White Paper

Public

The bridge to possible

Deploy K3s on SUSE Linux Enterprise Micro and Cisco UCS C220, C240, and C240 SD with Cisco Intersight

Contents

Purpose of this document

This document provides a high-level procedure for deploying the K3s lightweight Kubernetes distribution on Cisco UCS® C220, C240, and C240 SD Rack Servers in space-constrained locations. The focus will be on areas where the deployment deviates from default installations. Everything that is not specified in this document can be configured based on the default settings for your local environment.

Introduction

During the past few years, organizations have been participating in a radical transformation of the way that modern applications are built, deployed, and operated. Monolithic applications are being broken down into microservices and serverless functions to ease development exponentially, facilitate lifecycle management, increase the speed at which new features are deployed, and improve the availability of services offered.

More and more mission-critical workloads have become containerized. According to various Gartner and IDC estimates, between 35 and 50 percent of an enterprise's application sprawl is now containerized—and not just the application front ends or the dashboards, but mission-critical workloads such as revenue-generating data analytics pipelines, middleware, and core business logic.

Not only are workloads and applications changing, but the locations at which data is generated, accessed, and partially processed are changing from the data center to a highly distributed world. Hybrid cloud, edge, the Internet of Things (IoT), and similar technologies are becoming the default for more and more companies, and IT departments must find ways to deploy, manage, and support containerized workloads at nearly every place: in the data center, at the shop floor, in vehicles, and in the public cloud.

This document provides a sample configuration for deploying a container platform on a single server that provides all the capabilities of the data center while fitting into a shortened network rack at the shop floor or edge location: the Cisco UCS C240 SD Rack Server. For the operating system, the solution uses SUSE Enterprise Linux (SLE) Micro: an optimized container option based on the proven enterprise-class Linux distribution. The lightweight Kubernetes service K3s, which is optimized to run on a single server, eliminates the need to install multiple servers.

About Cisco Unified Computing System

The solution uses a Cisco UCS C240 M5SX Rack Server with solid-state disks (SSDs) and hard-disk drives (HDDs). The configuration can be used with any Cisco UCS C-Series Rack Server.

Cisco UCS C240 M5 Rack Server overview

The Cisco UCS C240 M5 Rack Server is an enterprise-class server in a 2-rack-unit (2RU) form factor. It is designed to deliver exceptional performance, expandability, and efficiency for storage and I/O-intensive infrastructure workloads. These workloads include big data analytics, virtualization, and graphics-intensive and bare-metal applications.

The Cisco UCS C240 M5 server provides:

- Support for a 2RU 2-socket server using Intel® Xeon® Scalable processors
- Support for 2666-MHz DDR4 DIMMs and 128-GB DIMMs
- Increased storage density with 24 front-pluggable 2.5-inch small-form-factor (SFF) drive bays, or 12 front-pluggable 3.5-inch large-form-factor (LFF) drive bays and 2 rear 2.5-inch SFF drive bays
- Non-Volatile Memory Express (NVMe) PCI Express (PCIe) SSD support (for up to 2 drives on the standard chassis SKU or up to 10 drives on the NVMe-optimized SKU)

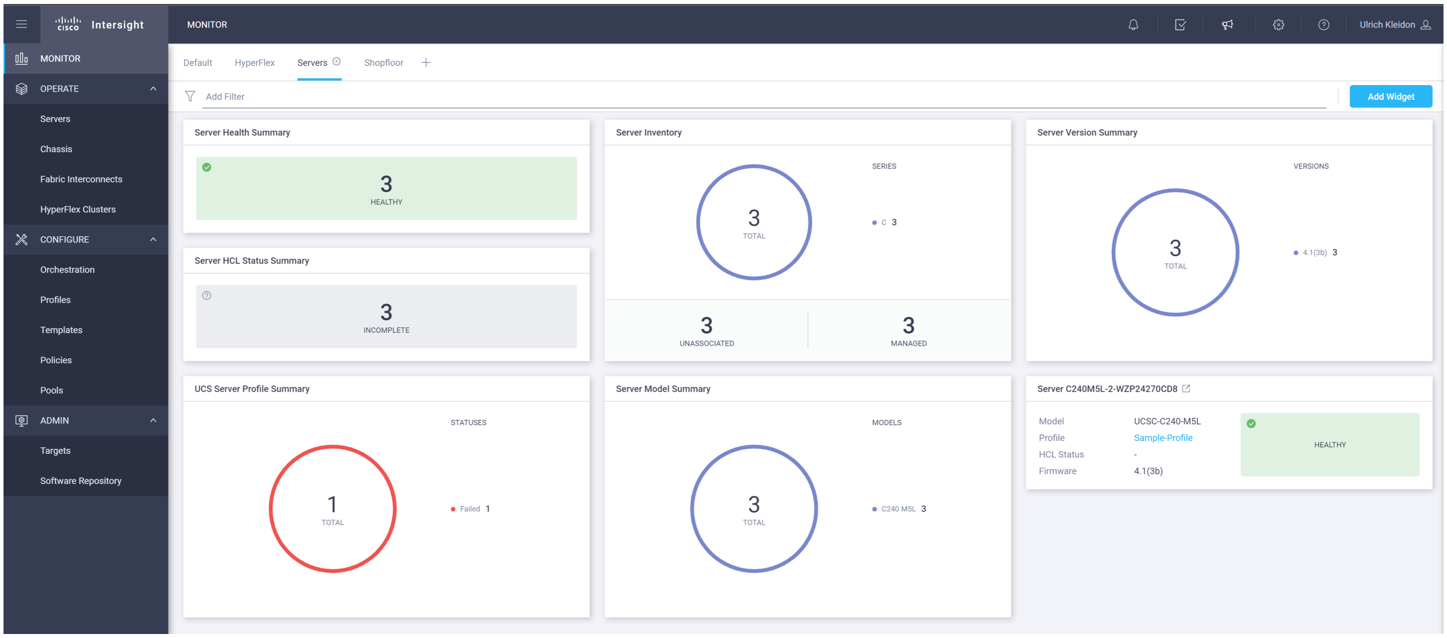
- Cisco® 12-Gbps SAS RAID modular controller and Cisco 12-Gbps SAS host bus adapter (HBA) controller
- 2 Flexible Flash (FlexFlash) Secure Digital (SD) card slots or 2 modular M.2 SATA slots
- 10-Gbps embedded Intel x550 10GBASE-T LAN-on-motherboard (LOM) port
- 1 modular LOM (mLOM) slot
- 6 PCIe Generation 3 (Gen 3) slots
- Up to 2 hot-pluggable redundant power supplies

The Cisco UCS C240 M5 server can be deployed as a standalone device or as part of a managed Cisco Unified Computing System™ (Cisco UCS) environment. Cisco UCS unifies computing, networking, management, virtualization, and storage access into a single integrated architecture that can enable end-to-end server visibility, management, and control in both bare-metal and virtualized environments. With a Cisco UCS managed deployment, the Cisco UCS C240 M5 takes advantage of our standards-based unified computing innovations to significantly reduce customers' total cost of ownership (TCO) and increase business agility.

About the Cisco Intersight platform

The Cisco Intersight™ platform (https://intersight.com) is an API-driven, cloud-based system management tool (Figure 1). It is designed to help organizations implement their IT management and operations with a higher level of automation, simplicity, and operational efficiency. It is a new generation of global management tool for Cisco UCS and Cisco HyperFlex™ systems and provides a holistic and unified approach to managing customers' distributed and virtualized environments. The Cisco Intersight platform simplifies the installation, monitoring, troubleshooting, upgrading, and support of your infrastructure through the following benefits:

- Cloud-based management: The capability to manage Cisco UCS and Cisco HyperFlex systems from the cloud enables customers to more quickly and simply scale and manage their infrastructure whether in data centers or remote and branch-office locations.
- Automation: The unified API in Cisco UCS and Cisco HyperFlex systems enables policy-based configuration and management of the infrastructure and makes the Cisco Intersight platform itself and the devices connected to it fully programmable and DevOps friendly.
- Analytics and telemetry: The Cisco Intersight platform monitors the health and relationships of all physical and virtual infrastructure components. It also collects telemetry and configuration information to develop the intelligence of the platform in accordance with Cisco information security requirements.
- Connected Cisco Technical Assistance Center (TAC): Solid integration with the Cisco TAC enables more efficient and proactive technical support. The Cisco Intersight platform provides enhanced operations automation by expediting file transmission to accelerate troubleshooting.
- Recommendation engine: Driven by analytics and machine learning, the Cisco Intersight recommendation engine provides actionable intelligence for IT operations management through the daily-increasing knowledge base and practical insights learned in the entire system.
- Management as a service: The Cisco Intersight platform provides management as a service and is designed to be infinitely scalable and easy to implement. It relieves users of the burden of maintaining systems management software and hardware.



Model	UCSC-C240-M5L
Profile	Sample-Profile
HCL Status	-
Firmware	4.1(3b)

Figure 1.
Cisco Intersight platform

About SUSE Linux Enterprise Micro

SUSE Linux Enterprise, or SLE, Micro is an ultra-reliable, lightweight operating system purpose-built for containerized and virtualized workloads. It uses the enterprise-hardened security and compliance components of SUSE Linux Enterprise and merges them with a modern, immutable, developer-friendly OS platform.

About K3s lightweight Kubernetes

K3s is packaged as a single binary about 50 MB in size. Bundled in that single binary is everything needed to run Kubernetes anywhere, including low-powered IoT and edge-based devices. The binary includes:

- The container runtime
- Any essential host utilities, such as iptables, socat, and du

The only OS dependencies are the Linux kernel itself and proper dev, proc, and sysfs mounts (these are included automatically in all modern Linux distributions).

K3s bundles these Kubernetes components:

- kube-apiserver
- kube-controller-manager
- kube-scheduler
- kubelet
- kube-proxy

Solution overview

The Cisco Intersight platform is a cloud-based service for managing Cisco UCS servers located at different locations from a single point. With policy-based architecture and infrastructure management based on profiles, organizations can easily define a server profile for a Cisco UCS server, such as the Cisco UCS C240, running SLE Micro and K3s and deploy it at any location. SUSE Rancher is used to manage the Kubernetes installations in the data center, in branch offices, the edge, or in the public cloud.

Using the sample landscape shown in Figure 2, this document demonstrates the installation of a single server.

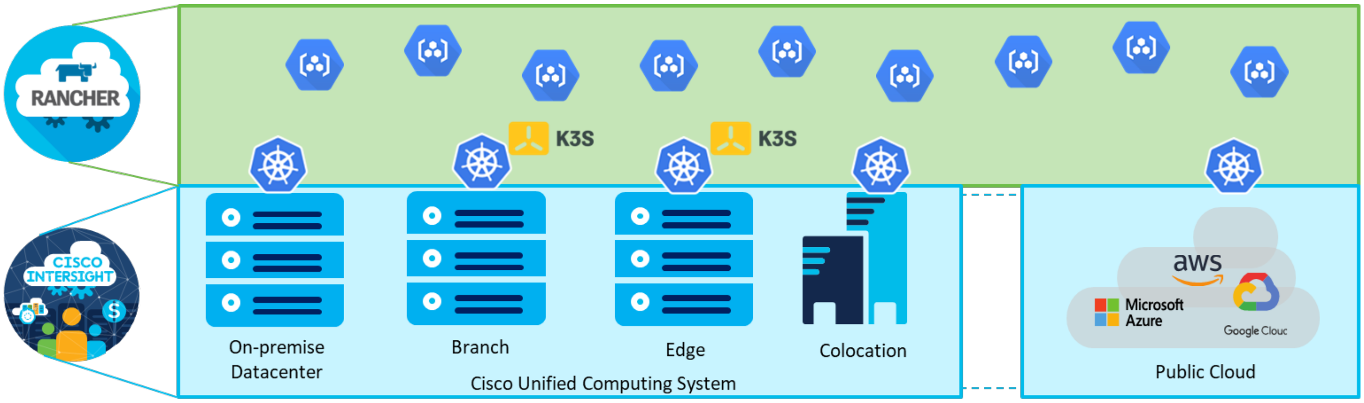


Figure 2.
Solution overview with Cisco Intersight platform and SUSE Rancher

Prerequisites

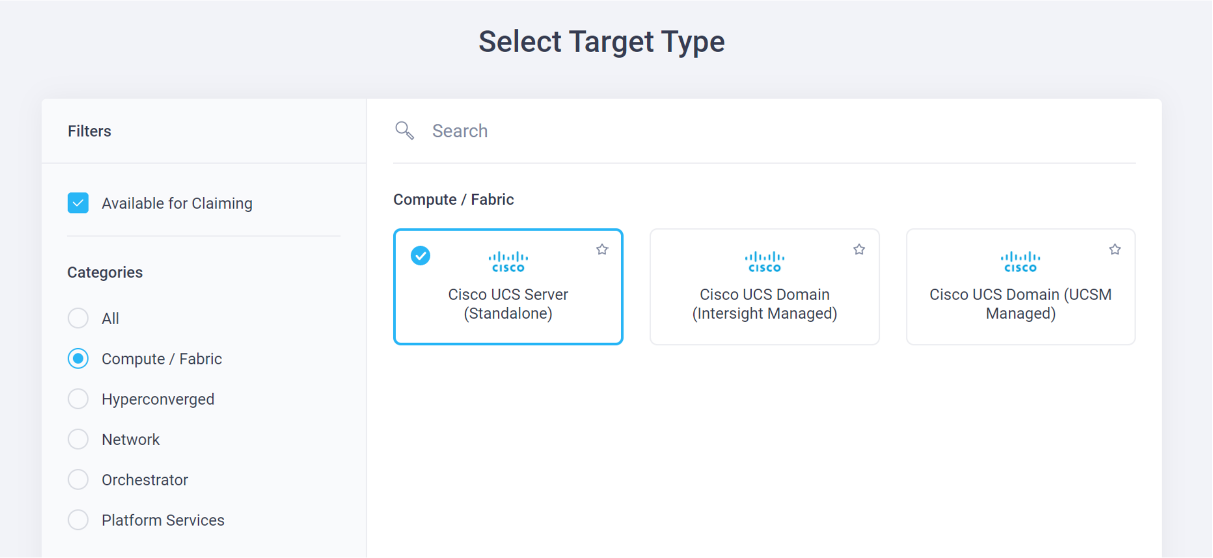
The following items need to be preconfigured before you begin the setup and configuration of a K3s system on a Cisco UCS C240 SD server:

- Linux host with kubectl client binary installed and access to the Internet to download required software packages
- One Cisco UCS server racked and cabled
- Domain Host Configuration Protocol (DHCP) server to provide an IP address to the Cisco Integrated Management Controller (IMC)
- Monitor, keyboard, and mouse for initial IMC configuration

Server operations with Cisco Intersight platform

To monitor and operate a Cisco UCS server from the Cisco Intersight platform, the first step is to claim the device. The following procedure provides the steps for claiming the Cisco UCS C240 server manually in the Cisco Intersight platform.

1. Log on to the Cisco Intersight platform and navigate to Admin > Targets.
2. In the top-right corner of the window, click Claim a New Target.
3. In the next window, choose Compute / Fabric > Cisco UCS Server (Standalone). Then click Start.



Select Target Type

Filters

☑ Available for Claiming

Categories

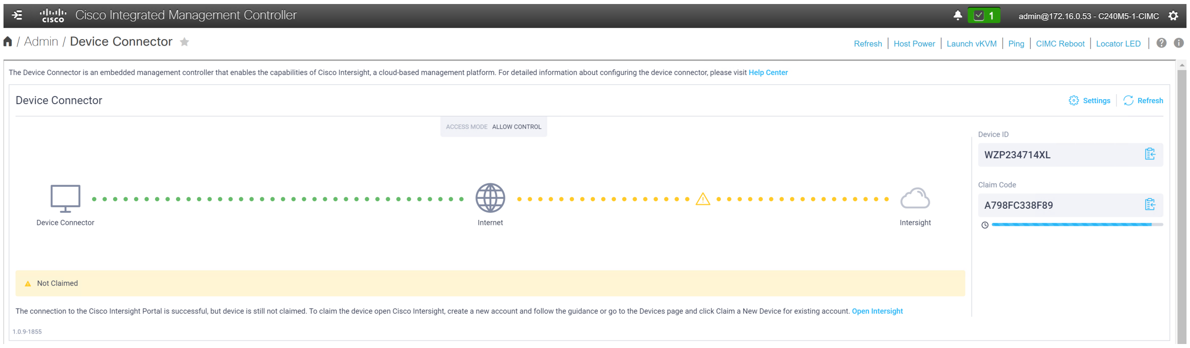
○ All
● Compute / Fabric
○ Hyperconverged
○ Network
○ Orchestrator
○ Platform Services

Search

Compute / Fabric

- ✓ Cisco UCS Server (Standalone)
- Cisco UCS Domain (Intersight Managed)
- Cisco UCS Domain (UCSM Managed)

4. In a second tab of the web browser, log on to the Cisco IMC portal of the Cisco UCS C240 SD and navigate to Admin > Device Connector.



Cisco Integrated Management Controller
1
admin@172.16.0.53 - C240M5-1-CIMC
/ Admin / Device Connector
Refresh | Host Power | Launch vKVM | Ping | CIMC Reboot | Locator LED

The Device Connector is an embedded management controller that enables the capabilities of Cisco Intersight, a cloud-based management platform. For detailed information about configuring the device connector, please visit Help Center

Device Connector

Settings
Refresh
Device Connector
Internet
Intersight

ACCESS MODE ALLOW CONTROL

Device ID: WZP234714XL

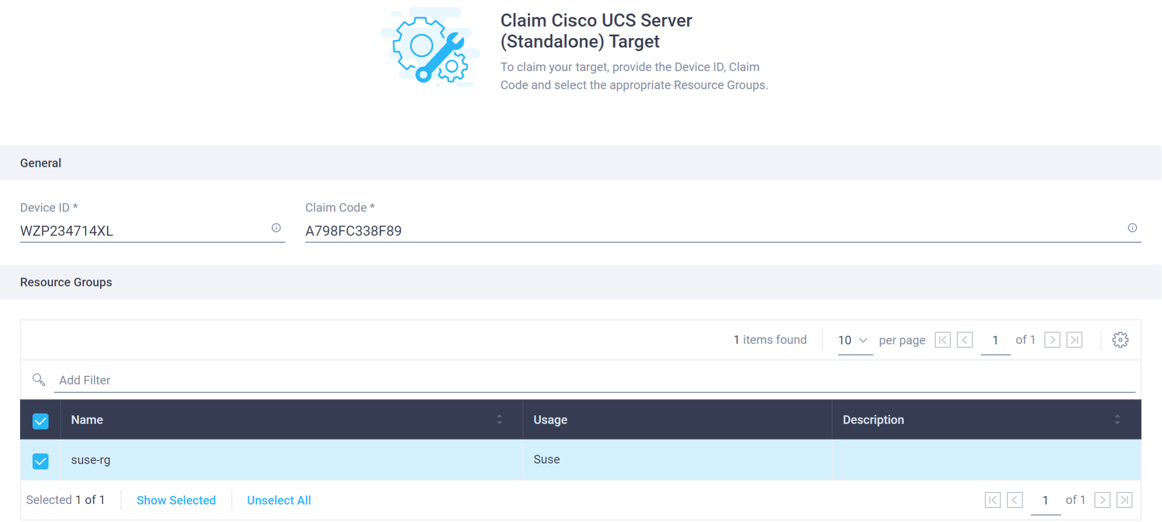
Claim Code: A798FC338F89

Not Claimed

The connection to the Cisco Intersight Portal is successful, but device is still not claimed. To claim the device open Cisco Intersight, create a new account and follow the guidance or go to the Devices page and click Claim a New Device for existing account. Open Intersight

1.0.9-1855

5. Back in the Cisco Intersight platform, enter the device ID and claim code from the server and click Claim.



Claim Cisco UCS Server (Standalone) Target

To claim your target, provide the Device ID, Claim Code and select the appropriate Resource Groups.

General

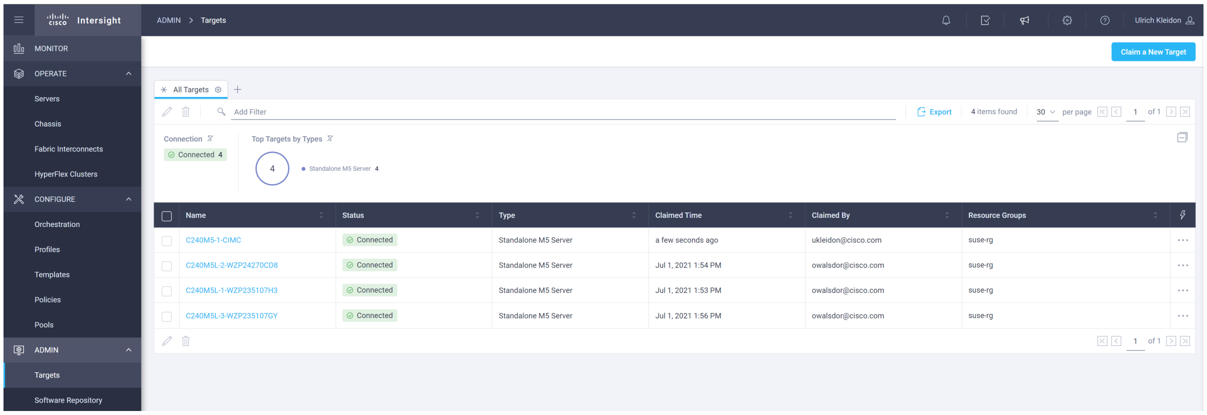
Device ID *: WZP234714XL

Claim Code *: A798FC338F89

Resource Groups

☑	Name	Usage	Description
☑	suse-rg	Suse	

The server is now listed in the Cisco Intersight platform under Targets and under Servers.



ADMIN > Targets

Connected 4

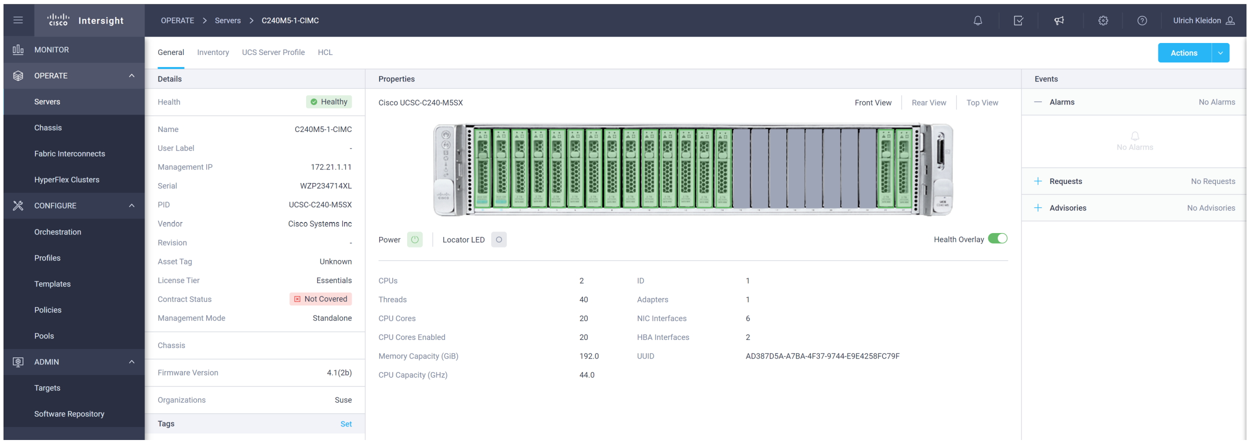
4 items found

Name	Status	Type	Claimed Time	Claimed By	Resource Groups
C240M5-1-CIMC	Connected	Standalone M5 Server	a few seconds ago	ukleidon@cisco.com	suse-rg
C240M5L-2-WZP24270CD8	Connected	Standalone M5 Server	Jul 1, 2021 1:54 PM	owalsdor@cisco.com	suse-rg
C240M5L-1-WZP235107H3	Connected	Standalone M5 Server	Jul 1, 2021 1:53 PM	owalsdor@cisco.com	suse-rg
C240M5L-3-WZP235107GY	Connected	Standalone M5 Server	Jul 1, 2021 1:56 PM	owalsdor@cisco.com	suse-rg

6. Navigate to Operate > Servers and choose the name of the new server to see the details and actions available for this system.

   The available actions are based on the Cisco Intersight license level available for this server and the privileges of the user account.

   See https://intersight.com/help/saas/getting_started/licensing_requirements#intersight_licensing for an overview of the functions available with the different license tiers.



OPERATE > Servers > C240M5-1-CIMC

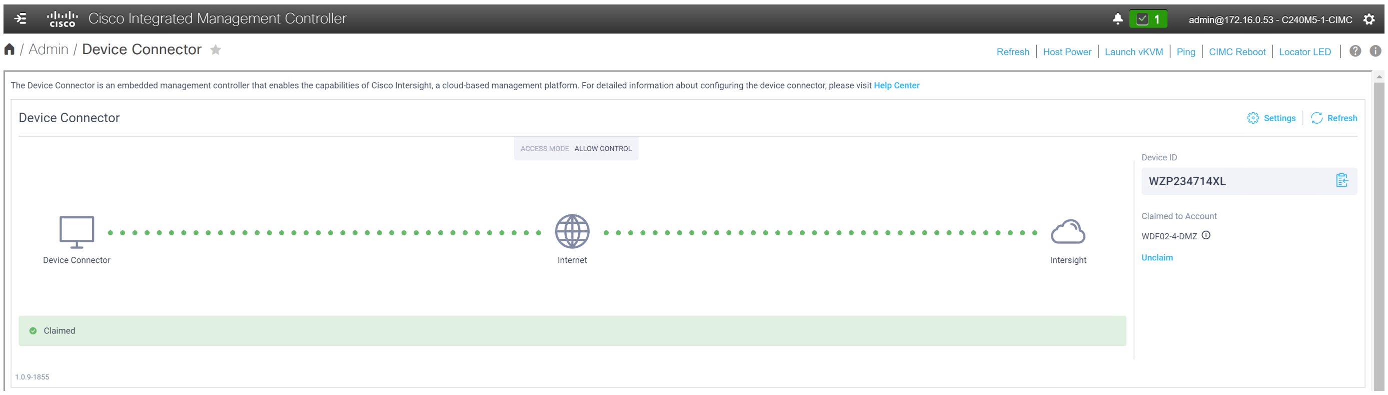
Health	Healthy
Name	C240M5-1-CIMC
User Label	-
Management IP	172.21.1.11
Serial	WZP234714XL
PID	UCSC-C240-M5SX
Vendor	Cisco Systems Inc
Revision	-
Asset Tag	Unknown
License Tier	Essentials
Contract Status	Not Covered
Management Mode	Standalone
Chassis	
Firmware Version	4.1(2b)
Organizations	Suse
Tags	

Cisco UCSC-C240-M5SX

CPUs	2	ID	1
Threads	40	Adapters	1
CPU Cores	20	NIC Interfaces	6
CPU Cores Enabled	20	HBA Interfaces	2
Memory Capacity (GiB)	192.0	UUID	AD387D5A-A7BA-4F37-9744-E9E4258FC79F
CPU Capacity (GHz)	44.0		

Alarms	No Alarms
Requests	No Requests
Advisories	No Advisories

7. In the C240 IMC, click Refresh. The system must be shown as Claimed. Click Settings.



/ Admin / Device Connector

The Device Connector is an embedded management controller that enables the capabilities of Cisco Intersight, a cloud-based management platform. For detailed information about configuring the device connector, please visit Help Center

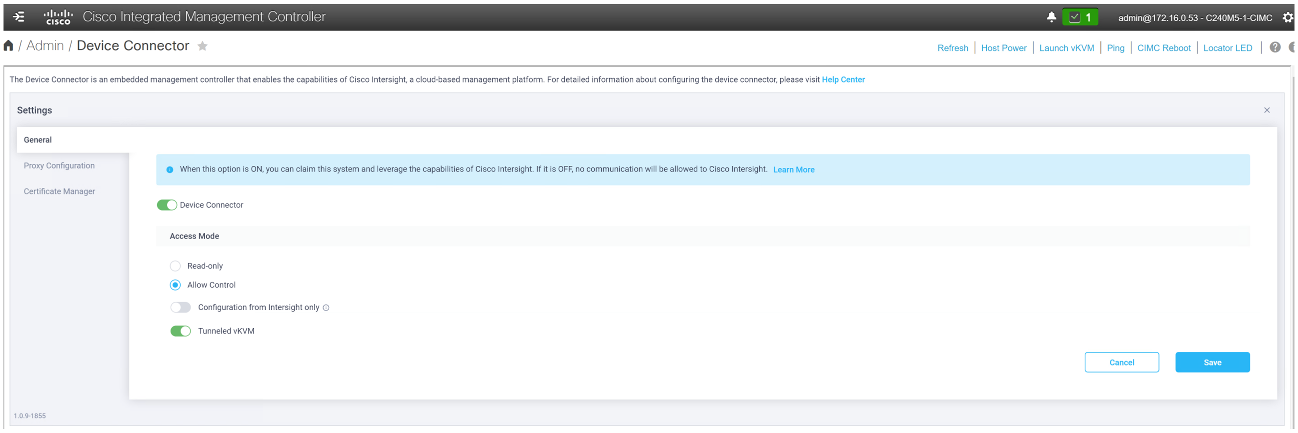
Device Connector

Device ID
WZP234714XL

Claimed to Account
WDF02-4-DMZ

Claimed

8. Enable Tunneld vKVM and click Save. Tunneld vKVM allows the Cisco Intersight platform to open the virtual keyboard, video, and mouse (vKVM) window in the event that the client has no direct network access to the server on the local LAN or virtual private network (VPN).



The Device Connector is an embedded management controller that enables the capabilities of Cisco Intersight, a cloud-based management platform. For detailed information about configuring the device connector, please visit Help Center

When this option is ON, you can claim this system and leverage the capabilities of Cisco Intersight. If it is OFF, no communication will be allowed to Cisco Intersight. Learn More

Device Connector: ON

Access Mode

○ Read-only
● Allow Control

Configuration from Intersight only: OFF

Tunneled vKVM: ON

Configure Cisco UCS C220, C240, and C240 SD through the Cisco Intersight platform

Use the procedure described in this section to prepare Cisco UCS C-Series Servers for the SLE Micro installation. The main focus here is the configuration of the storage and the network.

All configuration steps are performed in the Cisco Intersight portal.

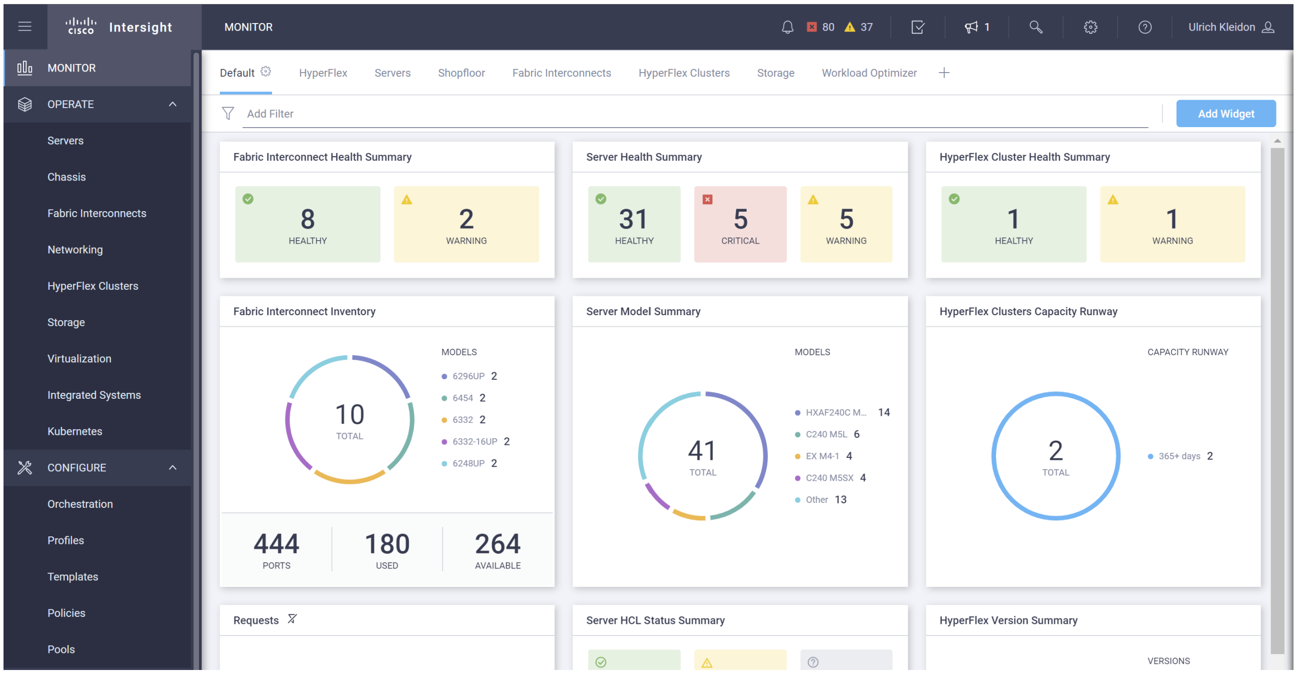
Perform initial setup

Hardware installation details and the initial server setup process are documented in the server's installation documentation. For the Cisco UCS C240 SD M5, the document can be found here: https://www.cisco.com/c/en/us/td/docs/unified_computing/ucs/c/hw/c240sdm5/install/c240sdm5/C240M5_chapter_01.html.

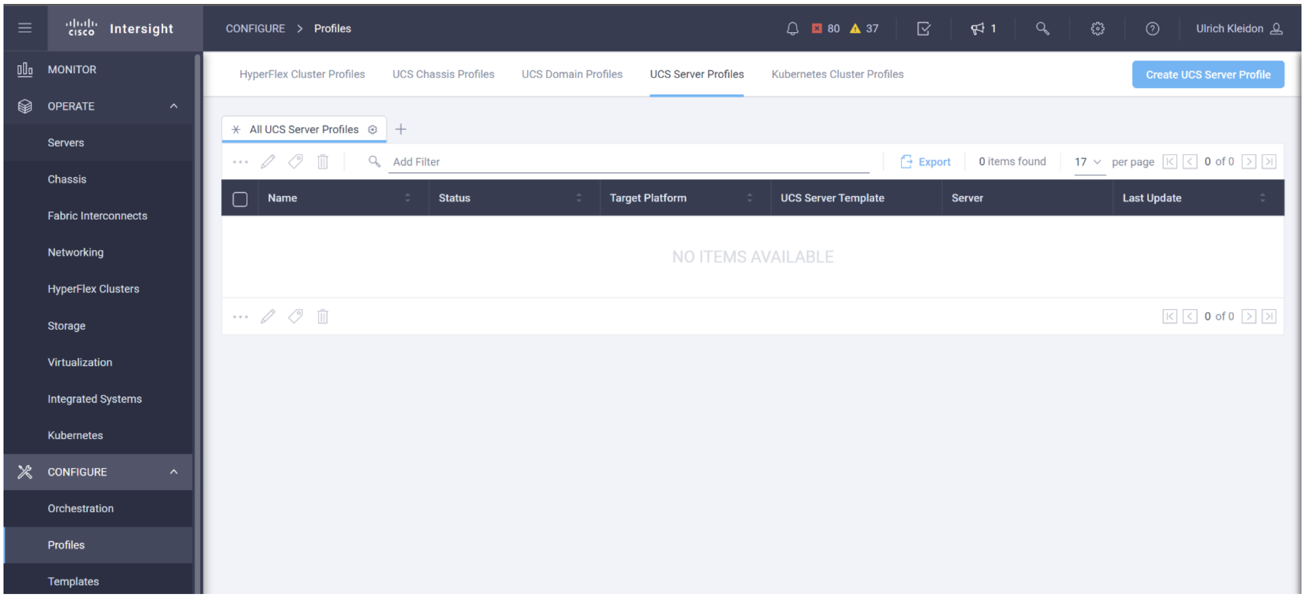
Configure the storage and network

Follow these steps to configure the storage and network for SLE Micro and K3s:

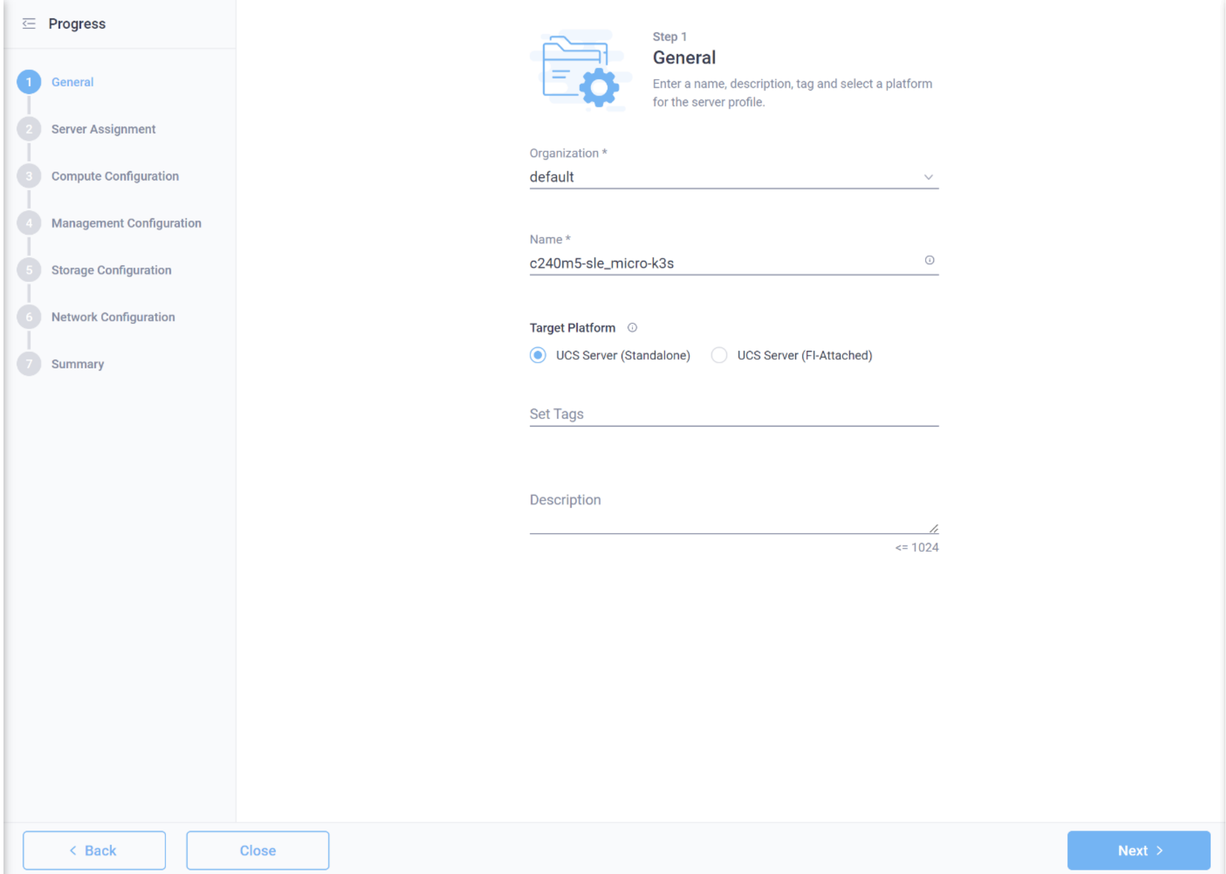
1. Open the Cisco Intersight portal in a web browser and log in as a user with admin permissions.



2. In the left menu, navigate to Configure > Profiles and click the UCS Server Profiles tab. Click Create UCS Server Profile.



3. Enter a name for the new server profile and click Next.



Step 1

General

Enter a name, description, tag and select a platform for the server profile.

Organization *
default

Name *
c240m5-sle_micro-k3s

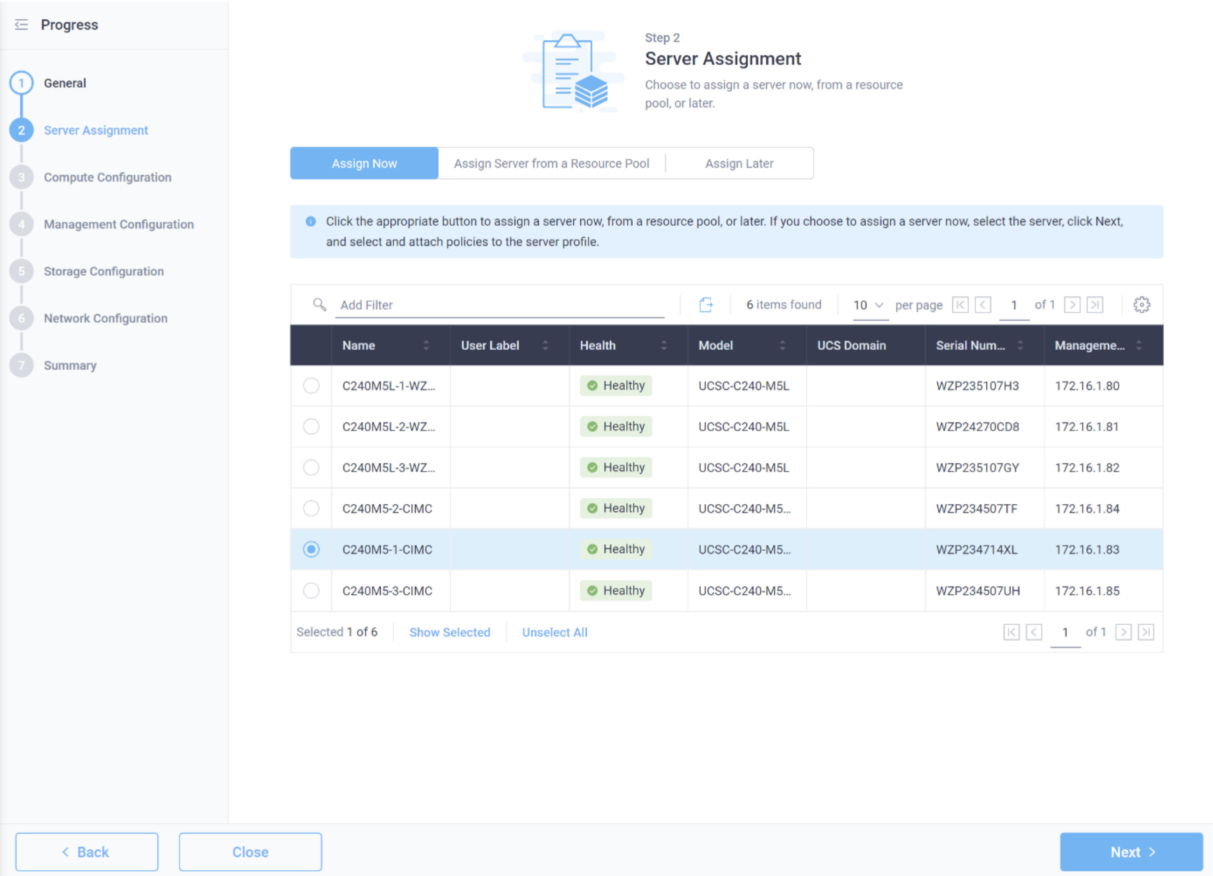
Target Platform
● UCS Server (Standalone) ○ UCS Server (FI-Attached)

Set Tags

Description

<= 1024

4. Select the server that will be assigned to the server profile and used to install SLE Micro and K3s.



Step 2

Server Assignment

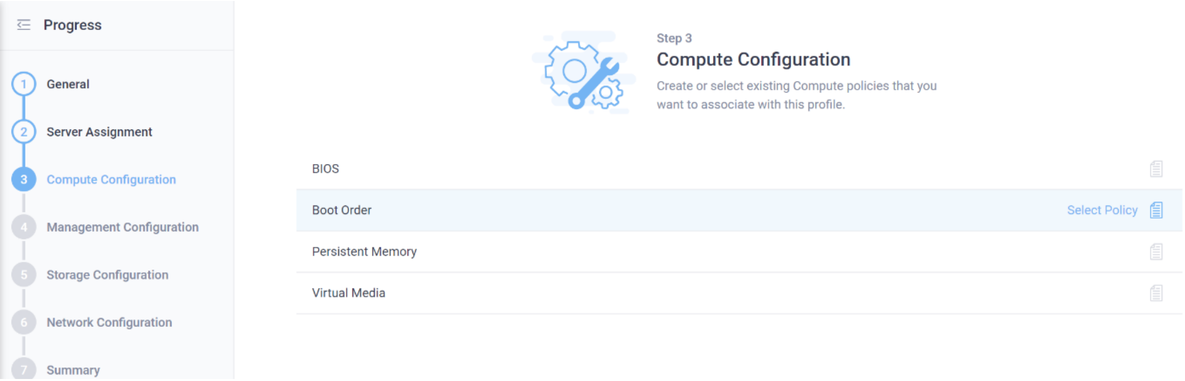
Choose to assign a server now, from a resource pool, or later.

Click the appropriate button to assign a server now, from a resource pool, or later. If you choose to assign a server now, select the server, click Next, and select and attach policies to the server profile.

	Name	User Label	Health	Model	UCS Domain	Serial Num...	Manageme...
○	C240M5L-1-WZ...		Healthy	UCSC-C240-M5L		WZP235107H3	172.16.1.80
○	C240M5L-2-WZ...		Healthy	UCSC-C240-M5L		WZP24270CD8	172.16.1.81
○	C240M5L-3-WZ...		Healthy	UCSC-C240-M5L		WZP235107GY	172.16.1.82
○	C240M5-2-CIMC		Healthy	UCSC-C240-M5...		WZP234507TF	172.16.1.84
●	C240M5-1-CIMC		Healthy	UCSC-C240-M5...		WZP234714XL	172.16.1.83
○	C240M5-3-CIMC		Healthy	UCSC-C240-M5...		WZP234507UH	172.16.1.85

Selected 1 of 6 Show Selected Unselect All

5. Click Select Policy to the right of Boot Order.

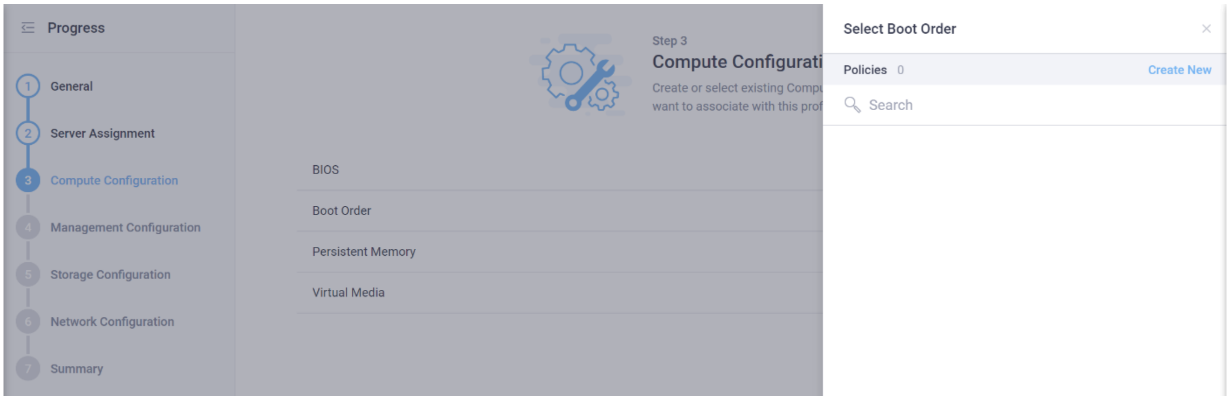


Step 3

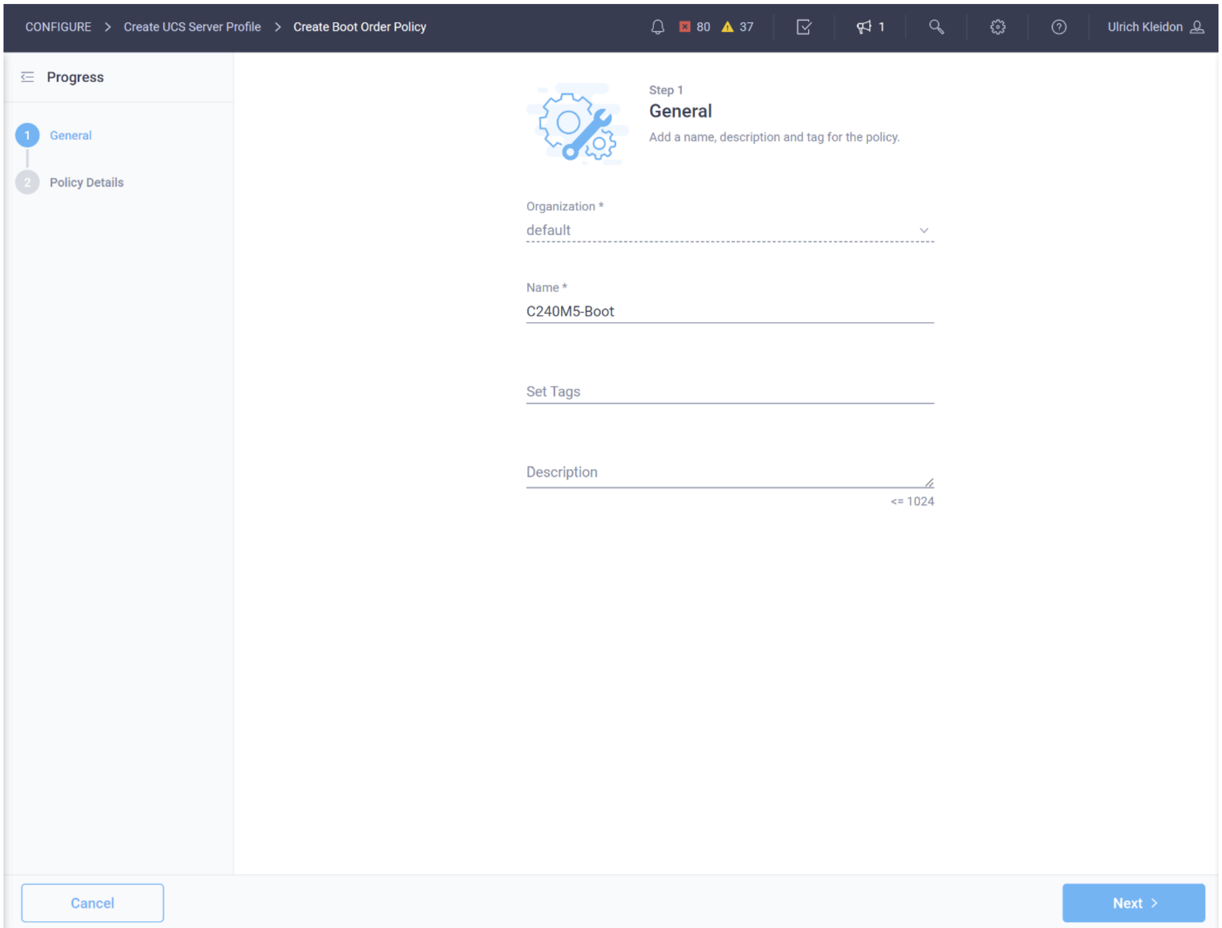
Compute Configuration

Create or select existing Compute policies that you want to associate with this profile.

6. Click Create New (or select a profile that fits your needs).



7. Enter the name of the new boot profile and click Next.


CONFIGURE > Create UCS Server Profile > Create Boot Order Policy
80 37 1
Ulrich Kleidon
Progress
1 General
2 Policy Details
Step 1
General
Add a name, description and tag for the policy.

Organization * default

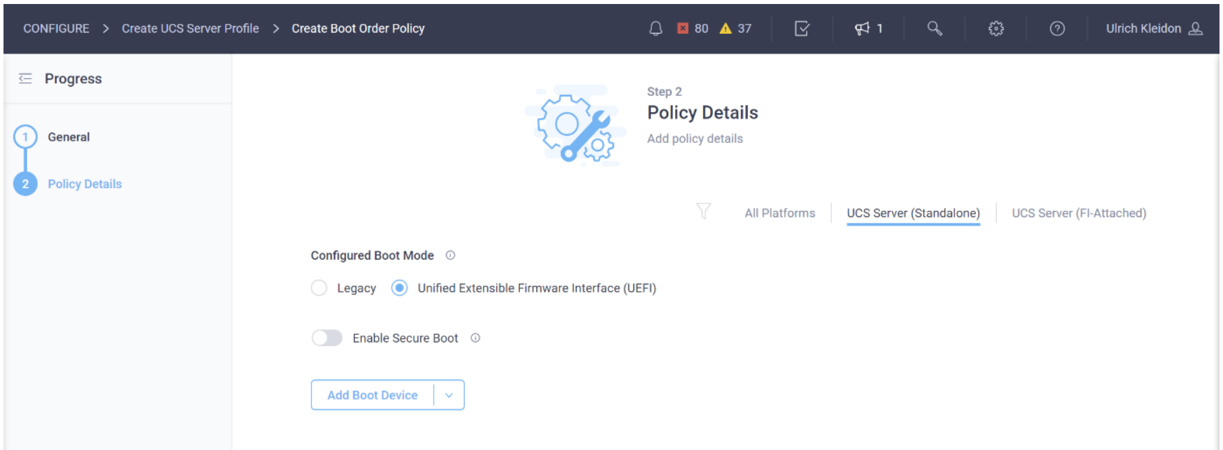
Name * C240M5-Boot

Set Tags

Description

<= 1024

8. Select Unified Extensible Firmware Image (UEFI) under Configured Boot Mode and click Add Boot Device.

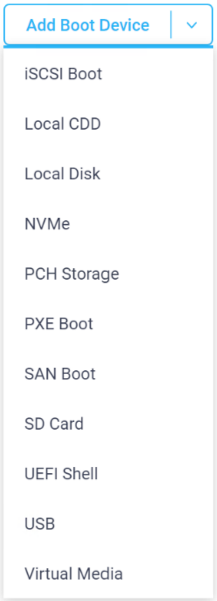


Configured Boot Mode

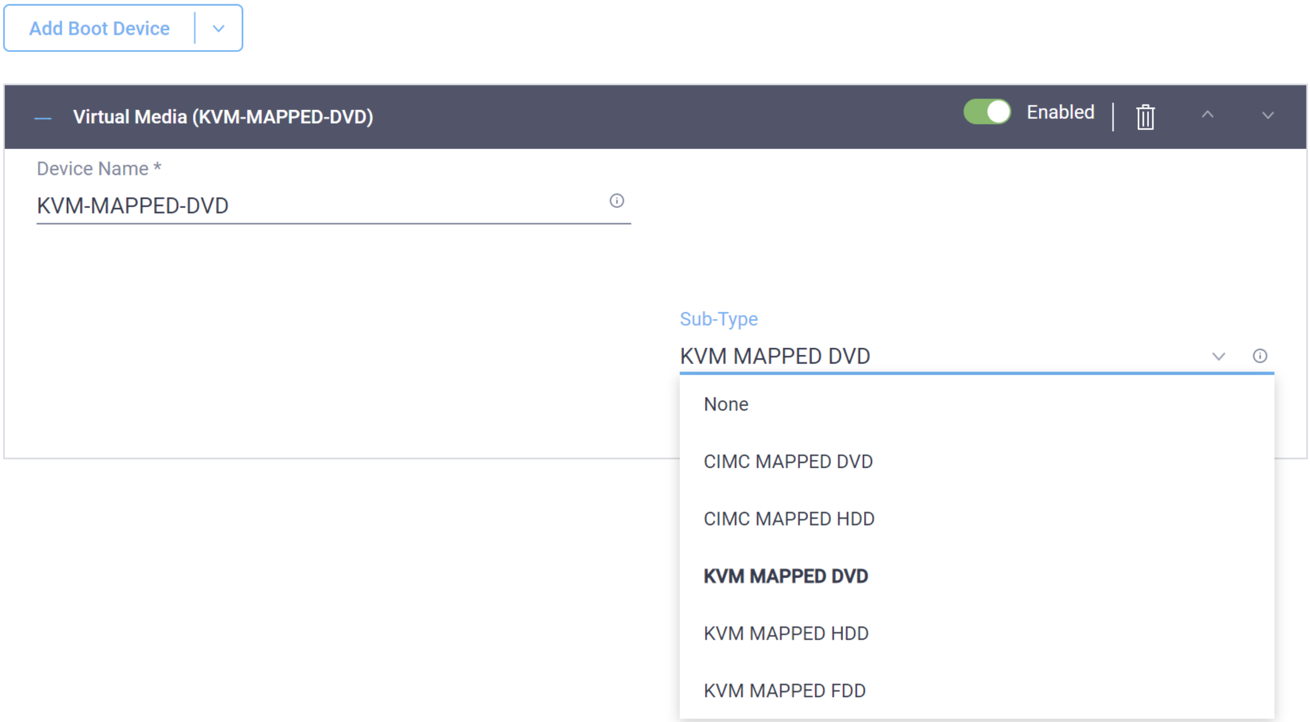
○ Legacy ● Unified Extensible Firmware Interface (UEFI)

Enable Secure Boot

9. Select UEFI Shell from the drop-down menu, enter **UEFI-SHELL** as the name, and click Add.



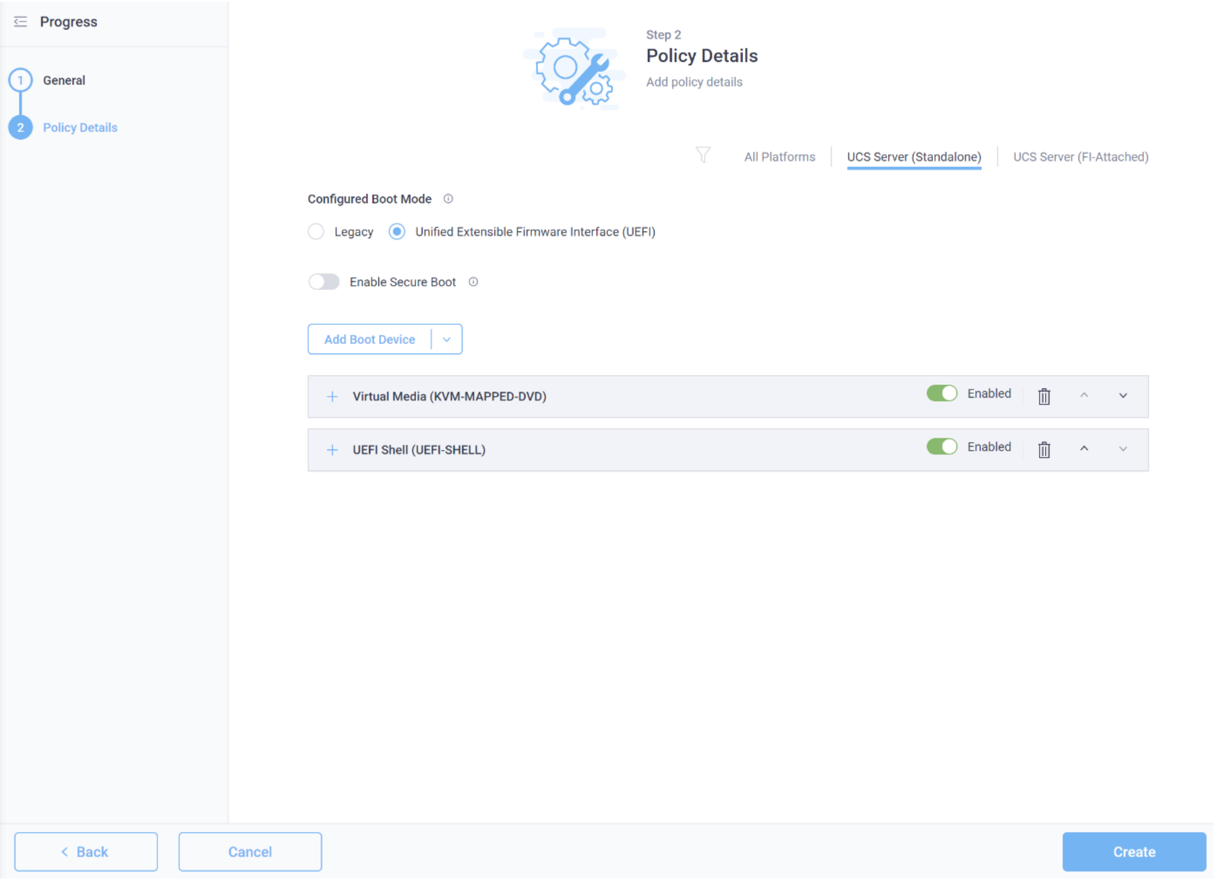
10. Click Add Boot Device again and select Virtual Media.
11. Enter KVM-MAPPED-DVD as the device name and select KVM MAPPED DVD as the subtype from the drop-down list.
    Click Add.



Device Name *
KVM-MAPPED-DVD

Sub-Type
KVM MAPPED DVD

12. The KVM-MAPPED-DVD should be the first option and the UEFI-Shell the second option in the list. Click Create.



Progress

1 General

2 Policy Details

Step 2

Policy Details

Add policy details

All Platforms | UCS Server (Standalone) | UCS Server (FI-Attached)

Configured Boot Mode

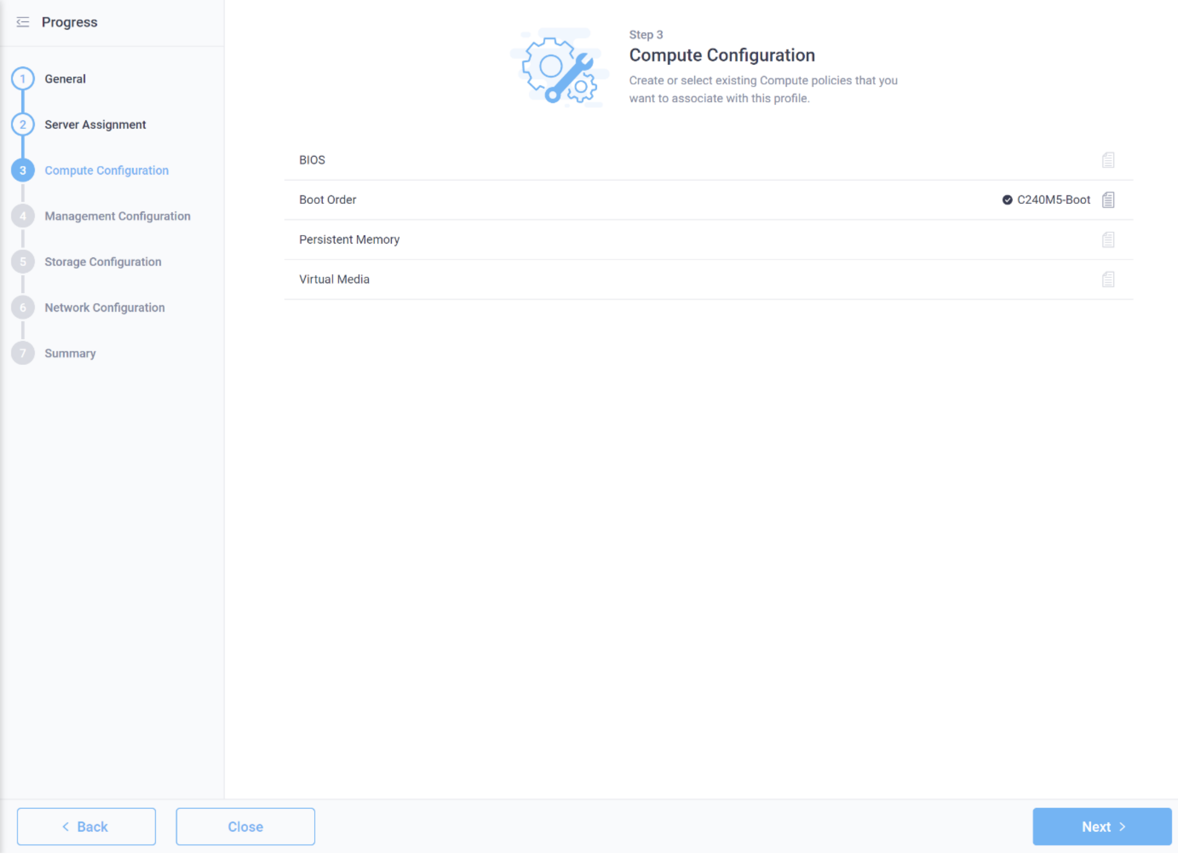
○ Legacy ● Unified Extensible Firmware Interface (UEFI)

Enable Secure Boot

Add Boot Device

Boot device	State
Virtual Media (KVM-MAPPED-DVD)	Enabled
UEFI Shell (UEFI-SHELL)	Enabled

13. Click Next.



Progress

1 General

2 Server Assignment

3 Compute Configuration

4 Management Configuration

5 Storage Configuration

6 Network Configuration

7 Summary

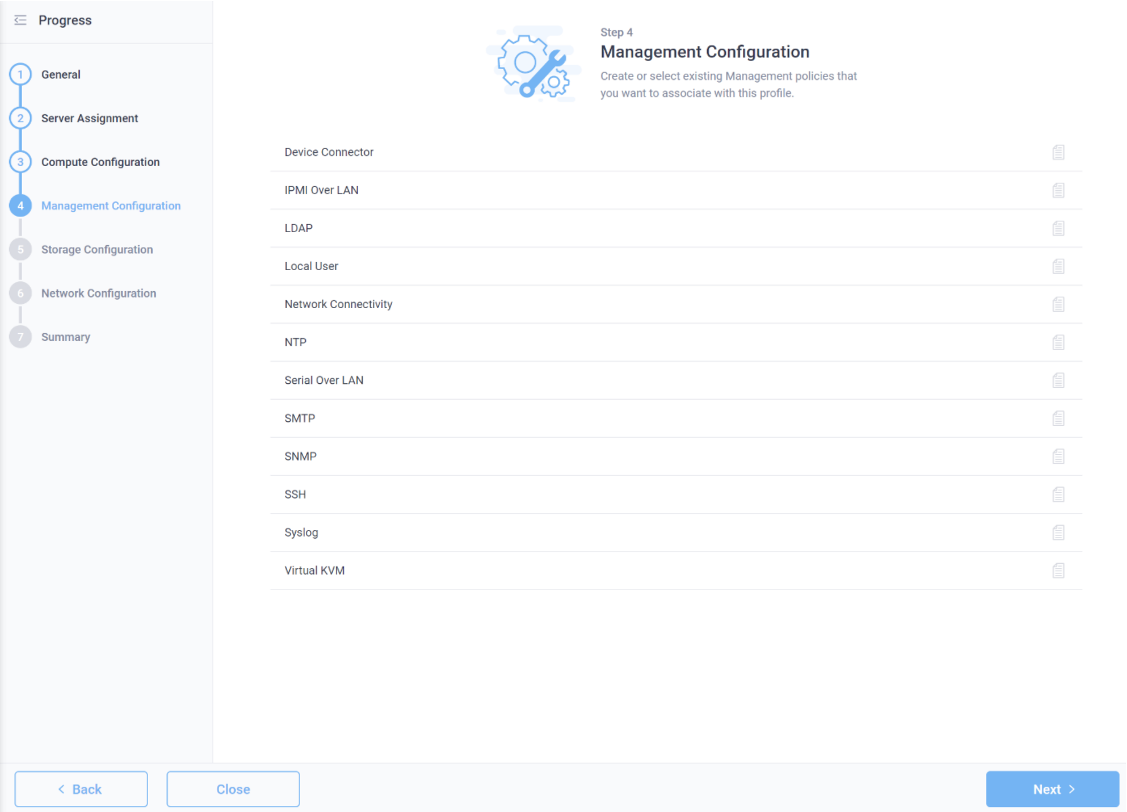
Step 3

Compute Configuration

Create or select existing Compute policies that you want to associate with this profile.

Policy	Selected
BIOS	
Boot Order	C240M5-Boot
Persistent Memory	
Virtual Media	

14. Click Next.



Step 4

Management Configuration

Create or select existing Management policies that you want to associate with this profile.

Device Connector

IPMI Over LAN

LDAP

Local User

Network Connectivity

NTP

Serial Over LAN

SMTP

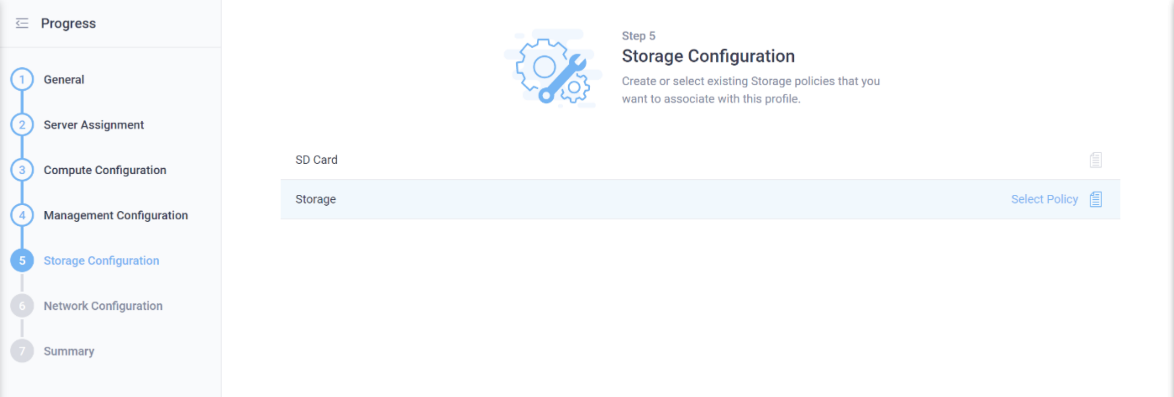
SNMP

SSH

Syslog

Virtual KVM

15. Move your mouse to the Storage entry and click Select Policy and Create New.



Step 5

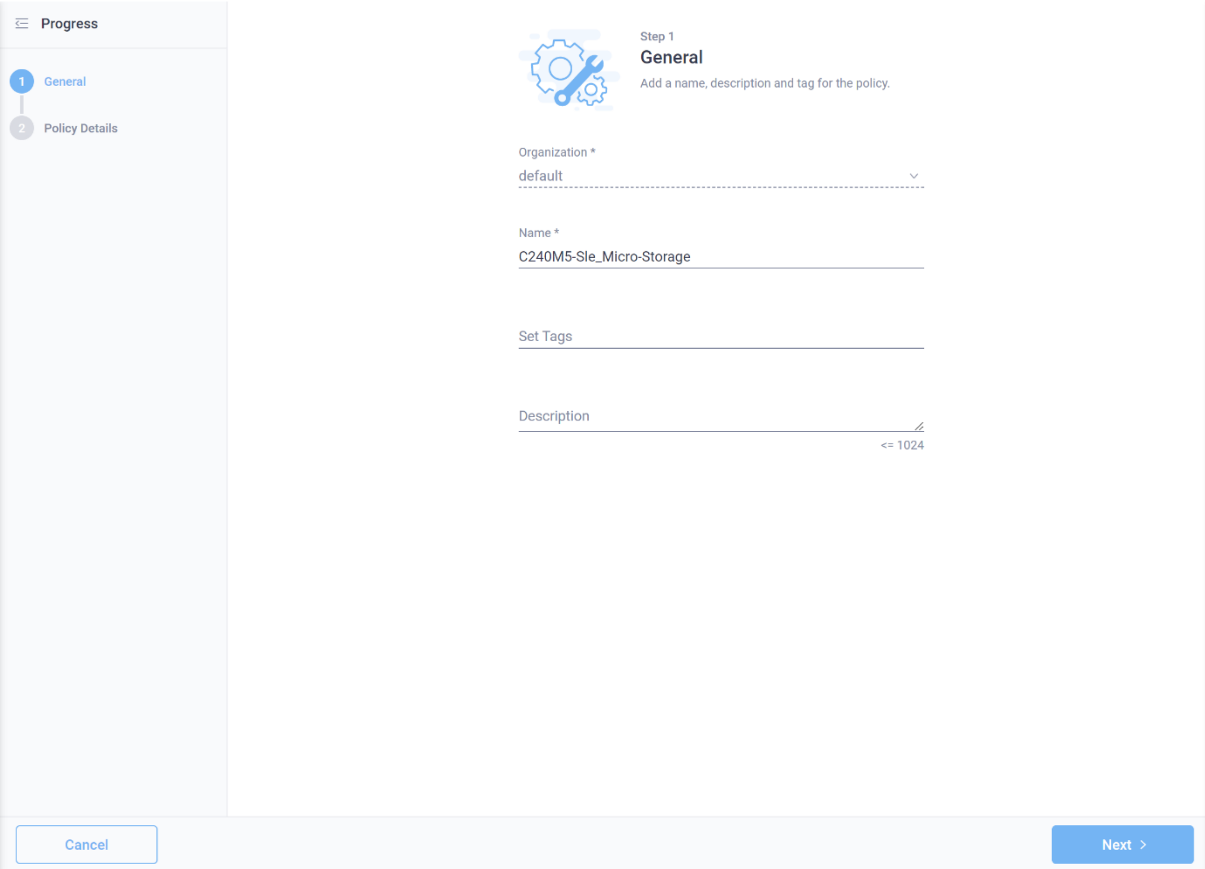
Storage Configuration

Create or select existing Storage policies that you want to associate with this profile.

SD Card

Storage

16. Enter a name for the new storage policy and click Next.



Step 1

General

Add a name, description and tag for the policy.

Organization * default

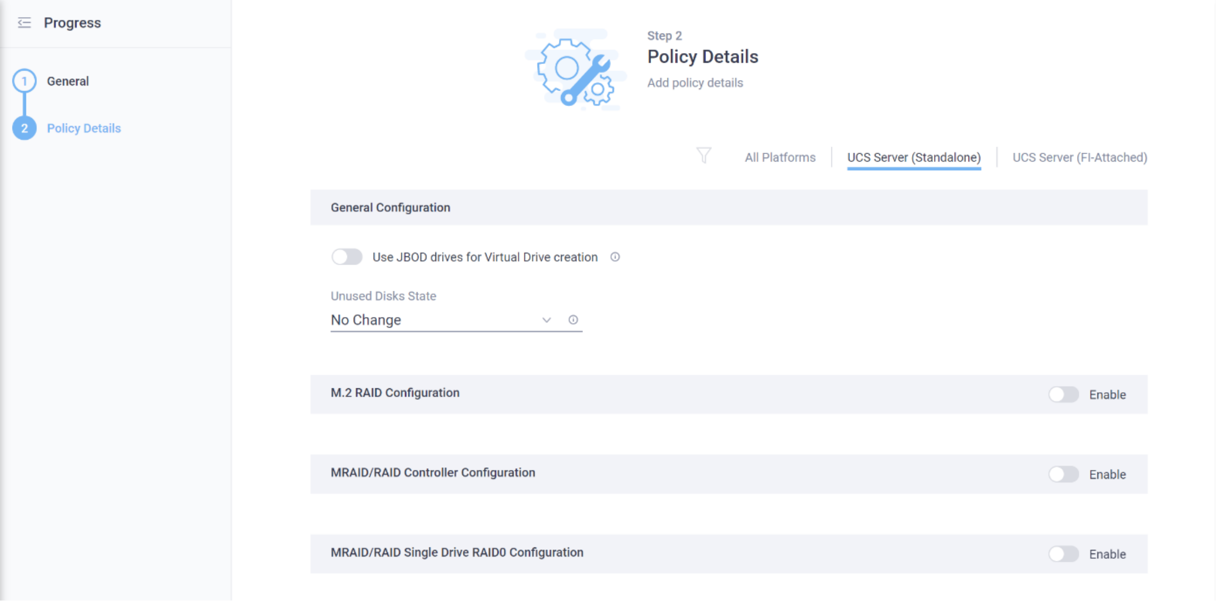
Name * C240M5-Sle_Micro-Storage

Set Tags

Description

<= 1024

17. If the drive state in this server is unknown, you can enable “Use JBOD drives for Virtual Drive creation.” As the drive state of this server is known, you do not need to enable this option



Step 2

Policy Details

Add policy details

General Configuration

Use JBOD drives for Virtual Drive creation

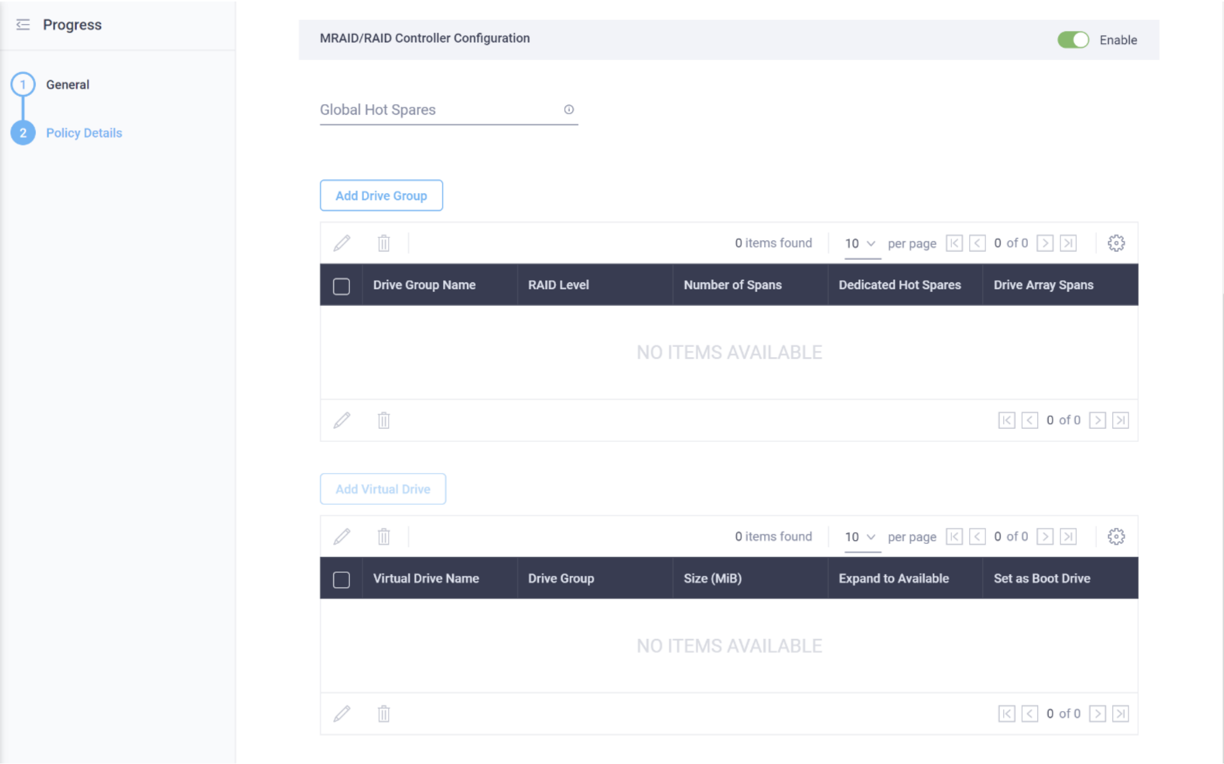
Unused Disks State No Change

M.2 RAID Configuration Enable

MRAID/RAID Controller Configuration Enable

MRAID/RAID Single Drive RAID0 Configuration Enable

18. Enable MRAID/RAID Controller Configuration and click Add Drive Group.



MRAID/RAID Controller Configuration — Enable

Global Hot Spares

0 items found 10 per page 0 of 0

☐	Drive Group Name	RAID Level	Number of Spans	Dedicated Hot Spares	Drive Array Spans

NO ITEMS AVAILABLE

0 of 0

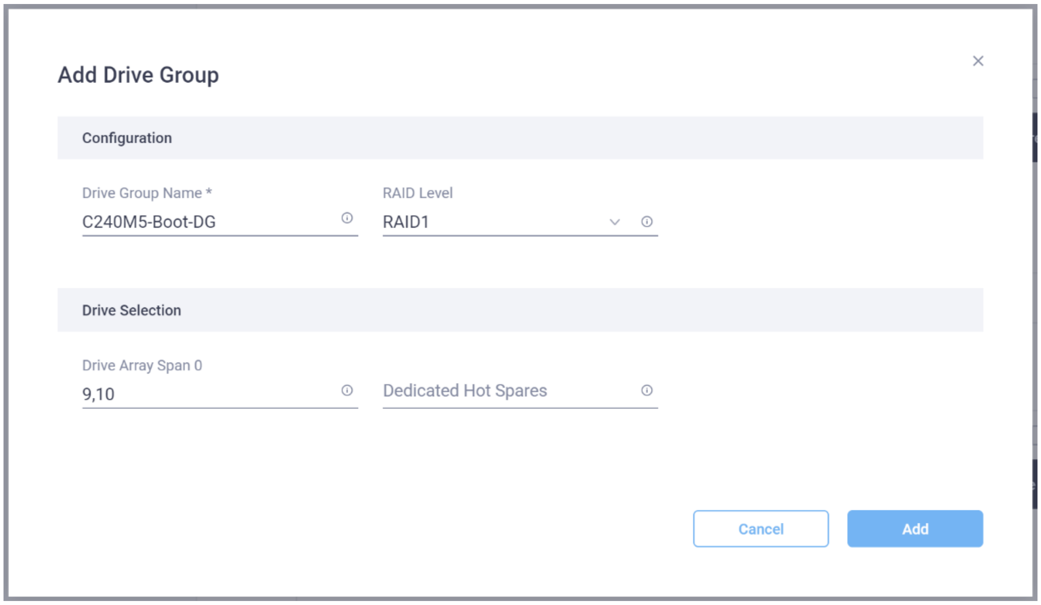
0 items found 10 per page 0 of 0

☐	Virtual Drive Name	Drive Group	Size (MiB)	Expand to Available	Set as Boot Drive

NO ITEMS AVAILABLE

0 of 0

19. Enter a drive group Name, select RAID1 as the RAID level, and enter the drive numbers of the two drives that will form the RAID1 group for boot. Then click Add.



Add Drive Group

Configuration

Drive Group Name *: C240M5-Boot-DG

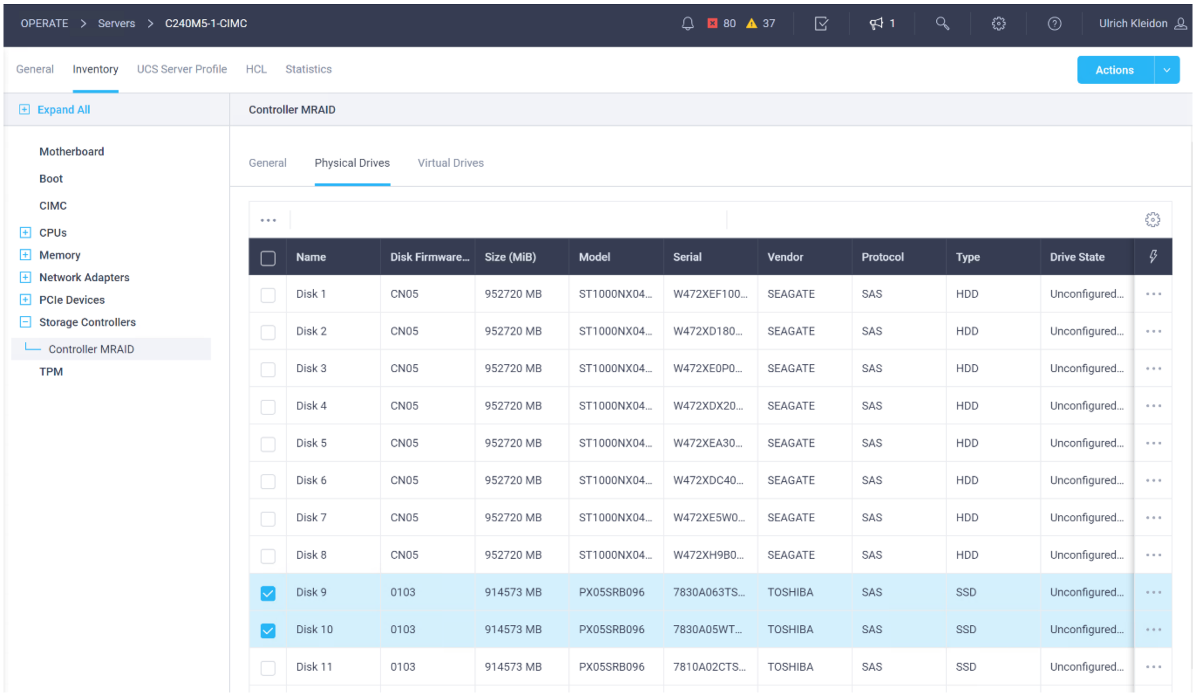
RAID Level: RAID1

Drive Selection

Drive Array Span 0: 9,10

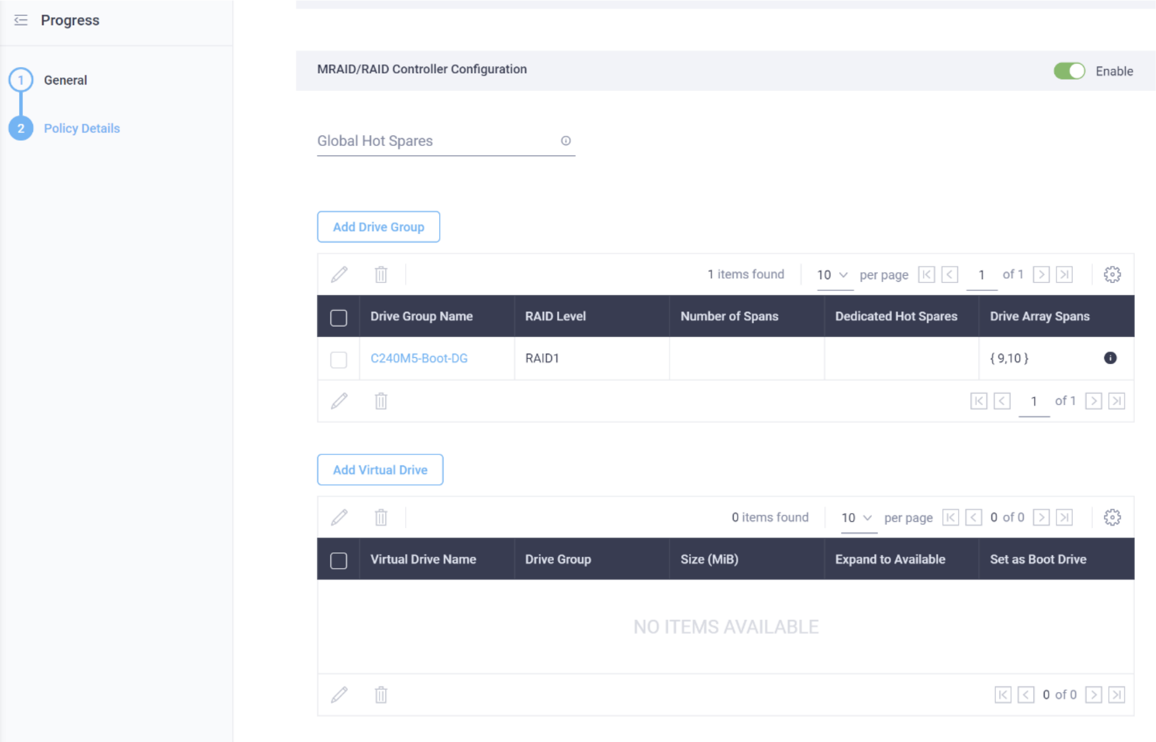
Dedicated Hot Spares

You can find the drive numbers by navigating to Operate > Server > [name of your server] > Inventory > Storage Controller > Controller MRAID > Physical Drives.



□	Name	Disk Firmware...	Size (MiB)	Model	Serial	Vendor	Protocol	Type	Drive State
□	Disk 1	CN05	952720 MB	ST1000NX04...	W472XEF100...	SEAGATE	SAS	HDD	Unconfigured...
□	Disk 2	CN05	952720 MB	ST1000NX04...	W472XD180...	SEAGATE	SAS	HDD	Unconfigured...
□	Disk 3	CN05	952720 MB	ST1000NX04...	W472XE0P0...	SEAGATE	SAS	HDD	Unconfigured...
□	Disk 4	CN05	952720 MB	ST1000NX04...	W472XDX20...	SEAGATE	SAS	HDD	Unconfigured...
□	Disk 5	CN05	952720 MB	ST1000NX04...	W472XEA30...	SEAGATE	SAS	HDD	Unconfigured...
□	Disk 6	CN05	952720 MB	ST1000NX04...	W472XDC40...	SEAGATE	SAS	HDD	Unconfigured...
□	Disk 7	CN05	952720 MB	ST1000NX04...	W472XE5W0...	SEAGATE	SAS	HDD	Unconfigured...
□	Disk 8	CN05	952720 MB	ST1000NX04...	W472XH9B0...	SEAGATE	SAS	HDD	Unconfigured...
☑	Disk 9	0103	914573 MB	PX05SRB096	7830A063TS...	TOSHIBA	SAS	SSD	Unconfigured...
☑	Disk 10	0103	914573 MB	PX05SRB096	7830A05WT...	TOSHIBA	SAS	SSD	Unconfigured...
□	Disk 11	0103	914573 MB	PX05SRB096	7810A02CTS...	TOSHIBA	SAS	SSD	Unconfigured...

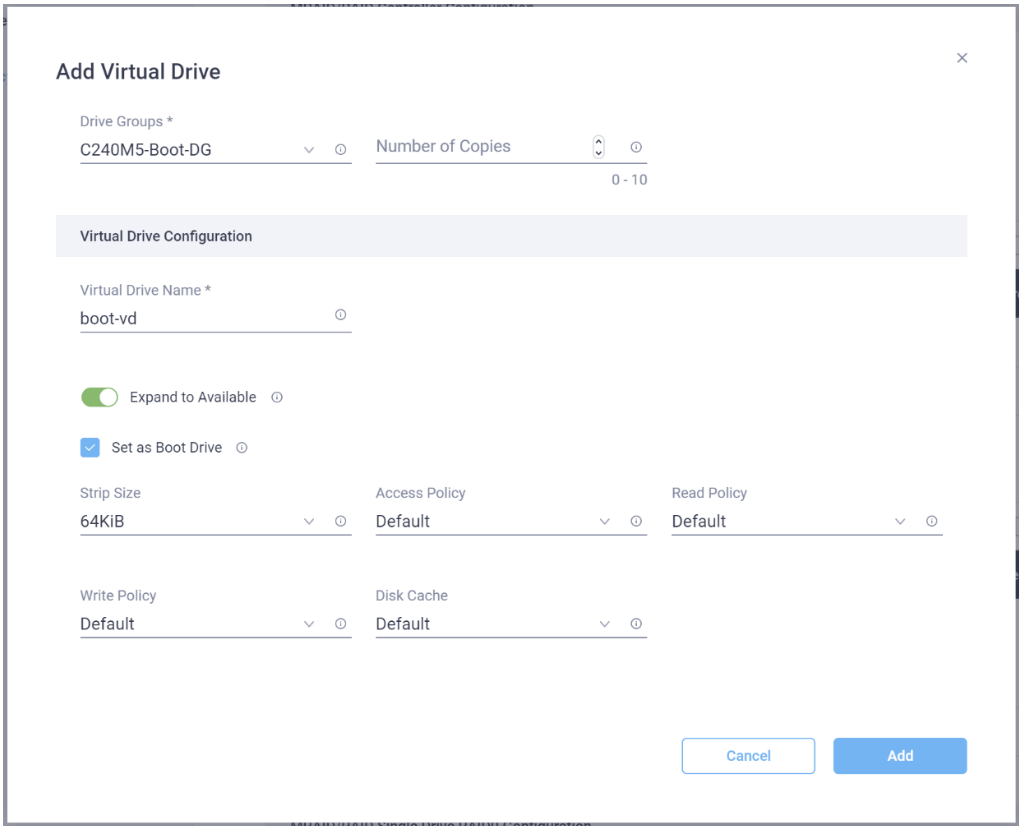
20. Click Add Virtual Drive.



□	Drive Group Name	RAID Level	Number of Spans	Dedicated Hot Spares	Drive Array Spans
□	C240M5-Boot-DG	RAID1			{ 9,10 }

□	Virtual Drive Name	Drive Group	Size (MiB)	Expand to Available	Set as Boot Drive

21. Enter a name for the new virtual drive, select the created drive group, and enable Expand to Available to use the complete capacity of the RAID1 drive group. Click Add.



Add Virtual Drive

Drive Groups * C240M5-Boot-DG

Number of Copies 0 - 10

Virtual Drive Configuration

Virtual Drive Name * boot-vd

Expand to Available: enabled

☑ Set as Boot Drive

Strip Size: 64KiB

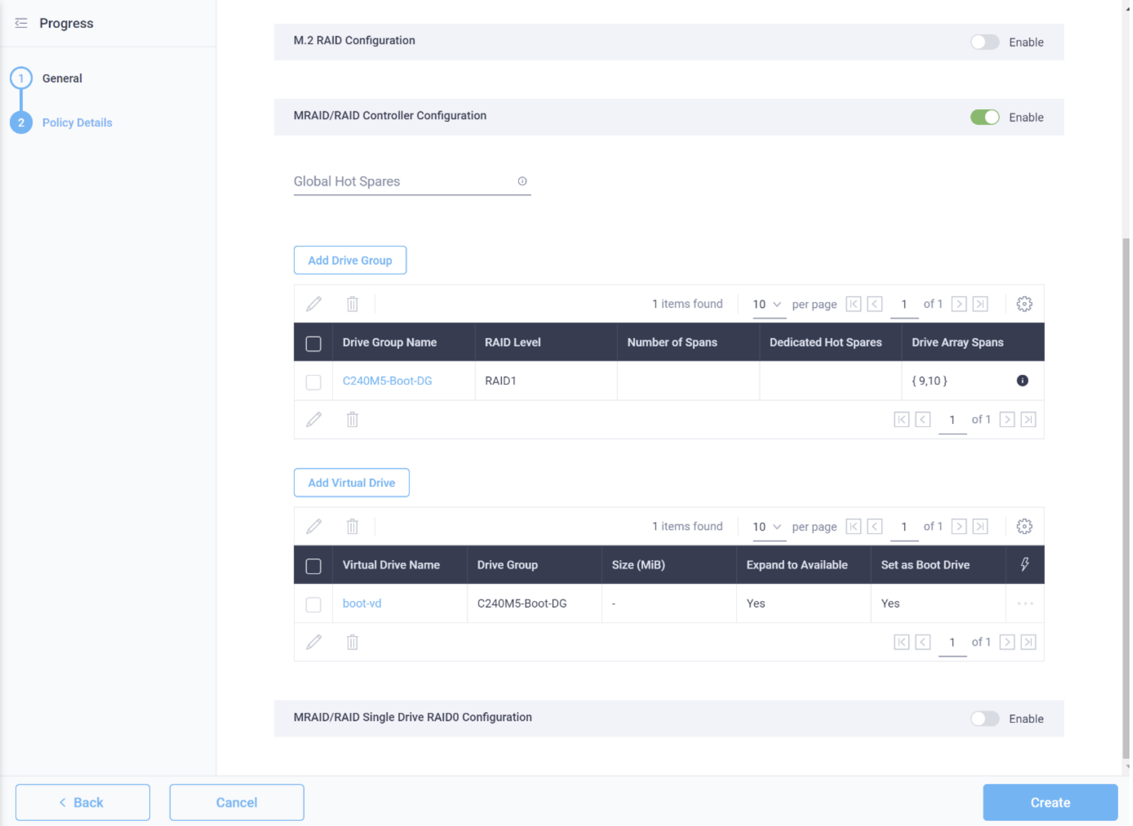
Access Policy: Default

Read Policy: Default

Write Policy: Default

Disk Cache: Default

22. Click Create.



M.2 RAID Configuration — Enable: off

MRAID/RAID Controller Configuration — Enable: on

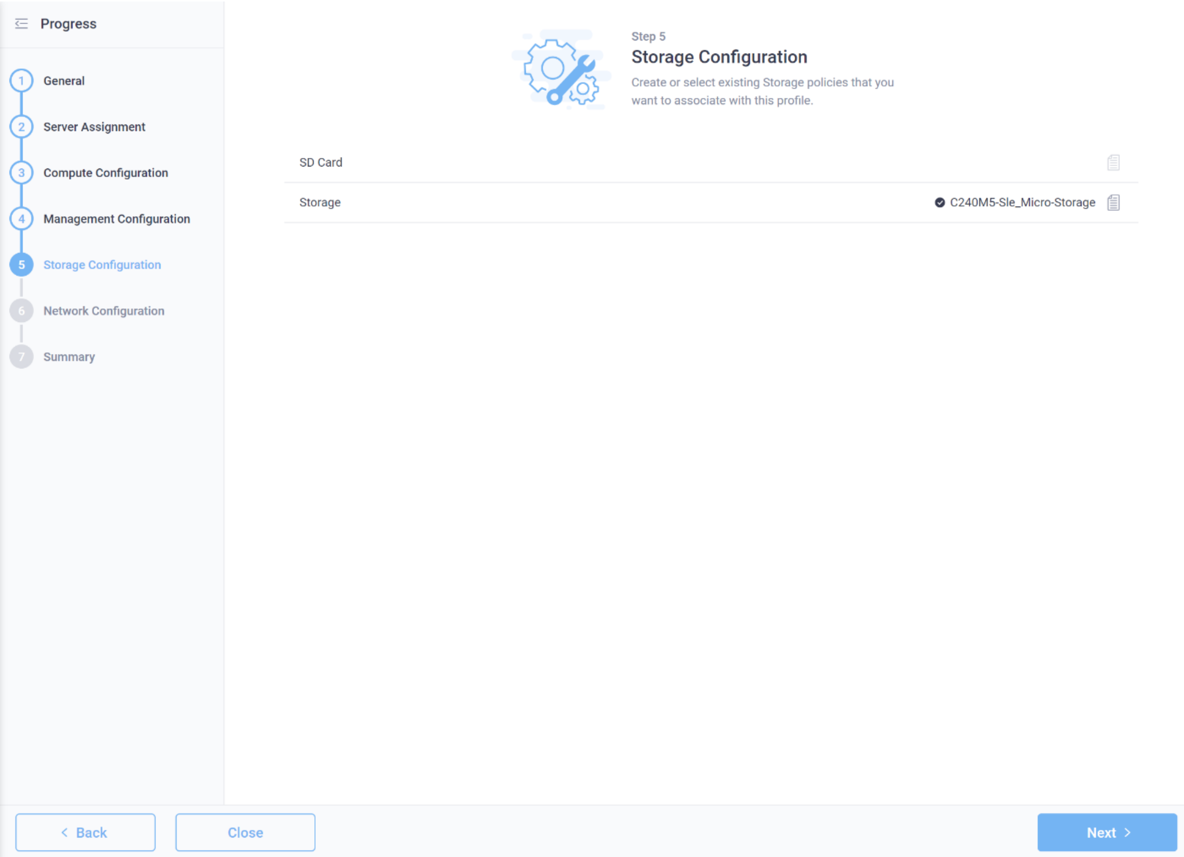
Global Hot Spares

Drive Group Name	RAID Level	Number of Spans	Dedicated Hot Spares	Drive Array Spans
C240M5-Boot-DG	RAID1			{ 9,10 }

Virtual Drive Name	Drive Group	Size (MiB)	Expand to Available	Set as Boot Drive
boot-vd	C240M5-Boot-DG	-	Yes	Yes

MRAID/RAID Single Drive RAID0 Configuration — Enable: off

23. Click Next.



Step 5

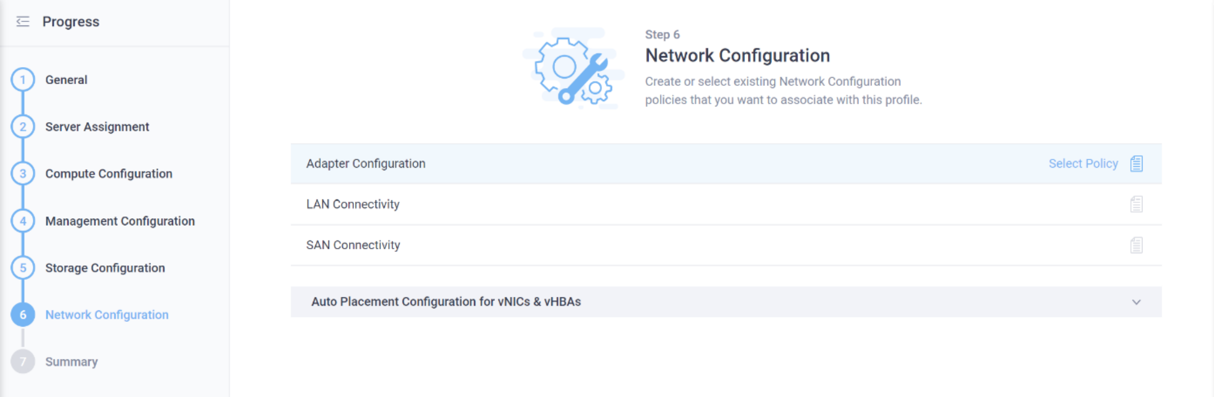
Storage Configuration

Create or select existing Storage policies that you want to associate with this profile.

SD Card

Storage ✓ C240M5-Sle_Micro-Storage

24. Click Select Policy to the right of Adapter Configuration and then click Create New.



Step 6

Network Configuration

Create or select existing Network Configuration policies that you want to associate with this profile.

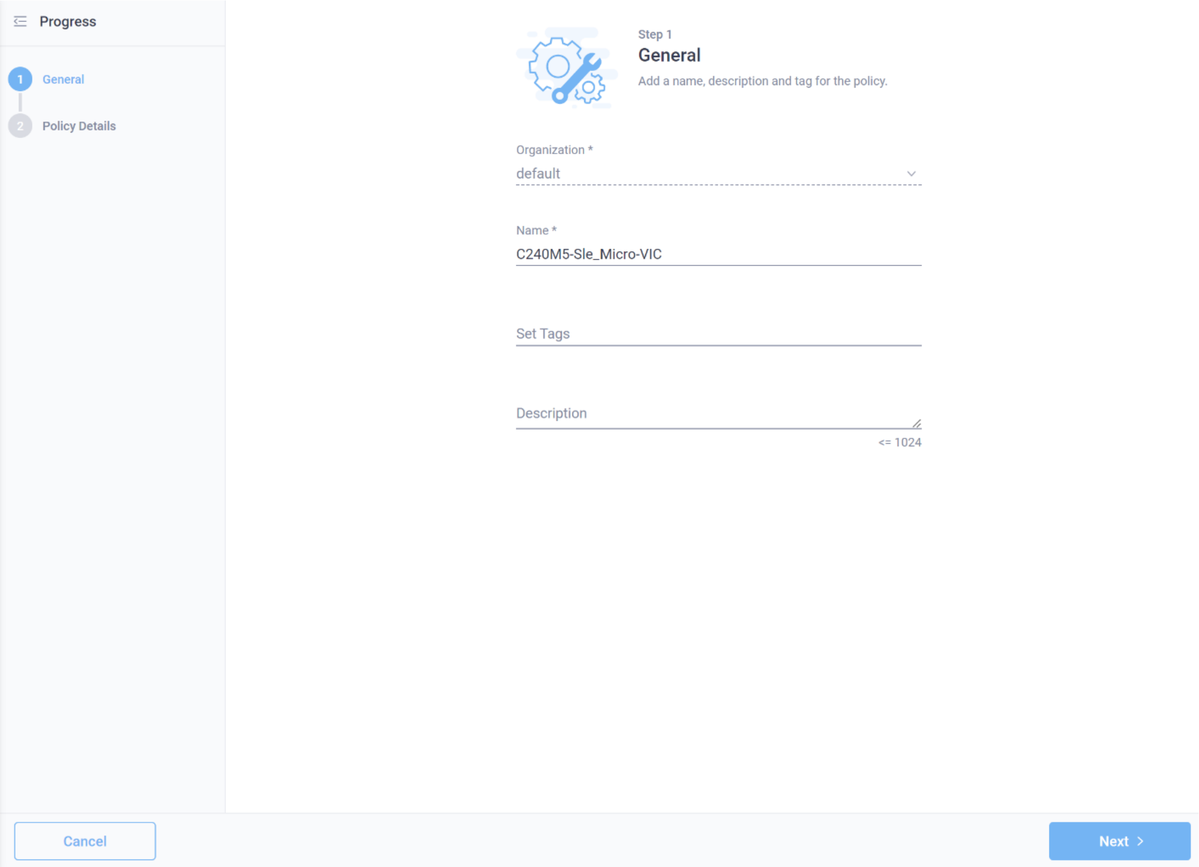
Adapter Configuration

LAN Connectivity

SAN Connectivity

Auto Placement Configuration for vNICs & vHBAs

25. Enter the name for the new adapter configuration policy and click Next.



Step 1

General

Add a name, description and tag for the policy.

Organization *
default

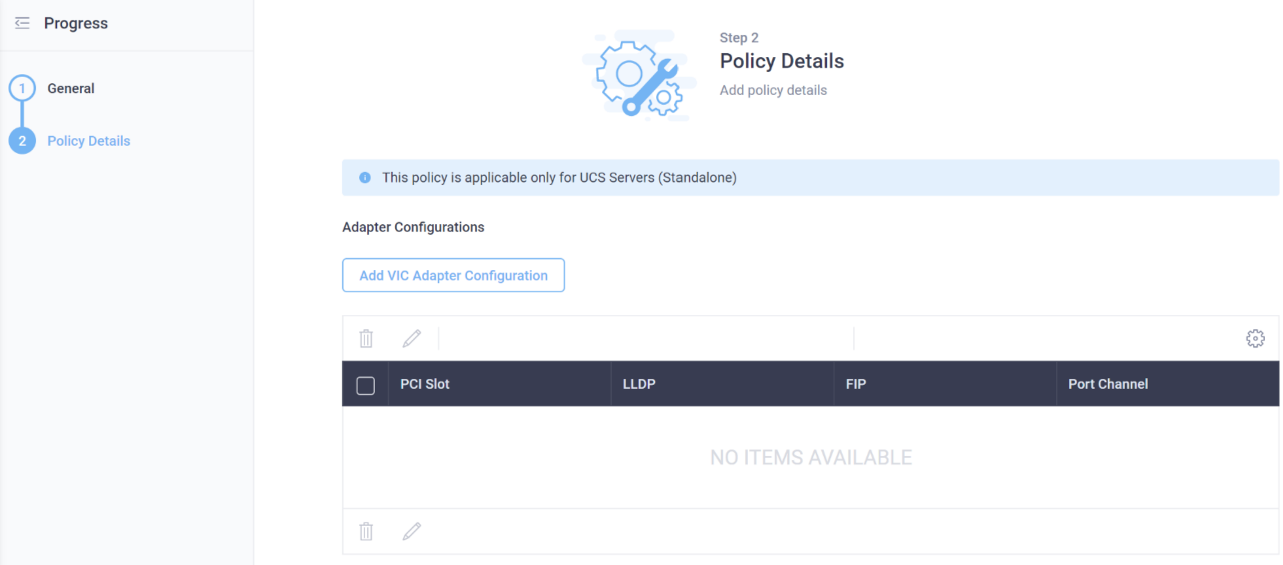
Name *
C240M5-Sle_Micro-VIC

Set Tags

Description

<= 1024

26. Click Add VIC Adapter Configuration.



Step 2

Policy Details

Add policy details

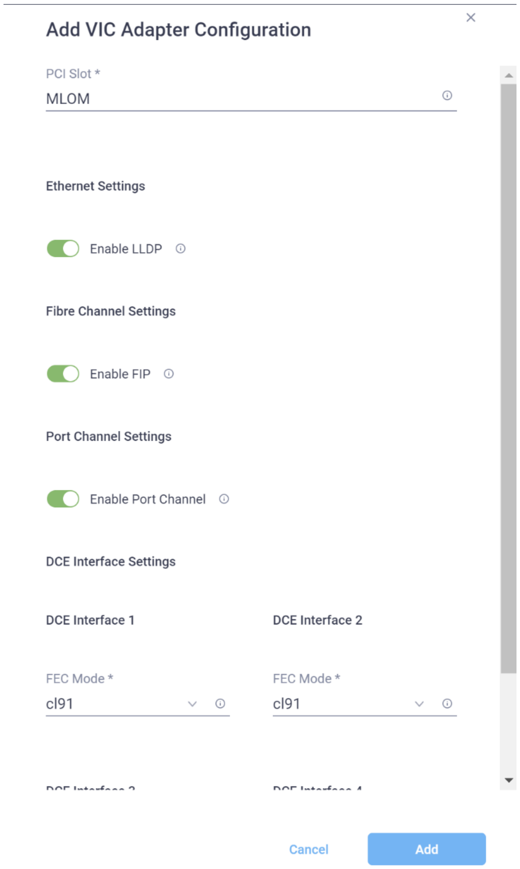
This policy is applicable only for UCS Servers (Standalone)

Adapter Configurations

□	PCI Slot	LLDP	FIP	Port Channel

NO ITEMS AVAILABLE

27. Enter MLOM as the PCI slot, enable the port channel settings, and click Add.



Add VIC Adapter Configuration

PCI Slot *
MLOM

Ethernet Settings

Enable LLDP

Fibre Channel Settings

Enable FIP

Port Channel Settings

Enable Port Channel

DCE Interface Settings

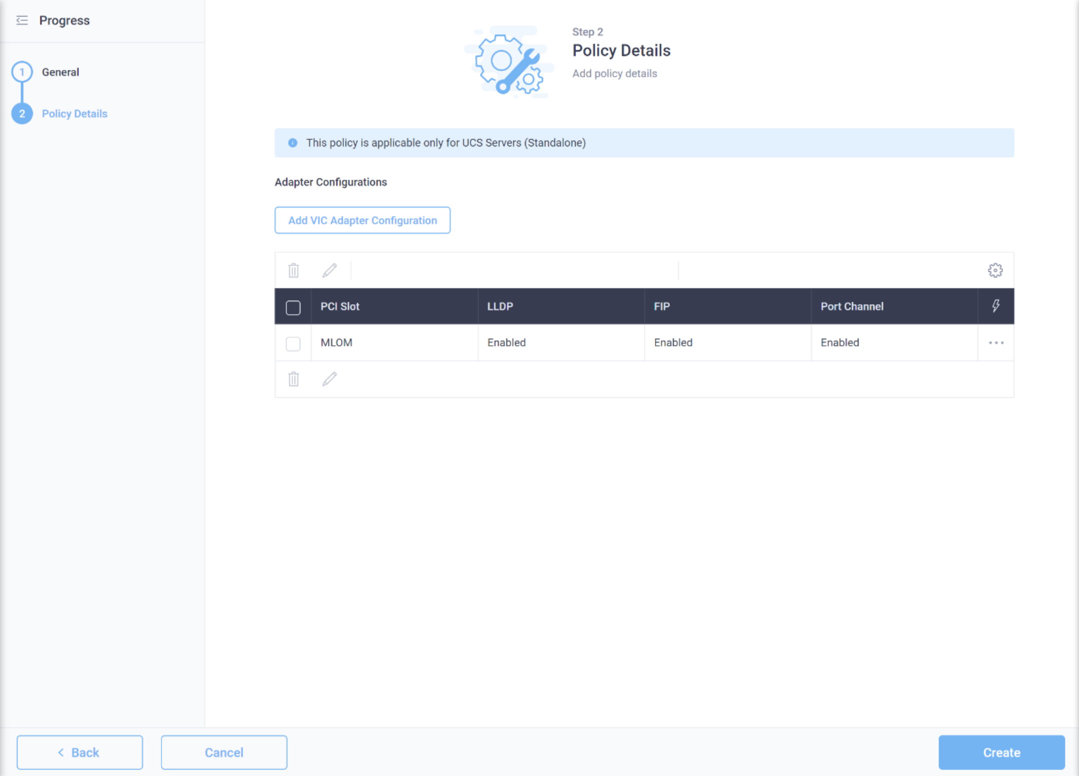
DCE Interface 1

DCE Interface 2

FEC Mode *
cl91

FEC Mode *
cl91

28. Click Create.



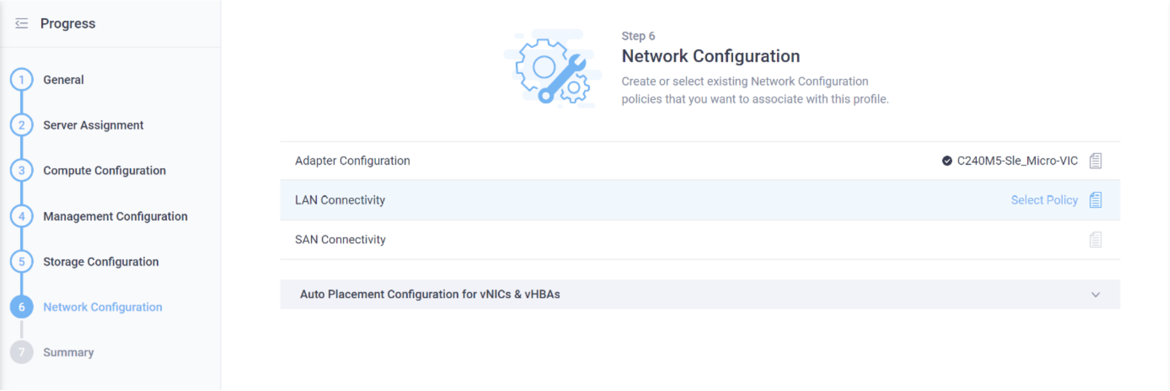
Step 2
Policy Details
Add policy details

This policy is applicable only for UCS Servers (Standalone)

Adapter Configurations

PCI Slot	LLDP	FIP	Port Channel
MLOM	Enabled	Enabled	Enabled

29. Click Select Policy to the right of LAN Connectivity and then click Create New.



Progress

1 General
2 Server Assignment
3 Compute Configuration
4 Management Configuration
5 Storage Configuration
6 Network Configuration
7 Summary

Step 6

Network Configuration

Create or select existing Network Configuration policies that you want to associate with this profile.

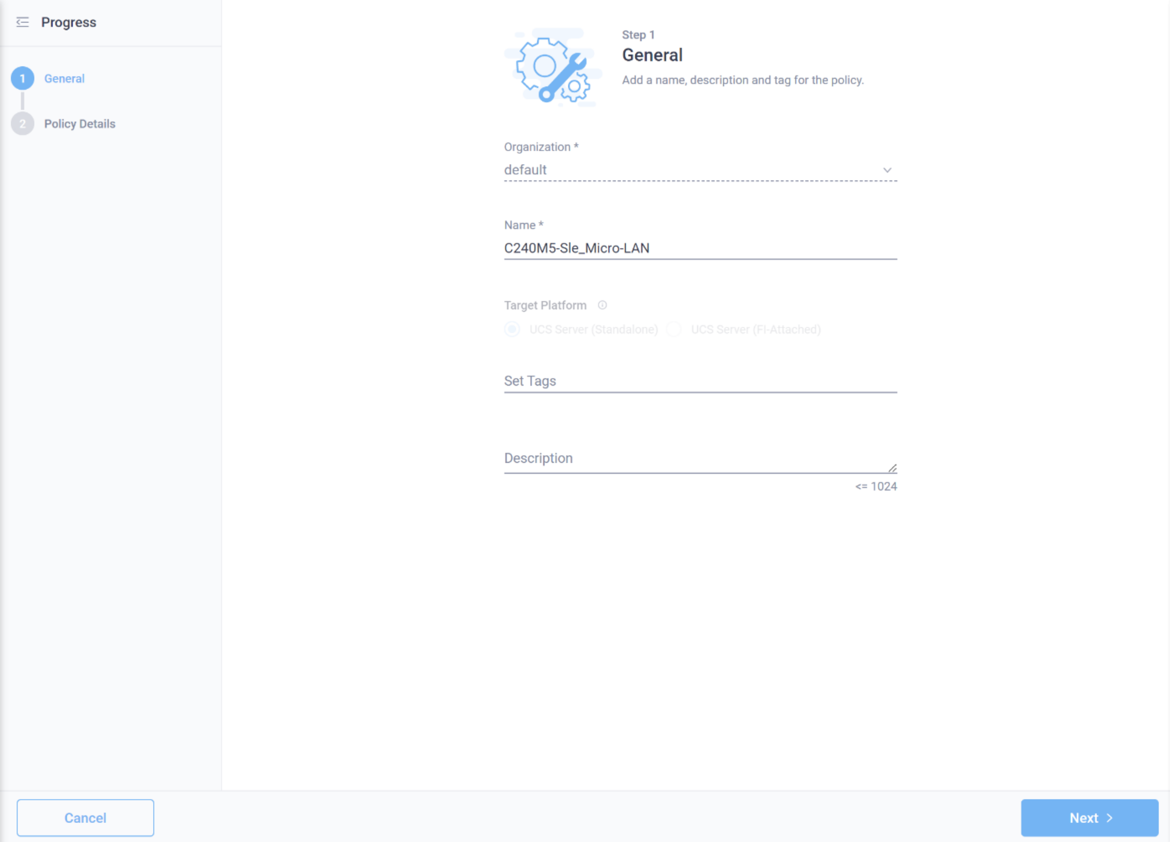
Adapter Configuration ✓ C240M5-Sle_Micro-VIC

LAN Connectivity Select Policy

SAN Connectivity

Auto Placement Configuration for vNICs & vHBAs

30. Enter the name for the new policy used for this type of server and click Next.



Progress

1 General
2 Policy Details

Step 1

General

Add a name, description and tag for the policy.

Organization *
default

Name *
C240M5-Sle_Micro-LAN

Target Platform
● UCS Server (Standalone) ○ UCS Server (FI-Attached)

Set Tags

Description

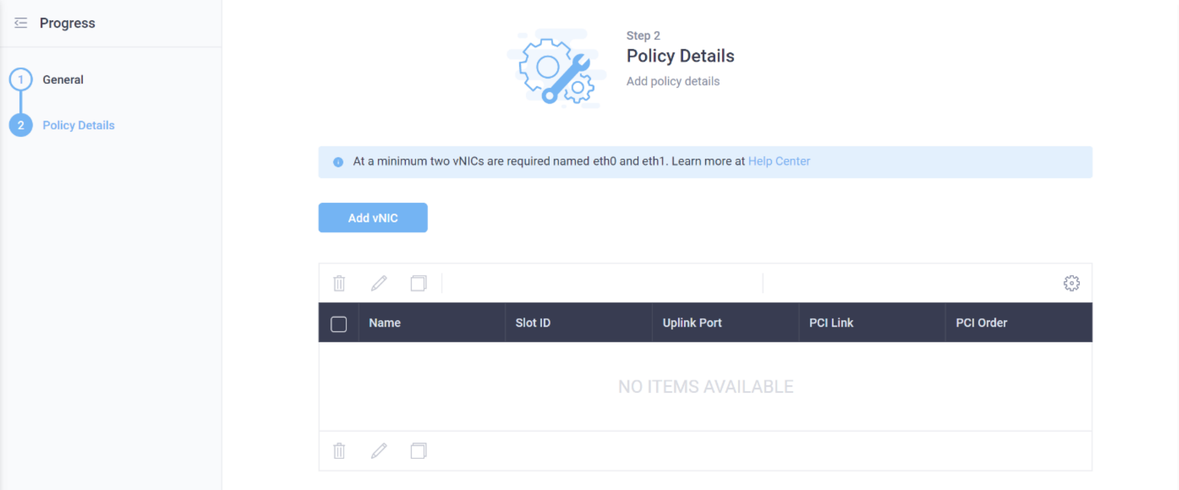
<= 1024

A useful feature of the Cisco virtual interface card (VIC) is the capability to define multiple virtual network adapters to be presented to the operating system, with each configured for specific uses. For example, you can configure administration traffic with a maximum transmission unit (MTU) of 1500 to be compatible with all communication partners, and you can configure the network for storage traffic with MTU 9000 for the best throughput. This sample configuration uses this approach, creating two virtual network interface cards (vNICs) for administration traffic, two vNICs for default user traffic, and two vNICs for data traffic to the storage location. For high availability, the two network devices per traffic type will be combined in a bond on the operating system layer. Table 1 shows the required information for creating the vNICs.

Table 1. vNIC information

vNIC name	Uplink port	PCI order	LAN	VLAN ID
Eth0	0	0	Admin	211
Eht1	1	1	Admin	211
Eth2	0	2	Access	210
Eth3	1	3	Access	210
Eth4	0	4	Storage	212
Eth5	1	5	Storage	212

31. Click Add vNIC.

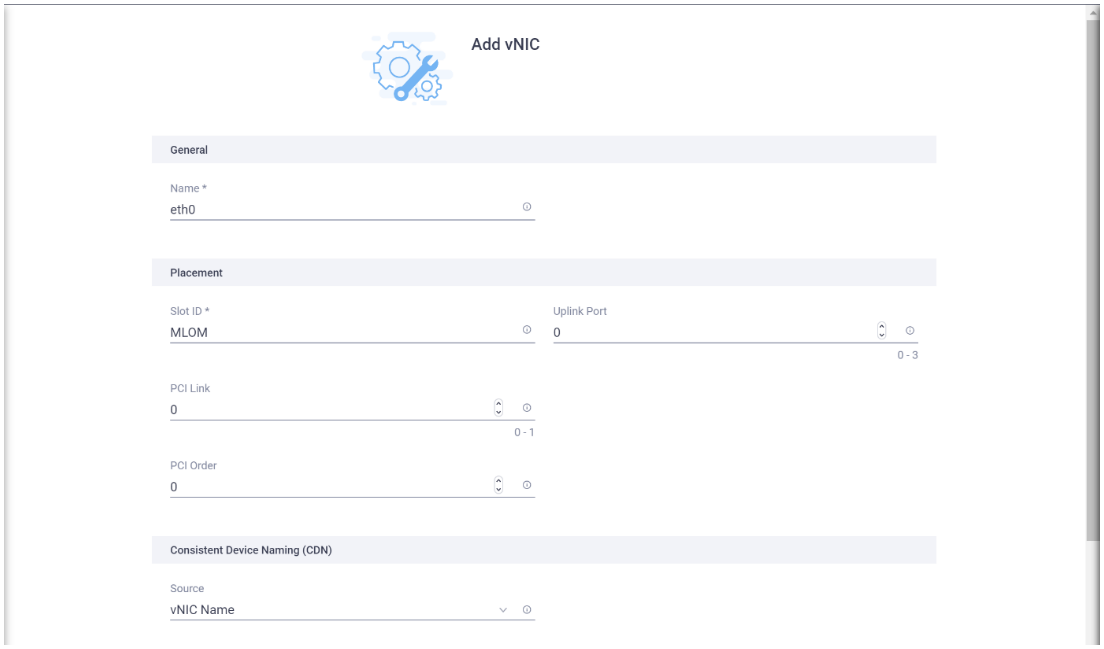


At a minimum two vNICs are required named eth0 and eth1. Learn more at Help Center

Name	Slot ID	Uplink Port	PCI Link	PCI Order

NO ITEMS AVAILABLE

32. Enter a name for this vNIC and select 0 as the uplink port.



General

Name * eth0

Placement

Slot ID * MLOM

Uplink Port 0 (0 - 3)

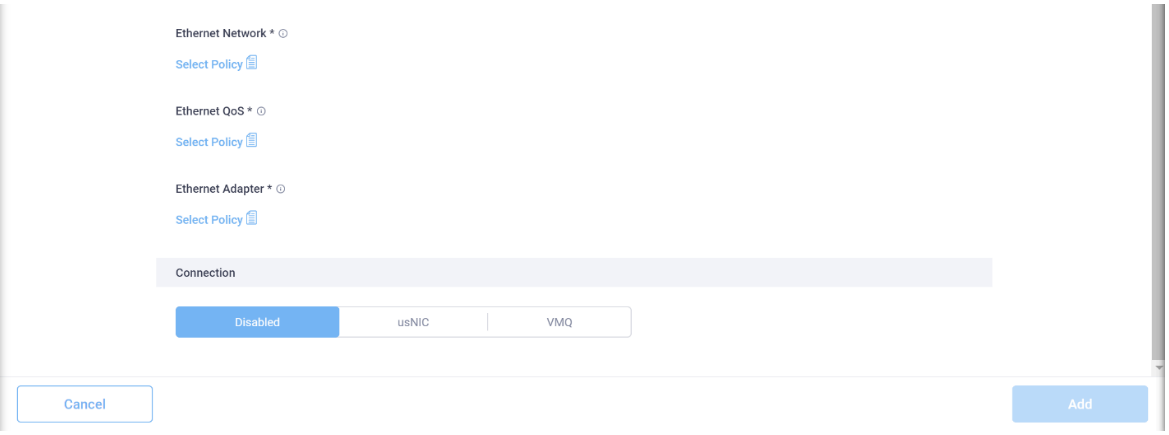
PCI Link 0 (0 - 1)

PCI Order 0

Consistent Device Naming (CDN)

Source vNIC Name

33. Click Select Policy under Ethernet Network and click Create New.



Ethernet Network *

Select Policy

Ethernet QoS *

Select Policy

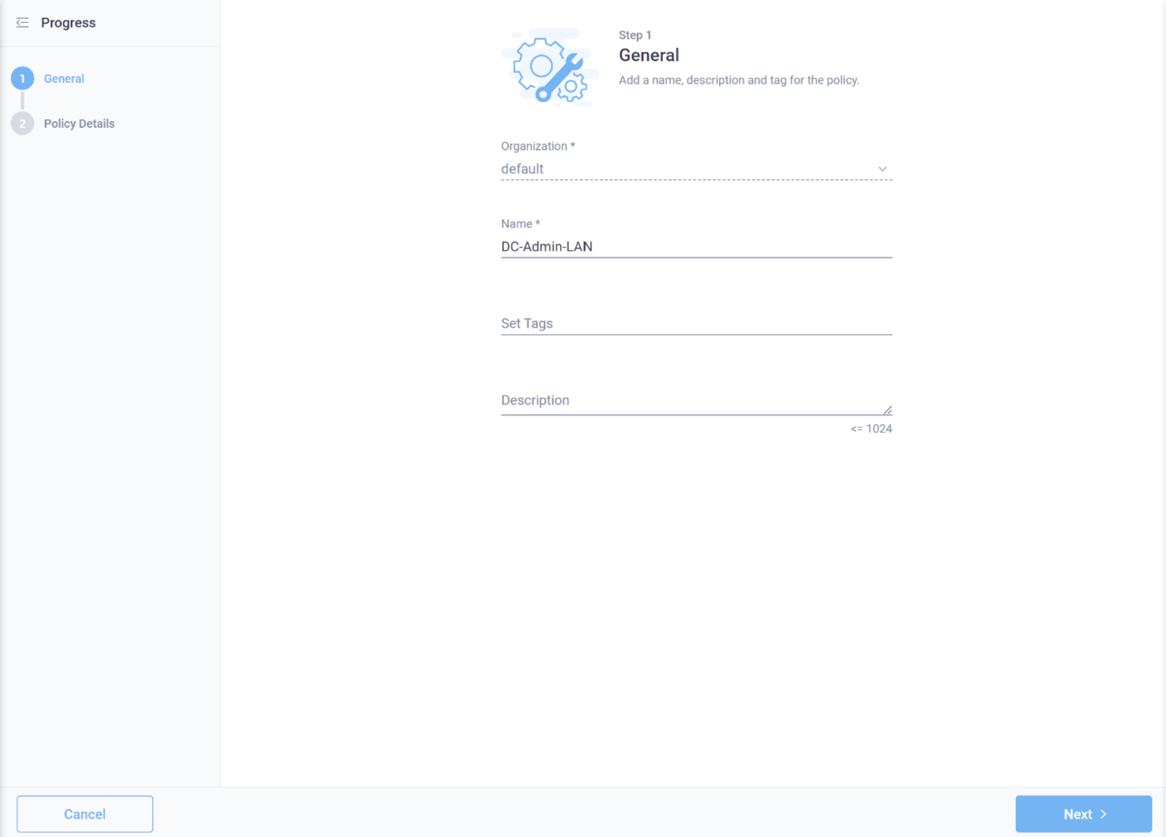
Ethernet Adapter *

Select Policy

Connection

Disabled | usNIC | VMQ

34. Enter a name for the administration LAN policy and click Next.



Step 1

General

Add a name, description and tag for the policy.

Organization *

default

Name *

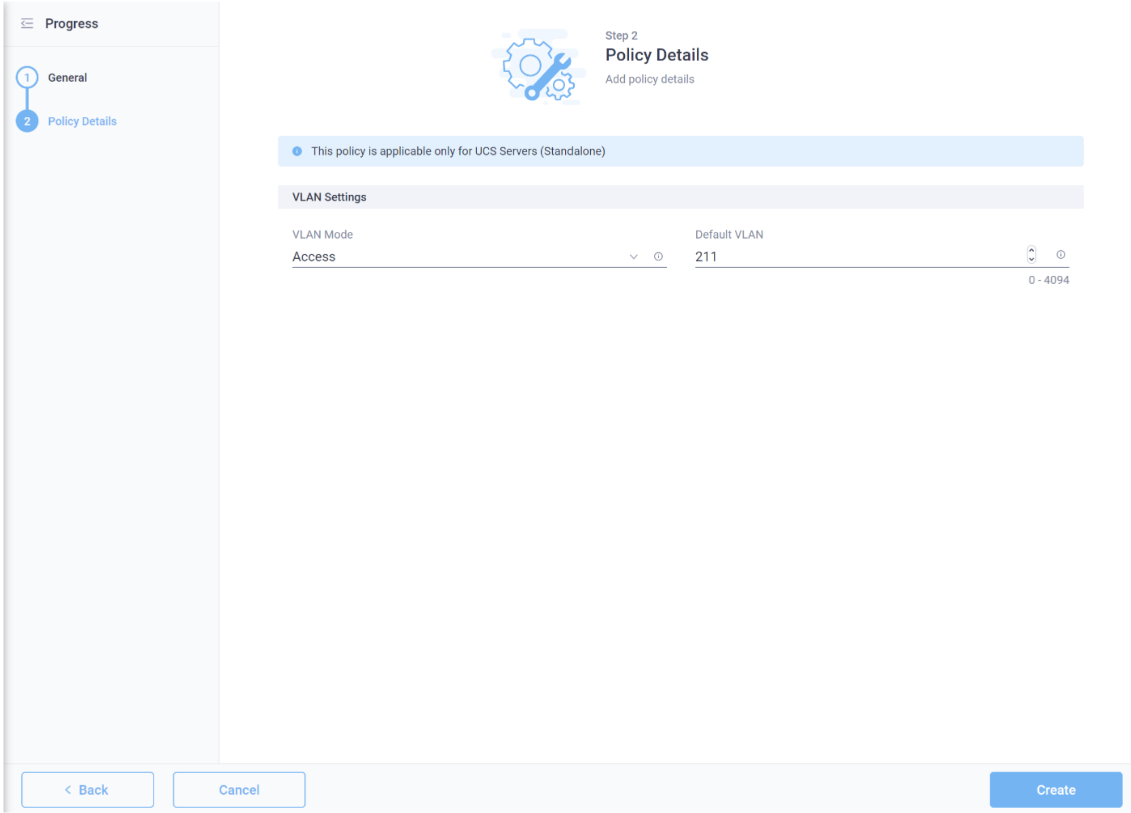
DC-Admin-LAN

Set Tags

Description

<= 1024

35. Keep the VLAN mode at Access and enter the VLAN ID for the administration LAN. Here, 211 is used. Click Create.



This policy is applicable only for UCS Servers (Standalone)

VLAN Settings

VLAN Mode

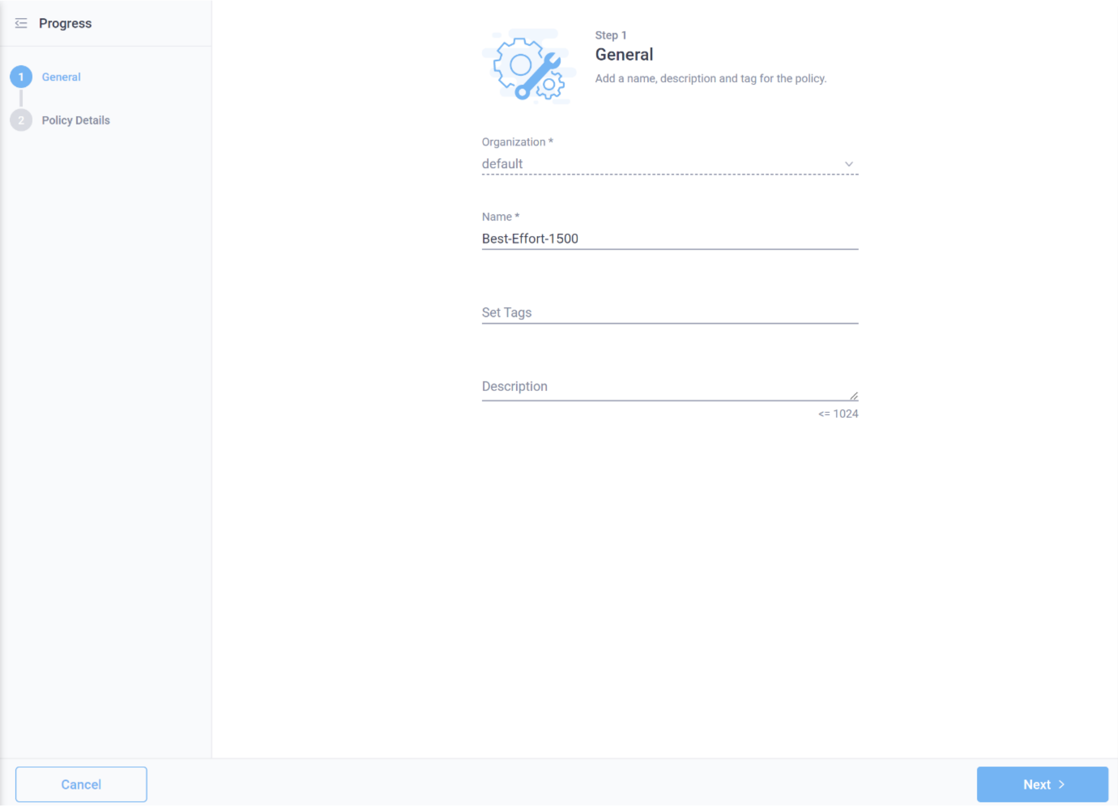
Access

Default VLAN

211

0 - 4094

36. Click Select Policy under QoS Policy and click Create New.
37. In the new view, enter a name for the new quality-of-service (QoS) policy and click Next.



Organization *

default

Name *

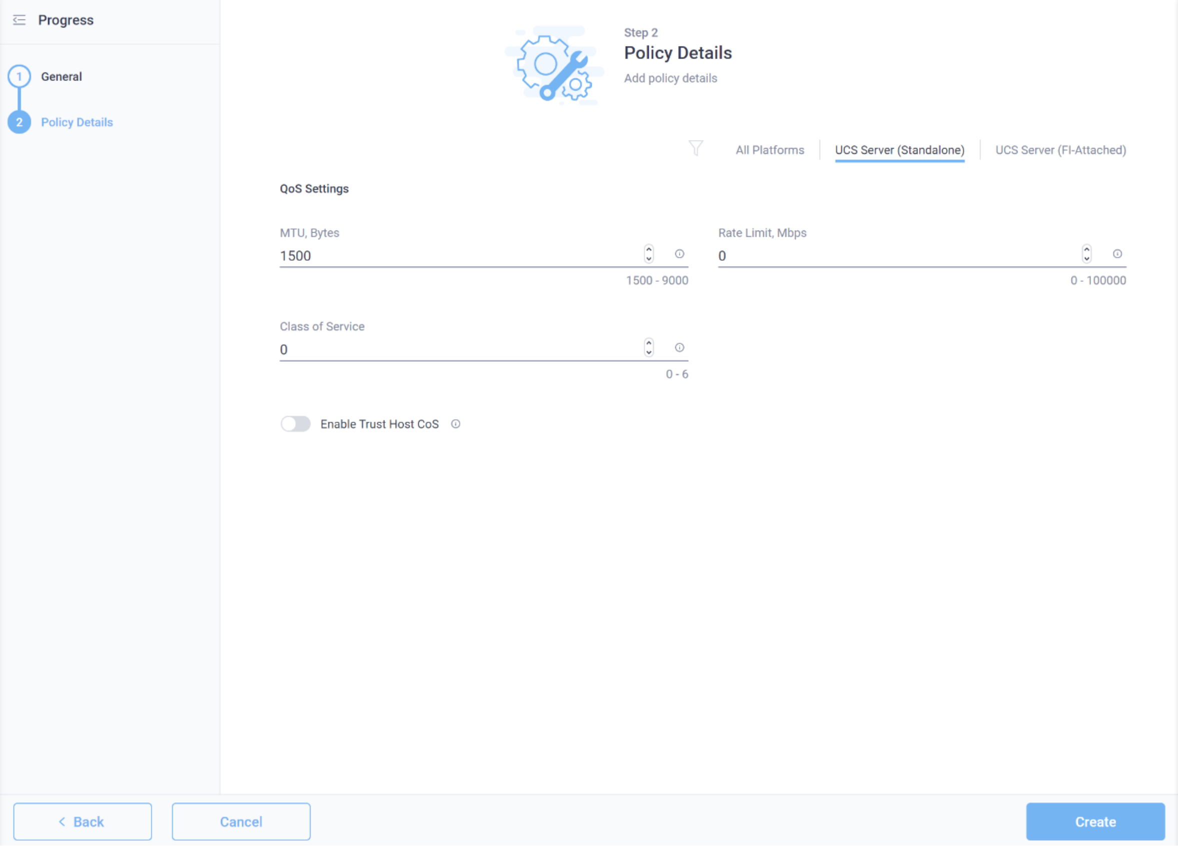
Best-Effort-1500

Set Tags

Description

<= 1024

38. Keep MTU Bytes at 1500 and change the class of service only if advised by your network team, otherwise, use 0. Click Create.



QoS Settings

MTU, Bytes: 1500 (1500 - 9000)

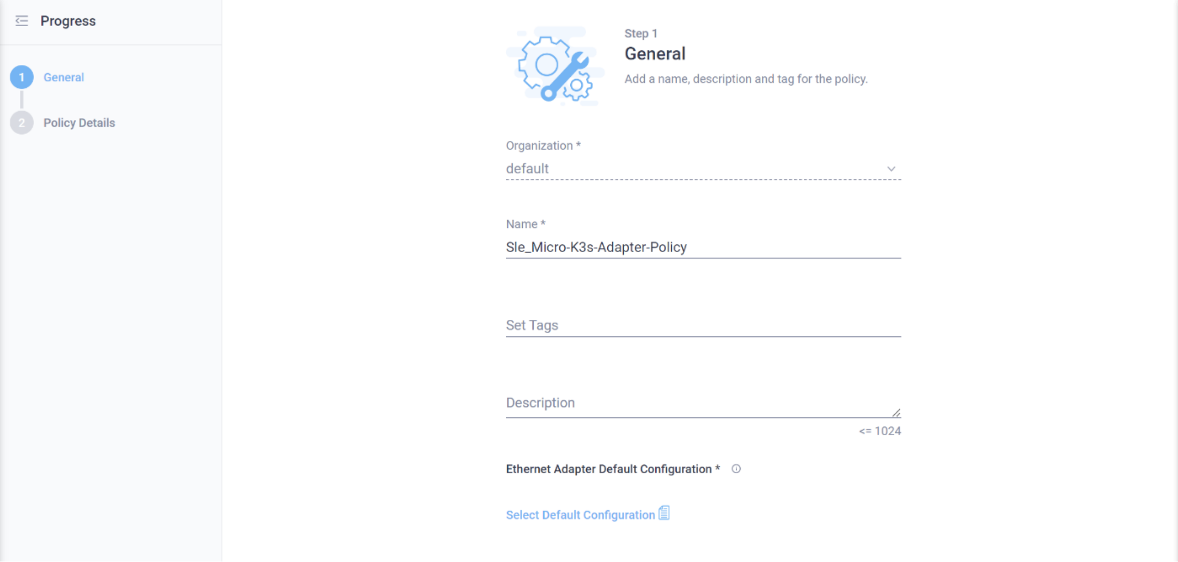
Rate Limit, Mbps: 0 (0 - 100000)

Class of Service: 0 (0 - 6)

Enable Trust Host CoS

39. Click Select Policy under Adapter Policy and click Create New.

40. In the new view, enter a name for the new QoS policy and click Select Default Configuration.



Progress
1 General
2 Policy Details
Step 1
General
Add a name, description and tag for the policy.
Select Default Configuration

Organization *: default

Name *: Sle_Micro-K3s-Adapter-Policy

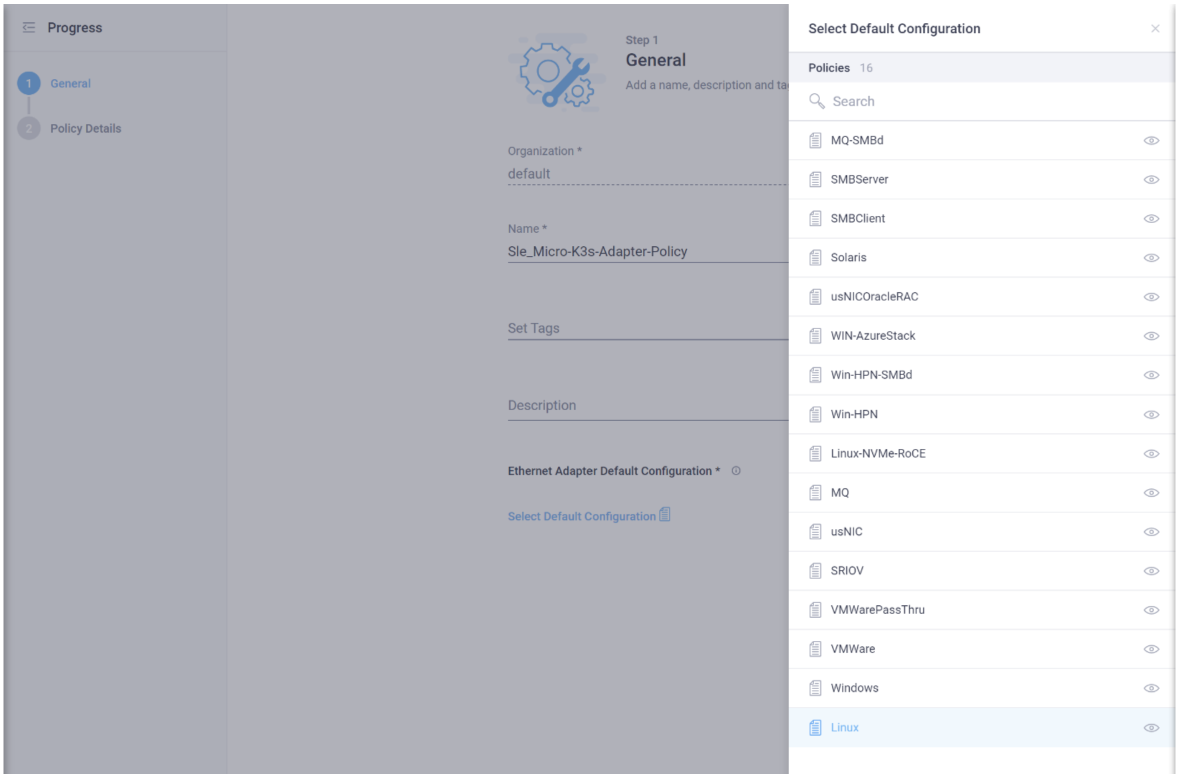
Set Tags

Description

<= 1024

Ethernet Adapter Default Configuration *

41. Click Linux.


Progress

1 General

2 Policy Details

Step 1

General

Add a name, description and ta

Organization *

default

Name *

Sle_Micro-K3s-Adapter-Policy

Set Tags

Description

Ethernet Adapter Default Configuration *

Select Default Configuration

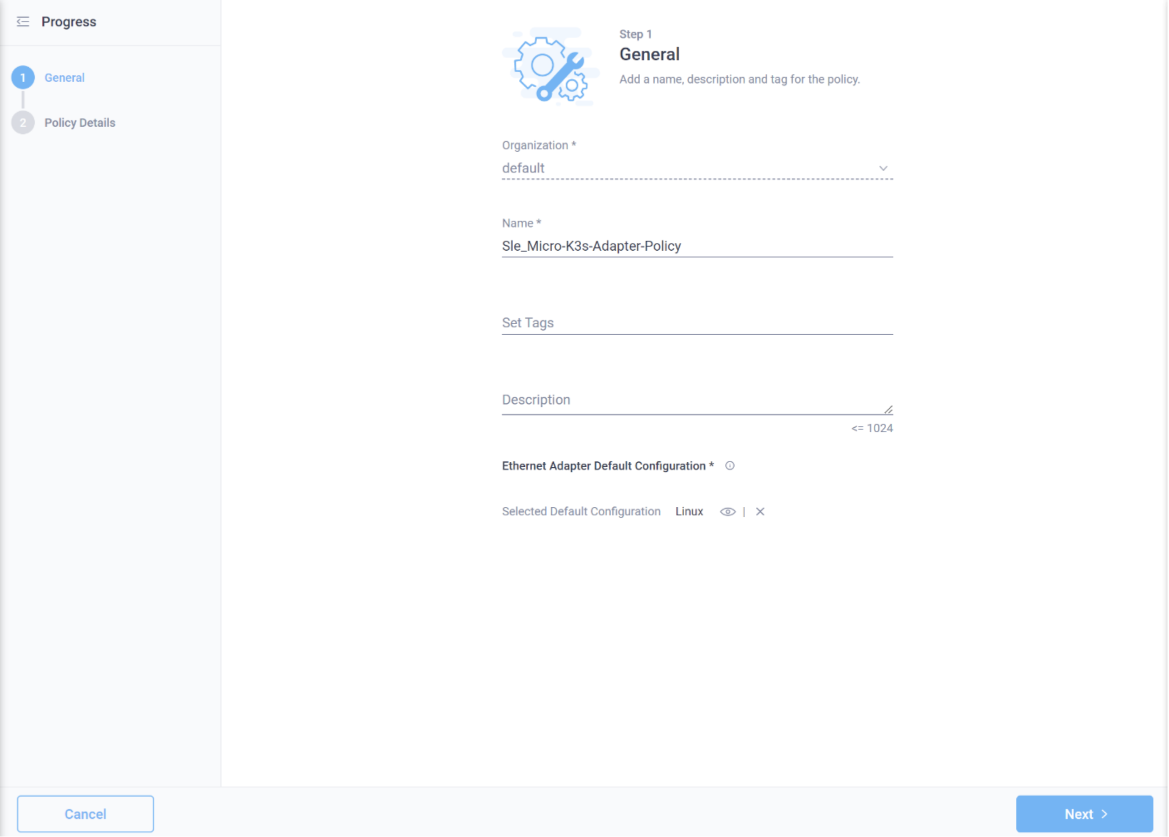
Select Default Configuration

Policies 16

Search

- MQ-SMBd
- SMBServer
- SMBClient
- Solaris
- usNICOracleRAC
- WIN-AzureStack
- Win-HPN-SMBd
- Win-HPN
- Linux-NVMe-RoCE
- MQ
- usNIC
- SRIOV
- VMWarePassThru
- VMWare
- Windows
- Linux

42. Click Next.


Progress

1 General

2 Policy Details

Step 1

General

Add a name, description and tag for the policy.

Organization *

default

Name *

Sle_Micro-K3s-Adapter-Policy

Set Tags

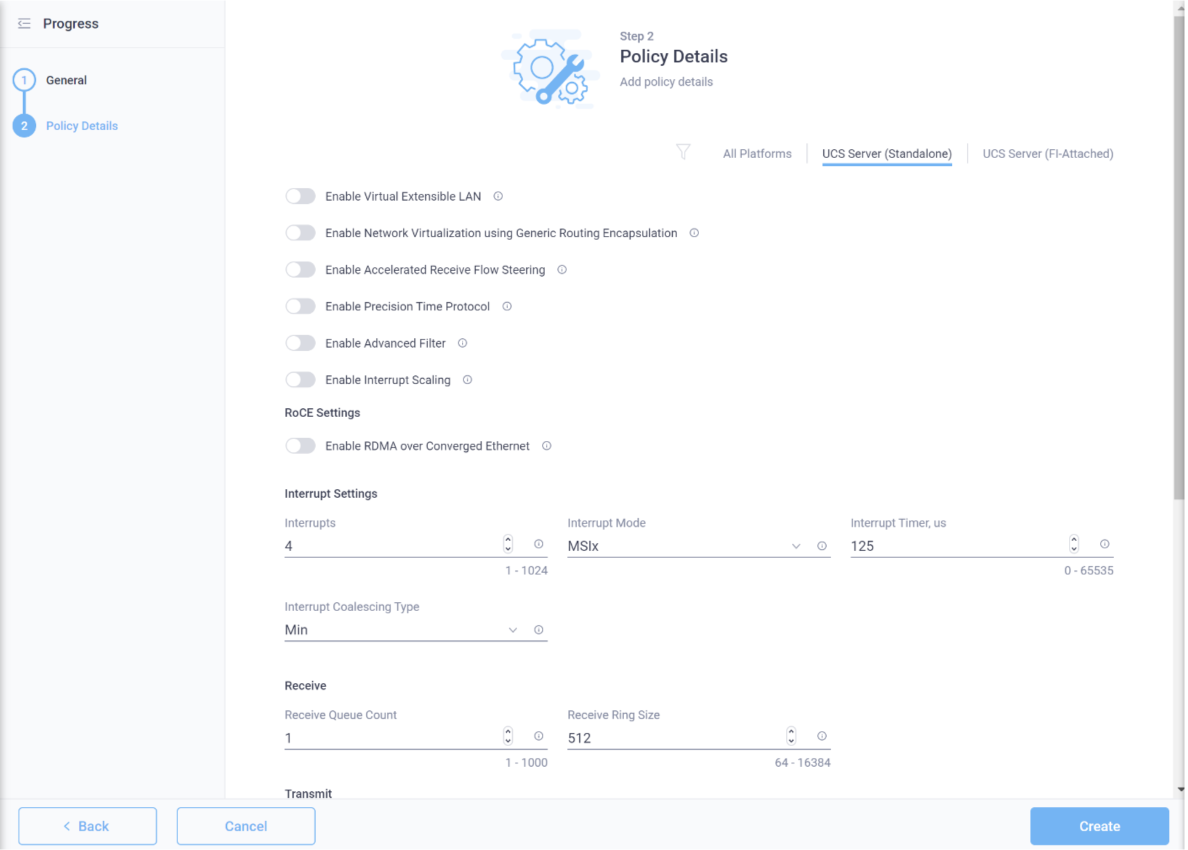
Description

<= 1024

Ethernet Adapter Default Configuration *

Selected Default Configuration Linux

43. Click Create.



Enable Virtual Extensible LAN

Enable Network Virtualization using Generic Routing Encapsulation

Enable Accelerated Receive Flow Steering

Enable Precision Time Protocol

Enable Advanced Filter

Enable Interrupt Scaling

RoCE Settings

Enable RDMA over Converged Ethernet

Interrupt Settings

Interrupts: 4 (1 - 1024)

Interrupt Mode: MSIx

Interrupt Timer, us: 125 (0 - 65535)

Interrupt Coalescing Type: Min

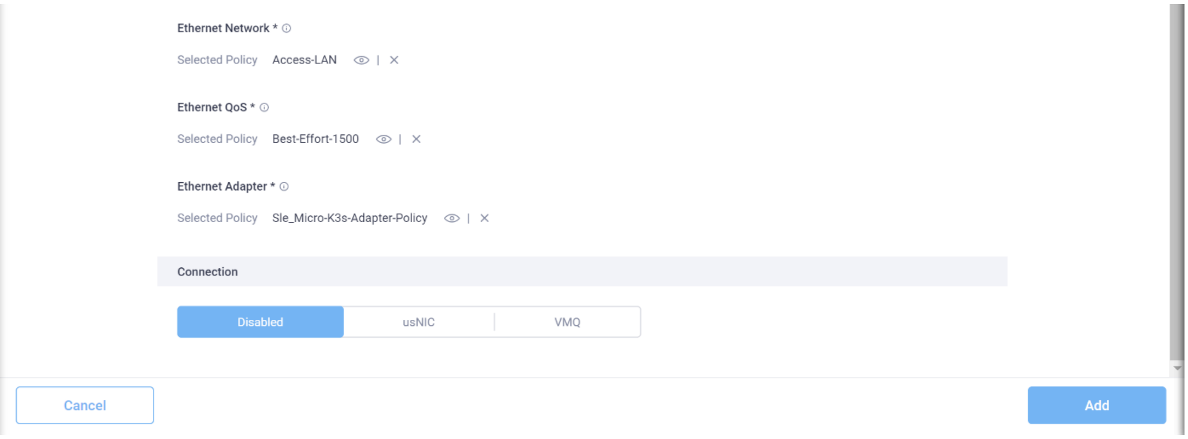
Receive

Receive Queue Count: 1 (1 - 1000)

Receive Ring Size: 512 (64 - 16384)

Transmit

44. Click Add to create the vNIC.



Ethernet Network *

Selected Policy Access-LAN

Ethernet QoS *

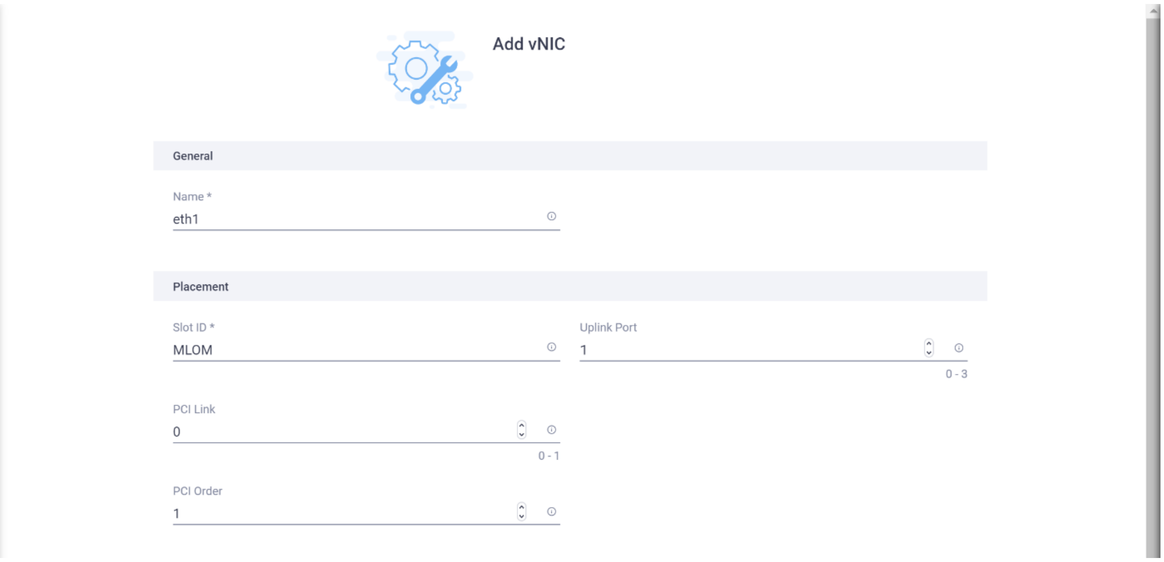
Selected Policy Best-Effort-1500

Ethernet Adapter *

Selected Policy Sle_Micro-K3s-Adapter-Policy

Connection

45. Create vNIC eth1 with uplink port 1 and PCI order 1 as shown in Table 1. Then select the same Ethernet, QoS, and Adapter Policy as for eth0.


Add vNIC

General

Name * eth1

Placement

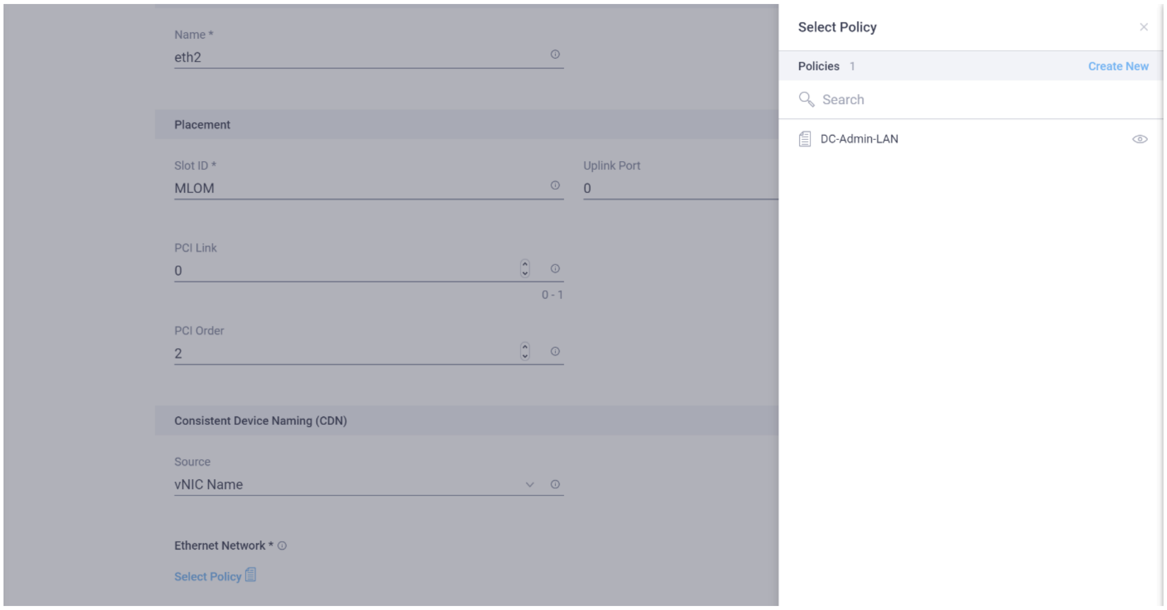
Slot ID * MLOM

Uplink Port 1 (0 - 3)

PCI Link 0 (0 - 1)

PCI Order 1

46. Click Add vNIC to create vNIC eth2 with uplink port 0 and PCI order 2.
47. Click Select Policy under Ethernet Network and click Create New.


Name * eth2

Placement

Slot ID * MLOM

Uplink Port 0

PCI Link 0 (0 - 1)

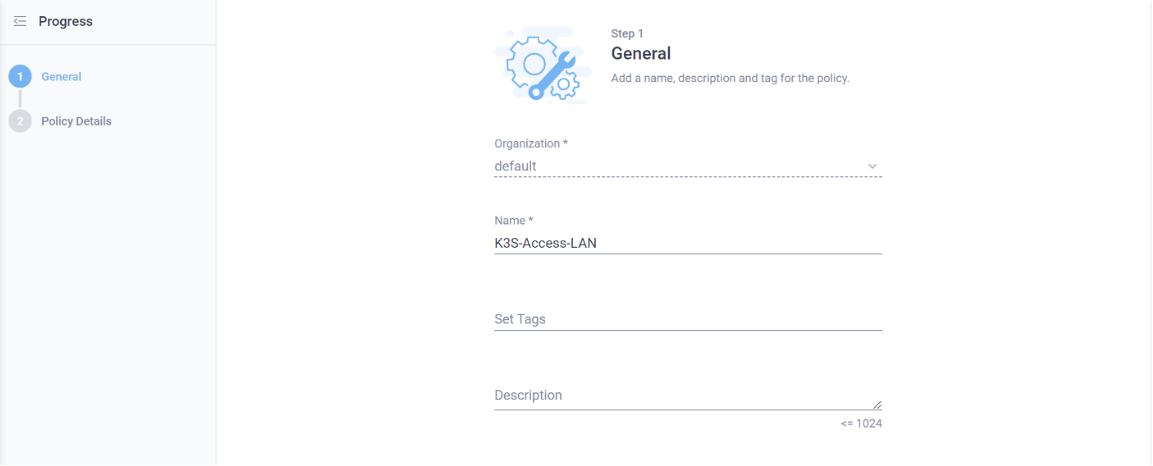
PCI Order 2

Consistent Device Naming (CDN)

Source vNIC Name

Ethernet Network *

48. Enter a name for the access LAN policy and click Next.



Step 1

General

Add a name, description and tag for the policy.

Organization *

default

Name *

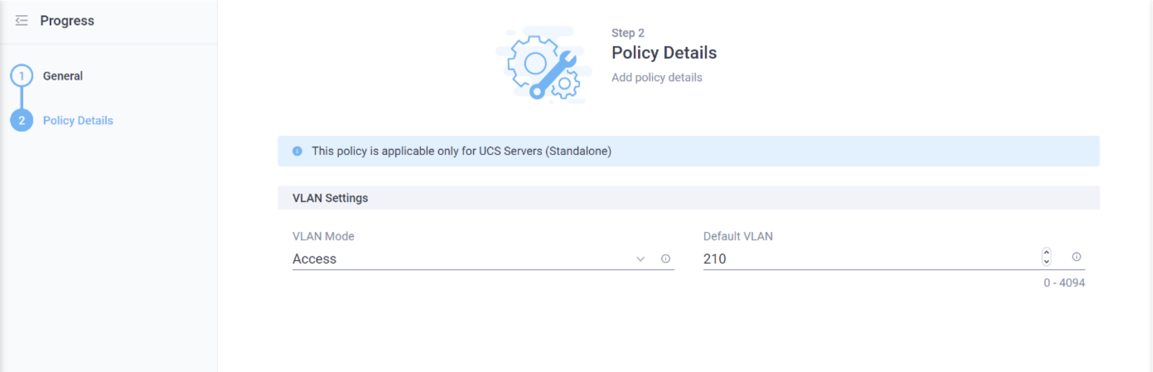
K3S-Access-LAN

Set Tags

Description

<= 1024

49. Keep VLAN Mode as Access and enter the VLAN ID for the access network; here, 210 is used. Click Create.



Step 2

Policy Details

Add policy details

This policy is applicable only for UCS Servers (Standalone)

VLAN Settings

VLAN Mode

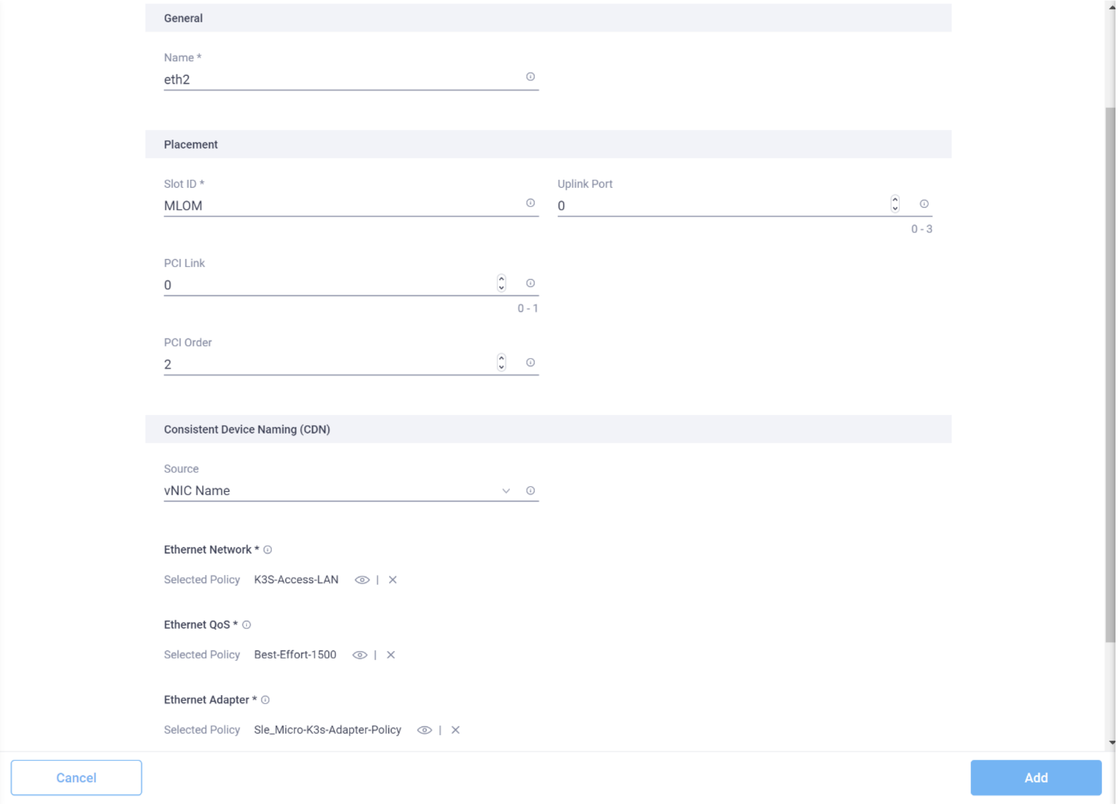
Access

Default VLAN

210

0 - 4094

50. Use the same QoS and adapter policies as for eth0 and eth1 and click Add.



General

Name * eth2

Placement

Slot ID * MLOM

Uplink Port 0 (0 - 3)

PCI Link 0 (0 - 1)

PCI Order 2

Consistent Device Naming (CDN)

Source vNIC Name

Ethernet Network *

Selected Policy K3S-Access-LAN

Ethernet QoS *

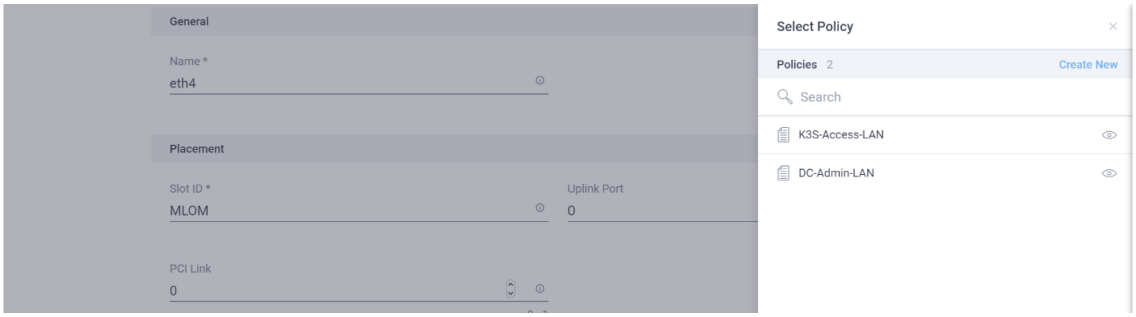
Selected Policy Best-Effort-1500

Ethernet Adapter *

Selected Policy Sle_Micro-K3s-Adapter-Policy

51. Create eth3 with the settings from Table 1 and the same Ethernet, QoS, and adapter policies as for eth2.

52. For eth4 and eth5, the Ethernet policy for the storage LAN is required. To create vNIC eth4, click Select Policy and then Create New.



General

Name * eth4

Placement

Slot ID * MLOM

Uplink Port 0

PCI Link 0

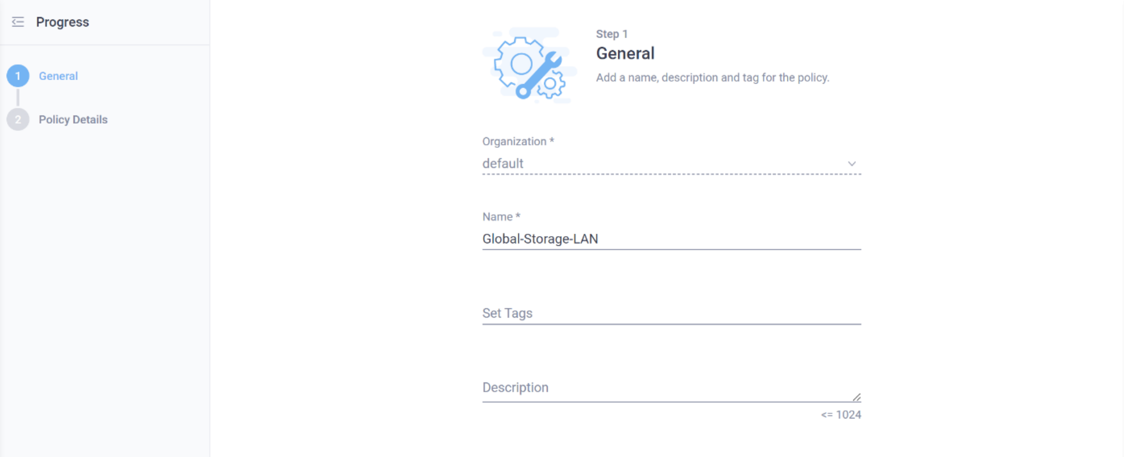
Select Policy

Policies 2

K3S-Access-LAN

DC-Admin-LAN

53. Enter a name for the new storage LAN policy and click Next.



Step 1

General

Add a name, description and tag for the policy.

Organization * default

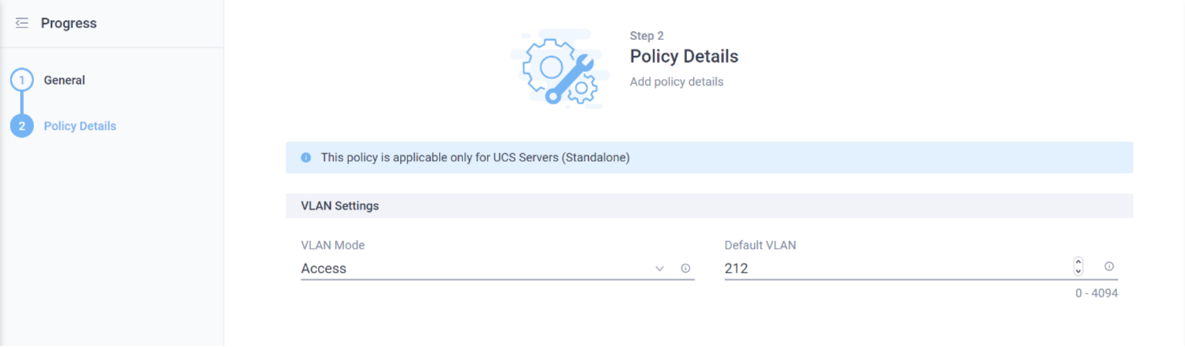
Name * Global-Storage-LAN

Set Tags

Description

<= 1024

54. Keep VLAN Mode at Access and enter the VLAN ID for the storage LAN; here, 212 is used. Click Create.



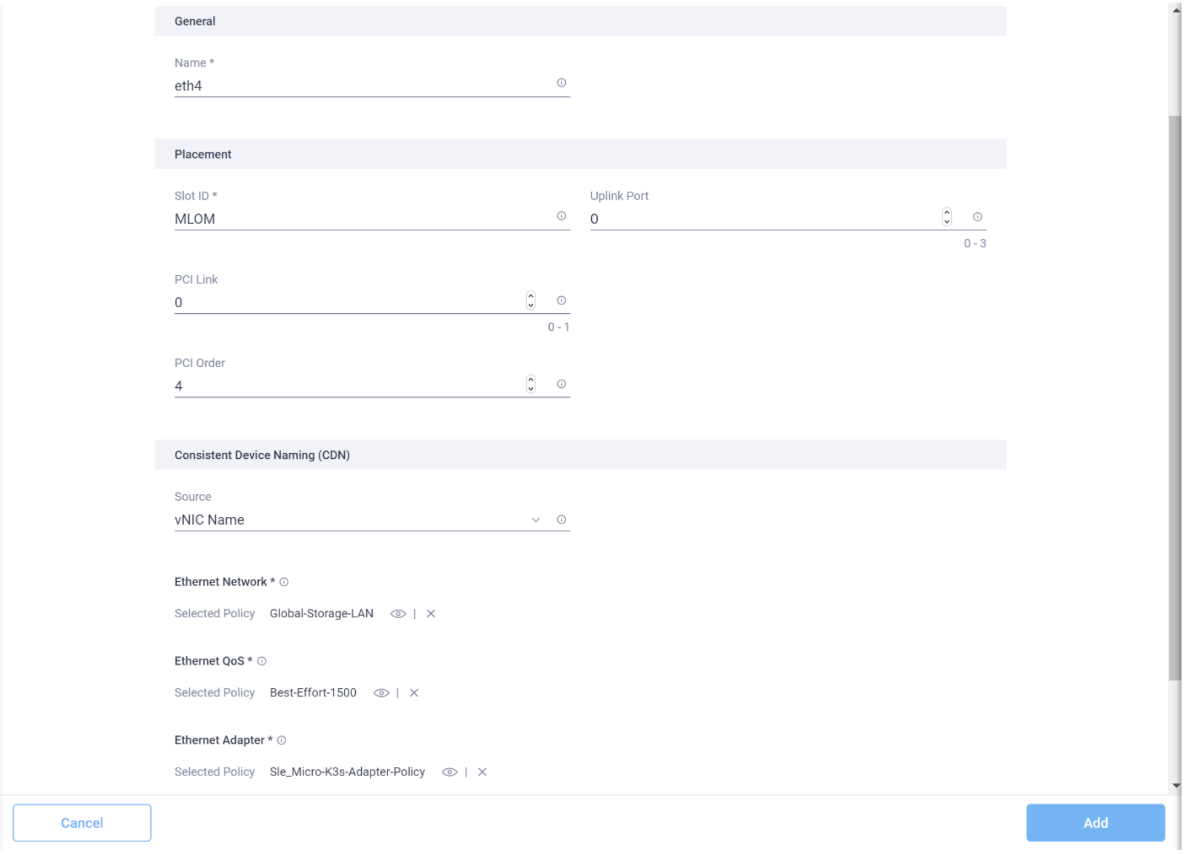
This policy is applicable only for UCS Servers (Standalone)

VLAN Settings

VLAN Mode: Access

Default VLAN: 212 (0 - 4094)

55. Use the same QoS and adapter policies as for the other vNICs and click Add.



General

Name *: eth4

Placement

Slot ID *: MLOM

Uplink Port: 0 (0 - 3)

PCI Link: 0 (0 - 1)

PCI Order: 4

Consistent Device Naming (CDN)

Source: vNIC Name

Ethernet Network *

Selected Policy: Global-Storage-LAN

Ethernet QoS *

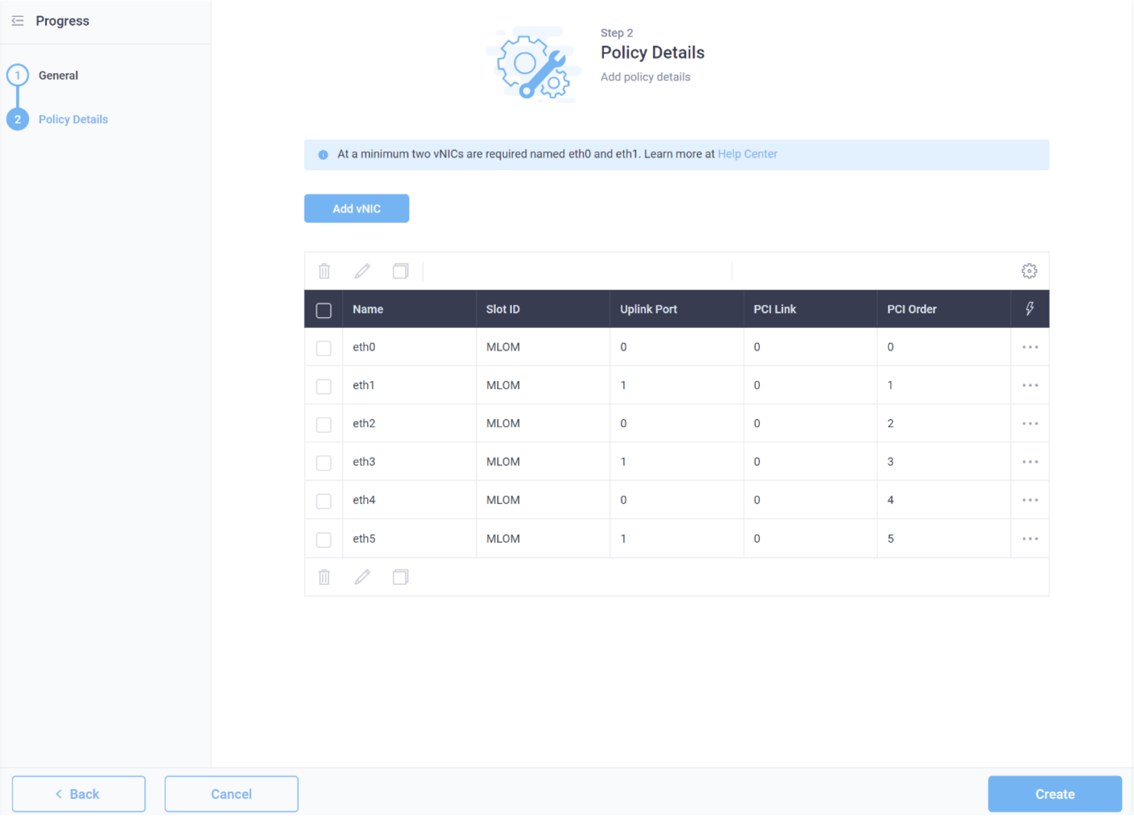
Selected Policy Best-Effort-1500

Ethernet Adapter *

Selected Policy: Sle_Micro-K3s-Adapter-Policy

56. Use the settings from Table 1 and the policies from eth4 to create vNIC eth5.

57. The Policy Details screen shows the final list of vNICs. For every VLAN ID there are two vNICs: one on uplink port 0 and one on uplink port 1. This list will be used later to validate the bond configuration at the operating system layer. Click Create.



Step 2

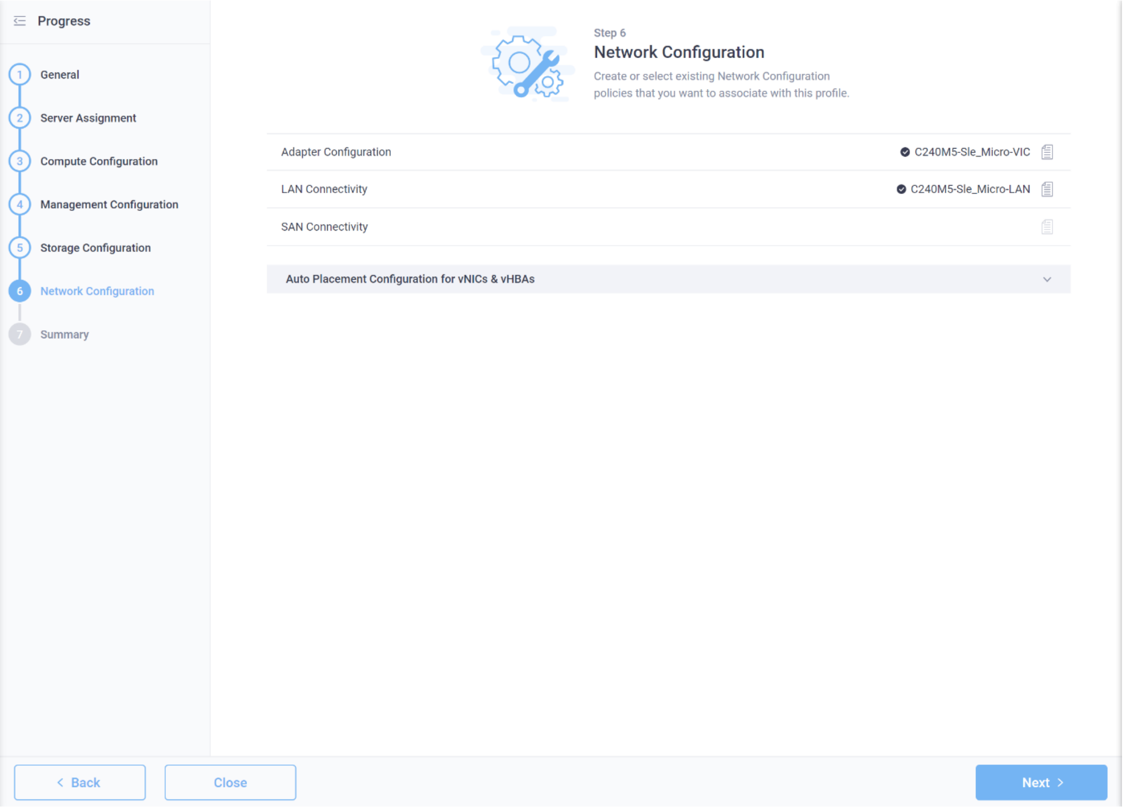
Policy Details

Add policy details

At a minimum two vNICs are required named eth0 and eth1. Learn more at Help Center

□	Name	Slot ID	Uplink Port	PCI Link	PCI Order
□	eth0	MLOM	0	0	0
□	eth1	MLOM	1	0	1
□	eth2	MLOM	0	0	2
□	eth3	MLOM	1	0	3
□	eth4	MLOM	0	0	4
□	eth5	MLOM	1	0	5

58. Back in the Server Profile view, click Next.



Step 6

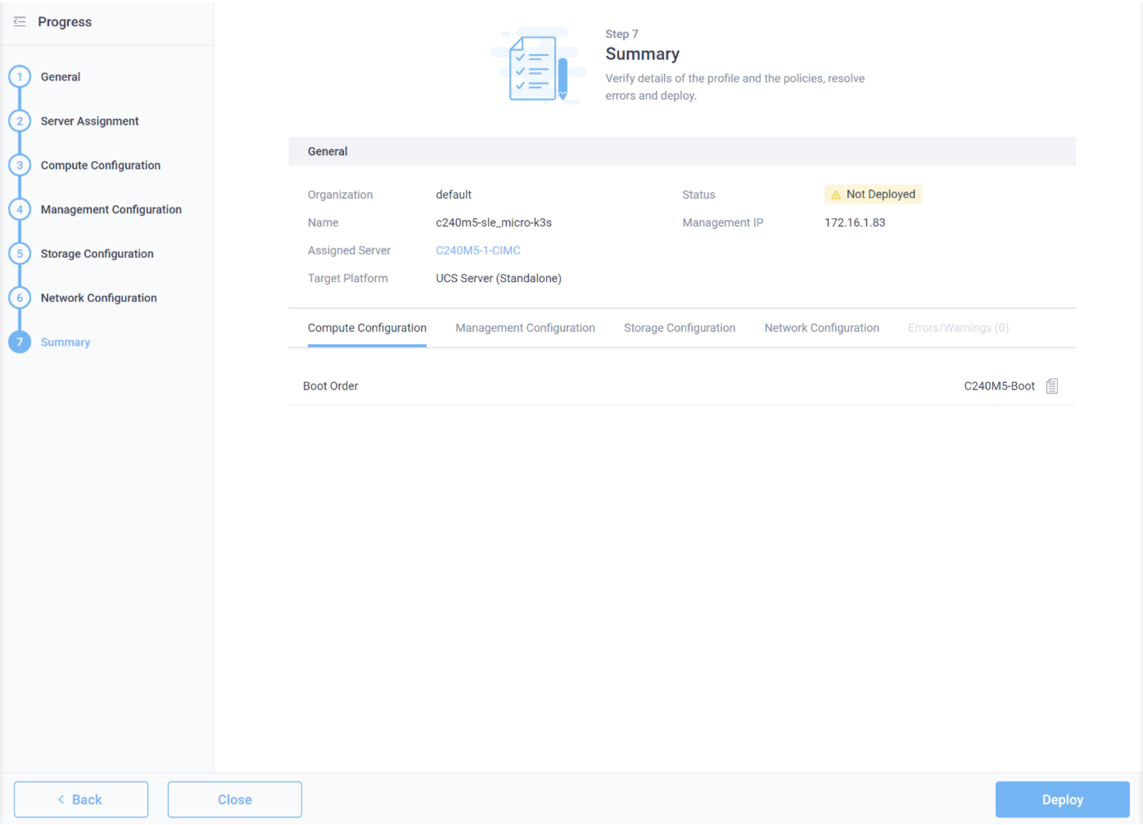
Network Configuration

Create or select existing Network Configuration policies that you want to associate with this profile.

Adapter Configuration	C240M5-Sle_Micro-VIC
LAN Connectivity	C240M5-Sle_Micro-LAN
SAN Connectivity	

Auto Placement Configuration for vNICs & vHBAs

59. Review the information on the Summary page and click Deploy.



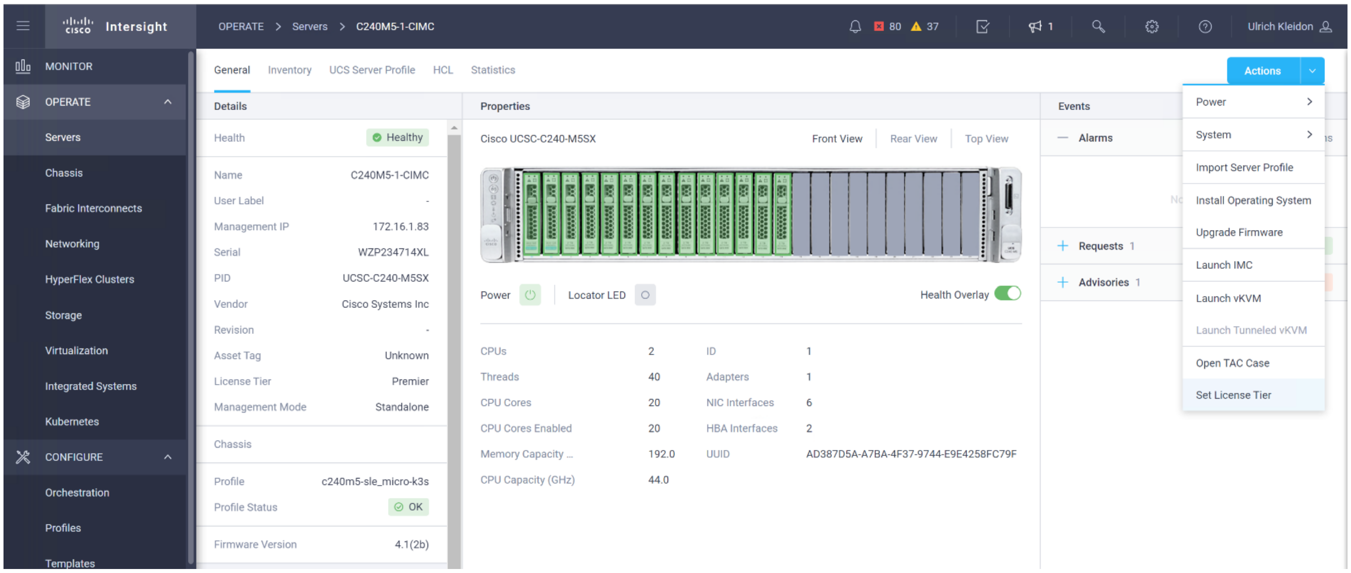
Step 7
Summary
Verify details of the profile and the policies, resolve errors and deploy.

General

Organization	default	Status	⚠ Not Deployed
Name	c240m5-sle_micro-k3s	Management IP	172.16.1.83
Assigned Server	C240M5-1-CIMC		
Target Platform	UCS Server (Standalone)		

Boot Order C240M5-Boot

60. Browse to Operate > Servers and select the assigned server. Then click Actions and choose Launch vKVM.



Details

Health	Healthy
Name	C240M5-1-CIMC
User Label	-
Management IP	172.16.1.83
Serial	WZP234714XL
PID	UCSC-C240-M5SX
Vendor	Cisco Systems Inc
Revision	-
Asset Tag	Unknown
License Tier	Premier
Management Mode	Standalone
Chassis	
Profile	c240m5-sle_micro-k3s
Profile Status	OK
Firmware Version	4.1(2b)

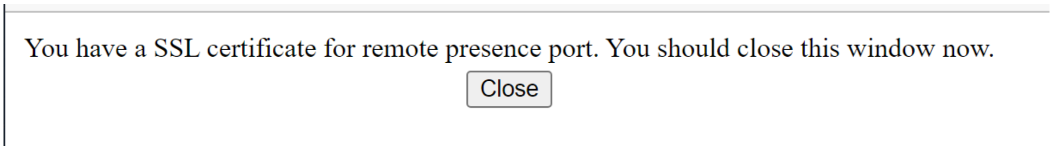
Properties

Cisco UCSC-C240-M5SX

Power Locator LED Health Overlay

CPUs	2	ID	1
Threads	40	Adapters	1
CPU Cores	20	NIC Interfaces	6
CPU Cores Enabled	20	HBA Interfaces	2
Memory Capacity ...	192.0	UUID	AD387D5A-A7BA-4F37-9744-E9E4258FC79F
CPU Capacity (GHz)	44.0		

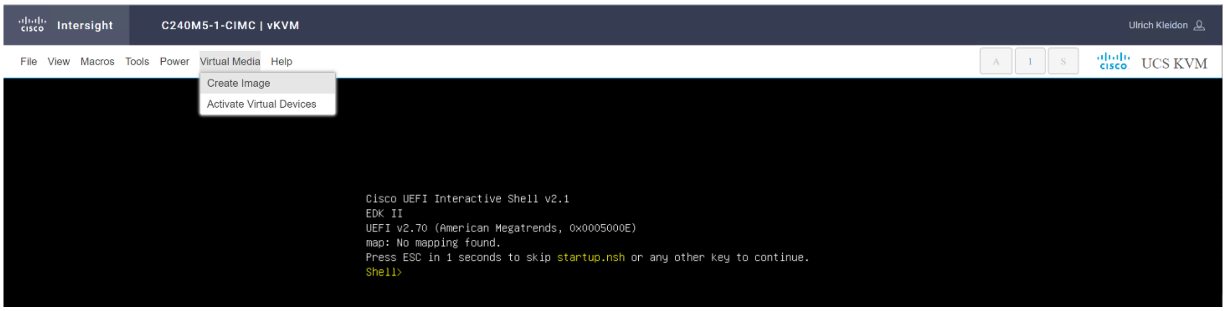
61. In the new window, take the necessary steps to continue with an untrusted certificate and close it at the end.


You have a SSL certificate for remote presence port. You should close this window now.

Install SLE Micro

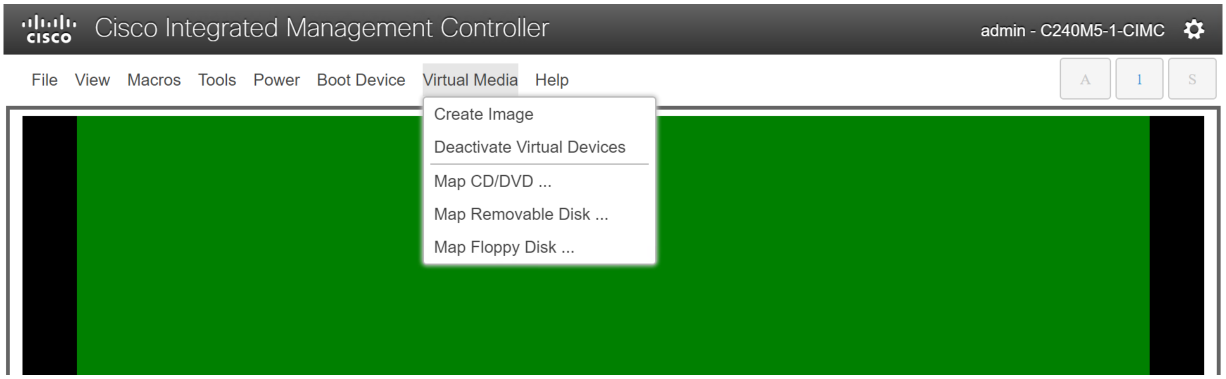
Follow the steps here to install the SLE Micro operating system on the prepared server.

1. In the vKVM window, click Virtual Media and choose Activate Virtual Devices.

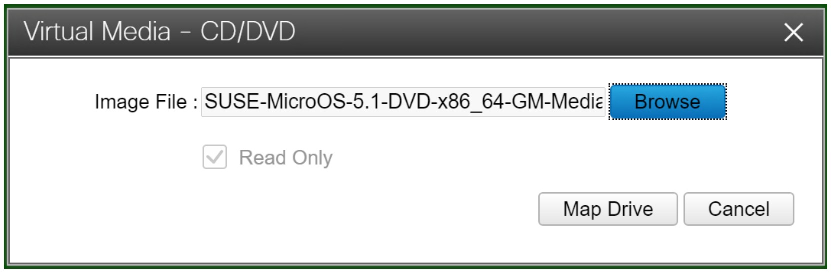


```
Cisco UEFI Interactive Shell v2.1
EDK II
UEFI v2.70 (American Megatrends, 0x0005000E)
map: No mapping found.
Press ESC in 1 seconds to skip startup.nsh or any other key to continue.
Shell>
```

2. Again click Virtual Media and now choose Map CD/DVD.



3. Click Browse, select the SLE Micro media ISO image, and click Map Drive.

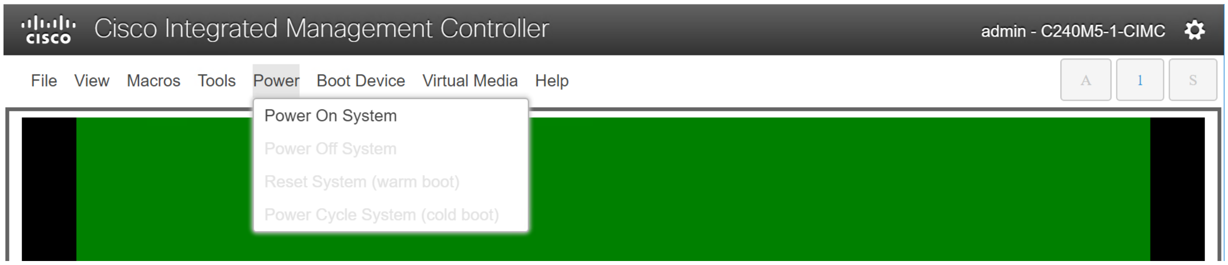


Virtual Media - CD/DVD

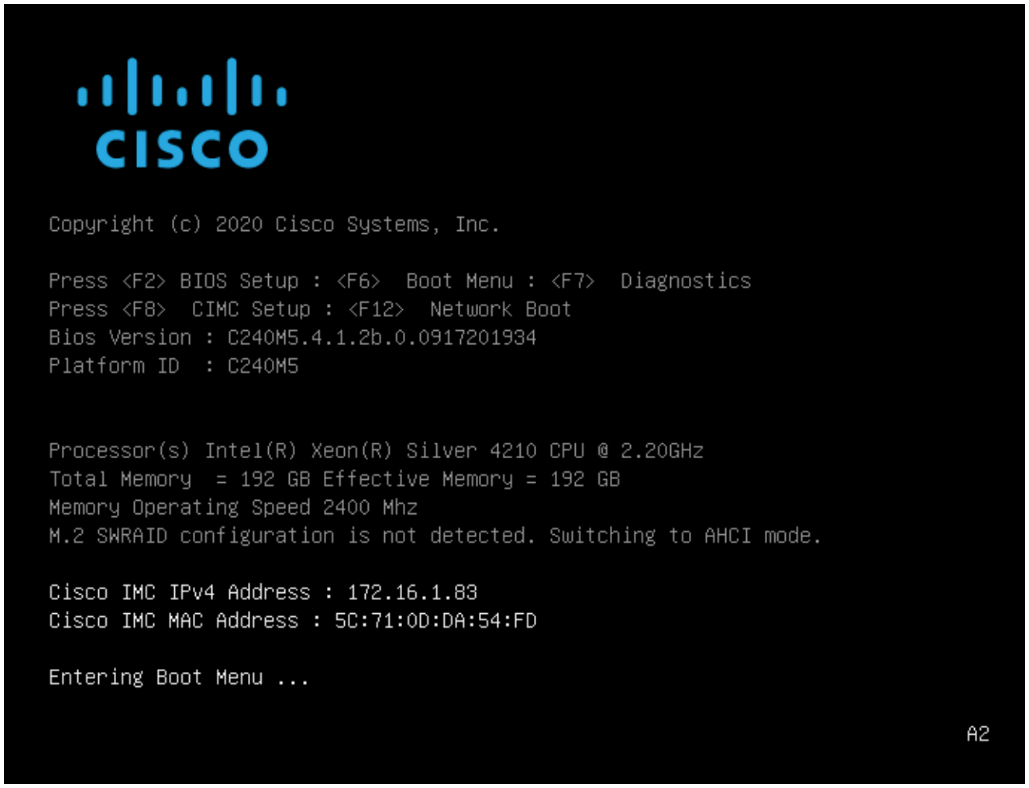
Image File : SUSE-MicroOS-5.1-DVD-x86_64-GM-Media

☑ Read Only

4. Click Power and choose Power On System. In the pop-up window, click OK.

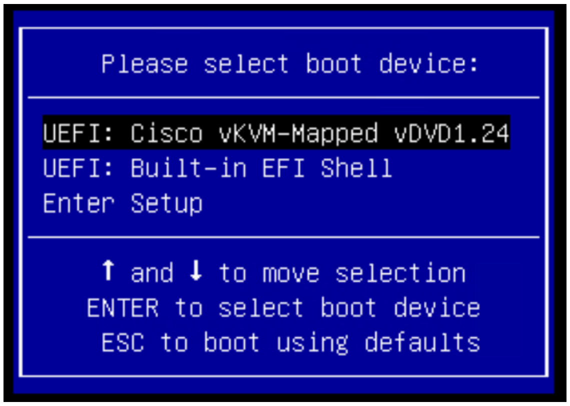


5. As soon the selection menu appears, press F6 to enter the Boot Menu.



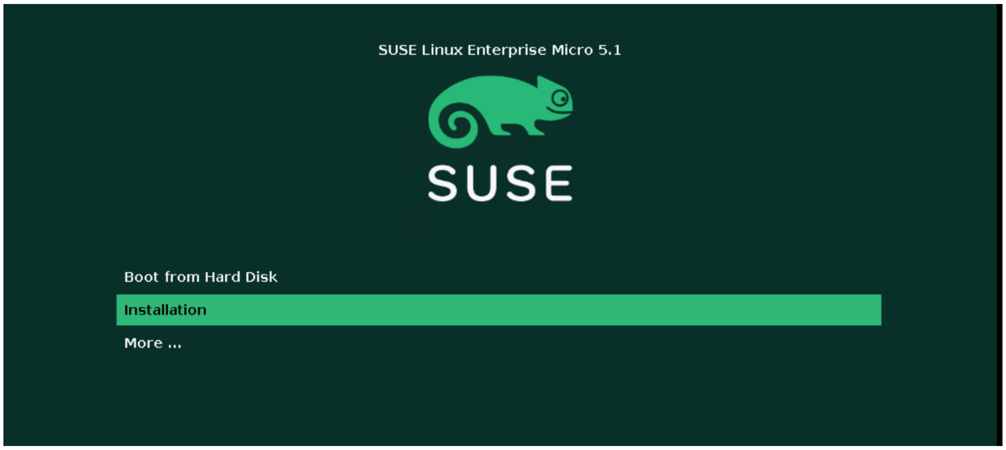
```
Copyright (c) 2020 Cisco Systems, Inc.

Press <F2> BIOS Setup : <F6>  Boot Menu : <F7>  Diagnostics
Press <F8>  CIMC Setup : <F12>  Network Boot
Bios Version : C240M5.4.1.2b.0.0917201934
Platform ID  : C240M5


Processor(s) Intel(R) Xeon(R) Silver 4210 CPU @ 2.20GHz
Total Memory  = 192 GB Effective Memory = 192 GB
Memory Operating Speed 2400 Mhz
M.2 SWRAID configuration is not detected. Switching to AHCI mode.

Cisco IMC IPv4 Address : 172.16.1.83
Cisco IMC MAC Address : 5C:71:0D:DA:54:FD

Entering Boot Menu ...
                                                                    A2
```

6. Select UEFI: Cisco vKVM-Mapped vDVD and press Enter.

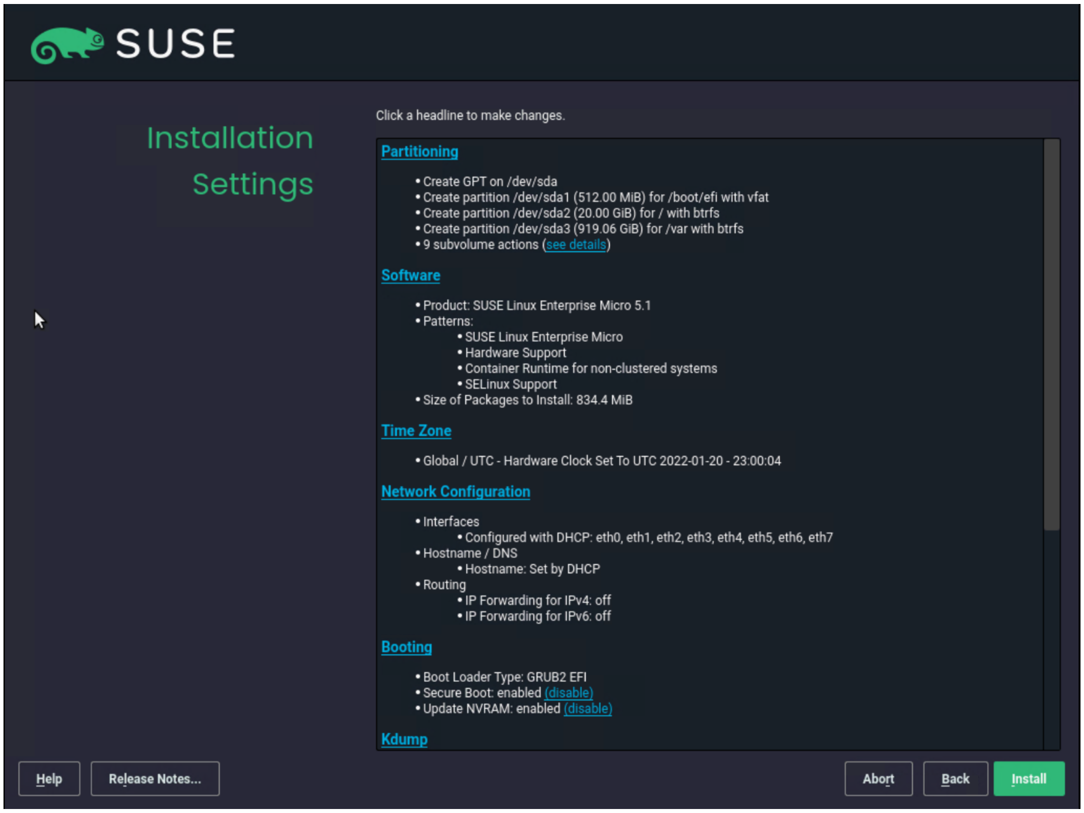


```
 Please select boot device:

UEFI: Cisco vKVM-Mapped vDVD1.24
UEFI: Built-in EFI Shell
Enter Setup

   ↑ and ↓ to move selection
  ENTER to select boot device
   ESC to boot using defaults
```

The SUSE installation process will start automatically.



7. Proceed with the installation process until you see the Installation Settings screen. Then click Network Configuration.



Click a headline to make changes.

Partitioning

- Create GPT on /dev/sda
- Create partition /dev/sda1 (512.00 MiB) for /boot/efi with vfat
- Create partition /dev/sda2 (20.00 GiB) for / with btrfs
- Create partition /dev/sda3 (919.06 GiB) for /var with btrfs
- 9 subvolume actions (see details)

Software

- Product: SUSE Linux Enterprise Micro 5.1
- Patterns:
  - SUSE Linux Enterprise Micro
  - Hardware Support
  - Container Runtime for non-clustered systems
  - SELinux Support
- Size of Packages to Install: 834.4 MiB

Time Zone

- Global / UTC - Hardware Clock Set To UTC 2022-01-20 - 23:00:04

Network Configuration

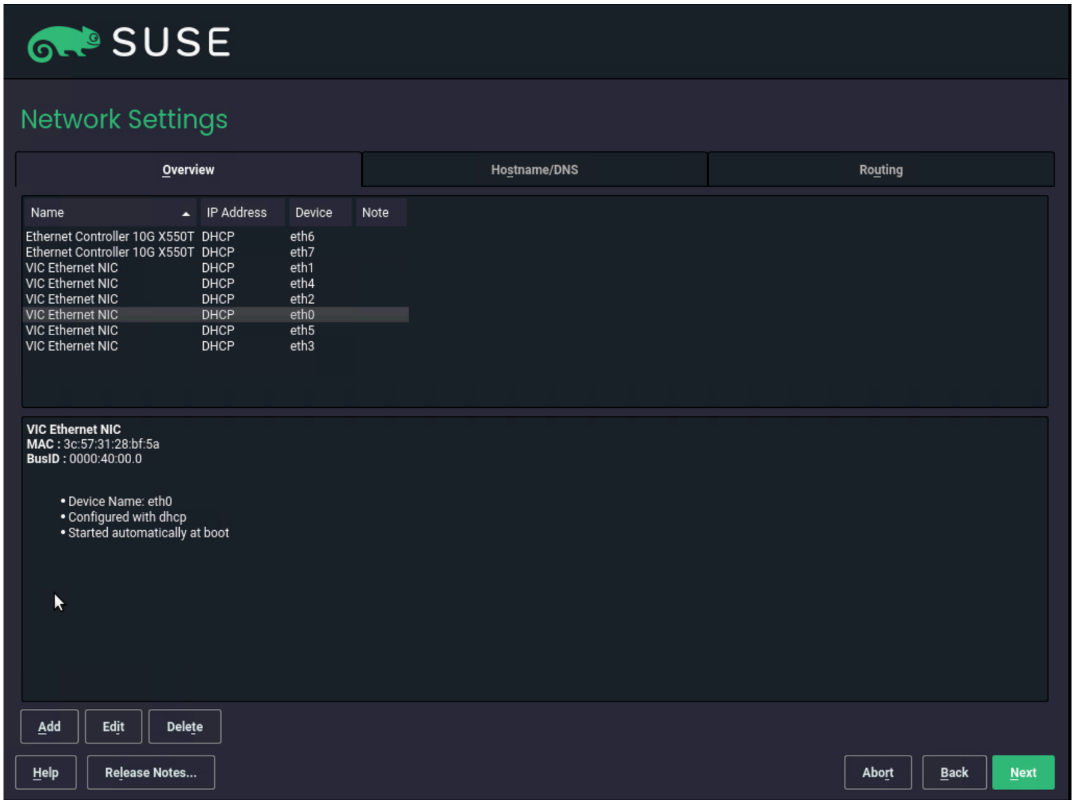
- Interfaces
  - Configured with DHCP: eth0, eth1, eth2, eth3, eth4, eth5, eth6, eth7
- Hostname / DNS
  - Hostname: Set by DHCP
- Routing
  - IP Forwarding for IPv4: off
  - IP Forwarding for IPv6: off

Booting

- Boot Loader Type: GRUB2 EFI
- Secure Boot: enabled (disable)
- Update NVRAM: enabled (disable)

Kdump

8. Click the various devices in the network view and compare the names and MAC addresses with the vNIC list from the IMC. Click Add.

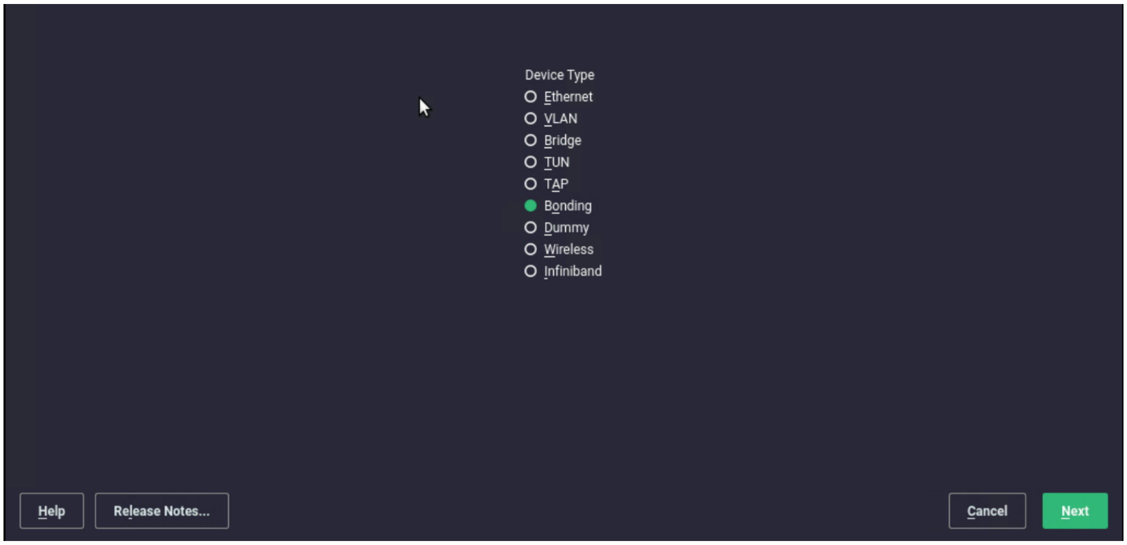


Name	IP Address	Device	Note
Ethernet Controller 10G X550T	DHCP	eth6	
Ethernet Controller 10G X550T	DHCP	eth7	
VIC Ethernet NIC	DHCP	eth1	
VIC Ethernet NIC	DHCP	eth4	
VIC Ethernet NIC	DHCP	eth2	
VIC Ethernet NIC	DHCP	eth0	
VIC Ethernet NIC	DHCP	eth5	
VIC Ethernet NIC	DHCP	eth3	

VIC Ethernet NIC
MAC : 3c:57:31:28:bf:5a
BusID : 0000:40:00.0

- Device Name: eth0
- Configured with dhcp
- Started automatically at boot

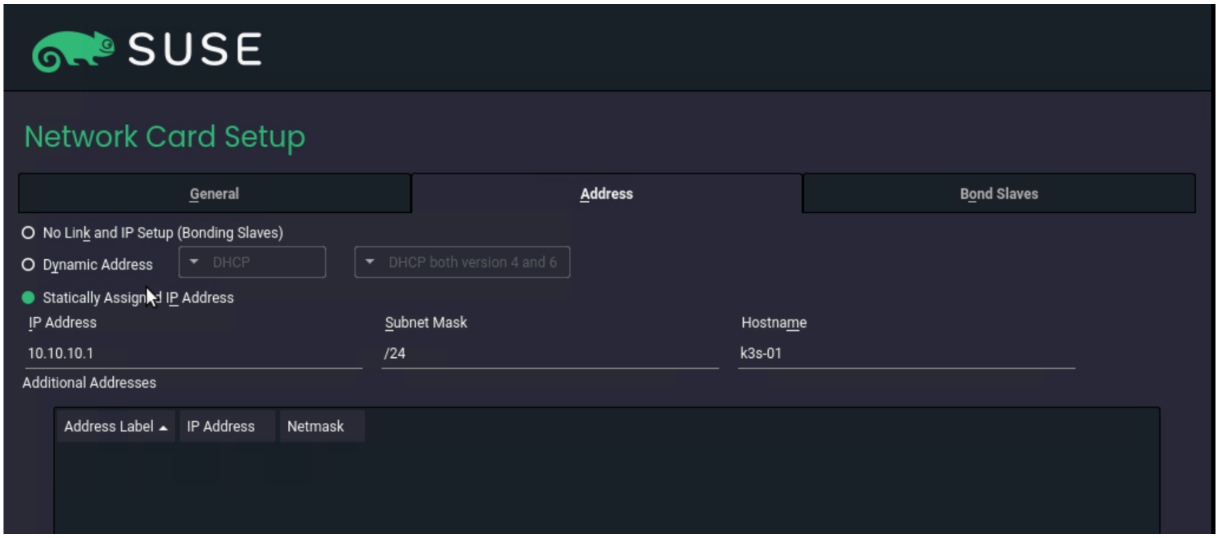
9. We want to create bonding devices for high availability. Select Bonding and click Next.



Device Type

○ Ethernet
○ VLAN
○ Bridge
○ TUN
○ TAP
● Bonding
○ Dummy
○ Wireless
○ Infiniband

10. Enter the IP address, the netmask for the administration traffic network, and a hostname. Click Bond Slaves.



Network Card Setup

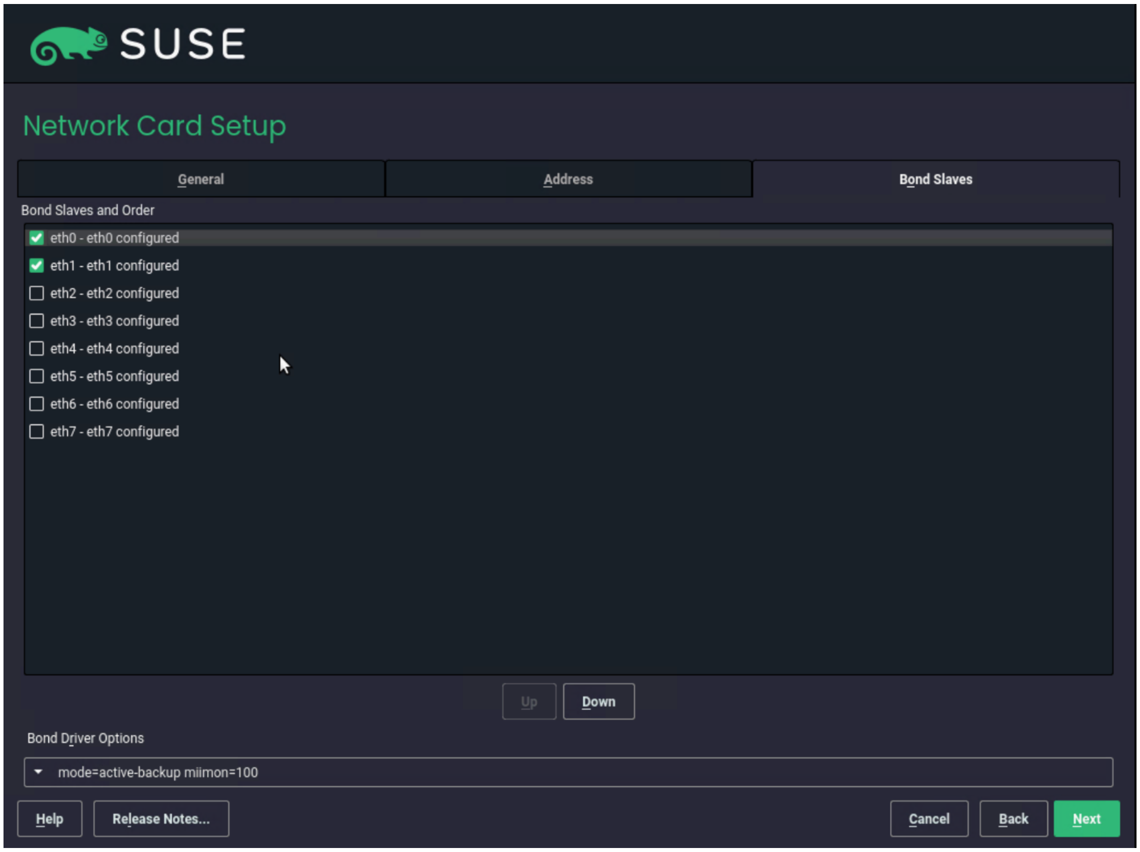
○ No Link and IP Setup (Bonding Slaves)
○ Dynamic Address DHCP DHCP both version 4 and 6
● Statically Assigned IP Address

IP Address	Subnet Mask	Hostname
10.10.10.1	/24	k3s-01

Additional Addresses

Address Label	IP Address	Netmask

11. Select the two interfaces created for administration traffic (eth0 and eth1) and use active-backup as the mode. Click Next. In the pop-up window, click Continue.

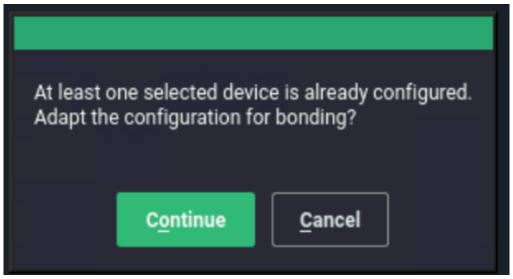


Bond Slaves and Order

☑ eth0 - eth0 configured
☑ eth1 - eth1 configured
□ eth2 - eth2 configured
□ eth3 - eth3 configured
□ eth4 - eth4 configured
□ eth5 - eth5 configured
□ eth6 - eth6 configured
□ eth7 - eth7 configured

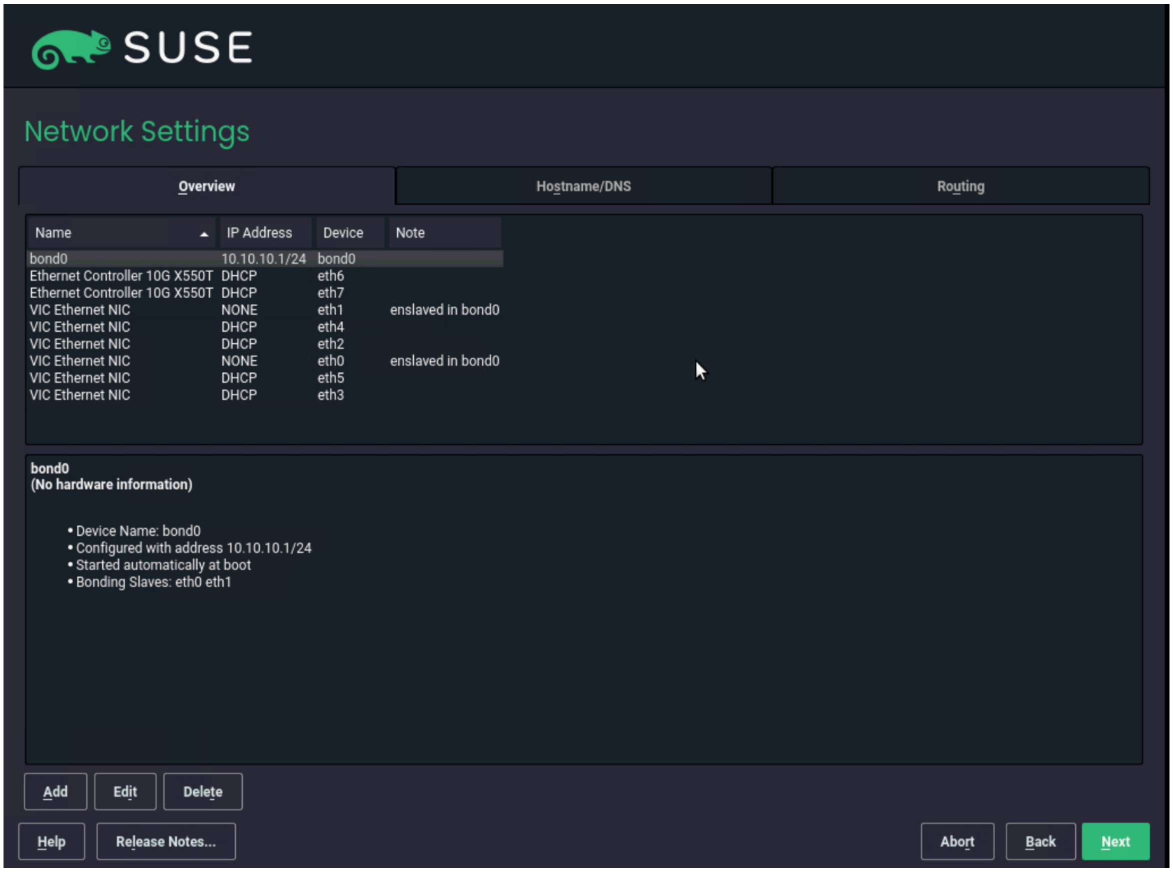
Bond Driver Options

mode=active-backup miimon=100



At least one selected device is already configured. Adapt the configuration for bonding?

12. Click Add to create the bonding device for the access traffic. Select Bonding on the next screen and click Next.



SUSE

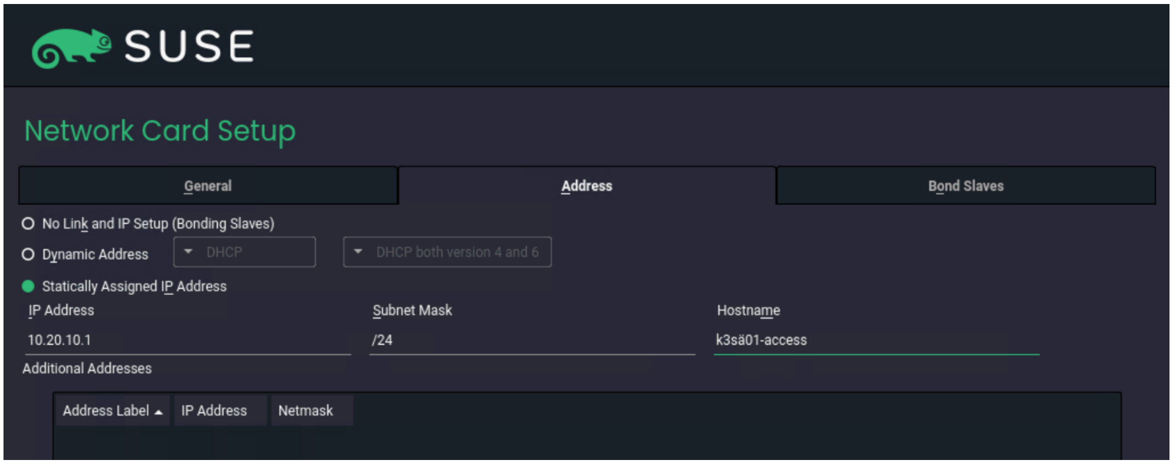
Network Settings

Name	IP Address	Device	Note
bond0	10.10.10.1/24	bond0	
Ethernet Controller 10G X550T	DHCP	eth6	
Ethernet Controller 10G X550T	DHCP	eth7	
VIC Ethernet NIC	NONE	eth1	enslaved in bond0
VIC Ethernet NIC	DHCP	eth4	
VIC Ethernet NIC	DHCP	eth2	
VIC Ethernet NIC	NONE	eth0	enslaved in bond0
VIC Ethernet NIC	DHCP	eth5	
VIC Ethernet NIC	DHCP	eth3	

bond0
(No hardware information)

- Device Name: bond0
- Configured with address 10.10.10.1/24
- Started automatically at boot
- Bonding Slaves: eth0 eth1

13. Enter the IP address and netmask for the access traffic connection and a hostname. Click Bond Slaves.



SUSE

Network Card Setup

○ No Link and IP Setup (Bonding Slaves)

○ Dynamic Address DHCP DHCP both version 4 and 6

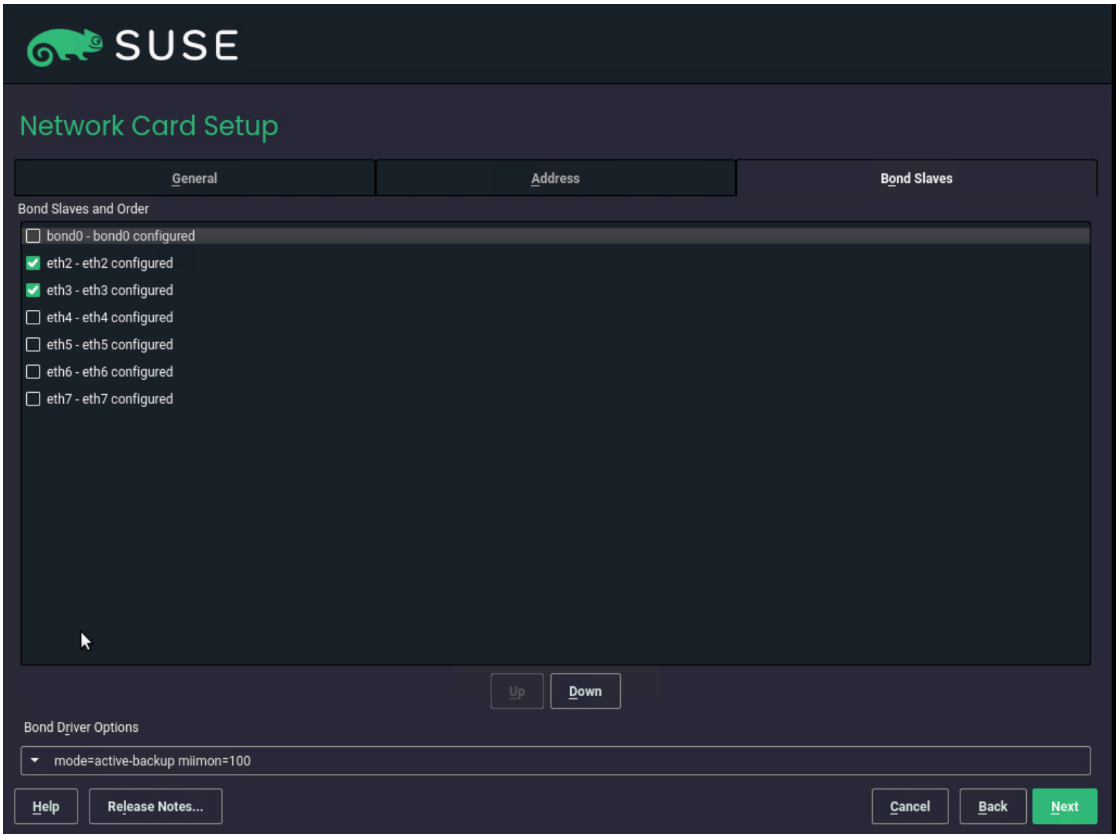
● Statically Assigned IP Address

IP Address	Subnet Mask	Hostname
10.20.10.1	/24	k3sä01-access

Additional Addresses

Address Label	IP Address	Netmask

14. Select the two interfaces created for access traffic (eth2 and eth3) and use active-backup as the mode. Click Next. In the pop-up window, click Continue.



Network Card Setup

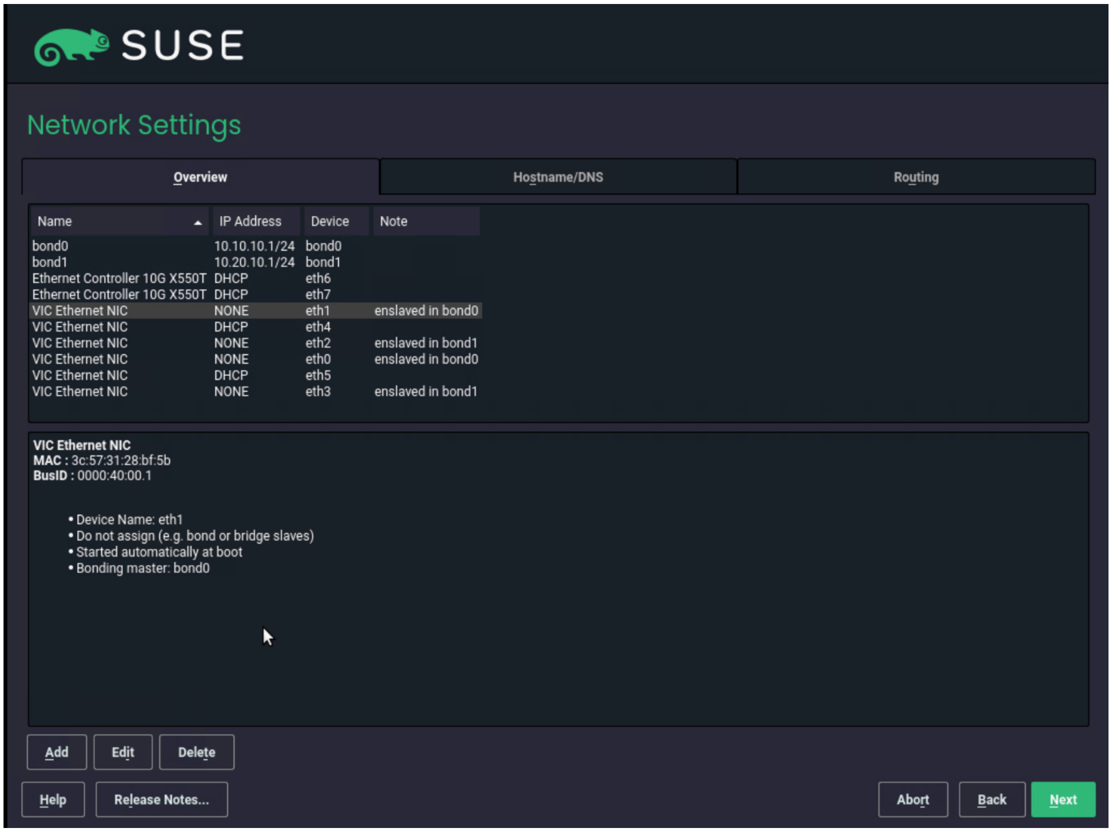
Bond Slaves and Order

- ☐ bond0 - bond0 configured
- ☑ eth2 - eth2 configured
- ☑ eth3 - eth3 configured
- ☐ eth4 - eth4 configured
- ☐ eth5 - eth5 configured
- ☐ eth6 - eth6 configured
- ☐ eth7 - eth7 configured

Bond Driver Options

mode=active-backup miimon=100

15. Back on the Network Settings screen, click Add to create the bonding for storage traffic. Select Bonding on the next screen and click Next.



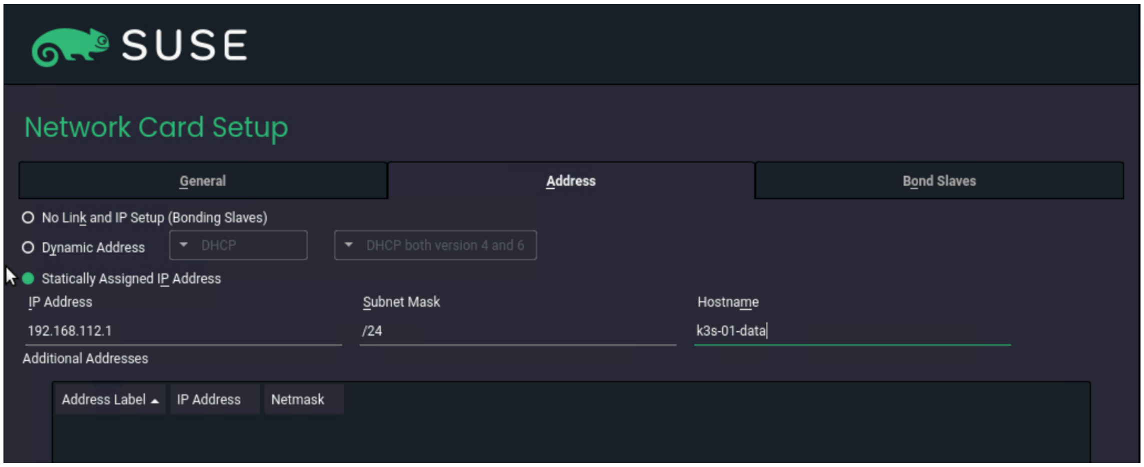
Network Settings

Name	IP Address	Device	Note
bond0	10.10.10.1/24	bond0	
bond1	10.20.10.1/24	bond1	
Ethernet Controller 10G X550T	DHCP	eth6	
Ethernet Controller 10G X550T	DHCP	eth7	
VIC Ethernet NIC	NONE	eth1	enslaved in bond0
VIC Ethernet NIC	DHCP	eth4	
VIC Ethernet NIC	NONE	eth2	enslaved in bond1
VIC Ethernet NIC	NONE	eth0	enslaved in bond0
VIC Ethernet NIC	DHCP	eth5	
VIC Ethernet NIC	NONE	eth3	enslaved in bond1

VIC Ethernet NIC
MAC : 3c:57:31:28:bf:5b
BusID : 0000:40:00.1

- Device Name: eth1
- Do not assign (e.g. bond or bridge slaves)
- Started automatically at boot
- Bonding master: bond0

16. Enter the IP address and netmask for the storage traffic connection and a hostname. Click Bond Slaves.



Network Card Setup

○ No Link and IP Setup (Bonding Slaves)

○ Dynamic Address

● Statically Assigned IP Address

IP Address: 192.168.112.1

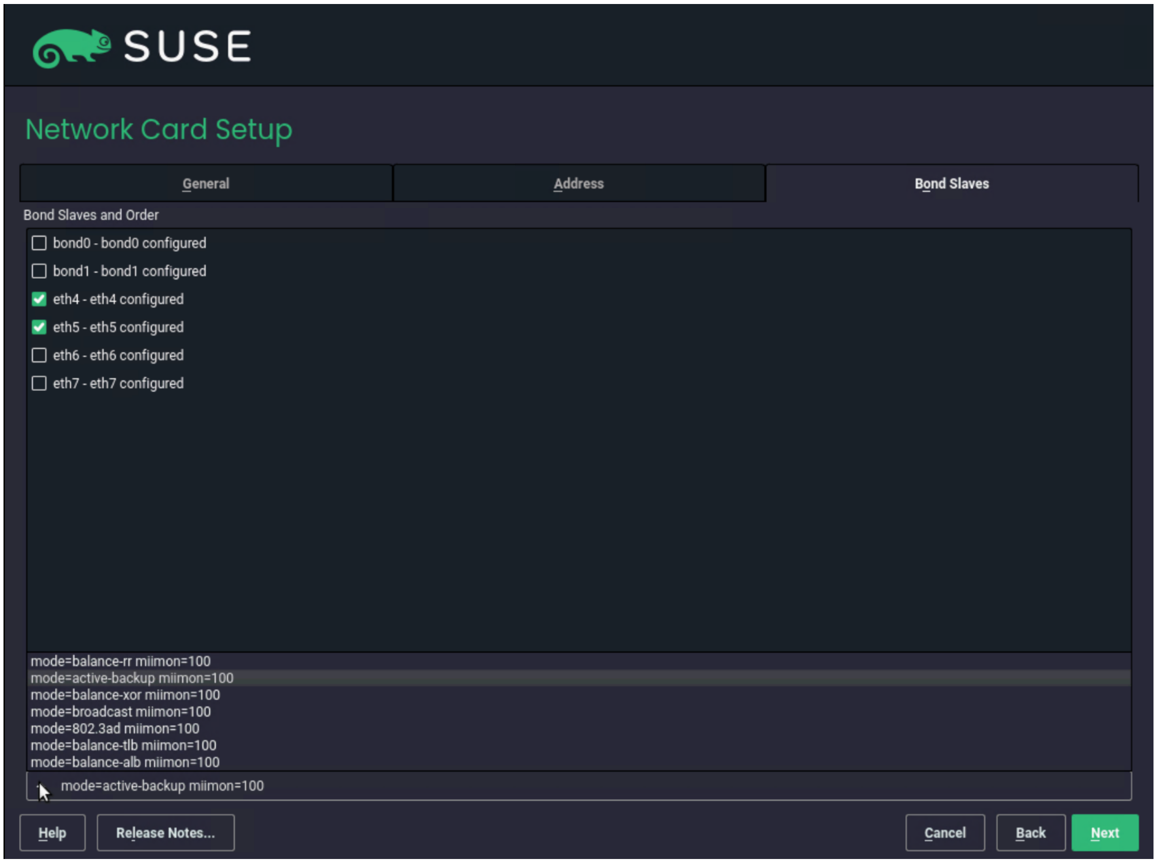
Subnet Mask: /24

Hostname: k3s-01-data

Additional Addresses

17. Select the two interfaces created for storage traffic (eth4 and eth5). Check with your networking and storage teams to determine whether an active-active bonding option for storage access is possible. An active-active option will increase the maximum throughput between this server and the storage system. In the absence of a clear answer from the network team, use active-backup as the mode.

18. Click General and in the pop-up window click Continue.



Network Card Setup

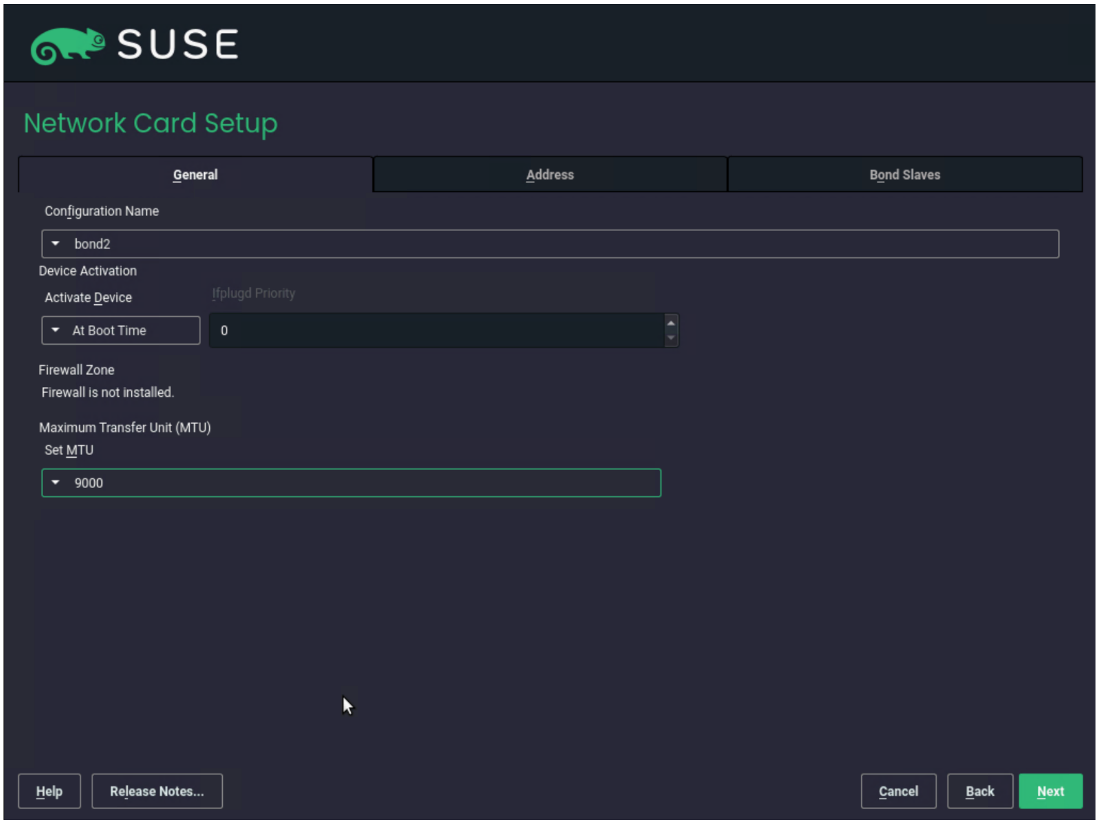
Bond Slaves and Order

- ☐ bond0 - bond0 configured
- ☐ bond1 - bond1 configured
- ☑ eth4 - eth4 configured
- ☑ eth5 - eth5 configured
- ☐ eth6 - eth6 configured
- ☐ eth7 - eth7 configured

```
mode=balance-rr miimon=100
mode=active-backup miimon=100
mode=balance-xor miimon=100
mode=broadcast miimon=100
mode=802.3ad miimon=100
mode=balance-tlb miimon=100
mode=balance-alb miimon=100
```

mode=active-backup miimon=100

19. Enter **9000** in the field under Set MTU and click Next.



Configuration Name: bond2

Device Activation

Activate Device: At Boot Time

Ifplugd Priority: 0

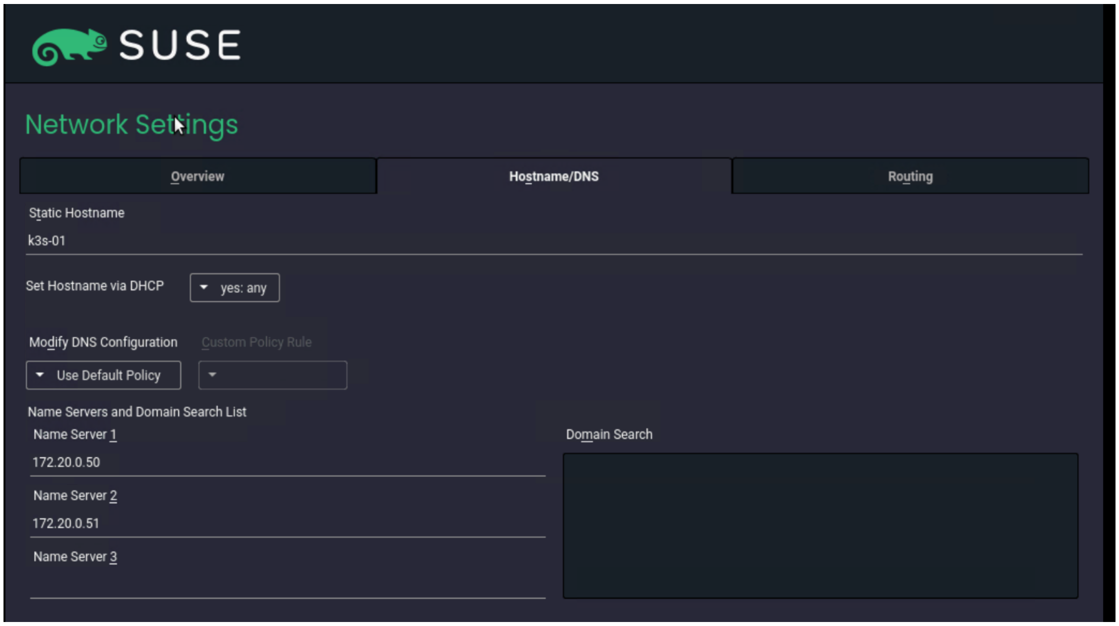
Firewall Zone

Firewall is not installed.

Maximum Transfer Unit (MTU)

Set MTU: 9000

20. Click Hostname / DNS.
21. Enter the static hostname for this system and the IP address for at least one name server. Click Routing.



Static Hostname: k3s-01

Set Hostname via DHCP: yes: any

Modify DNS Configuration: Use Default Policy

Custom Policy Rule

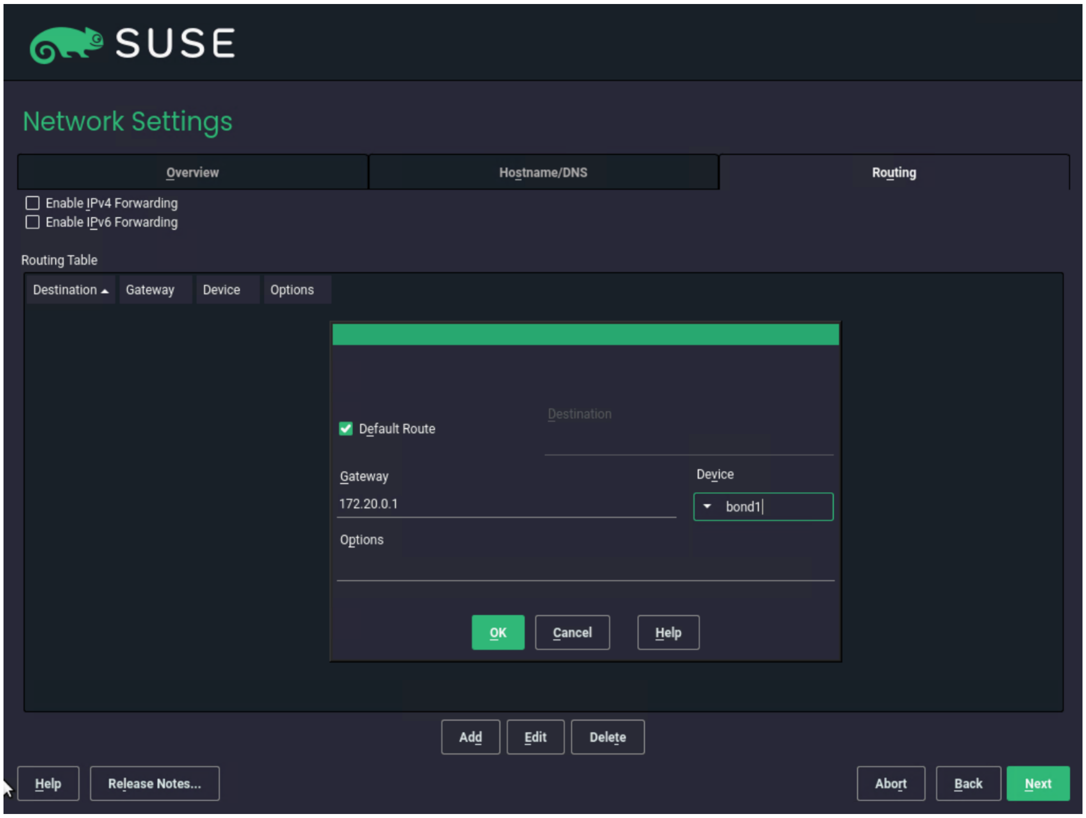
Name Servers and Domain Search List

Name Server 1: 172.20.0.50

Name Server 2: 172.20.0.51

Name Server 3

22. Click Add and in the pop-up window enter at least the default route for your network. Click OK. Click Next.



Network Settings

□ Enable IPv4 Forwarding
□ Enable IPv6 Forwarding

Routing Table

Destination ▲	Gateway	Device	Options

☑ Default Route

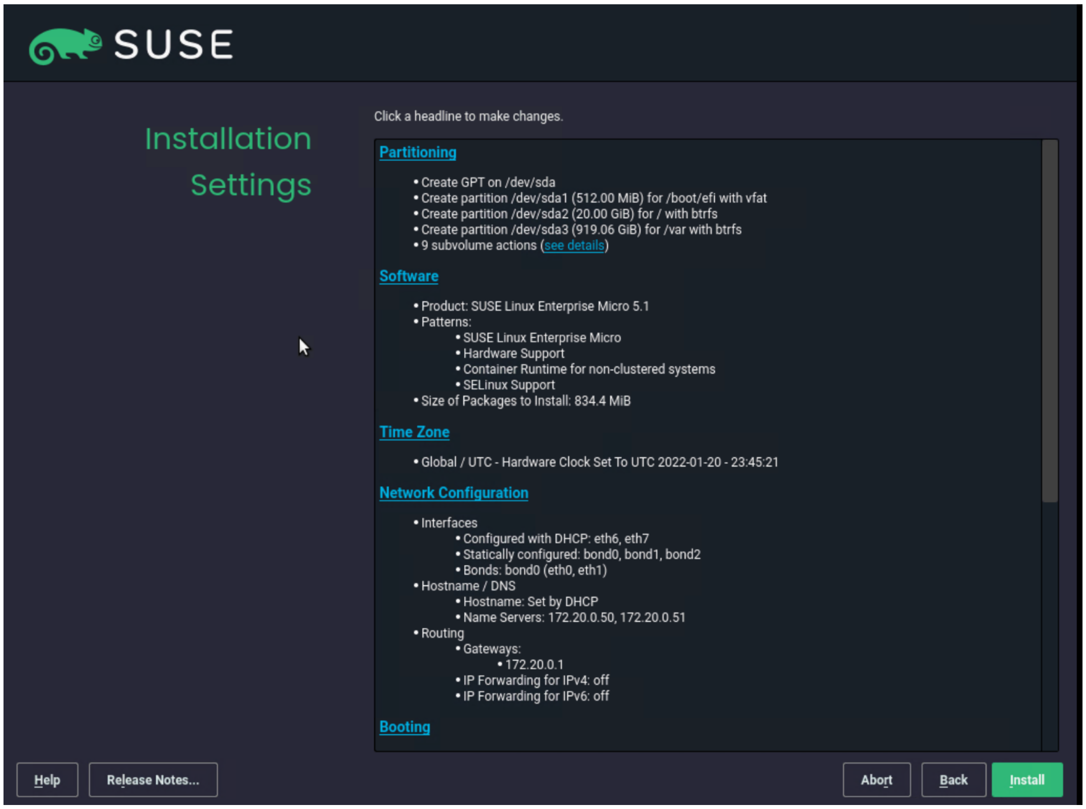
Destination

Gateway: 172.20.0.1

Device: bond1

Options

23. Back on the Installation Settings page, check all information and start the installation by clicking Install. Follow the next screens until the installation process is finished.



Installation Settings

Click a headline to make changes.

Partitioning

- Create GPT on /dev/sda
- Create partition /dev/sda1 (512.00 MiB) for /boot/efi with vfat
- Create partition /dev/sda2 (20.00 GiB) for / with btrfs
- Create partition /dev/sda3 (919.06 GiB) for /var with btrfs
- 9 subvolume actions (see details)

Software

- Product: SUSE Linux Enterprise Micro 5.1
- Patterns:
  - SUSE Linux Enterprise Micro
  - Hardware Support
  - Container Runtime for non-clustered systems
  - SELinux Support
- Size of Packages to Install: 834.4 MiB

Time Zone

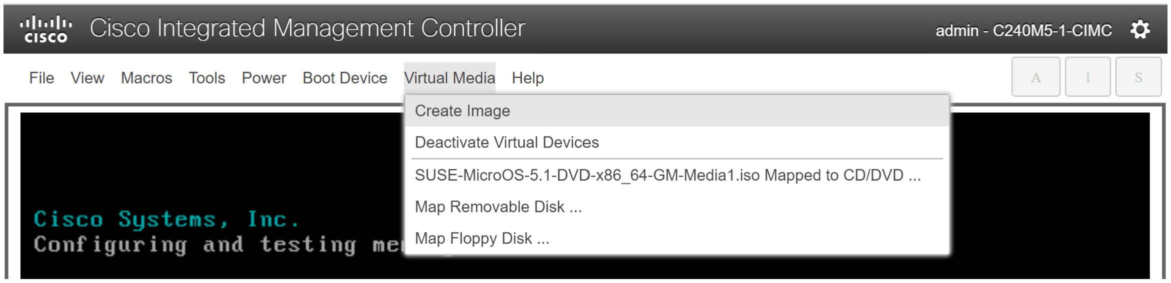
- Global / UTC - Hardware Clock Set To UTC 2022-01-20 - 23:45:21

Network Configuration

- Interfaces
  - Configured with DHCP: eth6, eth7
  - Statically configured: bond0, bond1, bond2
  - Bonds: bond0 (eth0, eth1)
- Hostname / DNS
  - Hostname: Set by DHCP
  - Name Servers: 172.20.0.50, 172.20.0.51
- Routing
  - Gateways:
    - 172.20.0.1
  - IP Forwarding for IPv4: off
  - IP Forwarding for IPv6: off

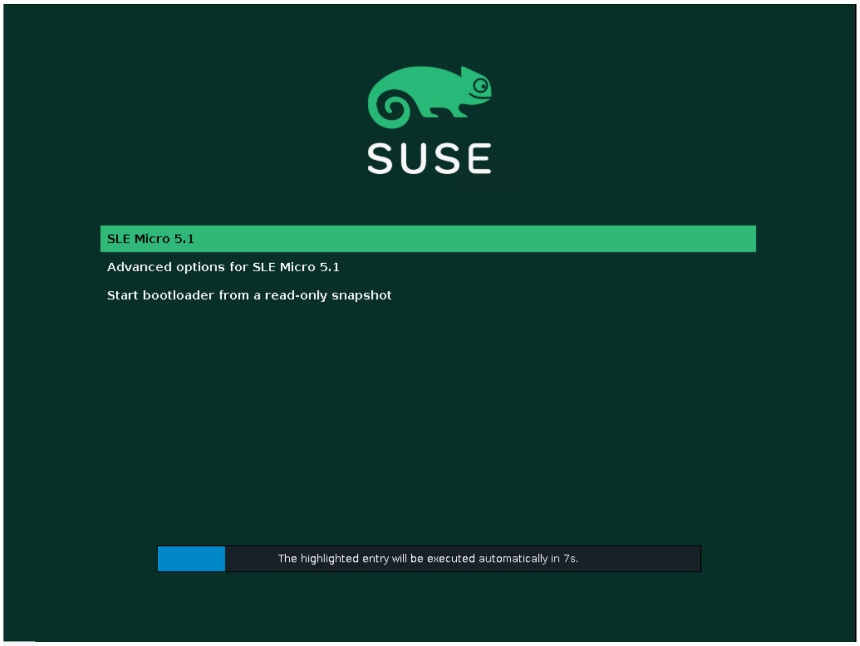
Booting

24. You must “eject” the CD/DVD as soon the installation process is finished and the reboot is initiated. Click Virtual Media > ****** Mapped to CD/DVD and confirm the ejection by clicking OK in the pop-up window.



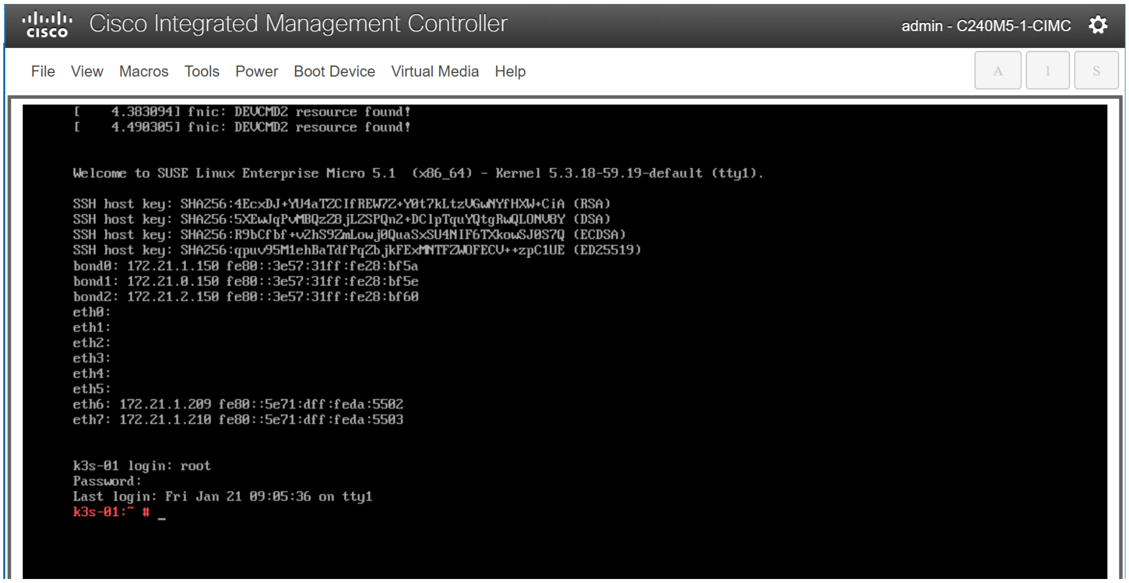
```
Cisco Systems, Inc.
Configuring and testing me
```

After the installation is complete, the system will reboot automatically.


SUSE
SLE Micro 5.1
Advanced options for SLE Micro 5.1
Start bootloader from a read-only snapshot

The highlighted entry will be executed automatically in 7s.

25. Log on to the system as the user root and using the password provided during the installation process.



```
[    4.383094] fnic: DEVCMD2 resource found!
[    4.490305] fnic: DEVCMD2 resource found!


Welcome to SUSE Linux Enterprise Micro 5.1  (x86_64) - Kernel 5.3.18-59.19-default (tty1).

SSH host key: SHA256:4EcxDJ+YU4aTZCIfREW7Z+Y0t7kLtzVGwNYfHXW+CiA (RSA)
SSH host key: SHA256:5XEwJqPvMBQzZ8jLZSPQn2+DClpTquYQtgRwQLONV8Y (DSA)
SSH host key: SHA256:R9bCfbf+v2hS9ZmLowj0QuaSxSU4NIF6TXkowSJ0S7Q (ECDSA)
SSH host key: SHA256:qpuv95M1ehBaTdfPqZbjkFExMNTFZWOFECV++zpC1UE (ED25519)
bond0: 172.21.1.150 fe80::3e57:31ff:fe28:bf5a
bond1: 172.21.0.150 fe80::3e57:31ff:fe28:bf5e
bond2: 172.21.2.150 fe80::3e57:31ff:fe28:bf60
eth0:
eth1:
eth2:
eth3:
eth4:
eth5:
eth6: 172.21.1.209 fe80::5e71:dff:feda:5502
eth7: 172.21.1.210 fe80::5e71:dff:feda:5503


k3s-01 login: root
Password:
Last login: Fri Jan 21 09:05:36 on tty1
k3s-01:~ # _
```

26. Run the following commands to check the network configuration:

```
k3s-01:~ # ip addr
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,SLAVE,UP,LOWER_UP> mtu 1500 qdisc mq master bond0 state UP
group default qlen 1000
    link/ether 3c:57:31:28:bf:5a brd ff:ff:ff:ff:ff:ff
    altname enp64s0f0
.
.
.
10: bond2: <BROADCAST,MULTICAST,MASTER,UP,LOWER_UP> mtu 9000 qdisc noqueue state UP group
default qlen 1000
    link/ether 3c:57:31:28:bf:60 brd ff:ff:ff:ff:ff:ff
    inet 172.21.2.150/24 brd 172.21.2.255 scope global bond2
       valid_lft forever preferred_lft forever
    inet6 fe80::3e57:31ff:fe28:bf60/64 scope link
       valid_lft forever preferred_lft forever
11: bond1: <BROADCAST,MULTICAST,MASTER,UP,LOWER_UP> mtu 1500 qdisc noqueue state UP group
default qlen 1000
    link/ether 3c:57:31:28:bf:5e brd ff:ff:ff:ff:ff:ff
    inet 172.21.0.150/24 brd 172.21.0.255 scope global bond1
       valid_lft forever preferred_lft forever
    inet6 fe80::3e57:31ff:fe28:bf5e/64 scope link
       valid_lft forever preferred_lft forever
12: bond0: <BROADCAST,MULTICAST,MASTER,UP,LOWER_UP> mtu 1500 qdisc noqueue state UP group
default qlen 1000
    link/ether 3c:57:31:28:bf:5a brd ff:ff:ff:ff:ff:ff
    inet 172.21.1.150/24 brd 172.21.1.255 scope global bond0
       valid_lft forever preferred_lft forever
    inet6 fe80::3e57:31ff:fe28:bf5a/64 scope link
       valid_lft forever preferred_lft forever
k3s-01:~ #
```

```
k3s-01:~ # ip route
default via 172.21.1.1 dev eth6 proto dhcp
172.21.0.0/24 dev bond1 proto kernel scope link src 172.21.0.150
172.21.1.0/24 dev eth6 proto kernel scope link src 172.21.1.209
```

```
172.21.1.0/24 dev eth7 proto kernel scope link src 172.21.1.210
172.21.1.0/24 dev bond0 proto kernel scope link src 172.21.1.150
172.21.2.0/24 dev bond2 proto kernel scope link src 172.21.2.150
k3s-01:~ #


k3s-01:~ # cat /proc/net/bonding/bond0
Ethernet Channel Bonding Driver: v3.7.1 (April 27, 2011)

Bonding Mode: fault-tolerance (active-backup)
Primary Slave: None
Currently Active Slave: eth0
MII Status: up
MII Polling Interval (ms): 100
Up Delay (ms): 0
Down Delay (ms): 0
Peer Notification Delay (ms): 0

Slave Interface: eth0
MII Status: up
Speed: 25000 Mbps
Duplex: full
Link Failure Count: 0
Permanent HW addr: 3c:57:31:28:bf:5a
Slave queue ID: 0

Slave Interface: eth1
MII Status: up
Speed: 25000 Mbps
Duplex: full
Link Failure Count: 0
Permanent HW addr: 3c:57:31:28:bf:5b
Slave queue ID: 0
k3s-01:~ #


k3s-01:~ # ping wdf02-4-pdc.wdf02-4-dmz.local. -c 3
PING wdf02-4-pdc.wdf02-4-dmz.local (172.20.0.50) 56(84) bytes of data.
64 bytes from wdf02-4-pdc.wdf02-4-dmz.local (172.20.0.50): icmp_seq=1 ttl=126 time=0.254 ms
64 bytes from wdf02-4-pdc.wdf02-4-dmz.local (172.20.0.50): icmp_seq=2 ttl=126 time=0.259 ms
64 bytes from wdf02-4-pdc.wdf02-4-dmz.local (172.20.0.50): icmp_seq=3 ttl=126 time=0.379 ms
```

```
--- wdf02-4-pdc.wdf02-4-dmz.local ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2040ms
rtt min/avg/max/mdev = 0.254/0.297/0.379/0.059 ms
k3s-01:~ #
```

```
k3s-01:~ # ping www.google.de. -c 3
PING www.google.de (142.250.179.131) 56(84) bytes of data.
64 bytes from ams17s10-in-f3.1e100.net (142.250.179.131): icmp_seq=1 ttl=115 time=16.9 ms
64 bytes from ams17s10-in-f3.1e100.net (142.250.179.131): icmp_seq=2 ttl=115 time=16.9 ms
64 bytes from ams17s10-in-f3.1e100.net (142.250.179.131): icmp_seq=3 ttl=115 time=16.9 ms

--- www.google.de ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2003ms
rtt min/avg/max/mdev = 16.915/16.937/16.963/0.019 ms
k3s-01:~ #
```

Install K3s

This section presents the installation procedure for the K3s software as described in Rancher Docs: K3s - Lightweight Kubernetes.

1. Use the **curl** command to download the K3s software package and install it.

```
k3s-01:~ # curl -sfL https://get.k3s.io | sh -s - --write-kubeconfig-mode 644
[INFO]  Finding release for channel stable
[INFO]  Using v1.22.5+k3s1 as release
[INFO]  Downloading hash https://github.com/k3s-
io/k3s/releases/download/v1.22.5+k3s1/sha256sum-amd64.txt
[INFO]  Downloading binary https://github.com/k3s-io/k3s/releases/download/v1.22.5+k3s1/k3s
[INFO]  Verifying binary download
[INFO]  Installing k3s to /usr/local/bin/k3s
transactional-update 3.5.6 started
Options: --no-selfupdate -d run zypper --gpg-auto-import-keys install -y k3s-selinux
Separate /var detected.
2022-01-21 09:27:10 tukit 3.5.6 started
2022-01-21 09:27:10 Options: --discard -c1 open
2022-01-21 09:27:10 Using snapshot 1 as base for new snapshot 3.
2022-01-21 09:27:10 No previous snapshot to sync with - skipping
ID: 3
2022-01-21 09:27:10 Transaction completed.
2022-01-21 09:27:10 tukit 3.5.6 started
2022-01-21 09:27:10 Options: --discard call 3 zypper --gpg-auto-import-keys install -y k3s-
selinux
2022-01-21 09:27:11 Executing `zypper --gpg-auto-import-keys install -y k3s-selinux`:
```

```
Building repository 'Rancher K3s Common (stable)' cache
............................................................[done]
Loading repository data...
Reading installed packages...
Resolving package dependencies...

The following NEW package is going to be installed:
  k3s-selinux

1 new package to install.
Overall download size: 20.0 KiB. Already cached: 0 B. After the operation, additional 85.1
KiB will be used.
Continue? [y/n/v/...? shows all options] (y): y
Retrieving package k3s-selinux-0.5-1.sle.noarch                                      (1/1),
20.0 KiB ( 85.1 KiB unpacked)
Retrieving: k3s-selinux-0.5-1.sle.noarch.rpm
.............................................................[done (713 B/s)]
k3s-selinux-0.5-1.sle.noarch.rpm:
    Header V4 RSA/SHA1 Signature, key ID e257814a: NOKEY
    V4 RSA/SHA1 Signature, key ID e257814a: NOKEY

Looking for gpg key ID E257814A in cache /var/cache/zypp/pubkeys.
Looking for gpg key ID E257814A in repository Rancher K3s Common (stable).
  gpgkey=https://rpm.rancher.io/public.key
Retrieving: public.key
............................................................................................
.[done]

Automatically importing the following key:

  Repository:       Rancher K3s Common (stable)
  Key Fingerprint:  C8CF F216 4551 26E9 B9C9 18BE 925E A29A E257 814A
  Key Name:         Rancher (CI) <ci@rancher.com>
  Key Algorithm:    RSA 3072
  Key Created:      Tue Mar 10 22:43:06 2020
  Key Expires:      (does not expire)
  Subkey:           AA7E9EC8FE21FDCF 2020-03-10 [does not expire]
  Rpm Name:         gpg-pubkey-e257814a-5e6817fa

Note: A GPG pubkey is clearly identified by it's fingerprint. Do not rely the keys name. If
youare not sure whether the presented key is authentic, ask the repository provider or check
his web site. Many provider maintain a web page showing the fingerprints of the GPG keys
they are using.
```

```
Checking for file conflicts:
......................................................................................[done]
(1/1) Installing: k3s-selinux-0.5-1.sle.noarch
......................................................................[done]
Executing %posttrans scripts
......................................................................................[done]
2022-01-21 09:27:21 Application returned with exit status 0.
2022-01-21 09:27:22 Transaction completed.
2022-01-21 09:27:22 tukit 3.5.6 started
2022-01-21 09:27:22 Options: --discard close 3
2022-01-21 09:27:22 New default snapshot is #3 (/.snapshots/3/snapshot).
2022-01-21 09:27:22 Transaction completed.

Please reboot your machine to activate the changes and avoid data loss.
New default snapshot is #3 (/.snapshots/3/snapshot).
transactional-update finished
[INFO]  Creating /usr/local/bin/kubectl symlink to k3s
[INFO]  Creating /usr/local/bin/crictl symlink to k3s
[INFO]  Creating /usr/local/bin/ctr symlink to k3s
[INFO]  Creating killall script /usr/local/bin/k3s-killall.sh
[INFO]  Creating uninstall script /usr/local/bin/k3s-uninstall.sh
[INFO]  env: Creating environment file /etc/systemd/system/k3s.service.env
[INFO]  systemd: Creating service file /etc/systemd/system/k3s.service
[INFO]  systemd: Enabling k3s unit
Created symlink /etc/systemd/system/multi-user.target.wants/k3s.service →
/etc/systemd/system/k3s.service.
k3s-01:~ #
```

2. Use the **systemctl** command to start the K3s server and check the status.

```
k3s-01:~ # systemctl start k3s
k3s-01:~ # systemctl status k3s
● k3s.service - Lightweight Kubernetes
     Loaded: loaded (/etc/systemd/system/k3s.service; enabled; vendor preset: disabled)
     Active: active (running) since Fri 2022-01-21 09:37:50 UTC; 7min ago
       Docs: https://k3s.io
    Process: 2583 ExecStartPre=/bin/sh -xc ! /usr/bin/systemctl is-enabled --quiet nm-cloud-
setup.service (code=exited, s>
    Process: 2596 ExecStartPre=/sbin/modprobe br_netfilter (code=exited, status=0/SUCCESS)
    Process: 2610 ExecStartPre=/sbin/modprobe overlay (code=exited, status=0/SUCCESS)
   Main PID: 2611 (k3s-server)
      Tasks: 225
…
k3s-01:~ #
```

3. Get basic information from the installed K3s cluster.

```
k3s-01:~ # kubectl cluster-info

Kubernetes control plane is running at https://127.0.0.1:6443

CoreDNS is running at https://127.0.0.1:6443/api/v1/namespaces/kube-system/services/kube-
dns:dns/proxy

Metrics-server is running at https://127.0.0.1:6443/api/v1/namespaces/kube-
system/services/https:metrics-server:/proxy


To further debug and diagnose cluster problems, use 'kubectl cluster-info dump'.

k3s-01:~ #

k3s-01:~ # kubectl get nodes -o wide

NAME     STATUS   ROLES                  AGE   VERSION        INTERNAL-IP    EXTERNAL-IP
OS-IMAGE                          KERNEL-VERSION         CONTAINER-RUNTIME

k3s-01   Ready    control-plane,master   15m   v1.22.5+k3s1   172.21.1.209   <none>
SUSE Linux Enterprise Micro 5.1   5.3.18-59.19-default   containerd://1.5.8-k3s1

k3s-01:~ #

k3s-01:~ # kubectl get all -A

NAMESPACE     NAME                                          READY   STATUS      RESTARTS      AGE

kube-system   pod/local-path-provisioner-64ffb68fd-7qs4m   1/1     Running     1 (11m ago)   16m

kube-system   pod/metrics-server-9cf544f65-nxrd2            1/1     Running     0             16m

kube-system   pod/helm-install-traefik-crd--1-gln5p         0/1     Completed   0             16m

kube-system   pod/helm-install-traefik--1-sf5dz             0/1     Completed   1             16m

kube-system   pod/svclb-traefik-24sf4                       2/2     Running     0             11

kube-system   pod/coredns-85cb69466-vwbkc                   1/1     Running     1 (11m ago)   16m

kube-system   pod/traefik-786ff64748-x4cz5                  1/1     Running     0             11m


NAMESPACE     NAME                     TYPE           CLUSTER-IP     EXTERNAL-IP    PORT(S)
AGE

default       service/kubernetes       ClusterIP      10.43.0.1      <none>         443/TCP
16m

kube-system   service/kube-dns         ClusterIP      10.43.0.10     <none>
53/UDP,53/TCP,9153/TCP       16m

kube-system   service/metrics-server   ClusterIP      10.43.136.93   <none>         443/TCP
16m

kube-system   service/traefik          LoadBalancer   10.43.32.86    172.21.1.209
80:32380/TCP,443:32713/TCP   11m


NAMESPACE     NAME                          DESIRED   CURRENT   READY   UP-TO-DATE
AVAILABLE   NODE SELECTOR   AGE

kube-system   daemonset.apps/svclb-traefik   1         1         1       1            1
<none>          11m


NAMESPACE     NAME                                     READY   UP-TO-DATE   AVAILABLE   AGE

kube-system   deployment.apps/local-path-provisioner   1/1     1            1           16m
```

```
kube-system   deployment.apps/coredns                  1/1     1            1           16m
kube-system   deployment.apps/metrics-server           1/1     1            1           16m
kube-system   deployment.apps/traefik                  1/1     1            1           11m

NAMESPACE     NAME                                               DESIRED   CURRENT   READY
AGE
kube-system   replicaset.apps/local-path-provisioner-64ffb68fd   1         1         1
16m
kube-system   replicaset.apps/coredns-85cb69466                  1         1         1
16m
kube-system   replicaset.apps/metrics-server-9cf544f65           1         1         1
16m
kube-system   replicaset.apps/traefik-786ff64748                 1         1         1
11m

NAMESPACE     NAME                                 COMPLETIONS   DURATION   AGE
kube-system   job.batch/helm-install-traefik-crd   1/1           5m16s      16m
kube-system   job.batch/helm-install-traefik       1/1           5m17s      16m
k3s-01:~ #
```

The system is now installed and is ready for more specific configurations dependent on local requirements.

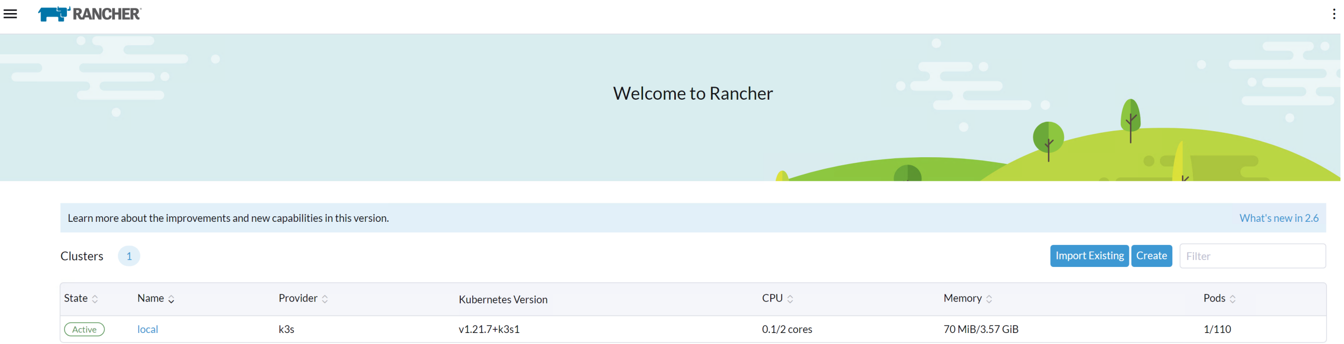
K3s integration into the workload management tool

Many options are available to manage a Kubernetes landscape with multiple clusters, with different workloads, and at different locations. We tested two options: integration into the SUSE Rancher Kubernetes Operations Platform and integration into the Rafay Kubernetes Operations Platform.

Integrate into SUSE Rancher Kubernetes Operations Platform

The obvious option for managing landscapes with SLE Micro and K3s components is SUSE Rancher. This section shows how to integrate a K3s system into the SUSE Rancher Kubernetes Operations Platform.

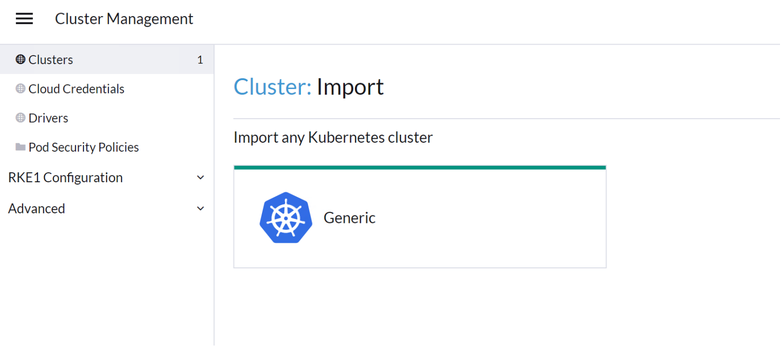
1. In the SUSE Rancher console, navigate to the list of clusters and click Import Existing.



Learn more about the improvements and new capabilities in this version.

State	Name	Provider	Kubernetes Version	CPU	Memory	Pods
Active	local	k3s	v1.21.7+k3s1	0.1/2 cores	70 MiB/3.57 GiB	1/110

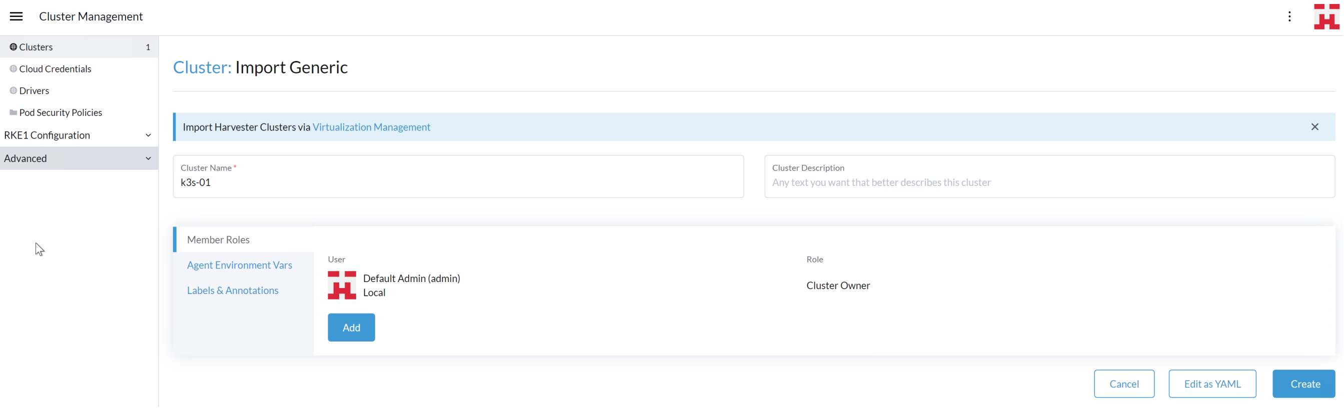
2. Click Generic.



Cluster: Import

Import any Kubernetes cluster

3. Enter a cluster name and click Create.



Cluster: Import Generic

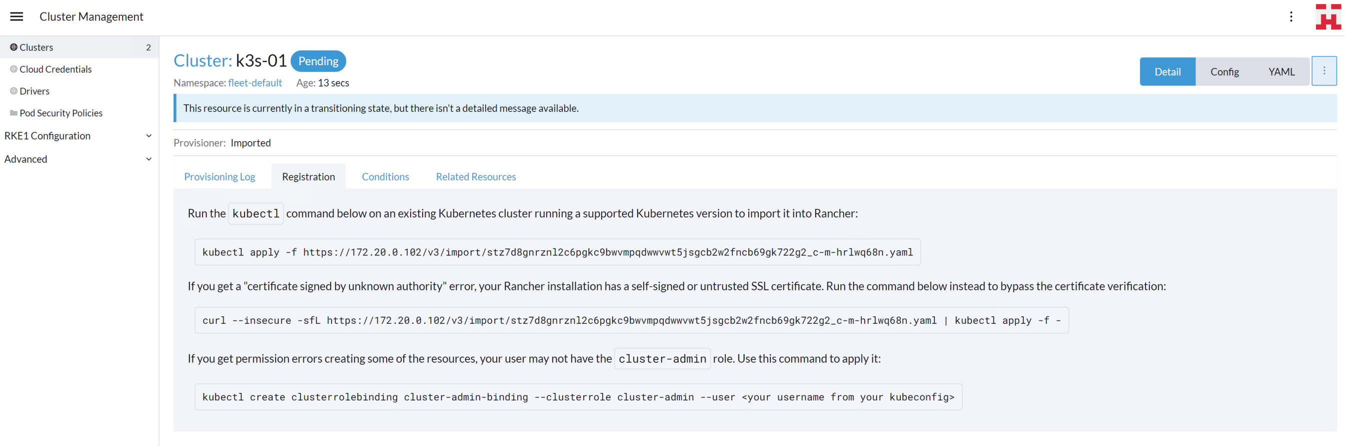
Import Harvester Clusters via Virtualization Management

Cluster Name * k3s-01

Cluster Description Any text you want that better describes this cluster

User	Role
Default Admin (admin) Local	Cluster Owner

4. Follow the steps shown on the next screen and click Done.



Cluster: k3s-01 Pending

Namespace: fleet-default Age: 13 secs

This resource is currently in a transitioning state, but there isn't a detailed message available.

Provisioner: Imported

Run the `kubectl` command below on an existing Kubernetes cluster running a supported Kubernetes version to import it into Rancher:

```
kubectl apply -f https://172.20.0.102/v3/import/stz7d8gnrznl2c6pgkc9bwvmpqdwwvwt5jsgcb2w2fncb69gk722g2_c-m-hrlwq68n.yaml
```

If you get a "certificate signed by unknown authority" error, your Rancher installation has a self-signed or untrusted SSL certificate. Run the command below instead to bypass the certificate verification:

```
curl --insecure -sfL https://172.20.0.102/v3/import/stz7d8gnrznl2c6pgkc9bwvmpqdwwvwt5jsgcb2w2fncb69gk722g2_c-m-hrlwq68n.yaml | kubectl apply -f -
```

If you get permission errors creating some of the resources, your user may not have the `cluster-admin` role. Use this command to apply it:

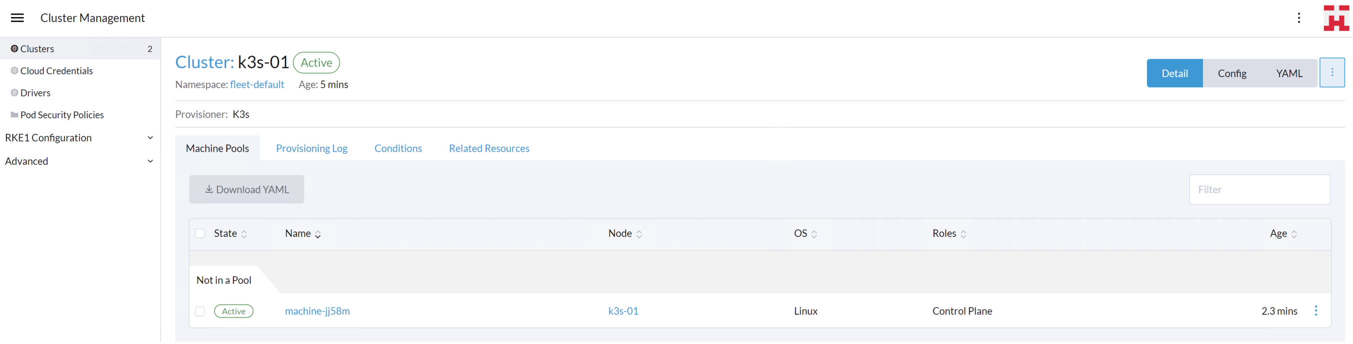
```
kubectl create clusterrolebinding cluster-admin-binding --clusterrole cluster-admin --user <your username from your kubeconfig>
```

5. Log on to the installed k3s system and run the listed commands from the preceding screen.

```
k3s-01:~ # kubectl create clusterrolebinding cluster-admin-binding \
>   --clusterrole cluster-admin \
>   --user root
clusterrolebinding.rbac.authorization.k8s.io/cluster-admin-binding created
k3s-01:~ #
k3s-01:~ # curl --insecure -sfL
https://172.20.0.102/v3/import/stz7d8gnrznl2c6pgkc9bwvmpqdwwvwt5jsgcb2w2fncb69gk722g2_c-m-
hrlwq68n.yaml | kubectl apply -f -
clusterrole.rbac.authorization.k8s.io/proxy-clusterrole-kubeapiserver created
clusterrolebinding.rbac.authorization.k8s.io/proxy-role-binding-kubernetes-master created
```

```
namespace/cattle-system created
serviceaccount/cattle created
clusterrolebinding.rbac.authorization.k8s.io/cattle-admin-binding created
secret/cattle-credentials-fad2056 created
clusterrole.rbac.authorization.k8s.io/cattle-admin created
Warning:
spec.template.spec.affinity.nodeAffinity.requiredDuringSchedulingIgnoredDuringExecution.nodeSelec
torTerms[0].matchExpressions[0].key: beta.kubernetes.io/os is deprecated since v1.14; use
"kubernetes.io/os" instead
deployment.apps/cattle-cluster-agent created
service/cattle-cluster-agent created
k3s-01:~ #
k3s-01:~ #
k3s-01:~ # kubectl get all -n cattle-system
NAME                                      READY   STATUS    RESTARTS   AGE
pod/cattle-cluster-agent-56d66975fc-t56mz   1/1     Running   0          60s

NAME                           TYPE        CLUSTER-IP     EXTERNAL-IP   PORT(S)          AGE
service/cattle-cluster-agent   ClusterIP   10.43.118.86   <none>        80/TCP,443/TCP   3m20s


NAME                                   READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/cattle-cluster-agent   1/1     1            1           3m20s

NAME                                              DESIRED   CURRENT   READY   AGE
replicaset.apps/cattle-cluster-agent-56d66975fc   1         1         1       60s
replicaset.apps/cattle-cluster-agent-857c647888   0         0         0       3m20s
k3s-01:~ #
```

6. Return to the SUSE Rancher user interface. The cluster is now shown as Active.



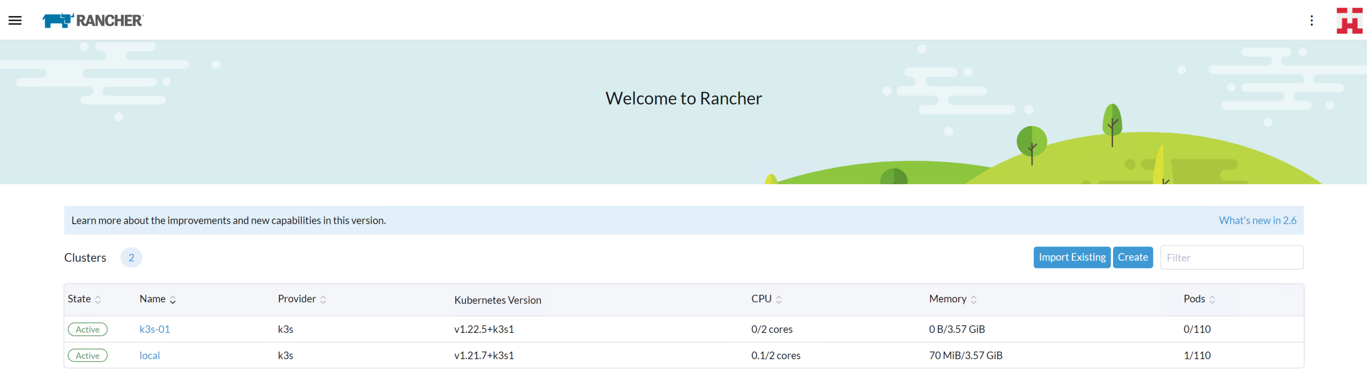
Cluster: k3s-01 Active

Namespace: fleet-default Age: 5 mins

Provisioner: K3s

State	Name	Node	OS	Roles	Age
Not in a Pool					
Active	machine-jj58m	k3s-01	Linux	Control Plane	2.3 mins

7. View the home screen. The high-level information of the cluster is shown on the home screen of SUSE Rancher.



Welcome to Rancher

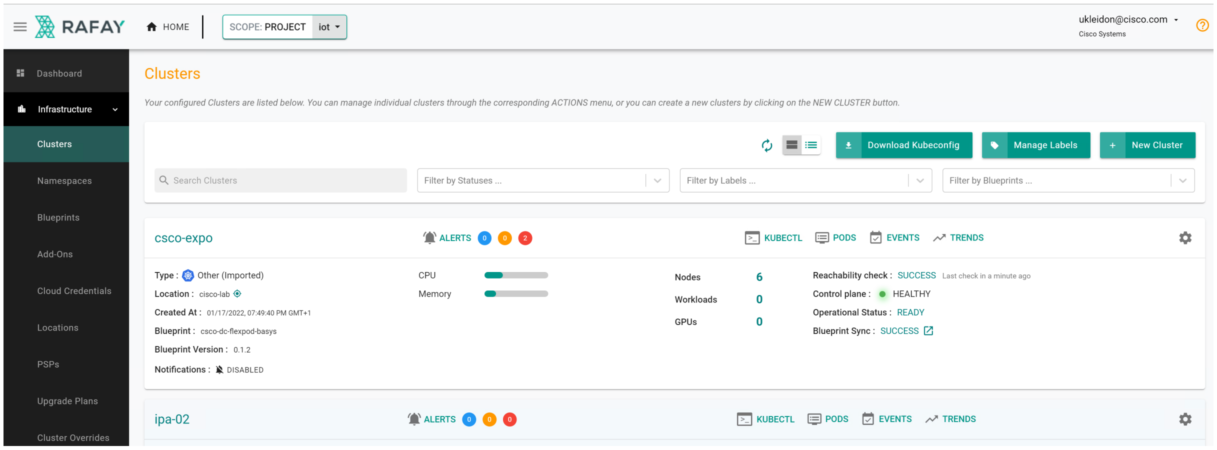
Learn more about the improvements and new capabilities in this version.

State	Name	Provider	Kubernetes Version	CPU	Memory	Pods
Active	k3s-01	k3s	v1.22.5+k3s1	0/2 cores	0 B/3.57 GiB	0/110
Active	local	k3s	v1.21.7+k3s1	0.1/2 cores	70 MiB/3.57 GiB	1/110

Integrate into Rafay Kubernetes Operations Platform

To demonstrate the manageability of an SLE Micro and K3s system with another tool, this section shows integration into the Rafay Kubernetes management console.

1. In the Rafay console, navigate to the list of clusters in the project of choice and click New Cluster.



Clusters

Your configured Clusters are listed below. You can manage individual clusters through the corresponding ACTIONS menu, or you can create a new clusters by clicking on the NEW CLUSTER button.

csco-expo — ALERTS 0 0 2

Type : Other (Imported)
Location : cisco-lab
Created At : 01/17/2022, 07:49:40 PM GMT+1
Blueprint : csco-dc-flexpod-basys
Blueprint Version : 0.1.2
Notifications : DISABLED

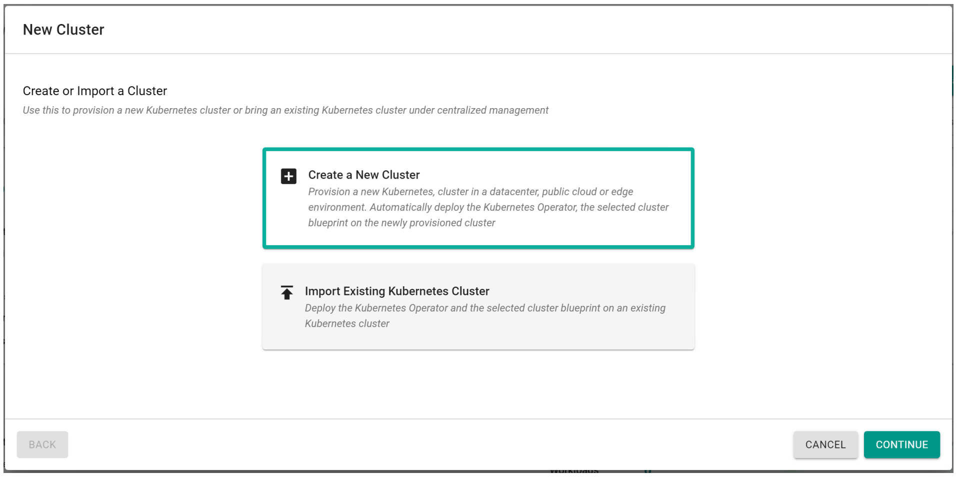
CPU
Memory

Nodes 6
Workloads 0
GPUs 0

Reachability check : SUCCESS Last check in a minute ago
Control plane : HEALTHY
Operational Status : READY
Blueprint Sync : SUCCESS

ipa-02 — ALERTS 0 0 0

2. Click Import Existing Kubernetes Cluster and click Continue.



New Cluster

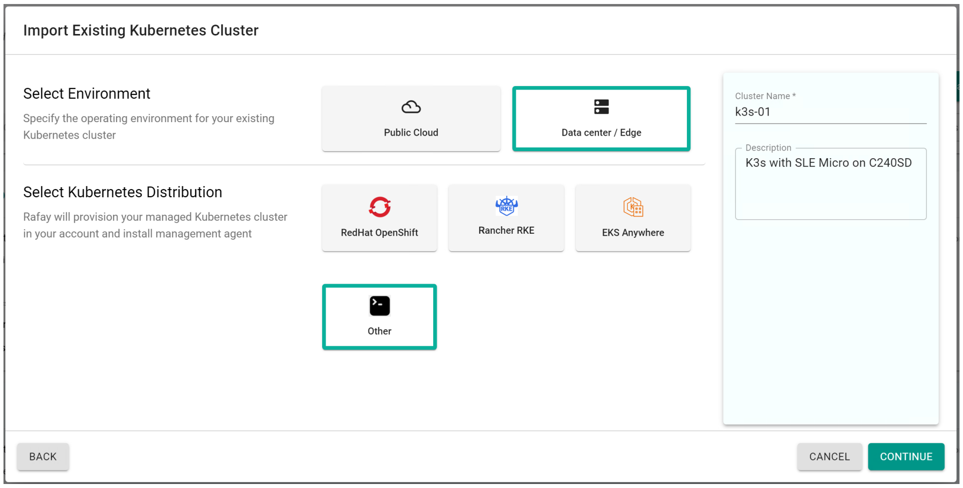
Create or Import a Cluster

Use this to provision a new Kubernetes cluster or bring an existing Kubernetes cluster under centralized management

Create a New Cluster
Provision a new Kubernetes, cluster in a datacenter, public cloud or edge environment. Automatically deploy the Kubernetes Operator, the selected cluster blueprint on the newly provisioned cluster

Import Existing Kubernetes Cluster
Deploy the Kubernetes Operator and the selected cluster blueprint on an existing Kubernetes cluster

3. Click Data center / Edge and then click Other. Enter a name for the new cluster and a description if wanted. Click Continue.



Import Existing Kubernetes Cluster

Select Environment

Specify the operating environment for your existing Kubernetes cluster

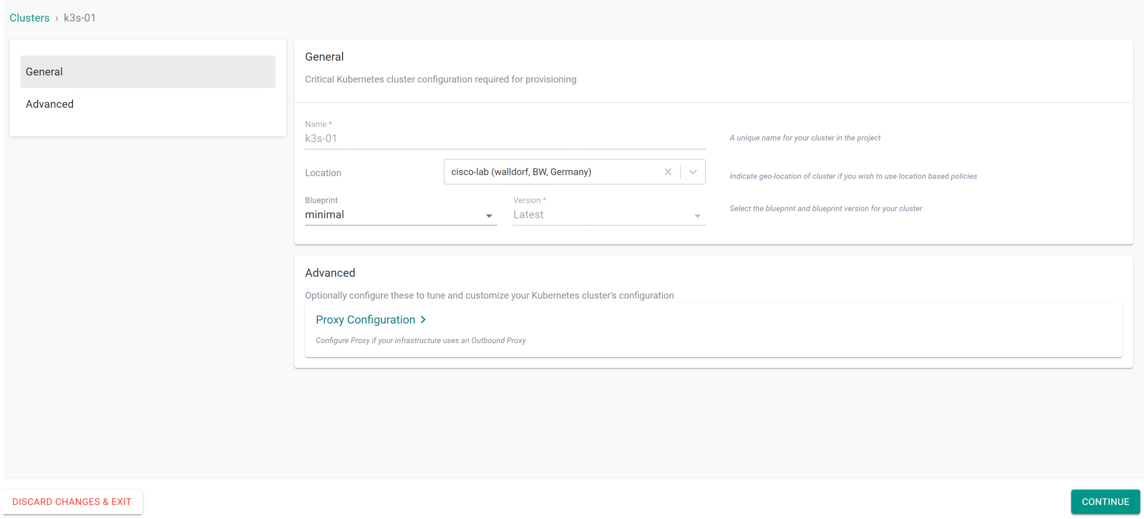
Select Kubernetes Distribution

Rafay will provision your managed Kubernetes cluster in your account and install management agent

Cluster Name *
k3s-01

Description
K3s with SLE Micro on C240SD

4. Select the location and deployment blueprint for this setup. If this is the first time a K3s cluster will be integrated into the Rafay system, it is best practice to start with the blueprint minimal or default. Those are the basic blueprints from Rafay to make the system work (minimal) or add components such as monitoring and reporting (default). Then click Continue.



Clusters › k3s-01

General

Critical Kubernetes cluster configuration required for provisioning

Name *
k3s-01

A unique name for your cluster in the project

Location: cisco-lab (walldorf, BW, Germany)

Indicate geo-location of cluster if you wish to use location based policies

Blueprint: minimal

Version *: Latest

Select the blueprint and blueprint version for your cluster

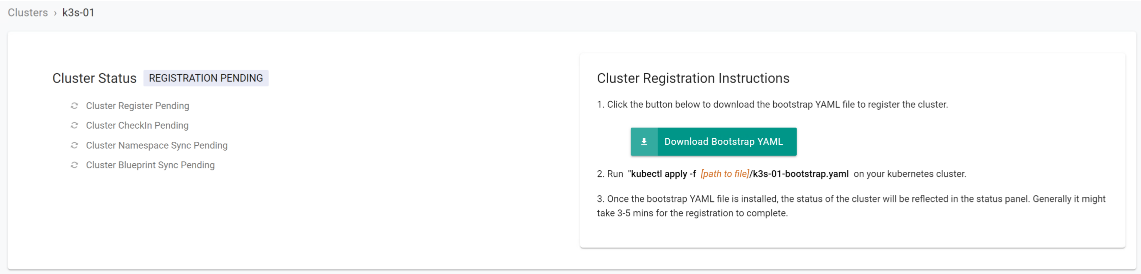
Advanced

Optionally configure these to tune and customize your Kubernetes cluster's configuration

Proxy Configuration ›

Configure Proxy if your infrastructure uses an Outbound Proxy

5. Download the Bootstrap YAML file to the K3s system.



Clusters › k3s-01

Cluster Status REGISTRATION PENDING

- Cluster Register Pending
- Cluster CheckIn Pending
- Cluster Namespace Sync Pending
- Cluster Blueprint Sync Pending

Cluster Registration Instructions

1. Click the button below to download the bootstrap YAML file to register the cluster.

2. Run "**kubectl apply -f** *[path to file]*/**k3s-01-bootstrap.yaml** on your kubernetes cluster.

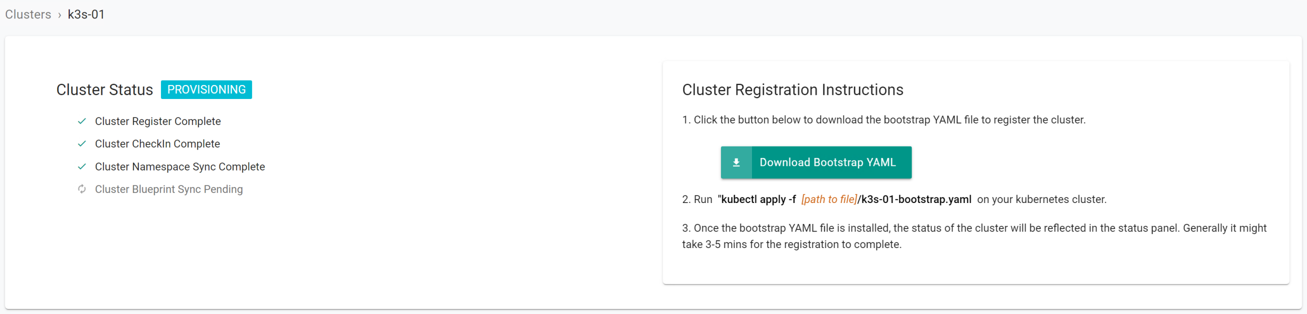
3. Once the bootstrap YAML file is installed, the status of the cluster will be reflected in the status panel. Generally it might take 3-5 mins for the registration to complete.

6. Log on to the K3s system and apply the bootstrap file.

```
k3s-01:~ # ls -l /tmp/k3s-01-bootstrap.yaml
-rwxr-xr-x 1 root root 13801 Jan 21 11:16 /tmp/k3s-01-bootstrap.yaml
k3s-01:~ #
k3s-01:~ # kubectl apply -f /tmp/k3s-01-bootstrap.yaml
namespace/rafay-system created
```

```
serviceaccount/system-sa created
Warning: policy/v1beta1 PodSecurityPolicy is deprecated in v1.21+, unavailable in v1.25+
podsecuritypolicy.policy/rafay-privileged-psp created
clusterrole.rbac.authorization.k8s.io/rafay:manager created
clusterrolebinding.rbac.authorization.k8s.io/rafay:rafay-system:manager-rolebinding created
clusterrole.rbac.authorization.k8s.io/rafay:proxy-role created
clusterrolebinding.rbac.authorization.k8s.io/rafay:rafay-system:proxy-rolebinding created
priorityclass.scheduling.k8s.io/rafay-cluster-critical created
role.rbac.authorization.k8s.io/rafay:leader-election-role created
rolebinding.rbac.authorization.k8s.io/rafay:leader-election-rolebinding created
customresourcedefinition.apiextensions.k8s.io/namespaces.cluster.rafay.dev created
customresourcedefinition.apiextensions.k8s.io/tasklets.cluster.rafay.dev created
customresourcedefinition.apiextensions.k8s.io/tasks.cluster.rafay.dev created
service/controller-manager-metrics-service-v3 created
deployment.apps/controller-manager-v3 created
configmap/connector-config-v3 created
configmap/proxy-config-v3 created
deployment.apps/rafay-connector-v3 created
service/rafay-drift-v3 created
validatingwebhookconfiguration.admissionregistration.k8s.io/rafay-drift-validate-v3 created
k3s-01:~ #
```

The process is shown in the Rafay console.



Clusters › k3s-01

Cluster Status PROVISIONING

- ✓ Cluster Register Complete
- ✓ Cluster CheckIn Complete
- ✓ Cluster Namespace Sync Complete
- Cluster Blueprint Sync Pending

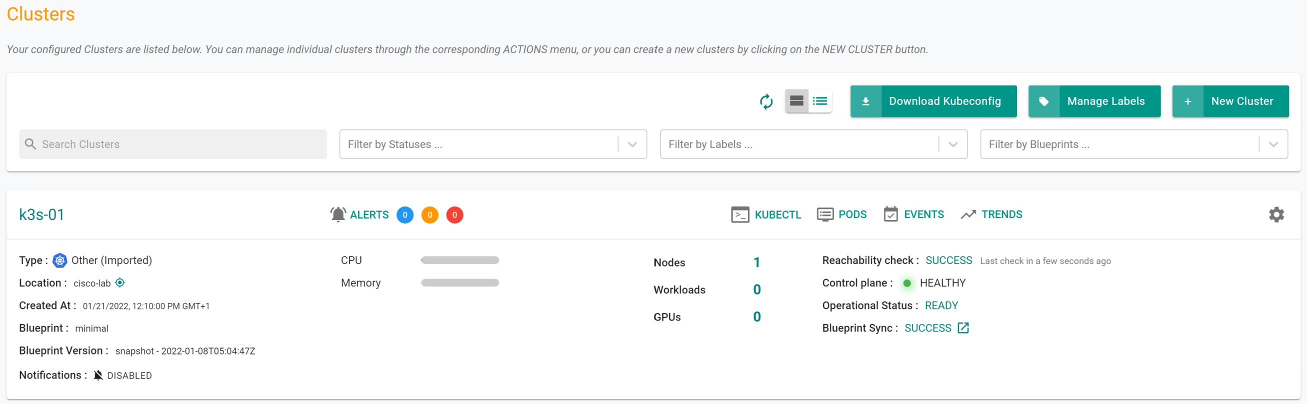
Cluster Registration Instructions

1. Click the button below to download the bootstrap YAML file to register the cluster.

2. Run "**kubectl apply -f** *[path to file]*/**k3s-01-bootstrap.yaml** on your kubernetes cluster.

3. Once the bootstrap YAML file is installed, the status of the cluster will be reflected in the status panel. Generally it might take 3-5 mins for the registration to complete.

7. After the deployment is finished, the cluster is shown in the list with basic information about the status.



Clusters

Your configured Clusters are listed below. You can manage individual clusters through the corresponding ACTIONS menu, or you can create a new clusters by clicking on the NEW CLUSTER button.

Type : Other (Imported)
Location : cisco-lab
Created At : 01/21/2022, 12:10:00 PM GMT+1
Blueprint : minimal
Blueprint Version : snapshot - 2022-01-08T05:04:47Z
Notifications : DISABLED

CPU
Memory

Nodes	1
Workloads	0
GPUs	0

Reachability check : SUCCESS Last check in a few seconds ago
Control plane : ● HEALTHY
Operational Status : READY
Blueprint Sync : SUCCESS

8. On the K3s system, a new namespace rafay-system is created to enable communication between the Rafay Kubernetes Operations Platform and the local K3s system.

```
k3s-01:~ # kubectl get all -A
NAMESPACE      NAME                                             READY   STATUS     RESTARTS      AGE
kube-system    pod/local-path-provisioner-64ffb68fd-7qs4m       1/1     Running    1 (110m ago)  115m
kube-system    pod/metrics-server-9cf544f65-nxrd2               1/1     Running    0             115m
kube-system    pod/helm-install-traefik-crd--1-gln5p            0/1     Completed  0             115m
kube-system    pod/helm-install-traefik--1-sf5dz                0/1     Completed  1             115m
kube-system    pod/svclb-traefik-24sf4                          2/2     Running    0             110m
kube-system    pod/coredns-85cb69466-vwbkc                      1/1     Running    1 (110m ago)  115m
kube-system    pod/traefik-786ff64748-x4cz5                     1/1     Running    0             110m
rafay-system   pod/edge-client-8c7748dfb-sk4l6                  1/1     Running    0             8m21s
rafay-system   pod/relay-agent-78d645bc89-9w6qw                 1/1     Running    0             8m20s
rafay-system   pod/controller-manager-v3-6bb696cc8b-5bsch       1/1     Running    0             6m13s
rafay-system   pod/rafay-connector-v3-6c8dcf8cf9-9m84r          1/1     Running      1 (5m33s ago)
6m14s

NAMESPACE      NAME                                                TYPE           CLUSTER-IP
EXTERNAL-IP    PORT(S)                     AGE
default        service/kubernetes                                  ClusterIP      10.43.0.1
<none>         443/TCP                     115m
kube-system    service/kube-dns                                    ClusterIP      10.43.0.10
<none>         53/UDP,53/TCP,9153/TCP      115m
kube-system    service/metrics-server                              ClusterIP      10.43.136.93
<none>         443/TCP                     115m
kube-system    service/traefik                                     LoadBalancer   10.43.32.86
172.21.1.209   80:32380/TCP,443:32713/TCP  110m
rafay-system   service/controller-manager-metrics-service-v3       ClusterIP      10.43.9.227
<none>         8443/TCP                    10m
rafay-system   service/rafay-drift-v3                              ClusterIP      10.43.2.198
<none>         8081/TCP                    10m

NAMESPACE     NAME                          DESIRED   CURRENT   READY   UP-TO-DATE   AVAILABLE
NODE SELECTOR   AGE
kube-system   daemonset.apps/svclb-traefik   1         1         1       1            1
<none>          110m

NAMESPACE      NAME                                      READY   UP-TO-DATE   AVAILABLE   AGE
kube-system    deployment.apps/local-path-provisioner   1/1     1            1           115m
kube-system    deployment.apps/coredns                  1/1     1            1           115m
kube-system    deployment.apps/metrics-server           1/1     1            1           115m
kube-system    deployment.apps/traefik                  1/1     1            1           110m
rafay-system   deployment.apps/edge-client              1/1     1            1           8m22s
rafay-system   deployment.apps/relay-agent              1/1     1            1           8m21s
```

```
rafay-system   deployment.apps/controller-manager-v3    1/1     1            1          10m
rafay-system   deployment.apps/rafay-connector-v3       1/1     1            1          10m

NAMESPACE      NAME                                               DESIRED  CURRENT   READY   AGE
kube-system    replicaset.apps/local-path-provisioner-64ffb68fd   1        1         1       115m
kube-system    replicaset.apps/coredns-85cb69466                  1        1         1       115m
kube-system    replicaset.apps/metrics-server-9cf544f65           1        1         1       115m
kube-system    replicaset.apps/traefik-786ff64748                 1        1         1       110m
rafay-system   replicaset.apps/edge-client-8c7748dfb              1        1         1
8m22s
rafay-system   replicaset.apps/relay-agent-78d645bc89             1        1         1
8m21s
rafay-system   replicaset.apps/rafay-connector-v3-88ff764c5       0        0         0       10m
rafay-system   replicaset.apps/controller-manager-v3-6bb696cc8b   1        1         1
6m14s
rafay-system   replicaset.apps/controller-manager-v3-7785d7b9d4   0        0         0       10m
rafay-system   replicaset.apps/rafay-connector-v3-6c8dcf8cf9      1        1         1      6m15s

NAMESPACE     NAME                               COMPLETIONS   DURATION   AGE
kube-system   job.batch/helm-install-traefik-crd   1/1           5m16s      115m
kube-system   job.batch/helm-install-traefik       1/1           5m17s      115m
k3s-01:~ #
```

Conclusion

The combination of SUSE Linux Enterprise Micro, the lightweight Kubernetes system K3s, and the Cisco UCS C240 SD server can run modern cloud-native applications developed for Kubernetes in a single server deployed in a short-depth network cabinet. With the Cisco Intersight platform, all servers can be monitored and operated from a single place, regardless of where they are deployed.

For more information

For additional information, see the following resources:

- https://suse.com/products/micro
- https://k3s.io/
- https://www.cisco.com/c/en/us/td/docs/unified_computing/ucs/c/hw/c240sdm5/install/c240sdm5.html
- https://www.intersight.com/help
- https://rafay.co/

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Printed in USA 222265.2 01/23