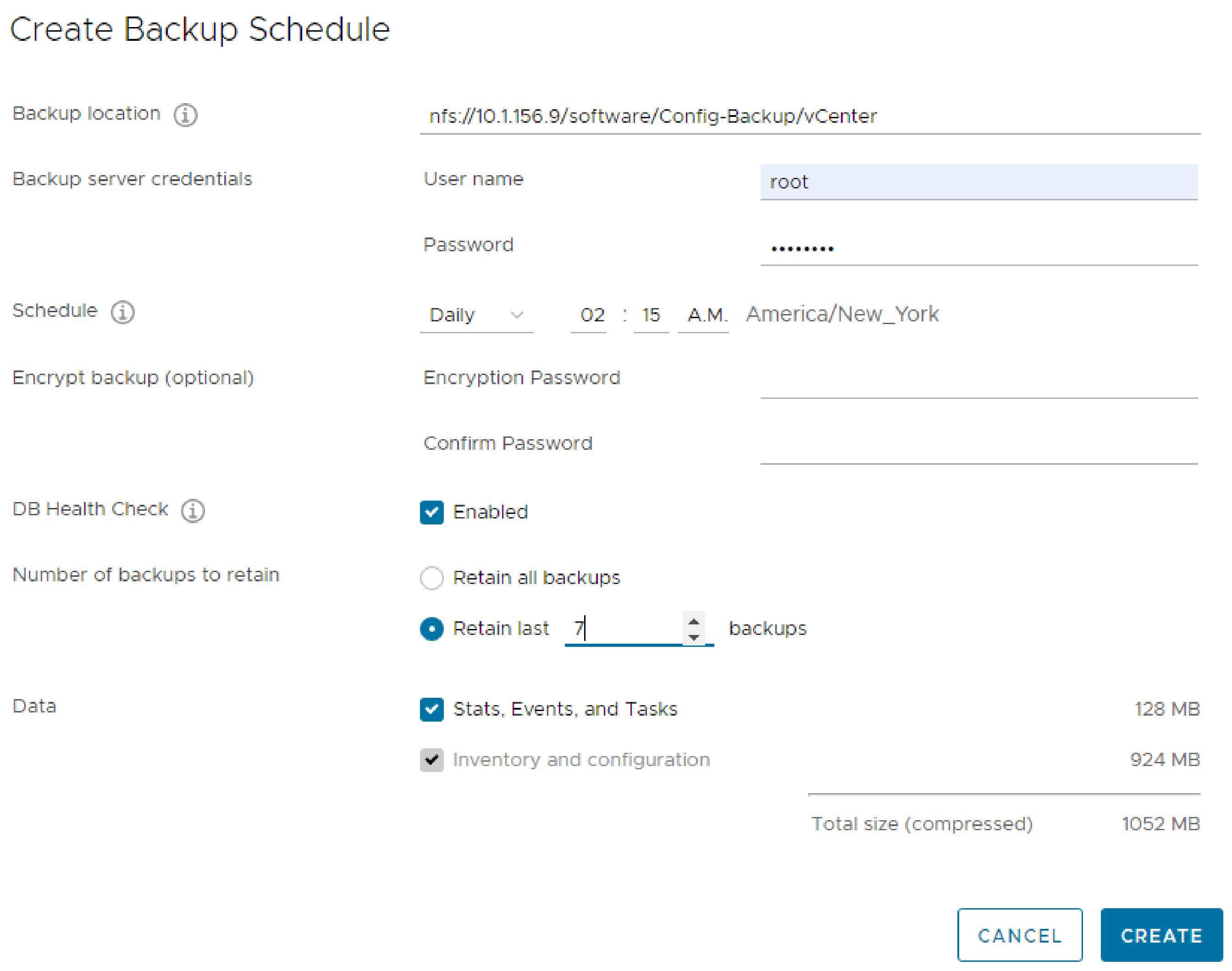
3. To the right of Backup Schedule, click CONFIGURE.

4. Specify:

   a. The Backup location with the protocol to use (FTPS,HTTPS,SFTP,FTP,NFS,SMB, and HTTP)

   b. The User name and password. This can be root and any password. (We used NFSv3 sys security).

   c. The Number of backups to retain.



Create Backup Schedule

Backup location ⓘ nfs://10.1.156.9/software/Config-Backup/vCenter

Backup server credentials User name root

Password ••••••••

Schedule ⓘ Daily 02 : 15 A.M. America/New_York

Encrypt backup (optional) Encryption Password

Confirm Password

DB Health Check ⓘ ☑ Enabled

Number of backups to retain ○ Retain all backups

● Retain last 7 backups

Data	☑ Stats, Events, and Tasks	128 MB
	☑ Inventory and configuration	924 MB
	Total size (compressed)	1052 MB

5. Click CREATE.

The Backup Schedule should now show a Status of Enabled.

6. To test the backup setup, you can choose BACKUP NOW and select “Use backup location and user name from backup schedule” to test the backup location.

7. Restoration can be initiated with the backed-up files using the Restore function of the VCSA 7.0 Installer.

About the Authors

John George, Technical Marketing Engineer, Data Center Solutions Engineering, Cisco Systems, Inc.

John has been involved in designing, developing, validating, and supporting the FlexPod Converged Infrastructure since it was developed over ten years ago. Before his role with FlexPod, he supported and administered a large worldwide training network and VPN infrastructure. John holds a master's degree in Computer Engineering from Clemson University.

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- Kamini Singh, Technical Marketing Engineer, NetApp
- Kishore Esanakula, Sr. Technical Marketing Engineer, NetApp

Feedback

For comments and suggestions about this guide and related guides, join the discussion on Cisco Community at https://cs.co/en-cvds.

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