ThinkSystem SR670 V2
Setup Guide

Machine Type: 7Z22, 7Z23

Note

Before using this information and the product it supports, be sure to read and understand the safety information and the safety instructions, which are available at:
https://pubs.lenovo.com/safety_documentation/

In addition, be sure that you are familiar with the terms and conditions of the Lenovo warranty for your server, which can be found at:
http://datacentersupport.lenovo.com/warrantylookup

Contents

Chapter 1. Introduction

The ThinkSystem SR670 V2 server (7Z22, 7Z23) is a 3U rack server designed for high-volume network transaction processing. This high-performance, multi-core server is ideally suited for networking environments that require superior microprocessor performance, input/output (I/O) flexibility, and high manageability.

Figure 1. ThinkSystem SR670 V2 — 8-DW GPU Model
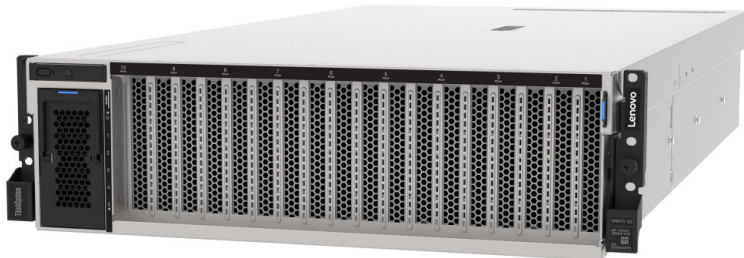
Server package contents

When you receive your server, verify that the shipment contains everything that you expected to receive.

The server package includes the following items:

Note: Some of the items listed are available on select models only.

- Server
- Rail installation kit (optional). Detailed instructions for installing the rail installation kit are provided in the package with the rail installation kit.
- Material box, including items such as power cords, rack installation template, and accessory kit.

Features

Performance, ease of use, reliability, and expansion capabilities were key considerations in the design of your server. These design features make it possible for you to customize the system hardware to meet your needs today and provide flexible expansion capabilities for the future.

Your server implements the following features and technologies:

- **Features on Demand**

  If a Features on Demand feature is integrated in the server or in an optional device that is installed in the server, you can purchase an activation key to activate the feature. For information about Features on Demand, see:

  https://fod.lenovo.com/lkms

- **Lenovo XClarity Controller (XCC)**

  The Lenovo XClarity Controller is the common management controller for Lenovo ThinkSystem server hardware. The Lenovo XClarity Controller consolidates multiple management functions in a single chip on the server system board.

Some of the features that are unique to the Lenovo XClarity Controller are enhanced performance, higher-resolution remote video, and expanded security options. For additional information about the Lenovo XClarity Controller, refer to the XCC documentation compatible with your server at:

https://pubs.lenovo.com/lxcc-overview/

Important: Lenovo XClarity Controller (XCC) supported version varies by product. All versions of Lenovo XClarity Controller are referred to as Lenovo XClarity Controller and XCC in this document, unless specified otherwise. To see the XCC version supported by your server, go to https://pubs.lenovo.com/lxcc-overview/.

- **UEFI-compliant server firmware**

  Lenovo ThinkSystem firmware is Unified Extensible Firmware Interface (UEFI) compliant. UEFI replaces BIOS and defines a standard interface between the operating system, platform firmware, and external devices.

  Lenovo ThinkSystem servers are capable of booting UEFI-compliant operating systems, BIOS-based operating systems, and BIOS-based adapters as well as UEFI-compliant adapters.

  Note: The server does not support Disk Operating System (DOS).

- **Active Memory**

  The Active Memory feature improves the reliability of memory through memory mirroring. Memory mirroring mode replicates and stores data on two pairs of DIMMs within two channels simultaneously. If a failure occurs, the memory controller switches from the primary pair of memory DIMMs to the backup pair of DIMMs.

- **Large system-memory capacity**

  The server supports synchronous dynamic random-access memory (SDRAM) registered dual inline memory modules (DIMMs) with error correcting code (ECC). For more information about the specific types and maximum amount of memory, see "Specifications" on page 3.

- **Integrated network support**

- **Integrated Trusted Platform Module (TPM)**

  This integrated security chip performs cryptographic functions and stores private and public secure keys. It provides the hardware support for the Trusted Computing Group (TCG) specification. You can download the software to support the TCG specification.

  For more information on TPM configurations, see "Enable TPM/TCM" in the *Maintenance Manual*.

  Note: For customers in Chinese Mainland, a Lenovo-qualified TPM 2.0 adapter or a Trusted Cryptographic Module (TCM) adapter (sometimes called a daughter card) may be pre-installed.

- **Large data-storage capacity and hot-swap capability**

- **Light path diagnostics**

  Light path diagnostics provides LEDs to help you diagnose problems. For more information about the light path diagnostics, see Light path diagnostics panel and Light path diagnostics LEDs.

- **Mobile access to Lenovo Service Information website**

  The server provides a QR code on the system service label, which is on the cover of the server, that you can scan using a QR code reader and scanner with a mobile device to get quick access to the Lenovo Service Information website. The Lenovo Service Information website provides additional information for parts installation, replacement videos, and error codes for server support.

- **Active Energy Manager**

Lenovo XClarity Energy Manager is a power and temperature management solution for data centers. You can monitor and manage the power consumption and temperature of Converged, NeXtScale, System x, and ThinkServer servers, and improve energy efficiency using Lenovo XClarity Energy Manager.

- **Redundant networking connection**

  The Lenovo XClarity Controller provides failover capability to a redundant Ethernet connection with the applicable application installed. If a problem occurs with the primary Ethernet connection, all Ethernet traffic that is associated with the primary connection is automatically switched to the optional redundant Ethernet connection. If the applicable device drivers are installed, this switching occurs without data loss and without user intervention.

- **Redundant cooling and optional power capabilities**

- **ThinkSystem RAID support**

Specifications

The following information is a summary of the features and specifications of the server. Depending on the model, some features might not be available, or some specifications might not apply.

The ThinkSystem SR670 V2 models are listed as below:

- The 4-DW GPU Model

- The 8-DW GPU Model

- The SXM GPU Model

Refer to the following tables for server general specification and model unique specifications.

General specification:

4-DW GPU Model and 8-DW GPU Model:

SXM GPU Model

General specifications

The following information is a summary of the features and specifications general to the 4-DW GPU Model, the 8-DW GPU Model, and the SXM GPU Model.

Table 1. General specifications

Specification	Description
Dimension	3 U server • Height: 131 mm (5.16 inches) • Width (with EIA flange): 482 mm (18.97 inches) • Depth: 953.1 mm (37.52 inches)
Processor	Supports multi-core Intel Xeon processors, with integrated memory controller and Intel Mesh UPI (Ultra Path Interconnect) topology. • Two processor sockets with minimal requirement of two installed on the system board. • Designed for LGA 4189 sockets • Scalable up to 40 cores • Supports 3 UPI links at 11.2 GT/s • Supports TDP up to 270 watts For a list of supported processors, see: https://serverproven.lenovo.com/.

Memory	See "Memory module installation rules and order" on page 154 for detailed information about memory configuration and setup.
	• Capacity
	  – Minimum: 32 GB
	  – Maximum:
	    – RDIMM: 2 TB
	    – Persistent Memory (PMEM) + RDIMM: 3TB
	• Memory module types:
	  – Double-data-rate 4 (TruDDR4) error correcting code (ECC) 3200 MT/s registered DIMM (RDIMM)
	  – Persistent Memory (PMEM)
	• Capacity:
	  – RDIMM: 16 GB (2Rx8), 32 GB (2Rx4, 2Rx8), and 64 GB (2Rx4)
	  – 3DS RDIMM: 128 GB (2S2Rx4)
	  – PMEM: 128 GB
	• Slots: 32 dual inline memory module (DIMM) connectors that support up to:
	  – 32 DRAM DIMMs
	  – 16 DRAM DIMMs and 16 PMEMs
	
	For a list of supported processors, see: https://serverproven.lenovo.com/.

M.2 Drive	The server support the following M.2 drive capacity: • 128 GB • 240 GB • 480 GB • 960 GB For a list of supported processors, see: https://serverproven.lenovo.com/.

Table 1. General specifications (continued)

Specification	Description
Integrated functions	- Lenovo XClarity Controller (XCC), which provides service processor control and monitoring functions, video controller, and remote keyboard, video, mouse, and remote drive capabilities. - One system-management RJ-45 connector on the rear to connect to a systems-management network. This connector is dedicated to the Lenovo XClarity Controller functions and runs at 1 GB speed. - A group of two or four Ethernet connectors on OCP 3.0 Ethernet adapter - Up to four USB 3.2 Gen1 ports: - Three on the rear of the server (Optional) One on the front of the server[1]. - One internal USB 3.2 Gen1 port (Optional) One USB 2.0 port on the front of the server[1]. (Optional) External LCD diagnostics handset connector on the front of the server[1]. - Up to two VGA connectors - One on the rear of the server (Optional) One on the front of the server[1]. (Optional) One serial port connector on the rear of the server[2]. **Notes:** 1. Available when the front I/O module is installed in the server. 2. Available when the serial port cable is installed in the server.
Network	OCP 3.0 Ethernet network adapter
Rear button	NMI button
RAID adapter	Hardware RAID 0, 1, 10, 5, 50 - ThinkSystem 530-8i Internal SAS/SATA RAID RAID 0, 1, 10, 5, 50, 6, 60 - ThinkSystem 930-8i Internal SAS/SATA RAID w/ 2GB Cache - ThinkSystem 930-8e External SAS/SATA RAID (0, 1, 10, 5, 50, 6, 60) w/ 4GB Cache - ThinkSystem 940-8i Internal SAS/SATA/NVMe RAID (0, 1, 10, 5, 50, 6, 60) w/ 4GB Cache - ThinkSystem 940-8i Internal SAS/SATA/NVMe RAID (0, 1, 10, 5, 50, 6, 60) w/ 8GB Cache
Host bus adapter	- ThinkSystem 430-8i Internal SAS/SATA - ThinkSystem 430-8e External SAS/SATA
System fan	Five 80 mm x 80 mm x 56 mm dual-rotor fans
Minimal configuration for debugging	- Two processors in socket 1 and 2 - Two DRAM memory modules in slots 14 and 30 - Two power supplies in bay 1 and 2 - One boot drive, M.2, 2.5-inch, 3.5-inch, or EDSFF drive, and RAID adapter if configured. (If OS is needed by debugging) - Five system fans

Table 1. General specifications (continued)

Specification	Description
Operating systems	Supported and certified operating systems: • Microsoft Windows Server • VMware ESXi • Red Hat Enterprise Linux • SUSE Linux Enterprise Server References: • Complete list of available operating systems: https://lenovopress.lenovo.com/osig. • OS deployment instructions: "Deploy the operating system" on page 267.

Acoustical noise emissions	The server has the following acoustic noise emissions declaration:
	
	• Sound power level (L_{WAd})
	  – Idling:
	    – SXM: 7.0 Bel
	    – GPU Typical: 7.0 Bel
	    – GPU Max: 7.8 Bel
	  – Operating:
	    – SXM: 8.3 Bel
	    – GPU Typical: 8.1 Bel
	    – GPU Max: 8.6 Bel
	• Sound pressure level (L_{pAm}):
	  – Idling:
	    – SXM: 54 dBA
	    – GPU Typical: 54 dBA
	    – GPU Max: 64 dBA
	  – Operating:
	    – SXM: 69 dBA
	    – GPU Typical: 66 dBA
	    – GPU Max: 72 dBA
	
	Notes:
	
	• These sound levels were measured in controlled acoustical environments according to procedures specified by ISO7779 and are reported in accordance with ISO 9296.
	• The declared acoustic sound levels are based on the specified configurations, which may change depending on configuration/conditions.
	  – SXM configuration: two 270W processors, thirty-two 64 GB DIMMs, eight HDD or SSD, NVIDIA SXM4 400W, two 1P HDR (CX6 card)
	  – GPU Typical configuration: two 205W processors, thirty-two 64 GB DIMMs, Diskless with M.2 or any disk, 4 or 8 NVIDIA A100, INTEL E810-DA2 10/25GbE SFP28 2-port Ethernet Adapter
	  – GPU Max configuration: two 270W processors, thirty-two 64 GB DIMMs, eight NVMe, 4 or 8 NVIDIA A40s, Mellanox ConnectX-6 Lx 10/25GbE SFP28 2-port
	• Government regulations (such as those prescribed by OSHA or European Community Directives) may govern noise level exposure in the workplace and may apply to you and your server installation. The actual sound pressure levels in your

Table 1. General specifications (continued)

Specification	Description
	installation depend upon a variety of factors, including the number of racks in the installation; the size, materials, and configuration of the room; the noise levels from other equipment; the room ambient temperature, and employee's location in relation to the equipment. Further, compliance with such government regulations depends on a variety of additional factors, including the duration of employees' exposure and whether employees wear hearing protection. Lenovo recommends that you consult with qualified experts in this field to determine whether you are in compliance with the applicable regulations.

Environment	ThinkSystem SR670 V2 complies with ASHRAE Class A2 specifications. System performance may be impacted when operating temperature is outside AHSARE A2 specification.
	• Air temperature:
	  – Operating
	    – ASHARE Class A2: 10°C to 35°C (50°F to 95°F); the maximum ambient temperature decreases by 1°C for every 300 m (984 ft) increase in altitude above 900 m (2,953 ft).
	  – Server off: 5°C to 45°C (41°F to 113°F)
	  – Shipment/storage: -40°C to 60°C (-40°F to 140°F)
	• Adjust ambient temperature when specific components are installed: Keep ambient temperature to 30°C or lower when one or more of the following components are installed.
	  – NVIDIA H100 NVL/H100/H800/L40S PCIe GPU adapter
	  – NVIDIA ConnectX-7 dual-port NDR200 or single-port NDR400 with Active Optical Cable installed in the PCIe slot 15, 16, 20, or 21
	  – NVIDIA HGX A100 80GB 500W 4-GPU Board
	• Maximum altitude: 3,050 m (10,000 ft)
	• Relative Humidity (non-condensing):
	  – Operating
	    – ASHRAE Class A2: 8% to 80%; maximum dew point: 21°C (70°F)
	  – Shipment/storage: 8% to 90%
	• Particulate contamination
	
	Attention: Airborne particulates and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the server. For information about the limits for particulates and gases, see "Particulate contamination" on page 11.
	
	Note: The server is designed for standard data center environment and recommended to be placed in industrial data center.

4-DW GPU Model / 8-DW GPU Model specification

The following information is a summary of the features and specifications of the 4-DW GPU Model and the 8-DW GPU Model servers. Depending on the model, some features might not be available, or some specifications might not apply.

Table 2. The 4-DW GPU Model / 8-DW GPU Model specification

Specification	Description
Weight	• 4-DW GPU Model weights approximately 36.7 kg (81 lbs.), depending on your configuration. • 8-DW GPU Model weighs approximately 39 kg (86 lbs.), depending on your configuration.
Storage expansion	**The 4-DW GPU Model supports one of following storage configuration:** • Up to eight hot-swap 2.5-inch SAS/SATA/NVMe drives • Up to four hot-swap 3.5-inch SATA drives **The 8-DW GPU Model supports the following storage configuration:** • Up to six hot-swap EDSFF drives **Note:** To support Tri-mode with U.3 NVMe drives, **U.3 x1 mode** must be enabled for the selected drive slots on the backplane through the XCC Web GUI. Otherwise, the U.3 NVMe drives cannot be detected. For more information, see "U.3 NVMe drive can be detected in NVMe connection, but cannot be detected in Tri-mode" on page 275.

Expansion slots	• **Front I/O expansion board**
	  – Slot 1 to 2 (Front I/O expansion board)
	    – PCI Express 4.0 x16, FH/FL
	• **Front GPU expansion board**
	  – Slot 3 to 6 (4-DW GPU Model)
	    – PCI Express 4.0 x16, double-wide, FH/FL
	  – Slot 3 to 10 (8-DW GPU Model)
	    – PCIe Express 4.0 x16, double-wide / single-wide, FH/FL
	• **Rear PCIe riser 1**
	  – Slot 15 to 16 (Rear PCIe riser 1 with one riser slot cabled)
	    – Slot 15: PCI Express 4.0 x16, FH/HL
	    – Slot 16: PCI Express 4.0 x16 / x8, FH/HL
	• **Rear PCIe riser 2**
	  – Slot 20 to 21 (Rear PCIe riser 2 with one riser slot cabled)
	    – Slot 20: PCI Express 4.0 x16, FH/HL
	    – Slot 21: PCI Express 4.0 x16 / x8, FH/HL
	• **OCP**
	  – Slot 27 (OCP):
	    – PCI Express 4.0 x16 / x8 OCP 3.0 Ethernet adapter connector
	
	Note: When Front I/O expansion board is installed, rear PCIe riser 1 and rear PCIe riser 2 are not available.

Table 2. The 4-DW GPU Model / 8-DW GPU Model specification (continued)

Specification	Description

Graphics processing unit (GPU)	**The 4-DW GPU Model supports one of following GPU configuration:**
	
	• Up to four PCIe x16, double-wide, FH/FL GPUs
	
	The 8-DW GPU Model supports the following GPU configuration:
	
	• Up to eight PCIe x16, double-wide, FH/FL GPUs
	• Up to eight PCIe x16, single-wide, FH/FL GPUs
	
	Notes:
	
	• The DisplayPort ports on the Nvidia A40 GPU are not supported when used in the ThinkSystem SR670 V2.
	• To prevent potential thermal issues, change the **Misc** setting in the BIOS from **Option3** (default value) to **Option1** if the following two conditions are met:
	  – The server is equipped with a GPU adapter.
	  – The UEFI firmware version is U8E128A or later.
	  For the method of changing the **Misc** setting, see https://support.lenovo.com/us/en/solutions/TT1832.
	
	Attention: When the H100 80GB double-wide, FH/FL GPU is installed and if the ambient temperature is above 30°C, the GPUs may be instructed by the system to enter an emergency power reduction state whereby GPU performance will be impacted.

Electrical input	This server supports up to four units of CFF V4 power supplies with N+N redundancy. Following is the list of supported types: • 2600-watt Titanium, input power 200-240 VAC • 2400-watt Platinum, input power 200-240 VAC • 1800-watt Platinum, input power 200-240 VAC **Important:** Power supplies and redundant power supplies in the enclosure must be with the same power rating, wattage or level.

SXM GPU Model specification

The following information is a summary of the features and specifications of the SXM GPU Model servers. Depending on the model, some features might not be available, or some specifications might not apply.

Table 3. The SXM GPU Model specifications

Specification	Description
Weight	SXM GPU Model weights approximately 39.5 kg (87 lbs.), depending on your configuration.
Storage expansion	Support the following configurations: • Eight hot-swap 2.5-inch NVMe drives • Four hot-swap 2.5-inch NVMe drives **Note:** OCP Ethernet adapter is available when only four 2.5-inch NVMe drives are installed in the server.

Expansion slots	**The SXM GPU Model supports one of following expansion slot configuration:**
	• **Front I/O expansion board**
	  – Slot 1 to 2 (Front I/O expansion board)
	    – PCI Express 4.0 x16, FH/HL
	• **OCP**
	  – Slot 27 (OCP):
	    – PCI Express 4.0 x16 / x8 OCP 3.0 Ethernet adapter connector
	Note: OCP Ethernet adapter is available when only four 2.5-inch NVMe drives are installed in the server.

Graphics processing unit (GPU)	• One set of HGX A100 40GB 400W 4-GPU Board • One set of HGX A100 80GB 500W 4-GPU Board **Attention:** When the HGX A100 80GB 500W 4-GPU Board is installed and if the ambient temperature is above 30°C, the GPUs may be instructed by the system to enter an emergency power reduction state whereby GPU performance will be impacted. **Notes:** To prevent potential thermal issues, change the **Misc** setting in the BIOS from **Option3** (default value) to **Option1** if the following two conditions are met: • The server is equipped with a GPU adapter. • The UEFI firmware version is U8E128A or later. For the method of changing the **Misc** setting, see https://support.lenovo.com/us/en/solutions/TT1832.
Electrical input	This server supports four units of CFF V4 power supplies with N+N redundancy. Following is the list of supported types: • 2600-watt Titanium, input power 200-240 VAC • 2400-watt Platinum, input power 200-240 VAC **Important:** Power supplies and redundant power supplies in the enclosure must be with the same power rating, wattage or level.

Particulate contamination

Attention: Airborne particulates (including metal flakes or particles) and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the device that is described in this document.

Risks that are posed by the presence of excessive particulate levels or concentrations of harmful gases include damage that might cause the device to malfunction or cease functioning altogether. This specification sets forth limits for particulates and gases that are intended to avoid such damage. The limits must not be viewed or used as definitive limits, because numerous other factors, such as temperature or moisture content of the air, can influence the impact of particulates or environmental corrosives and gaseous contaminant transfer. In the absence of specific limits that are set forth in this document, you must implement practices that maintain particulate and gas levels that are consistent with the protection of human health and safety. If Lenovo determines that the levels of particulates or gases in your environment have caused damage to the device, Lenovo may condition provision of repair or replacement of devices or parts on implementation of appropriate remedial measures to mitigate such environmental contamination. Implementation of such remedial measures is a customer responsibility.

Table 4. Limits for particulates and gases

Contaminant	Limits
Reactive gases	Severity level G1 as per ANSI/ISA 71.04-1985[1]: • The copper reactivity level shall be less than 200 Angstroms per month (Å/month ≈ 0.0035 µg/cm^2-hour weight gain).[2] • The silver reactivity level shall be less than 200 Angstroms per month (Å/month ≈ 0.0035 µg/cm^2-hour weight gain).[3] • The reactive monitoring of gaseous corrosivity must be conducted approximately 5 cm (2 in.) in front of the rack on the air inlet side at one-quarter and three-quarter frame height off the floor or where the air velocity is much higher.
Airborne particulates	Data centers must meet the cleanliness level of ISO 14644-1 class 8. For data centers without airside economizer, the ISO 14644-1 class 8 cleanliness might be met by choosing one of the following filtration methods: • The room air might be continuously filtered with MERV 8 filters. • Air entering a data center might be filtered with MERV 11 or preferably MERV 13 filters. For data centers with airside economizers, the choice of filters to achieve ISO class 8 cleanliness depends on the specific conditions present at that data center. • The deliquescent relative humidity of the particulate contamination should be more than 60% RH.[4] • Data centers must be free of zinc whiskers.[5]

[1] ANSI/ISA-71.04-1985. *Environmental conditions for process measurement and control systems: Airborne contaminants*. Instrument Society of America, Research Triangle Park, North Carolina, U.S.A.

[2] The derivation of the equivalence between the rate of copper corrosion growth in the thickness of the corrosion product in Å/month and the rate of weight gain assumes that Cu_2S and Cu_2O grow in equal proportions.

[3] The derivation of the equivalence between the rate of silver corrosion growth in the thickness of the corrosion product in Å/month and the rate of weight gain assumes that Ag_2S is the only corrosion product.

[4] The deliquescent relative humidity of particulate contamination is the relative humidity at which the dust absorbs enough water to become wet and promote ionic conduction.

[5] Surface debris is randomly collected from 10 areas of the data center on a 1.5 cm diameter disk of sticky electrically conductive tape on a metal stub. If examination of the sticky tape in a scanning electron microscope reveals no zinc whiskers, the data center is considered free of zinc whiskers.

Management options

The XClarity portfolio and other system management options described in this section are available to help you manage the servers more conveniently and efficiently.

Overview

Options	Description
Lenovo XClarity Controller	Baseboard management controller. (BMC) Consolidates the service processor functionality, Super I/O, video controller, and remote presence capabilities into a single chip on the server system board. **Interface** • CLI application • Web GUI interface • Mobile application • REST API **Usage and downloads** https://pubs.lenovo.com/lxcc-overview/
Lenovo XClarity Administrator	Centralized interface for multi-server management. **Interface** • Web GUI interface • Mobile application • REST API **Usage and downloads** http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/aug_product_page.html
Lenovo XClarity Essentials toolset	Portable and light toolset for server configuration, data collection, and firmware updates. Suitable both for single-server or multi-server management contexts. **Interface** • **OneCLI**: CLI application • **Bootable Media Creator**: CLI application, GUI application • **UpdateXpress**: GUI application **Usage and downloads** https://pubs.lenovo.com/lxce-overview/

Options	Description
Lenovo XClarity Provisioning Manager	UEFI-based embedded GUI tool on a single server that can simplify management tasks. **Interface** • Web interface (BMC remote access) • GUI application **Usage and downloads** https://pubs.lenovo.com/lxpm-overview/ **Important:** Lenovo XClarity Provisioning Manager (LXPM) supported version varies by product. All versions of Lenovo XClarity Provisioning Manager are referred to as Lenovo XClarity Provisioning Manager and LXPM in this document, unless specified otherwise. To see the LXPM version supported by your server, go to https://pubs.lenovo.com/lxpm-overview/.
Lenovo XClarity Integrator	Series of applications that integrate the management and monitoring functionalities of the Lenovo physical servers with the software used in a certain deployment infrastructure, such as VMware vCenter, Microsoft Admin Center, or Microsoft System Center while delivering additional workload resiliency. **Interface** GUI application **Usage and downloads** https://pubs.lenovo.com/lxci-overview/
Lenovo XClarity Energy Manager	Application that can manage and monitor server power and temperature. **Interface** • Web GUI Interface **Usage and downloads** https://datacentersupport.lenovo.com/solutions/lnvo-lxem
Lenovo Capacity Planner	Application that supports power consumption planning for a server or rack. **Interface** • Web GUI Interface **Usage and downloads** https://datacentersupport.lenovo.com/solutions/lnvo-lcp

Functions

		Functions						
Options		**Multi-system mgmt**	**OS deploy-ment**	**System configu-ration**	**Firm-ware up-dates[1]**	**Event-s/alert moni-toring**	**Inven-tory/ logs**	**Pow-er mgmt**	**Power planning**
Lenovo XClarity Controller				√	√[2]	√	√[4]		
Lenovo XClarity Administrator		√	√	√	√[2]	√	√[4]		
Lenovo XClarity Essen-tials toolset	OneCLI	√		√	√[2]	√	√[4]		
	Bootable Media Creator			√	√[2]		√[4]		
	UpdateXpress			√	√[2]				
Lenovo XClarity Provisioning Manager			√	√	√[3]		√[5]		
Lenovo XClarity Integrator		√	√[6]	√	√	√	√	√[7]	
Lenovo XClarity Energy Manager		√				√		√	
Lenovo Capacity Planner									√[8]

Notes:

1. Most options can be updated through the Lenovo tools. Some options, such as GPU firmware or Omni-Path firmware require the use of supplier tools.

2. The server UEFI settings for option ROM must be set to **Auto** or **UEFI** to update firmware using Lenovo XClarity Administrator, Lenovo XClarity Essentials, or Lenovo XClarity Controller.

3. Firmware updates are limited to Lenovo XClarity Provisioning Manager, Lenovo XClarity Controller, and UEFI updates only. Firmware updates for optional devices, such as adapters, are not supported.

4. The server UEFI settings for option ROM must be set to **Auto** or **UEFI** for detailed adapter card information, such as model name and firmware levels, to be displayed in Lenovo XClarity Administrator, Lenovo XClarity Controller, or Lenovo XClarity Essentials.

5. Limited inventory.

6. The Lenovo XClarity Integrator deployment check for System Center Configuration Manager (SCCM) supports Windows operating system deployment.

7. Power management function is supported only by Lenovo XClarity Integrator for VMware vCenter.

8. It is highly recommended that you check the power summary data for your server using Lenovo Capacity Planner before purchasing any new parts.

Chapter 2. Server components

This section contains information about each of the components associated with the server.

Identifying your server

When you contact Lenovo for help, the machine type, model, and serial number information help support technicians to identify your server and provide faster service.

Figure 2 "Location of the machine type, model, and serial number" on page 15 shows the location of the label containing the machine type, model, and serial number.
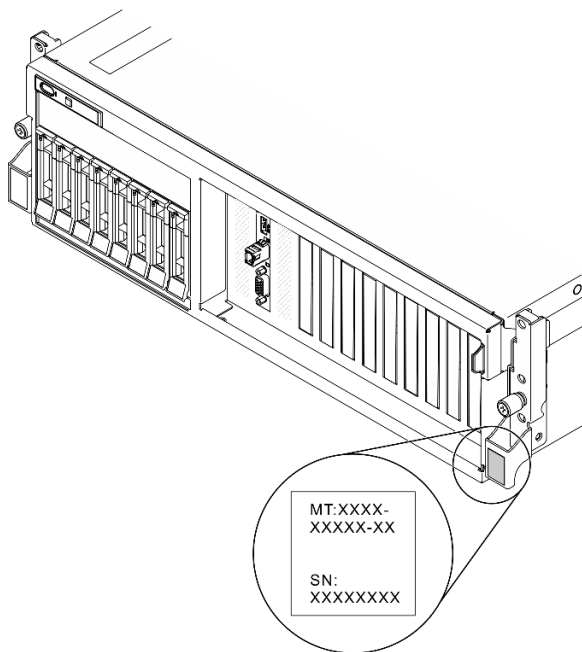
Figure 2. Location of the machine type, model, and serial number

The model number and serial number are on the ID label on the front of the server, as shown in the following illustrations. You can also add other system information labels to the front of the server in the customer label spaces.

XClarity Controller network access label

In addition, the XClarity Controller network access label is attached to the pull-out information tab located near the upper right corner in the front of the chassis, with MAC address accessible with a pull.
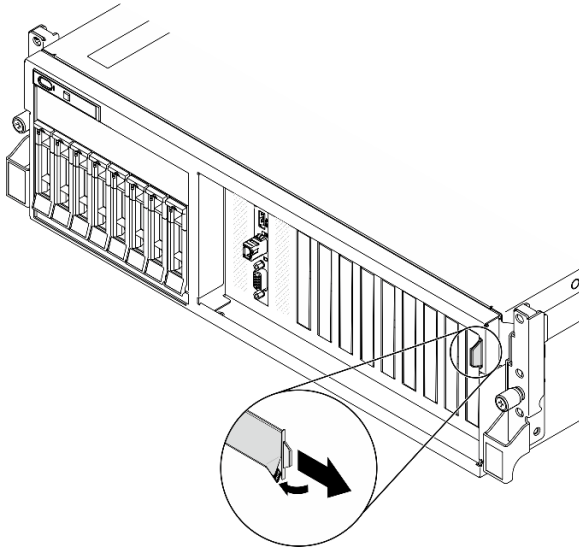
Figure 3. XClarity Controller network access label on the pull-out information tab

The 4-DW GPU Model Front view

This section contains information about the controls, LEDs, and connectors on the front of the 4-DW GPU Model server.

The 4-DW GPU Model offers two storage configurations, up to eight 2.5-inch drives or up to four 3.5-inch drives. Refer to the following tables for front view identification of each storage configuration:

- "Front view of 2.5-inch drive configuration" on page 16
- "Front view of 3.5-inch drive configuration" on page 17

Front view of 2.5-inch drive configuration

Figure 4. Front view of 2.5-inch drive configuration

Table 5. Components on the front view of 2.5-inch drive configuration

1 Front panel	**5** PCIe slot 3-6
2 Drive activity LED (green)	**6** PCIe slots 1-2 Not available when rear PCIe riser 1 and rear PCIe riser 2 are installed.

Table 5. Components on the front view of 2.5-inch drive configuration (continued)

3 Drive status LED (yellow)	**7** 2.5-inch drive bays (bay 0 to 7)
4 Front I/O module	

1 Front panel

For more information about the front panel, see "Front panel" on page 26.

2 Drive activity LED (green)

Each hot-swap drive comes with an activity LED. When this LED is flashing, it indicates that the drive is in use.

3 Drive status LED (yellow)

The drive status LED indicates the following status:

- The LED is lit: the drive has failed.
- The LED is flashing slowly (once per second): the drive is being rebuilt.
- The LED is flashing rapidly (three times per second): the drive is being identified.

4 Front I/O module

For more information about the front I/O module, see "Front I/O module" on page 27.

5 PCIe slot 3-6

Install PCIe adapters, particularly GPUs to these slots. These PCIe slots support the following configuration:

- PCIe slot 3-6, PCIe x16, double-wide, FH/FL

6 PCIe slots 1-2

Not available when rear PCIe riser 1 and rear PCIe riser 2 are installed.

Install PCIe adapters, particularly network adapters to these slots. These PCIe slots support the following configuration:

- PCIe slot 1-2, PCIe x16, FH/FL

7 2.5-inch drive bays (bay 0 to 7)

Install 2.5-inch drives to these bays. See "Install a 2.5-/3.5-inch hot-swap drive" on page 177 for more information.
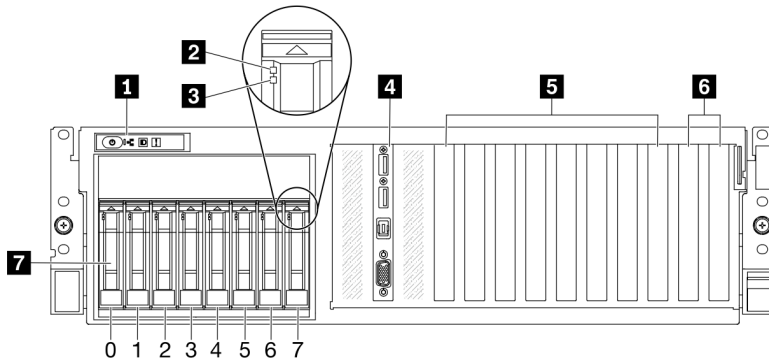
Front view of 3.5-inch drive configuration
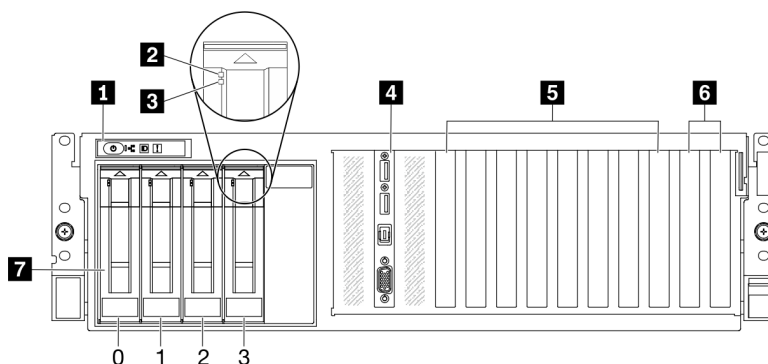
Figure 5. Front view of 3.5-inch drive configuration

Table 6. Components on the front view of 3.5-inch drive configuration

1 Front panel	**5** PCIe slot 3-6
2 Drive activity LED (green)	**6** PCIe slots 1-2 Not available when rear PCIe riser 1 and rear PCIe riser 2 are installed.
3 Drive status LED (yellow)	**7** 3.5-inch drive bays (bay 0 to 3)
4 Front I/O module	

1 Front panel

For more information about the front panel, see "Front panel" on page 26.

2 Drive activity LED (green)

Each hot-swap drive comes with an activity LED. When this LED is flashing, it indicates that the drive is in use.

3 Drive status LED (yellow)

The drive status LED indicates the following status:

- The LED is lit: the drive has failed.
- The LED is flashing slowly (once per second): the drive is being rebuilt.
- The LED is flashing rapidly (three times per second): the drive is being identified.

4 Front I/O module

For more information about the front I/O module, see "Front I/O module" on page 27.

5 PCIe slot 3-6

Install PCIe adapters, particularly GPUs to these slots. These PCIe slots support the following configuration:

- PCIe slot 3-6, PCIe x16, double-wide, FH/FL

6 PCIe slots 1-2

Not available when rear PCIe riser 1 and rear PCIe riser 2 are installed.

Install PCIe adapters, particularly network adapters to these slots. These PCIe slots support the following configuration:

- PCIe slot 1-2, PCIe x16, FH/FL

7 3.5-inch drive bays (bay 0 to 3)

Install 3.5-inch drives to these bays. See "Install a 2.5-/3.5-inch hot-swap drive" on page 177 for more information.

The 8-DW GPU Model Front view

This section contains information about the controls, LEDs, and connectors on the front of the 8-DW GPU Model server.

Figure 6. Front view of the 8-DW GPU Model

Table 7. Components on the front view of the 8-DW GPU Model

1 EDSFF drive cage cover	**5** PCIe slot 3-10
2 Front panel	**6** Front I/O module or PCIe Slot 1-2 One of the following is supported: • Front I/O module • PCIe Slot 1 and slot 2 (Not available when rear PCIe riser 1 and rear PCIe riser 2 are installed.)
3 Drive activity LED (green)	**7** ESDFF drive bays (bay 0 to 5)
4 Drive status LED (yellow)	

1 EDSFF drive cage cover

The 8-DW GPU Model servers should always operate with the EDSFF drive cage cover installed to the chassis.

2 Front panel

For more information about the front panel, see "Front panel" on page 26.

3 Drive activity LED (green)

Each hot-swap drive comes with an activity LED. When this LED is flashing, it indicates that the drive is in use.

4 Drive status LED (yellow)

The drive status LED indicates the following status:

• The LED is lit: the drive has failed.

• The LED is flashing slowly (once per second): the drive is being rebuilt.

• The LED is flashing rapidly (three times per second): the drive is being identified.

5 PCIe slot 3-10

Install PCIe adapters, particularly GPUs to these slots. These PCIe slots support one of the following configurations:

• PCIe slot 3-10, PCIe x16, double-wide, FH/FL

• PCIe slot 3-10, PCIe x16, single-wide, FH/FL

◧ Front I/O module or PCIe Slot 1-2

One of the following is supported:

- Front I/O module

  - For more information about the front I/O module, see "Front I/O module" on page 27.

- PCIe Slot 1 and slot 2, PCIe x16, FH/FL

  - Install PCIe adapters, particularly network adapters to these slots.

  Note: Not available when rear PCIe riser 1 and rear PCIe riser 2 are installed.

◨ ESDFF drive bays (bay 0 to 5)

Install EDSFF drives to these bays. See "Install an EDSFF hot-swap drive" on page 180 for more information.

The SXM GPU Model front view

This section contains information about the controls, LEDs, and connectors on the front of the SXM GPU Model server.
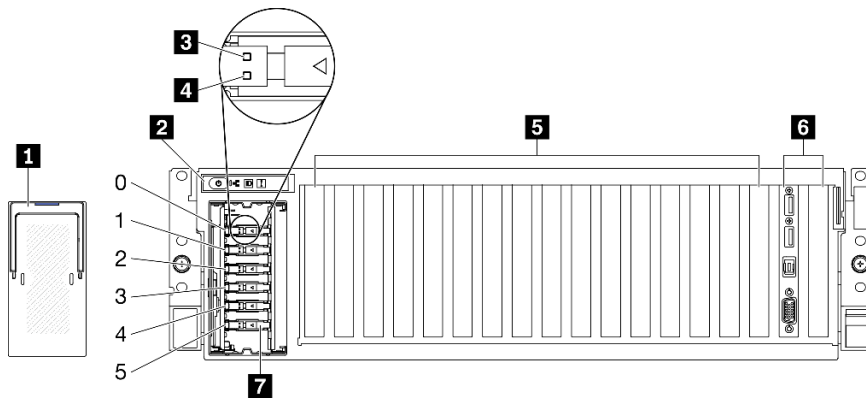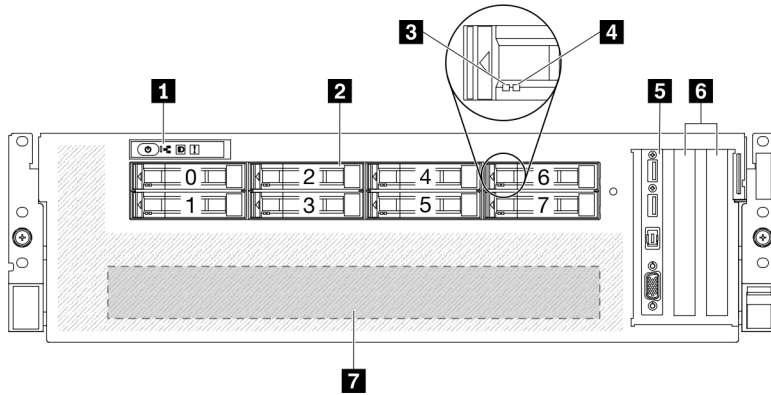

Figure 7. Front view of the SXM GPU Model

Table 8. Components on the front view of the SXM GPU Model

1 Front panel	**5** Front I/O module
2 2.5-inch drive bays (bay 0 to 7)	**6** PCIe slots 1-2
3 Drive activity LED (green)	**7** GPU-L2A assembly
4 Drive status LED (yellow)	

1 Front panel

For more information about the front panel, see "Front panel" on page 26.

2 2.5-inch drive bays (bay 0 to 7)

Install 2.5-inch drives to these bays. See "Install a 2.5-inch hot-swap drive (SXM GPU Model)" on page 183.

3 Drive activity LED (green)

Each hot-swap drive comes with an activity LED. When this LED is flashing, it indicates that the drive is in use.

4 Drive status LED (yellow)

The drive status LED indicates the following status:

- The LED is lit: the drive has failed.
- The LED is flashing slowly (once per second): the drive is being rebuilt.
- The LED is flashing rapidly (three times per second): the drive is being identified.

5 Front I/O module

For more information about the front I/O module, see "Front I/O module" on page 27.

6 PCIe slots 1-2

Install PCIe adapters, particularly network adapters to these slots. These PCIe slots support the following configuration:

- PCIe slot 1-2, PCIe x16, FH/HL

▼ GPU-L2A assembly

Install the GPU-L2A assembly in this space. A GPU-L2A assembly consists of the Lenovo Neptune™ liquid-to-air (L2A) hybrid cooling module and the SXM GPU board, which contains one of the following:

- One set of HGX A100 40GB 400W 4-GPU Board
- One set of HGX A100 80GB 500W 4-GPU Board

    Attention: When the HGX A100 80GB 500W 4-GPU Board is installed and if the ambient temperature is above 30°C, the GPUs may be instructed by the system to enter an emergency power reduction state whereby GPU performance will be impacted.

Rear view

The rear of the server provides access to several components, including the power supplies, PCIe adapters, serial port, and Ethernet port.
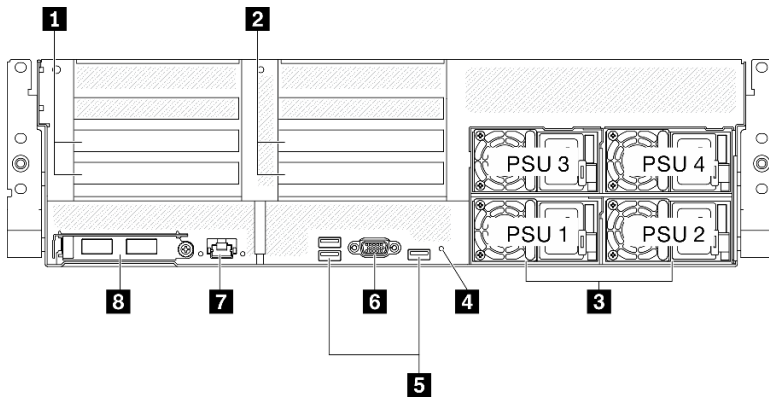
Figure 8. Rear view

Table 9. Components on the rear view

1 PCIe riser 1 (PCIe slot 15-16)	**5** USB 3.2 Gen 1 connectors (total of three connectors)
2 PCIe riser 2 (PCIe slot 20-21)	**6** VGA connector
3 Power supply units	**7** System management 1 GB RJ-45 connector dedicated to Lenovo XClarity Controller functions.
4 NMI button	**8** OCP 3.0 Ethernet adapter

Note: PCIe riser 1 and PCIe riser 2 are not supported in the SXM GPU Model.

1 / 2 PCIe riser

Install PCIe adapters into these risers. See the following table for PCIe slots corresponding to the risers.

Table 10. PCIe riser and corresponding slots

PCIe riser	**PCIe slot (PCI Express 4.0 x16, FH/FL)**
1 PCIe riser 1	Slot 15: PCI Express 4.0 x16, FH/HL
	Slot 16: PCI Express 4.0 x16 / x8, FH/HL

Table 10. PCIe riser and corresponding slots (continued)

PCIe riser	PCIe slot (PCI Express 4.0 x16, FH/FL)
2 PCIe riser 2	Slot 20: PCI Express 4.0 x16, FH/HL
	Slot 21: PCI Express 4.0 x16 / x8, FH/HL

3 Power supply units

Install power supply units to these bays, connect them to power cords. Make sure the power cords are connected properly. Following are the power supplies supported by this system:

- 2600-watt Titanium, input power 200-240 VAC
- 2400-watt Platinum, input power 200-240 VAC
- 1800-watt Platinum, input power 200-240 VAC

Each hot-swap power supply has three status LEDs:

Figure 9. 2400W/2600W power supply LEDs

Figure 10. 1800W power supply LEDs

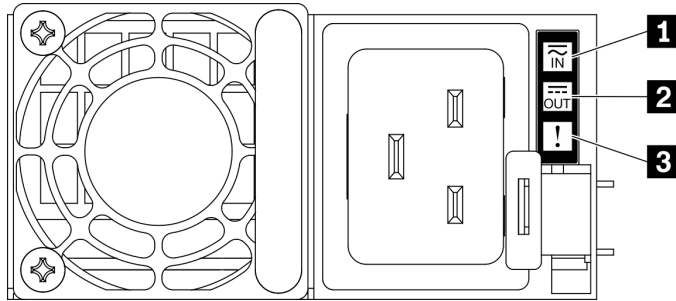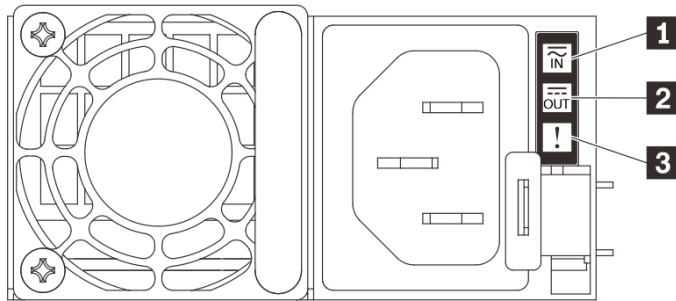| LED	Description
1 Input status	The input status LED can be in one of the following states: • Off: The power supply is disconnected from the ac power source. • Green: The power supply is connected to the ac power source.
2 Output status	The output status LED can be in one of the following states: • Off: The server is powered off, or the power supply is not working properly. If the server is powered on but the output status LED is off, replace the power supply. • Slow blinking green (about one flash every two seconds): The power supply is in cold redundancy active mode. • Fast blinking green (about 2 flashes each second): The power supply is in cold redundancy sleep mode. • Green: The server is on and the power supply is working normally.
3 Fault LED	• Off: The power supply is working normally • Amber: The power supply has failed. To resolve the issue, replace the power supply.

4 NMI button

Press this button to force a nonmaskable interrupt to the processor. You might have to use a pen or the end of a straightened paper clip to press the button. You can also use it to force a blue-screen memory dump. Use this button only when you are directed to do so by Lenovo Support.

5 USB 3.2 Gen 1 connector

There are three USB 3.2 Gen 1 connectors on the rear of the server. Connect a USB device, such as a mouse, keyboard, or other devices, to either of these connectors.

6 VGA connector

Connect a monitor to this connector.

7 System management port

The server has a 1 GB RJ-45 connector dedicated to Lenovo XClarity Controller functions. Through the management port, you can access the Lenovo XClarity Controller directly by connecting your laptop to the management port using an Ethernet cable. Make sure that you modify the IP settings on the laptop so that it is on the same network as the server default settings. A dedicated management network provides additional security by physically separating the management network traffic from the production network.

The system management port has two status LEDs to help you identify the Ethernet connectivity and activity:
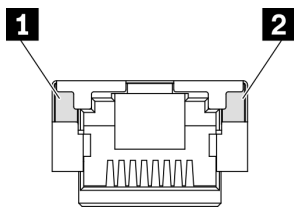
Figure 11. System management port LEDs

LED	Description
1 1 GB RJ-45 Ethernet port link LED	Use this green LED to distinguish the network connectivity status: • Off: The network link is disconnected. • Green: The network link is established.
2 1 GB RJ-45 Ethernet port activity LED	Use this green LED to distinguish the network activity status: • Off: The server is disconnected from a LAN. • Green: The network is connected and active.

8 OCP 3.0 Ethernet adapter

The OCP 3.0 Ethernet adapter provides a group of two or four Ethernet connectors on OCP 3.0 Ethernet adapter for network connections.

The system may support a 2-port or a 4-port OCP module for network connections. Port numbering are shown in the illustrations below.
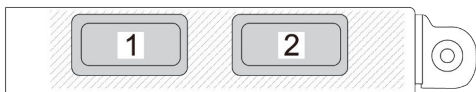
Figure 12. Port numbering — 2-port OCP module
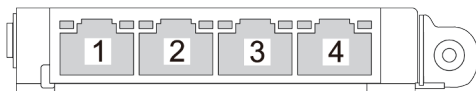
Figure 13. Port numbering — 4-port OCP 3.0 module

Front panel

The front panel of the server provides controls, connectors, and LEDs.
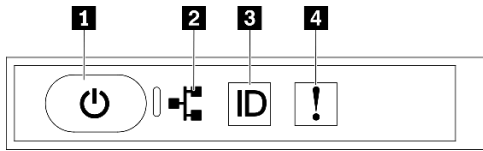
Figure 14. Front panel

Table 11. Components on the front panel

1 "Power button with power status LED (green)" on page 26	**3** "System ID button with system ID LED (blue)" on page 26
2 "Network activity LED (green)" on page 26	**4** "System Error LED (yellow)" on page 26

1 Power button with power status LED (green)

You can press the power button to power on the server when you finish setting up the server. You also can hold the power button for several seconds to power off the server if you cannot shut down the server from the operating system. The states of the power LED are as follows:

| Status	Color	Description
Off	None	No power supply is properly installed, or the LED itself has failed.
Flashing rapidly (four times per second)	Green	The server is turned off and is not ready to be turned on. The power button is disabled. This will last approximately 5 to 10 seconds.
Flashing slowly (once per second)	Green	The server is turned off and is ready to be turned on. You can press the power button to turn on the server.
Lit	Green	The server is turned on.

2 Network activity LED (green)

The network activity LED on the front panel helps you identify the network connectivity and activity.

Status	Color	Description
On	Green	The server is connected to a network.
Blinking	Green	The network is connected and active.
Off	None	The server is disconnected from the network.

3 System ID button with system ID LED (blue)

Use this system ID button and the blue system ID LED to visually locate the server. Each time you press the system ID button, the state of the system ID LEDs changes. The LEDs can be changed to on, blinking, or off. You can also use the Lenovo XClarity Controller or a remote management program to change the state of the system ID LEDs to assist in visually locating the server among other servers.

4 System Error LED (yellow)

The system error LED helps you to determine if there are any system errors.

Status	Color	Description	Action
On	Yellow	An error has been detected on the server. Causes might include one or more of the following errors: • The temperature of the server reached the non-critical temperature threshold. • The voltage of the server reached the non-critical voltage threshold. • A fan has been detected to be running at low speed. • The power supply has a critical error. • The power supply is not connected to the power.	Check the Event log to determine the exact cause of the error.
Off	None	The server is off or the server is on and is working correctly.	None.

Front I/O module

The front I/O module of the server provides controls, connectors, and LEDs. The front I/O module varies by model.

The following illustrations show the front I/O module for different server models. To locate the front I/O module, see Chapter 2 "Server components" on page 15.
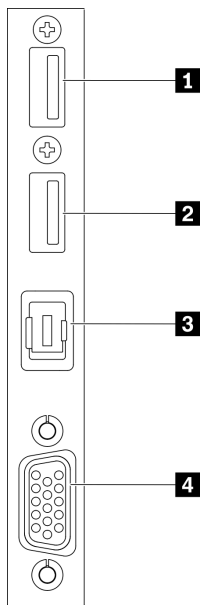
Figure 15. Front I/O module

Table 12. Components on the front I/O module

◻1 USB 2.0 connector with Lenovo XClarity Controller management	◻3 External LCD diagnostics handset connector
◻2 USB 3.2 Gen 1	◻4 VGA connector

◻ USB 2.0 connector with Lenovo XClarity Controller management

Connect a USB 2.0 device, such as a mouse, keyboard, or other devices, to this connector.

Connection to Lenovo XClarity Controller is primarily intended for users with a mobile device running the Lenovo XClarity Controller mobile application. When a mobile device is connected to this USB port, an Ethernet over USB connection is established between the mobile application running on the device and the Lenovo XClarity Controller.

Select **Network** in **BMC Configuration** to view or modify settings.

Four types of settings are available:

- **Host only mode**

  In this mode, the USB port is always solely connected to the server.
- **BMC only mode**

  In this mode, the USB port is always solely connected to Lenovo XClarity Controller.
- **Shared mode: owned by BMC**

  In this mode, connection to the USB port is shared by the server and Lenovo XClarity Controller, while the port is switched to Lenovo XClarity Controller.
- **Shared mode: owned by host**

  In this mode, connection to the USB port is shared by the server and Lenovo XClarity Controller, while the port is switched to the server.

◻ USB 3.2 Gen 1

Connect a USB 3.2 Gen 1 device, such as a mouse, keyboard, or other devices, to this connector.

◻ External LCD diagnostics handset connector

Connect the external LCD diagnostics handset here. See "External LCD diagnostics handset" on page 28 for more details.
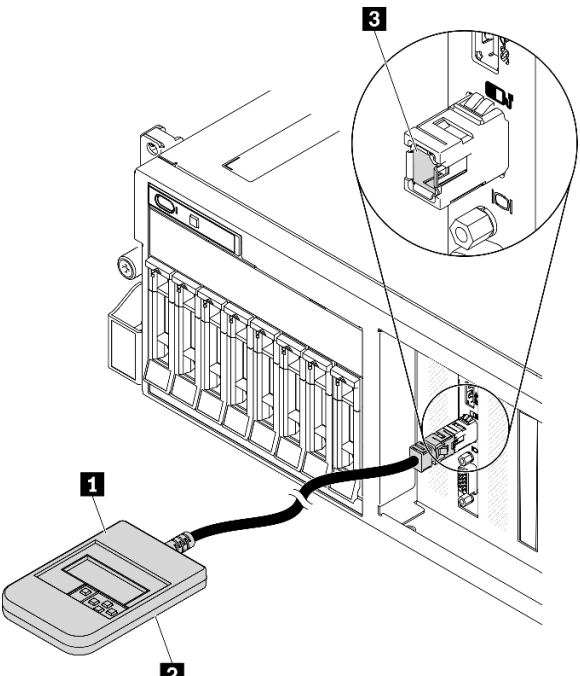
◻ VGA connector

Connect a monitor to this connector.

External LCD diagnostics handset

The external LCD diagnostics handset is an external device that is connected to the server with a cable, and it allows quick access to system information such as errors, system status, firmware, network, and health information.

Location of the external LCD diagnostics handset

Location	Callouts
The external LCD diagnostics handset is connected to the server with an external cable.	**1** External LCD diagnostics handset
	2 Magnetic bottom With this component, the diagnostic handset can be attached to the top or side of the rack with hands spared for service tasks.
	3 External diagnostics connector This connector is located on the front of the server, and is used to connect an external LCD diagnostics handset.

Note: When unplugging the external handset, see the following instructions:
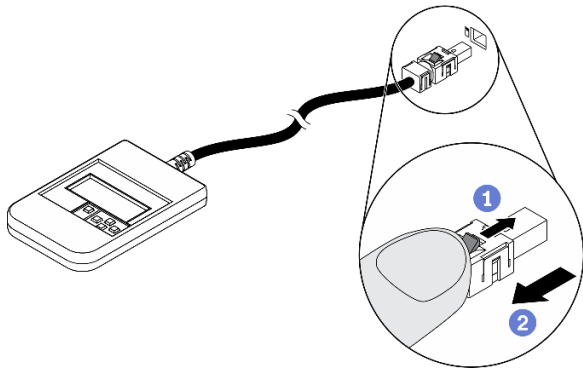
❶Press the plastic clip on the plug forward.

❷Hold the clip and remove the cable from the connector.

Display panel overview

The diagnostics device consists of an LCD display and 5 navigation buttons.

Status Dashboard System Name · Ambient Temp System Status · Power Active Alerts · · · · · · · · Checkpoint Code | Active Session **1** **Menu:** • Active Alerts • Status Dashboard • VPD • System Firmware • XCC Network • Environmental • Active Sessions • Actions **3** **2**	**1** LCD display
	2 Scroll buttons (up/down/left/right) Press the scroll buttons to locate and select system information.
	3 Select button Press the select button to select from the options in the menu.

Option flow diagram

The LCD panel displays various system information. Navigate through the options with the scroll keys.

Depending on the model, the options and entries on the LCD display might be different.
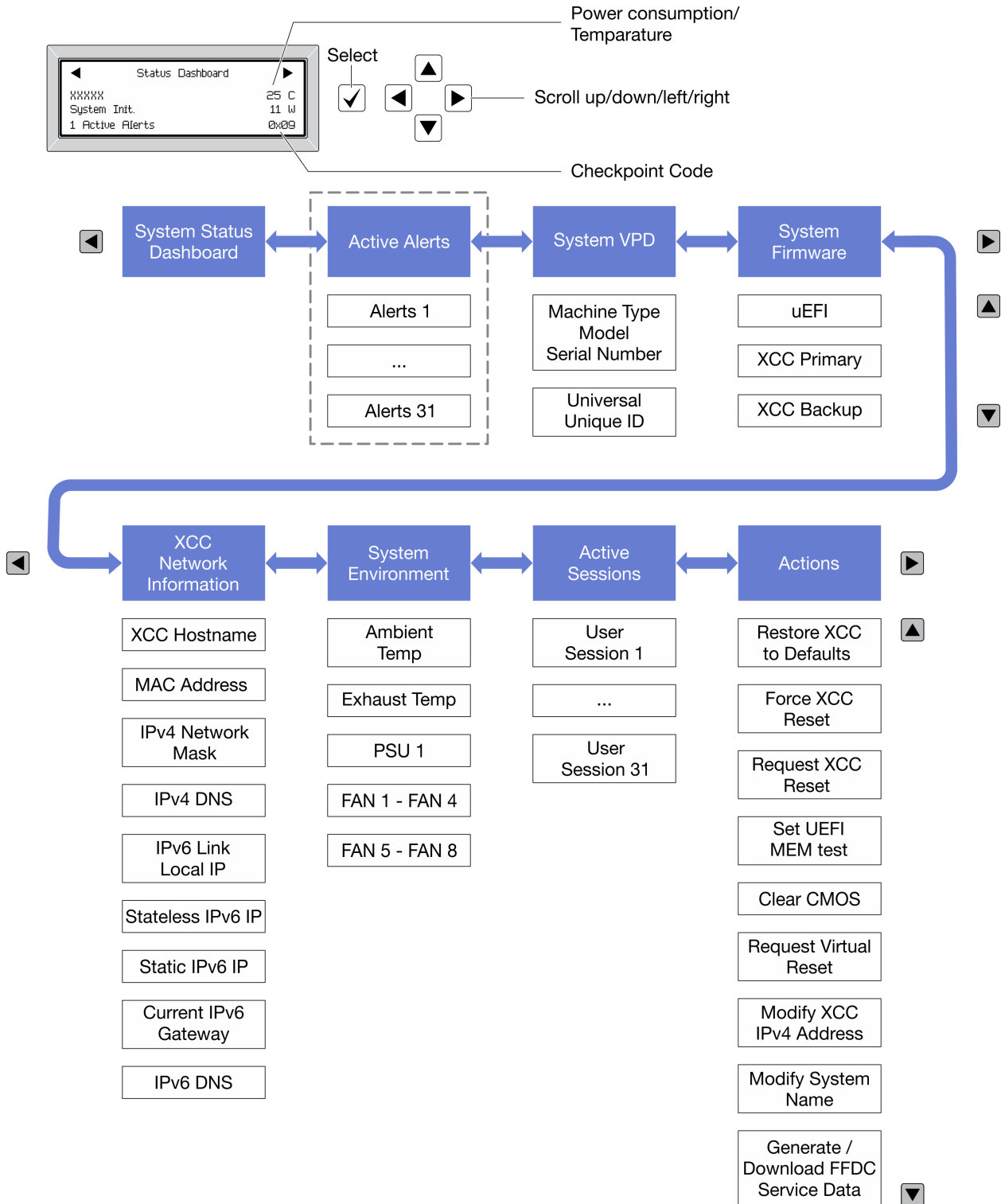
Full menu list

Following is the list of available options. Switch between an option and the subordinate information entries with the select button, and switch among options or information entries with the scroll buttons.

Depending on the model, the options and entries on the LCD display might be different.

Home Menu (System Status Dashboard)

Home Menu	Example
1 System name **2** System status **3** Active alert quantity **4** Temperature **5** Power consumption **6** Checkpoint code	◄ Status Dashboard ► **1** xxxxx 25 C **4** **2** System Init. 11 W **5** **3** 1 Active Alerts 0x09 **6**

Active Alerts

Sub Menu	Example
Home screen: Active error quantity **Note:** The "Active Alerts" menu displays only the quantity of active errors. If no errors occur, the "Active Alerts" menu will not be available during navigation.	1 Active Alerts
Details screen: • Error message ID (Type: Error/Warning/Information) • Occurrence time • Possible sources of the error	Active Alerts: 1 Press ▼ to view alert details FQXSPPU009N(Error) 04/07/2020 02:37:39 PM CPU 1 Status: Configuration Error

System VPD Information

Sub Menu	Example
• Machine type and serial number • Universal Unique ID (UUID)	Machine Type: xxxx Serial Num: xxxxxx Universal Unique ID: xxxxxxxxxxxxxxxxxxxxxxxxxxxxx

System Firmware

Sub Menu	Example
UEFI • Firmware level (status) • Build ID • Version number • Release date	UEFI (Inactive) Build: D0E101P Version: 1.00 Date: 2019-12-26
XCC Primary • Firmware level (status) • Build ID • Version number • Release date	XCC Primary (Active) Build: DVI399T Version: 4.07 Date: 2020-04-07
XCC Backup • Firmware level (status) • Build ID • Version number • Release date	XCC Backup (Active) Build: D8BT05I Version: 1.00 Date: 2019-12-30

XCC Network Information

Sub Menu	Example
• XCC hostname • MAC address • IPv4 Network Mask • IPv4 DNS • IPv6 Link Local IP • Stateless IPv6 IP • Static IPv6 IP • Current IPv6 Gateway • IPv6 DNS **Note:** Only the MAC address that is currently in use is displayed (extension or shared).	XCC Network Information XCC Hostname: XCC-xxxx-SN MAC Address: xx:xx:xx:xx:xx:xx IPv4 IP: xx.xx.xx.xx IPv4 Network Mask: x.x.x.x IPv4 Default Gateway: x.x.x.x

System Environmental Information

Sub Menu	Example

• Ambient temperature
• Exhaust temperature
• PSU status
• Spinning speed of fans by RPM
	`Ambient Temp: 24 C`
	`Exhaust Temp: 30 C`
	`PSU1: Vin= 213 w`
	`Inlet= 26 C`
	`FAN1 Front: 21000 RPM`
	`FAN2 Front: 21000 RPM`
	`FAN3 Front: 21000 RPM`
	`FAN4 Front: 21000 RPM`

Active Sessions

Sub Menu	Example
Quantity of active sessions	`Active User Sessions: 1`

Actions

Sub Menu	Example

Several quick actions are available:
• Restore XCC to Defaults
• Force XCC Reset
• Request XCC Reset
• Set UEFI Memory Test
• Clear CMOS
• Request Virtual Reseat
• Modify XCC Static IPv4 Address/Net mask/Gateway
• Modify System Name
• Generate/Download FFDC Service Data
	`Request XCC Reset?`
	`This will request the BMC to reboot itself.`
	`Hold √ for 3 seconds`

System-board layout

The illustrations in this section provide information about the connectors and switches that are available on the system board.

For more information about the LEDs that are available on the system board, see System-board LEDs in *ThinkSystem SR670 V2 Maintenance Manual*.

System-board connectors

The following illustrations show the internal connectors on the system board.
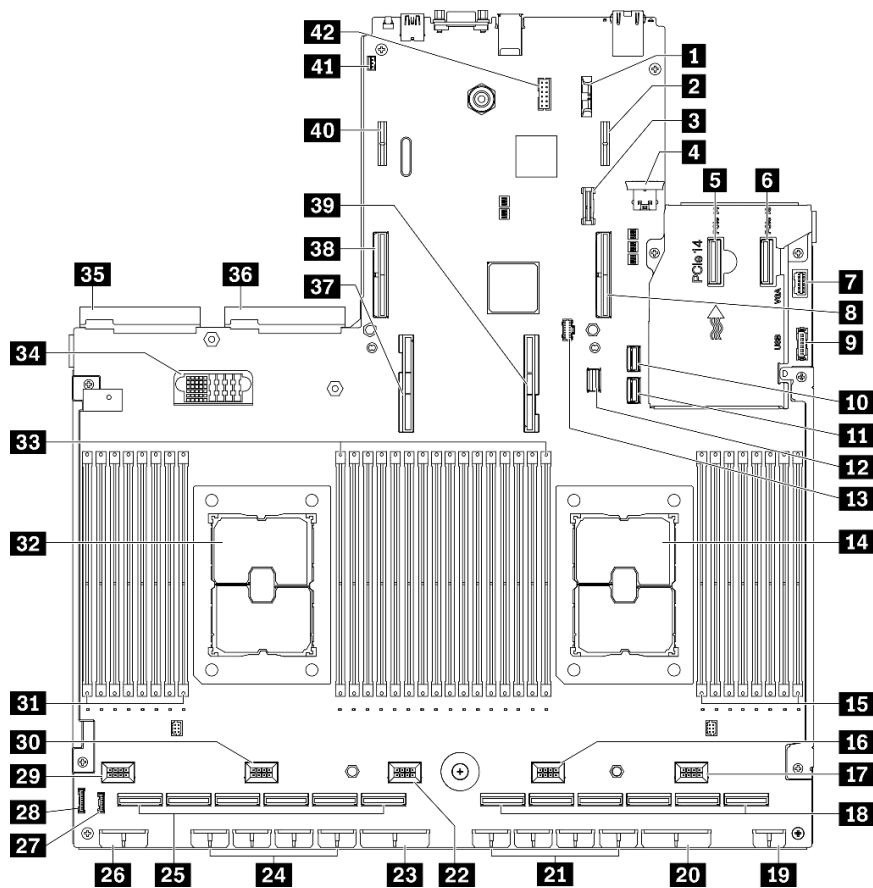
Figure 16. System-board connectors

Table 13. System-board connectors

1 3V battery (CR2032)	**22** Fan 3 connector
2 Rear PCIe riser power 1 connector	**23** PCIe adapter distribution board power 2 connector
3 TPM connector	**24** GPU power connector 8, 7, 6, 5 (left to right)
4 Internal USB connector	**25** PCIe connector 12, 11, 10, 9, 8, 7 (left to right)
5 PCIe connector 14	**26** Backplane power 1 connector
6 PCIe connector 13	**27** LCD connector[1]
7 Front VGA connector[1]	**28** Front panel connector
8 PCIe connector 15 (rear PCIe riser 1)	**29** Fan 5 connector
9 Front USB connector[1]	**30** Fan 4 connector
10 SATA 1 connector	**31** Memory module 32 - 25 (left to right)
11 SATA 2 connector	**32** Processor 2
12 M.2 signal connector	**33** Memory module slots 24 - 9 (left to right)
13 M.2 power connector	**34** Power distribution board connector
14 Processor 1	**35** Power supply unit 2 connector
15 Memory module slots 8 - 1 (left to right)	**36** Power supply unit 1 connector

Table 13. System-board connectors (continued)

16 Fan 2 connector	**37** Processor 2 UPI connector
17 Fan 1 connector	**38** PCIe connector 16 (rear PCIe riser 2)
18 PCIe connector 6, 5, 4, 3, 2, 1 (left to right)	**39** Processor 1 UPI connector
19 Front I/O expansion board power connector	**40** Rear PCIe riser power 2 connector
20 PCIe adapter distribution board power 1 connector	**41** Intrusion switch connector
21 GPU power connector 4, 3, 2, 1 (left to right)	**42** Serial port cable connector

Note: [1] Front I/O module cables connect to these connectors.

System-board switches

The following illustrations show the location of the switches, jumpers, and buttons on the server.

Note: If there is a clear protective sticker on the top of the switch blocks, you must remove and discard it to access the switches.
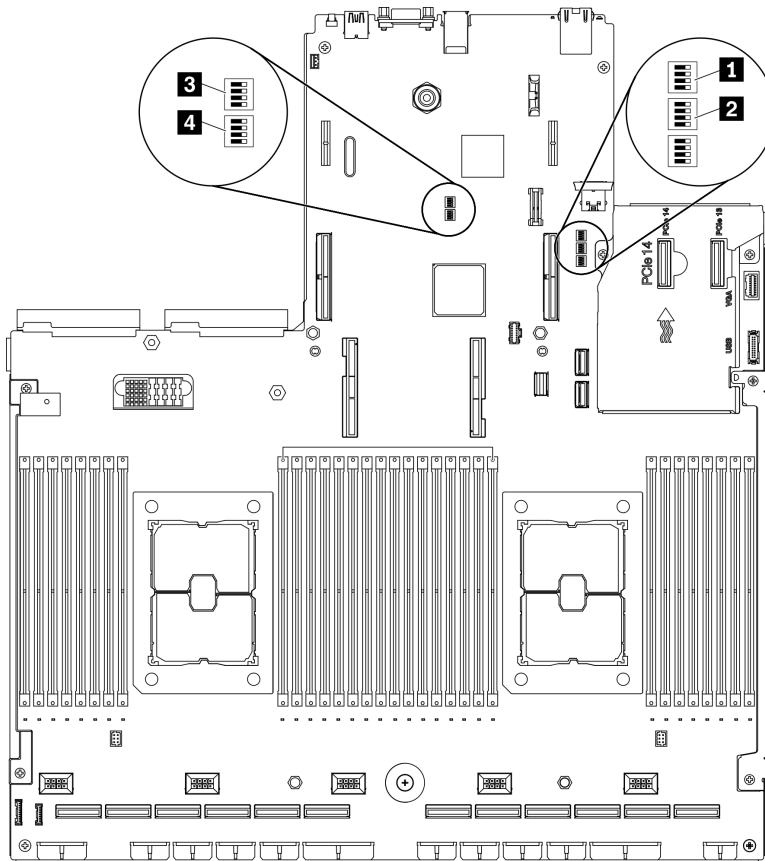

Figure 17. System-board switches

Important:

1. Before you change any switch settings or move any jumpers, turn off the server; then, disconnect all power cords and external cables. Review the information in https://pubs.lenovo.com/safety_

documentation/, "Installation Guidelines" on page 150, "Handling static-sensitive devices" on page 152, and "Power off the server" on page 257.

2. Any system-board switch or jumper block that is not shown in the illustrations in this document are reserved.

SW1 switch block

The following table describes the functions of the SW1 switch block on the system board.

Table 14. System board SW1 switch block description

Switch number	Default position	Description
1	Off	Reserved
2	Off	Changing this switch to the On position overrides the power-on password. Changing the position of this switch does not affect the administrator password check if an administrator password is set.
3	Off	Changing this switch to the On position to bypass the operational firmware image and performs a BMC firmware update, if the normal firmware update procedure results in an inoperative BMC. **Note:** Use this switch only if the normal firmware update procedure fails and the operational firmware image is corrupted. Use of this switch disables normal baseboard management controller operation.
4	Off	Reserved

SW2 switch block

The following table describes the functions of the SW2 switch block on the system board.

Table 15. System board SW2 switch block description

Switch number	Default position	Description
1	Off	Changing the switch to the On position to enable ME boots to recovery.
2	Off	Reserved
3	Off	Changing this switch to the On position to enable Power On.
4	Off	Reserved

SW3 switch block

The following table describes the functions of the SW3 switch block on the system board.

Table 16. System board SW3 switch block description

Switch number	Default position	Description
1	Off	Reserved
2	Off	Reserved
3	Off	Reserved
4	Off	When the switch is in the default Off position, the server will boot by using the primary XClarity Controller firmware. Change this switch to the On position, to enable the server to boot by using a backup of the XClarity Controller firmware.

SW10 switch block

The following table describes the functions of the SW10 switch block on the system board.

Table 17. System board SW10 switch block description

Switch number	Default position	Description
1	Off	Changing this switch to the On position to resets the RTC. A momentary toggle is all that is required. To avoid excessive CMOS battery drain, do not leave this switch in the On position.
3	Off	Reserved

Parts list

Use the parts list to identify each of the components that are available for your server.

The ThinkSystem SR670 V2 parts list varies by model. Refer to the parts list specific to each model to identify the components.

- "The 4-DW GPU Model (2.5-inch drive configuration) parts list" on page 39
- "The 4-DW GPU Model (3.5-inch drive configuration) parts list" on page 43
- "The 8-DW GPU Model parts list" on page 47
- "The SXM GPU Model parts list" on page 51

The 4-DW GPU Model (2.5-inch drive configuration) parts list

Use the parts list to identify each of the components that are available for your server.

For more information about ordering the parts shown in Figure 18 "Server components of the 4-DW GPU Model (2.5-inch drive configuration) parts list" on page 40:

1. Go to **https://datacentersupport.lenovo.com/products/servers/thinksystem/sr670v2/7z22/parts/ display/compatible** and navigate to the support page for your server.

2. Enter either the serial number or the machine type model for your server to see the parts for your server.

It is highly recommended that you check the power summary data for your server using Lenovo Capacity Planner before purchasing any new parts.

Note: Depending on the model, your server might look slightly different from the illustration.
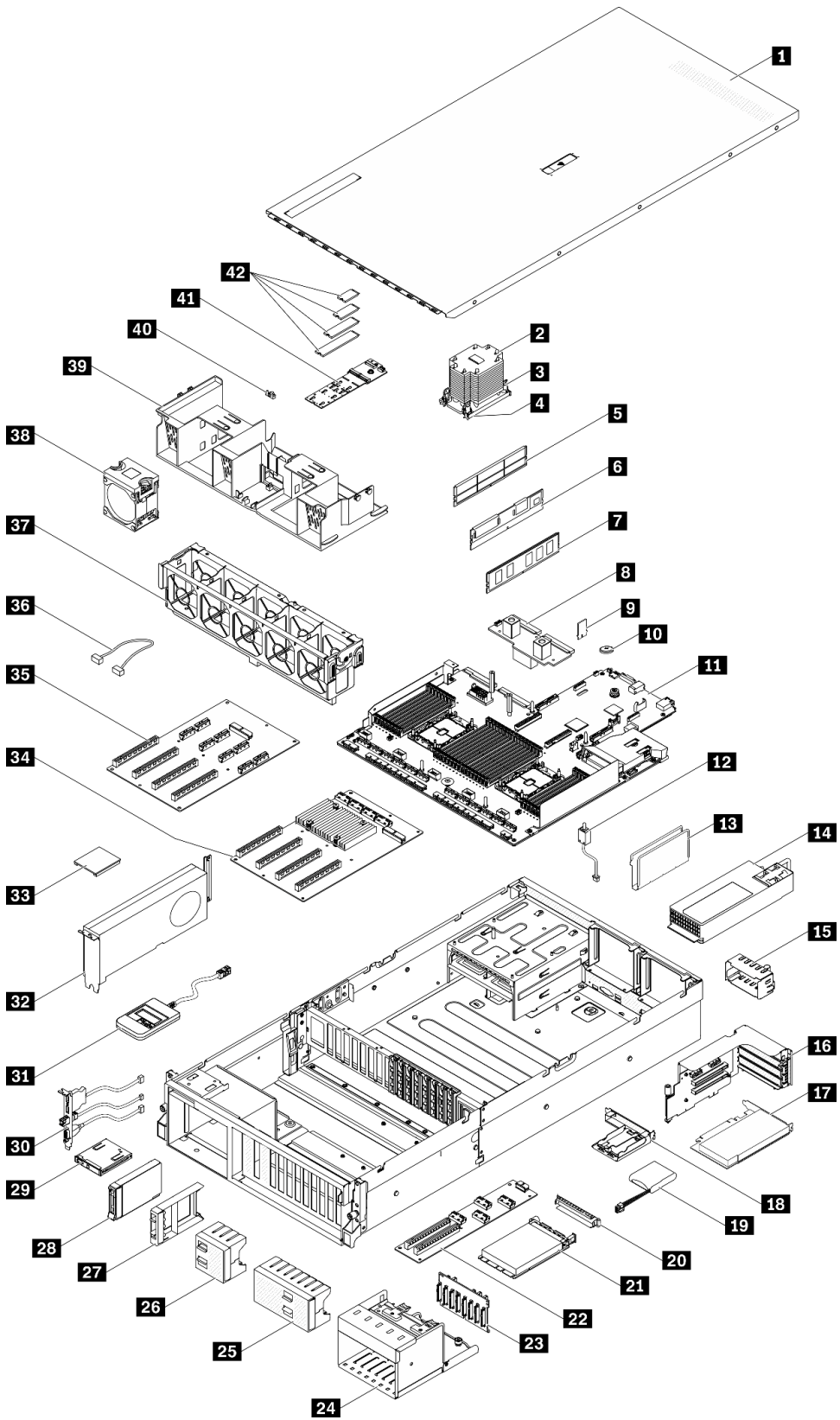
Figure 18. Server components of the 4-DW GPU Model (2.5-inch drive configuration) parts list

The parts listed in the following table are identified as one of the following:

- **Tier 1 customer replaceable unit (CRU):** Replacement of Tier 1 CRUs is your responsibility. If Lenovo installs a Tier 1 CRU at your request with no service agreement, you will be charged for the installation.

- **Tier 2 customer replaceable unit (CRU):** You may install a Tier 2 CRU yourself or request Lenovo to install it, at no additional charge, under the type of warranty service that is designated for your server.

- **Field replaceable unit (FRU):** FRUs must be installed only by trained service technicians.

- **Consumable and Structural parts:** Purchase and replacement of consumable and structural parts (components, such as a cover or bezel) is your responsibility. If Lenovo acquires or installs a structural component at your request, you will be charged for the service.

Table 18. Parts list of the 4-DW GPU Model (2.5-inch drive configuration)

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural part
For more information about ordering the parts shown in Figure 18 "Server components of the 4-DW GPU Model (2.5-inch drive configuration) parts list" on page 40: 1. Go to **https://datacentersupport.lenovo.com/products/servers/thinksystem/sr670v2/7z22/parts/display/compatible** and navigate to the support page for your server. 2. Enter either the serial number or the machine type model for your server to see the parts for your server. It is highly recommended that you check the power summary data for your server using Lenovo Capacity Planner before purchasing any new parts.					
1	Top cover				√
2	Processor heat sink			√	
3	Heat sink Torx T30	√			
4	Processor			√	
5	DIMM filler				√
6	Persistent Memory (PMEM)	√			
7	DRAM DIMM	√			
8	Power distribution board		√		
9	TPM card (Chinese Mainland only)	√			
10	CMOS battery (CR2032)				√
11	System board			√	
12	Intrusion switch	√			
13	Cable guide				√
14	Power supply unit	√			
15	Power supply unit filler				√
16	PCIe riser cage with riser	√			
17	PCIe adapter	√			
18	Flash power module holder				√
19	Flash power module	√			

Table 18. Parts list of the 4-DW GPU Model (2.5-inch drive configuration) (continued)

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consuma-ble and Structural part
20	OCP Ethernet adapter filler				√
21	OCP Ethernet adapter	√			
22	Front I/O expansion board		√		
23	2.5-inch drive backplane	√			
24	2.5-inch drive cage				√
25	2.5-inch drive filler (8-bay)				√
26	2.5-inch drive filler (4-bay)				√
27	2.5-inch drive filler (1-bay)				√
28	2.5-inch hot-swap drive	√			
29	Front panel	√			
30	Front I/O module	√			
31	External LCD diagnostics handset	√			
32	Double-wide GPU	√			
33	GPU adapter link bridge		√		
34	Four PCIe x16 slot switched PCIe distribution board			√	
35	Four PCIe x16 slot PCIe distribution board			√	
36	Cable	√			
37	Fan cage	√			
38	Fan	√			
39	Air baffle	√			
40	M.2 drive retainer				√
41	M.2 drive backplane	√			
42	M.2 drive	√			

The 4-DW GPU Model (3.5-inch drive configuration) parts list

Use the parts list to identify each of the components that are available for your server.

For more information about ordering the parts shown in Figure 19 "Server components of the 4-DW GPU Model (3.5-inch drive configuration)" on page 44:

1. Go to **https://datacentersupport.lenovo.com/products/servers/thinksystem/sr670v2/7z22/parts/ display/compatible** and navigate to the support page for your server.

2. Enter either the serial number or the machine type model for your server to see the parts for your server.

It is highly recommended that you check the power summary data for your server using Lenovo Capacity Planner before purchasing any new parts.

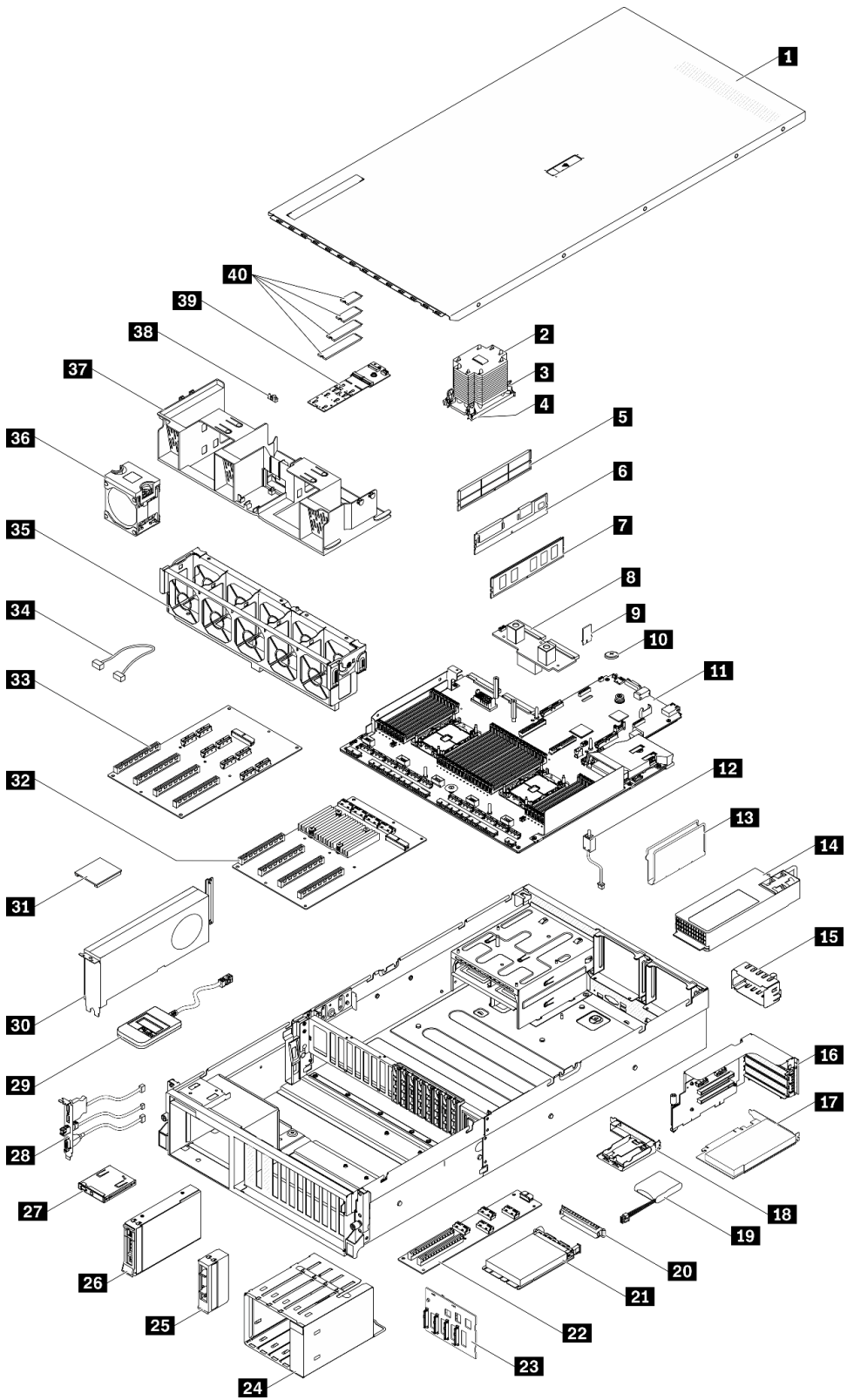**Note:** Depending on the model, your server might look slightly different from the illustration.

Figure 19. Server components of the 4-DW GPU Model (3.5-inch drive configuration)

The parts listed in the following table are identified as one of the following:

- **Tier 1 customer replaceable unit (CRU):** Replacement of Tier 1 CRUs is your responsibility. If Lenovo installs a Tier 1 CRU at your request with no service agreement, you will be charged for the installation.

- **Tier 2 customer replaceable unit (CRU):** You may install a Tier 2 CRU yourself or request Lenovo to install it, at no additional charge, under the type of warranty service that is designated for your server.

- **Field replaceable unit (FRU):** FRUs must be installed only by trained service technicians.

- **Consumable and Structural parts:** Purchase and replacement of consumable and structural parts (components, such as a cover or bezel) is your responsibility. If Lenovo acquires or installs a structural component at your request, you will be charged for the service.

Table 19. Parts list of the 4-DW GPU Model (3.5-inch drive configuration)

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural part
For more information about ordering the parts shown in Figure 19 "Server components of the 4-DW GPU Model (3.5-inch drive configuration)" on page 44:					
1. Go to **https://datacentersupport.lenovo.com/products/servers/thinksystem/sr670v2/7z22/parts/display/compatible** and navigate to the support page for your server.					
2. Enter either the serial number or the machine type model for your server to see the parts for your server.					
It is highly recommended that you check the power summary data for your server using Lenovo Capacity Planner before purchasing any new parts.					
1	Top cover				√
2	Processor heat sink			√	
3	Heat sink Torx T30	√			
4	Processor			√	
5	DIMM filler				√
6	Persistent Memory (PMEM)	√			
7	DRAM DIMM	√			
8	Power distribution board		√		
9	TPM card (Chinese Mainland only)	√			
10	CMOS battery (CR2032)				√
11	System board			√	
12	Intrusion switch	√			
13	Cable guide				√
14	Power supply unit	√			
15	Power supply unit filler				√
16	PCIe riser cage with riser	√			
17	PCIe adapter	√			
18	Flash power module holder				√
19	Flash power module	√			

Table 19. Parts list of the 4-DW GPU Model (3.5-inch drive configuration) (continued)

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consuma-ble and Structural part
20	OCP Ethernet adapter filler				√
21	OCP Ethernet adapter	√			
22	Front I/O expansion board		√		
23	3.5-inch drive backplane	√			
24	3.5-inch drive cage				√
25	3.5-inch drive filler (1-bay)				√
26	3.5-inch hot-swap drive	√			
27	Front panel	√			
28	Front I/O module	√			
29	External LCD diagnostics handset	√			
30	Double-wide GPU	√			
31	GPU adapter link bridge		√		
32	Four PCIe x16 slot switched PCIe distribution board			√	
33	Four PCIe x16 slot PCIe distribution board			√	
34	Cable	√			
35	Fan cage	√			
36	Fan	√			
37	Air baffle	√			
38	M.2 drive retainer				√
39	M.2 drive backplane	√			
40	M.2 drive	√			

The 8-DW GPU Model parts list

Use the parts list to identify each of the components that are available for your server.

For more information about ordering the parts shown in :

1. Go to **https://datacentersupport.lenovo.com/products/servers/thinksystem/sr670v2/7z22/parts/ display/compatible** and navigate to the support page for your server.

2. Enter either the serial number or the machine type model for your server to see the parts for your server.

It is highly recommended that you check the power summary data for your server using Lenovo Capacity Planner before purchasing any new parts.

Note: Depending on the model, your server might look slightly different from the illustration.

Figure 20. Server components of the 8-DW GPU Model

The parts listed in the following table are identified as one of the following:

- **Tier 1 customer replaceable unit (CRU):** Replacement of Tier 1 CRUs is your responsibility. If Lenovo installs a Tier 1 CRU at your request with no service agreement, you will be charged for the installation.

- **Tier 2 customer replaceable unit (CRU):** You may install a Tier 2 CRU yourself or request Lenovo to install it, at no additional charge, under the type of warranty service that is designated for your server.

- **Field replaceable unit (FRU):** FRUs must be installed only by trained service technicians.

- **Consumable and Structural parts:** Purchase and replacement of consumable and structural parts (components, such as a cover or bezel) is your responsibility. If Lenovo acquires or installs a structural component at your request, you will be charged for the service.

Table 20. Parts list of the 8-DW GPU Model

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural part
For more information about ordering the parts shown in Figure 20 "Server components of the 8-DW GPU Model" on page 48: 1. Go to **https://datacentersupport.lenovo.com/products/servers/thinksystem/sr670v2/7z22/parts/display/compatible** and navigate to the support page for your server. 2. Enter either the serial number or the machine type model for your server to see the parts for your server. It is highly recommended that you check the power summary data for your server using Lenovo Capacity Planner before purchasing any new parts.					
1	Top cover				√
2	Processor heat sink			√	
3	Heat sink Torx T30	√			
4	Processor			√	
5	DIMM filler				√
6	Persistent Memory (PMEM)	√			
7	DRAM DIMM	√			
8	Power distribution board		√		
9	TPM card (Chinese Mainland only)	√			
10	CMOS battery (CR2032)				√
11	System board			√	
12	Intrusion switch	√			
13	Cable guide				√
14	Power supply unit	√			
15	Power supply unit filler				√
16	PCIe riser cage with riser	√			
17	PCIe adapter	√			
18	Flash power module holder				√
19	Flash power module	√			

Table 20. Parts list of the 8-DW GPU Model (continued)

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural part
20	OCP Ethernet adapter filler				√
21	OCP Ethernet adapter	√			
22	Front I/O expansion board		√		
23	EDSFF drive backplane	√			
24	EDSFF drive cage (with cage cover)				√
25	EDSFF drive filler (1-bay)				√
26	EDSFF hot-swap drive	√			
27	Front panel	√			
28	Front I/O module	√			
29	External LCD diagnostics handset	√			
30	Double-wide GPU	√			
31	GPU adapter link bridge		√		
32	Four PCIe x16 slot switched PCIe distribution board			√	
33	Cable	√			
34	Fan cage	√			
35	Fan	√			
36	Air baffle	√			
37	M.2 drive retainer				√
38	M.2 drive backplane	√			
39	M.2 drive	√			

The SXM GPU Model parts list

Use the parts list to identify each of the components that are available for your server.

For more information about ordering the parts shown in Figure 21 "Server components" on page 52:

1. Go to **https://datacentersupport.lenovo.com/products/servers/thinksystem/sr670v2/7z22/parts/display/compatible** and navigate to the support page for your server.

2. Enter either the serial number or the machine type model for your server to see the parts for your server.

It is highly recommended that you check the power summary data for your server using Lenovo Capacity Planner before purchasing any new parts.

Note: Depending on the model, your server might look slightly different from the illustration.

Figure 21. Server components

The parts listed in the following table are identified as one of the following:

- **Tier 1 customer replaceable unit (CRU):** Replacement of Tier 1 CRUs is your responsibility. If Lenovo installs a Tier 1 CRU at your request with no service agreement, you will be charged for the installation.

- **Tier 2 customer replaceable unit (CRU):** You may install a Tier 2 CRU yourself or request Lenovo to install it, at no additional charge, under the type of warranty service that is designated for your server.

- **Field replaceable unit (FRU):** FRUs must be installed only by trained service technicians.

- **Consumable and Structural parts:** Purchase and replacement of consumable and structural parts (components, such as a cover or bezel) is your responsibility. If Lenovo acquires or installs a structural component at your request, you will be charged for the service.

Table 21. Parts list of the SXM GPU Model

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural part
For more information about ordering the parts shown in Figure 21 "Server components" on page 52: 1. Go to **https://datacentersupport.lenovo.com/products/servers/thinksystem/sr670v2/7z22/parts/display/compatible** and navigate to the support page for your server. 2. Enter either the serial number or the machine type model for your server to see the parts for your server. It is highly recommended that you check the power summary data for your server using Lenovo Capacity Planner before purchasing any new parts.					
1	Top cover				√
2	Processor heat sink			√	
3	Heat sink Torx T30	√			
4	Processor			√	
5	DIMM filler				√
6	Persistent Memory (PMEM)	√			
7	DRAM DIMM	√			
8	SXM GPU power distribution board		√		
9	Power distribution board		√		
10	TPM card (Chinese Mainland only)	√			
11	CMOS battery (CR2032)				√
12	System board			√	
13	Intrusion switch	√			
14	Cable guide				√
15	Power supply unit	√			
16	Power supply unit filler				√
17	Cable	√			
18	OCP Ethernet adapter	√			
19	OCP Ethernet adapter filler				√

Table 21. Parts list of the SXM GPU Model (continued)

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural part
20	Cross bar				√
21	2.5-inch drive backplane	√			
22	2.5-inch drive cage assembly				√
23	Front I/O expansion board		√		
24	External LCD diagnostics handset	√			
25	Front I/O module	√			
26	2.5-inch drive filler (1-bay)				√
27	2.5-inch drive	√			
28	Front panel	√			
29	Retimer assembly			√	
30	GPU tray			√	
31	GPU			√	
32	SXM GPU board			√	
33	Lenovo Neptune™ liquid-to-air (L2A) hybrid cooling module			√	
34	Fan cage	√			
35	Fan	√			
36	Air baffle	√			
37	M.2 drive retainer				√
38	M.2 drive backplane	√			
39	M.2 drive	√			

Power cords

Several power cords are available, depending on the country and region where the server is installed.

To view the power cords that are available for the server:

1. Go to:

   http://dcsc.lenovo.com/#/

2. Click **Preconfigured Model** or **Configure to order**.

3. Enter the machine type and model for your server to display the configurator page.

4. Click **Power** ➙ **Power Cables** to see all line cords.

Notes:

- For your safety, a power cord with a grounded attachment plug is provided to use with this product. To avoid electrical shock, always use the power cord and plug with a properly grounded outlet.

- Power cords for this product that are used in the United States and Canada are listed by Underwriter's Laboratories (UL) and certified by the Canadian Standards Association (CSA).

- For units intended to be operated at 115 volts: Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a parallel blade, grounding-type attachment plug rated 15 amperes, 125 volts.

- For units intended to be operated at 230 volts (U.S. use): Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a tandem blade, grounding-type attachment plug rated 15 amperes, 250 volts.

- For units intended to be operated at 230 volts (outside the U.S.): Use a cord set with a grounding-type attachment plug. The cord set should have the appropriate safety approvals for the country in which the equipment will be installed.

- Power cords for a specific country or region are usually available only in that country or region.

Chapter 3. Internal cable routing

See this section to do cable routing for specific components.

Note: Disengage all latches, release tabs, or locks on cable connectors when you disconnect cables from the system board. Failing to release them before removing the cables will damage the cable sockets on the system board, which are fragile. Any damage to the cable sockets might require replacing the system board.

Identifying connectors

See this section to locate and identify the connectors on the electric boards.

Note: For the connectors on system board, see "System-board connectors" on page 34.

Drive backplane connectors

See this section to locate the connectors in the drive backplanes.

Four types of drive backplanes are supported in this server:

4-DW GPU Model supports:

- 8x2.5-inch SAS/SATA/NVMe backplane
- 4x3.5-inch SAS/SATA/NVMe backplane

8-DW GPU Model supports:

- 6x EDSFF NVMe backplane

SXM GPU Model supports:

- 4x2.5-inch NVMe backplane

8x2.5-inch SAS/SATA/NVMe backplane

See this section to locate the connectors on the drive backplane.

1 NVMe 6-7
2 NVMe 4-5
3 SAS / SATA
4 Power connector
5 NVMe 2-3
6 NVMe 0-1
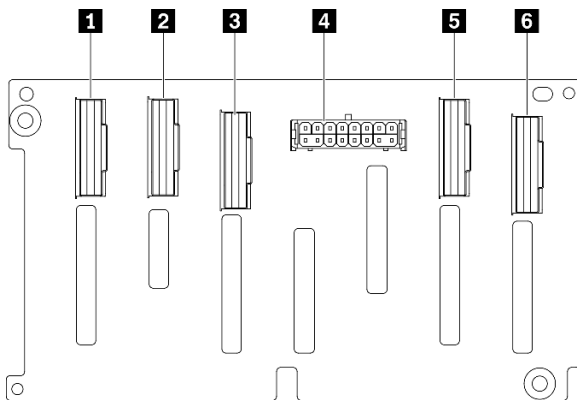
Figure 22. 8x2.5-inch SAS/SATA/NVMe backplane connectors

4x3.5-inch SAS/SATA/NVMe backplane

See this section to locate the connectors on the drive backplane.

1 NVMe 2-3
2 Power connector
3 NVMe 0-1
4 SAS / SATA
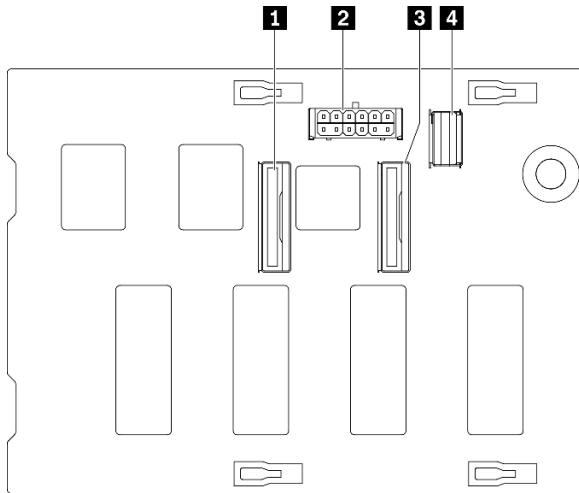
Figure 23. 4x3.5-inch SAS/SATA/NVMe backplane

6x EDSFF NVMe backplane

See this section to locate the connectors on the drive backplane.

1 EDSFF 0-1
2 Power connector
3 EDSFF 2-3
4 EDSFF 4-5
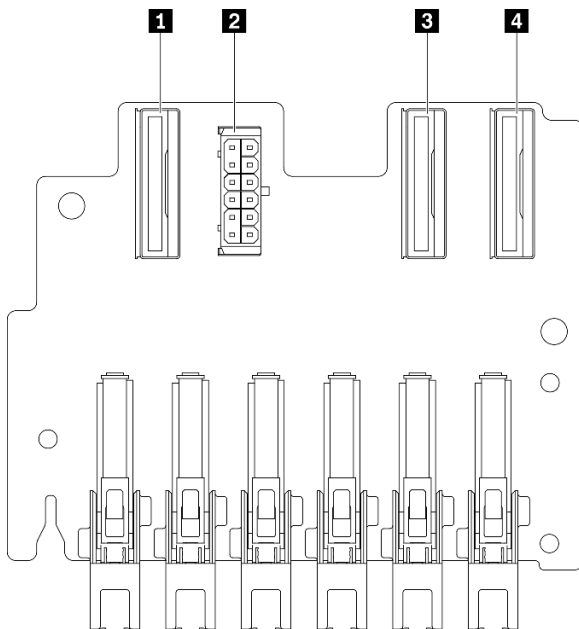
Figure 24. 6x EDSFF NVMe backplane

4x2.5-inch NVMe backplane

See this section to locate the connectors on the drive backplane.

1 NVMe 2-3
2 NVMe 0-1
3 Power connector
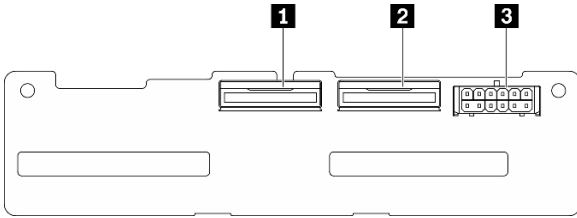
Figure 25. 4x2.5-inch NVMe backplane

GPU distribution board connectors

See this section to locate the connectors in the GPU distribution board.

Two types of GPU distribution board are supported in this server.

4-DW GPU Model supports:

- Four PCIe x16 slot PCIe distribution board
- Four PCIe x16 slot switched PCIe distribution board

8-DW GPU Model supports:

- Four PCIe x16 slot switched PCIe distribution board

Four PCIe x16 slot PCIe distribution board

See this section to locate the connectors on the GPU distribution board.

1 PCIe slots for GPU
2 MCIO connectors A to H
A B GPU #3 / #7
C D GPU #4 / #8
E F GPU #5 / #9
G H GPU #6 / #10
3 Power connector
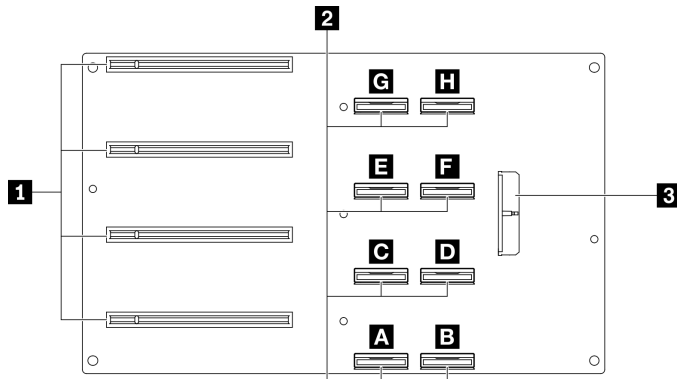
Figure 26. Four PCIe x16 slot PCIe distribution board

Four PCIe x16 slot switched PCIe distribution board

See this section to locate the connectors on the GPU distribution board.
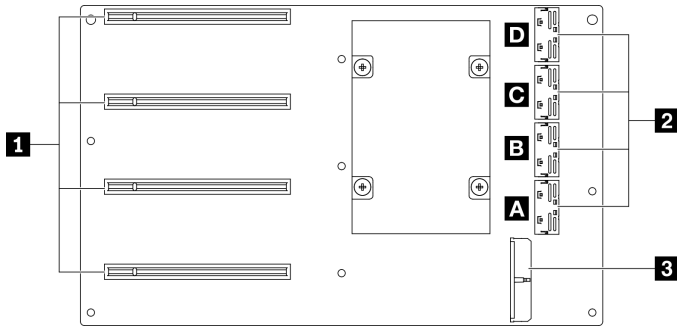
Figure 27. Four PCIe x16 slot switched PCIe distribution board

1 PCIe slots for GPU
2 MCIO connectors A to D
A **B** Uplink 2
C **D** Uplink 1
3 Power connector

Rear riser board connectors

See this section to locate the connectors in the rear riser board.

Rear riser board connectors
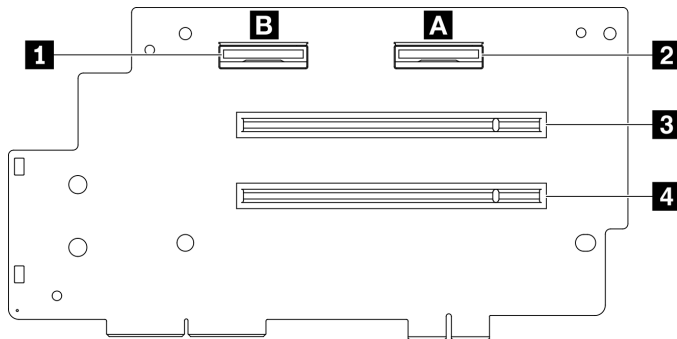
Figure 28. Four PCIe x16 slot PCIe distribution board

1 MCIO connectors B
2 MCIO connectors A
3 PCIe slot 2
4 PCIe slot 1

Front I/O expansion board connectors

See this section to locate the connectors in the front I/O expansion board.

Front I/O expansion board connectors
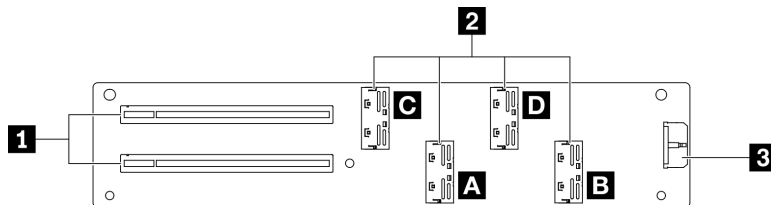
Figure 29. Front I/O expansion board connectors

1 PCIe slots
2 MCIO connectors A to D
A **B** PCIe Slot 1
C **D** PCIe Slot 2
3 Power connector

Retimer assembly connectors

See this section to locate the connectors in the retimer assembly.

Retimer assembly connectors
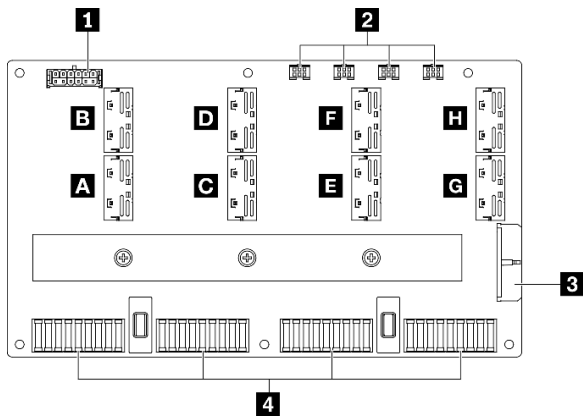
Figure 30. Retimer assembly connectors

1 Backplane power connector
2 Cold plate assembly pump cable connectors 1 to 4 (left to right)
3 Power connector
4 SXM GPU board connectors
A **B** **C** **D** **E** **F** **G** **H** MCIO connector

4-DW GPU Model with 8x 2.5-inch drives cable routing

Follow the instructions in this section to learn how to do cable routing for 4-DW GPU Model with 8x 2.5-inch drives.

Identifying connectors

Go through the following sections to acquire necessary information before starting cable routing.

- For the connectors on system board, see "System-board connectors" on page 34.
- For the connectors on the drive backplane, GPU distribution board, rear riser, and front I/O expansion board, see "Identifying connectors" on page 58.

4-DW GPU Model with 8x 2.5-inch drives configurations

Cable routing is different by configuration. See the table below for the configuration that matches your server, and refer to the corresponding cable routing guide.

Rear riser 1	Rear riser 2	Rear riser 2 installed with HBA/RAID adapter	OCP Ethernet adapter	Front I/O expansion board	Configurations
V			V		Configuration A
V		V			Configuration A with HBA/RAID adapter
				V	Configuration C
V	V		V		Configuration H
V		V	V		Configuration H with HBA/RAID adapter
			V	V	Configuration I

Refer to the corresponding cable routing guide:

- For Configuration A, see "Configuration A cable routing" on page 67
- For Configuration A with HBA/RAID adapter, see "Configuration A with HBA/RAID adapter cable routing" on page 72
- For Configuration C, see "Configuration C cable routing" on page 77
- For Configuration H, see "Configuration H cable routing" on page 81
- For Configuration H with HBA/RAID adapter, see "Configuration H with HBA/RAID adapter cable routing" on page 86
- For Configuration I, see "Configuration I cable routing" on page 91

Make sure to route the cables through cable guide and cable clip as instructed in the cable routing guides. See the illustration below for the cable guide and cable clip locations.
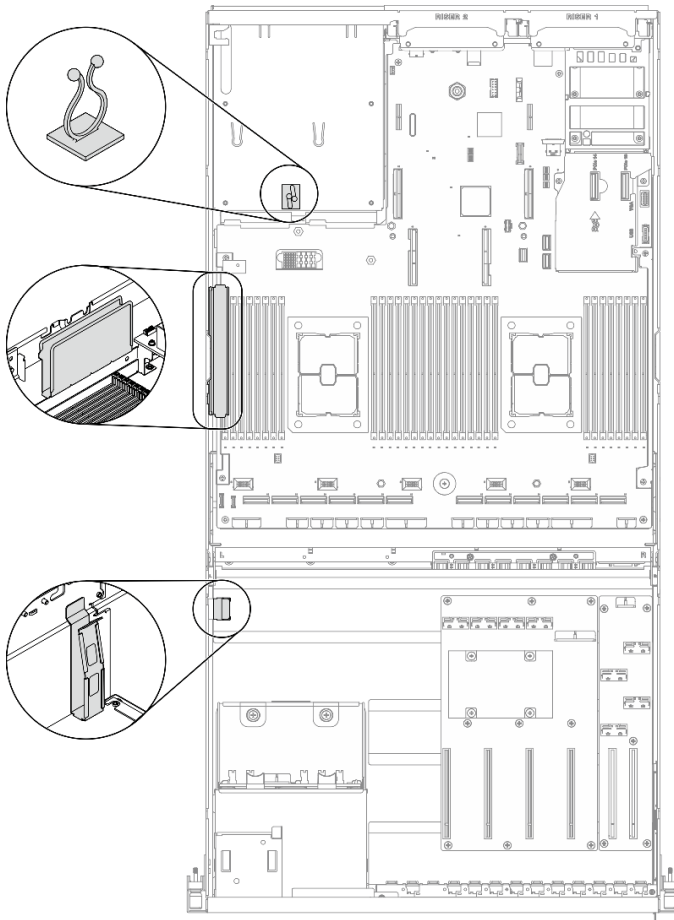

Figure 31. Cable guide and cable clip locations in the chassis

Configuration A cable routing

Follow the instructions in this section to learn how to do cable routing for Configuration A.

Configuration A cable routing includes the following items:

1. Drive backplane cable routing
2. GPU distribution board cable routing
3. Rear riser 1 cable routing
4. OCP Ethernet adapter routing

Cabling for these components are illustrated below.

Drive backplane cable routing

Connect the drive backplane signal cables and power cable as illustrated.
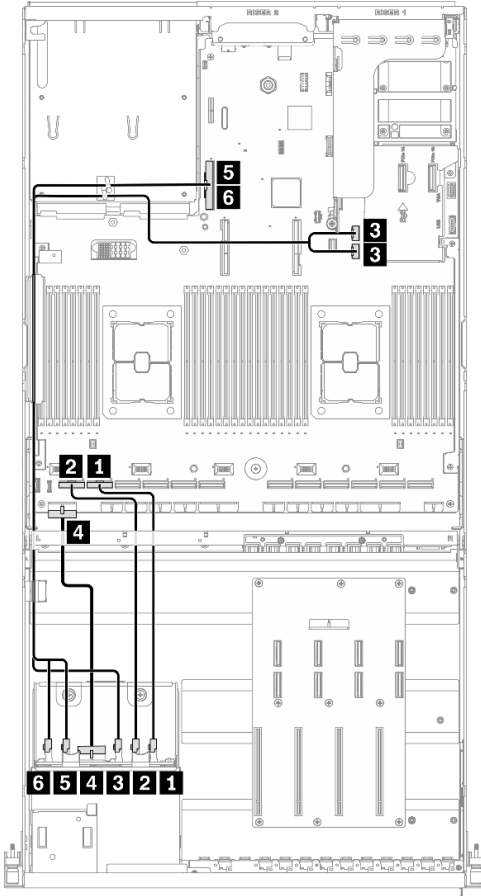
Figure 32. Drive backplane cable routing – Configuration A

From		To	
Drive backplane	**1** NVMe 6-7	System board	**1** PCIe connector 11
	2 NVMe 4-5		**2** PCIe connector 12
	3 SAS		**3** SATA 1 connector and SATA 2 connector
	4 Power connector		**4** Backplane power 1 connector
	5 NVMe 2-3		**5** PCIe connector 16
	6 NVMe 0-1		**6** PCIe connector 16

GPU distribution board cable routing

Connect the GPU distribution board signal cables and power cable as illustrated.
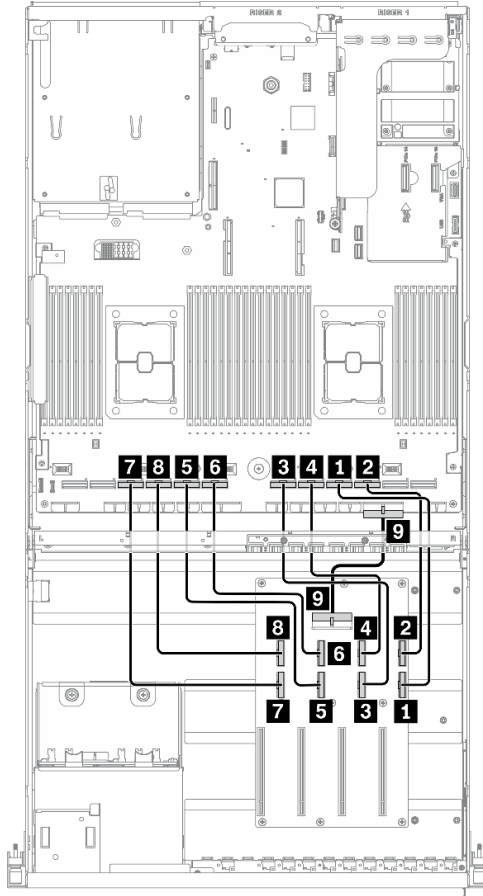
Figure 33. GPU distribution board cable routing – Configuration A

From			To		
GPU distribution board	**1** MCIO connector A	GPU #3	System board	**1** PCIe connector 4	
	2 MCIO connector B			**2** PCIe connector 3	
	3 MCIO connector C	GPU #4		**3** PCIe connector 6	
	4 MCIO connector D			**4** PCIe connector 5	
	5 MCIO connector E	GPU #5		**5** PCIe connector 8	
	6 MCIO connector F			**6** PCIe connector 7	
	7 MCIO connector G	GPU #6		**7** PCIe connector 10	
	8 MCIO connector H			**8** PCIe connector 9	
	9 Power connector			**9** PCIe adapter distribution board power 1 connector	

Rear riser 1 cable routing

Connect the rear riser 1 signal cable as illustrated.
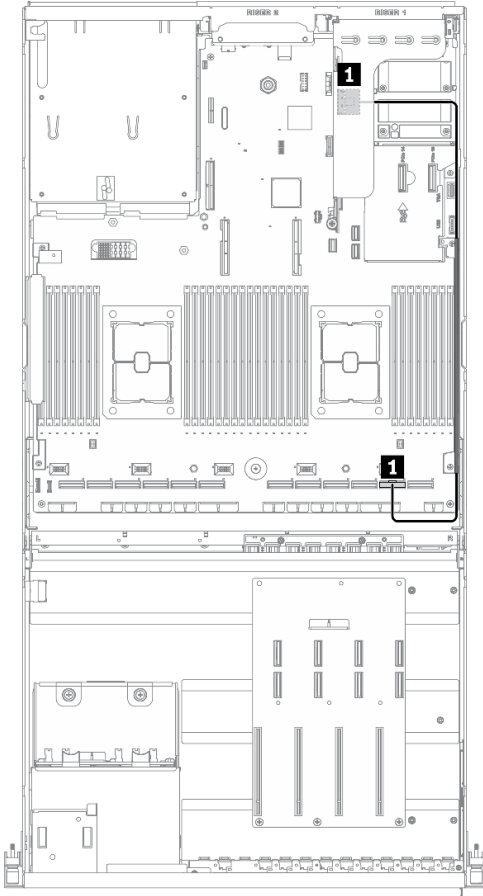
Figure 34. Rear riser 1 cable routing – Configuration A

From		To	
Rear riser 1	**1** MCIO connector A	System board	**1** PCIe connector 2

OCP Ethernet adapter cable routing

Connect the OCP Ethernet adapter signal cable as illustrated.
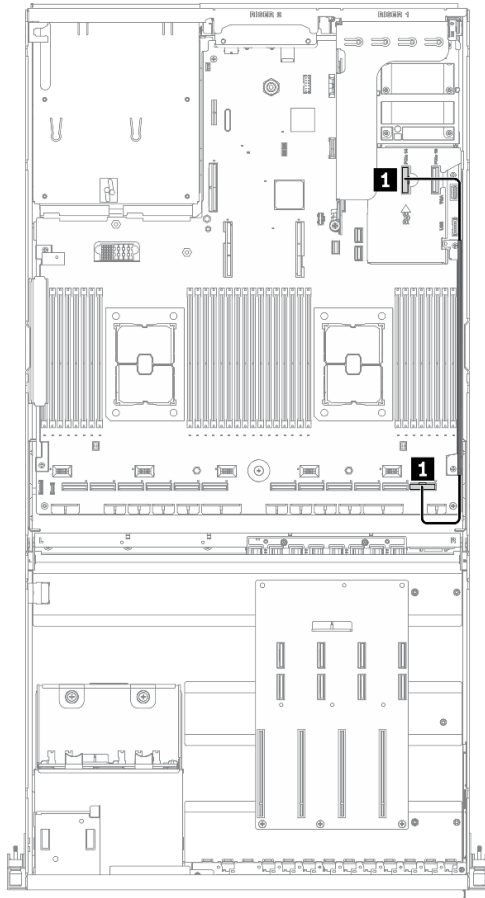
Figure 35. OCP Ethernet adapter cable routing – Configuration A

From		To	
System board	**1** PCIe connector 14	System board	**1** PCIe connector 1

Configuration A with HBA/RAID adapter cable routing

Follow the instructions in this section to learn how to do cable routing for Configuration A with HBA/RAID adapter.

Configuration A with HBA/RAID adapter cable routing includes the following items:

1. Drive backplane cable routing
2. GPU distribution board cable routing
3. Rear riser 1, rear riser 2, and HBA/RAID adapter cable routing
4. OCP Ethernet adapter routing

Cabling for these components are illustrated below.

Drive backplane cable routing

Connect the drive backplane signal cable and power cable as illustrated.

Figure 36. Drive backplane cable routing – Configuration A with HBA/RAID adapter

From		To	
Drive backplane	**1** SAS	System board	**1** HBA/RAID adapter installed on rear riser 2
	2 Power connector		**2** Backplane power 1 connector

GPU distribution board cable routing

Connect the GPU distribution board signal cables and power cable as illustrated.
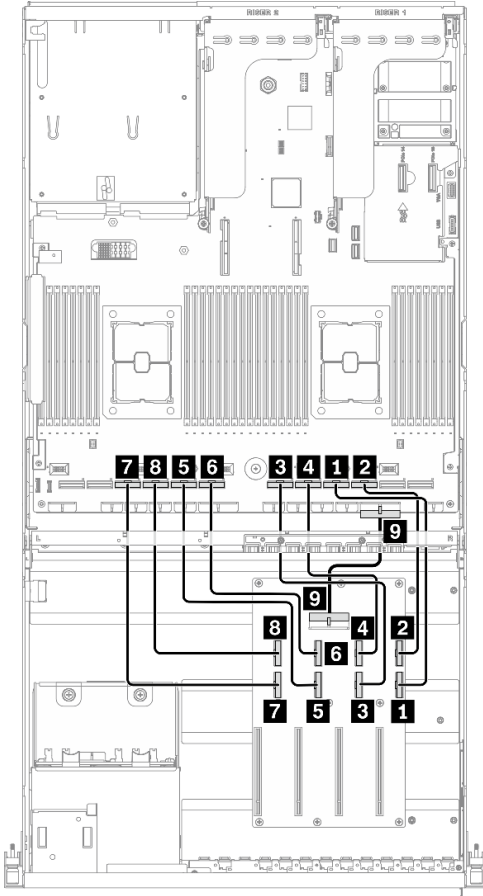
Figure 37. GPU distribution board cable routing – Configuration A with HBA/RAID adapter

From			To		
GPU distribution board	**1** MCIO connector A	GPU #3	System board	**1** PCIe connector 4	
	2 MCIO connector B			**2** PCIe connector 3	
	3 MCIO connector C	GPU #4		**3** PCIe connector 6	
	4 MCIO connector D			**4** PCIe connector 5	
	5 MCIO connector E	GPU #5		**5** PCIe connector 8	
	6 MCIO connector F			**6** PCIe connector 7	
	7 MCIO connector G	GPU #6		**7** PCIe connector 10	
	8 MCIO connector H			**8** PCIe connector 9	
	9 Power connector			**9** PCIe adapter distribution board power 1 connector	

Rear riser 1, rear riser 2, and HBA/RAID adapter cable routing

Connect the rear riser 1, rear riser 2, and HBA/RAID adapter signal cables as illustrated.

Figure 38. Rear riser 1, rear riser 2, and HBA/RAID adapter cable routing – Configuration A with HBA/RAID adapter

From		To	
Rear riser 2	**1** MCIO connector A	System board	**1** PCIe connector 12
	2 MCIO connector B		**2** PCIe connector 11
	3 HBA/RAID adapter installed on rear riser 2	Drive backplane	**3** SAS
Rear riser 1	**4** MCIO connector A	System board	**4** PCIe connector 2

OCP Ethernet adapter cable routing

Connect the OCP Ethernet adapter signal cable as illustrated.

Figure 39. OCP Ethernet adapter cable routing – Configuration A with HBA/RAID adapter

From		To	
System board	**1** PCIe connector 14	System board	**1** PCIe connector 1

Configuration C cable routing

Follow the instructions in this section to learn how to do cable routing for Configuration C.

Configuration C cable routing includes the following items:

1. Drive backplane cable routing
2. GPU distribution board cable routing
3. Front I/O expansion board cable routing

Cabling for these components are illustrated below.

Drive backplane cable routing

Connect the drive backplane signal cables and power cable as illustrated.
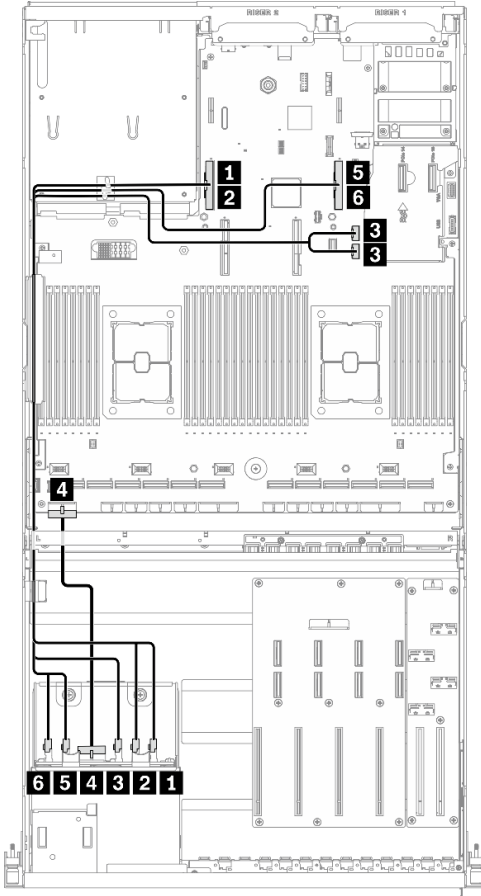
Figure 40. Drive backplane cable routing – Configuration C

From		To	
Drive backplane	**1** NVMe 6-7	System board	**1** PCIe connector 16
	2 NVMe 4-5		**2** PCIe connector 16
	3 SAS		**3** SATA 1 connector and SATA 2 connector
	4 Power connector		**4** Backplane power 1 connector
	5 NVMe 2-3		**5** PCIe connector 15
	6 NVMe 0-1		**6** PCIe connector 15

GPU distribution board cable routing

Connect the GPU distribution board signal cables and power cable as illustrated.
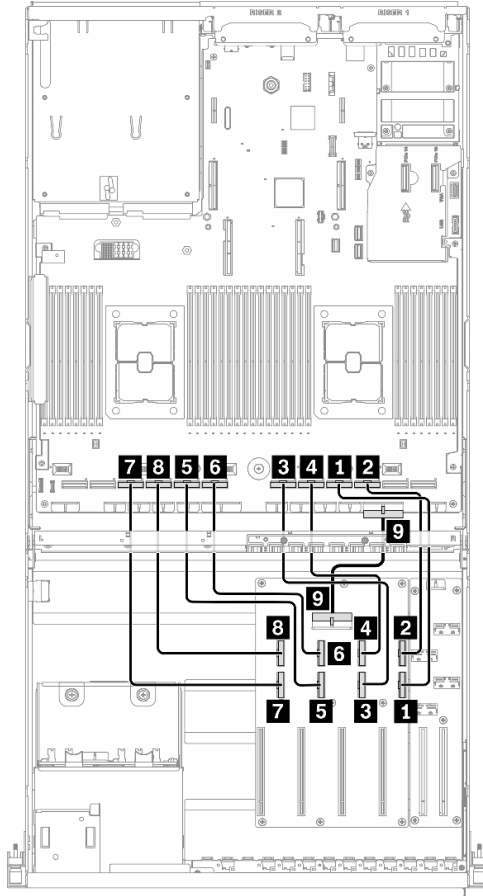
Figure 41. GPU distribution board cable routing – Configuration C

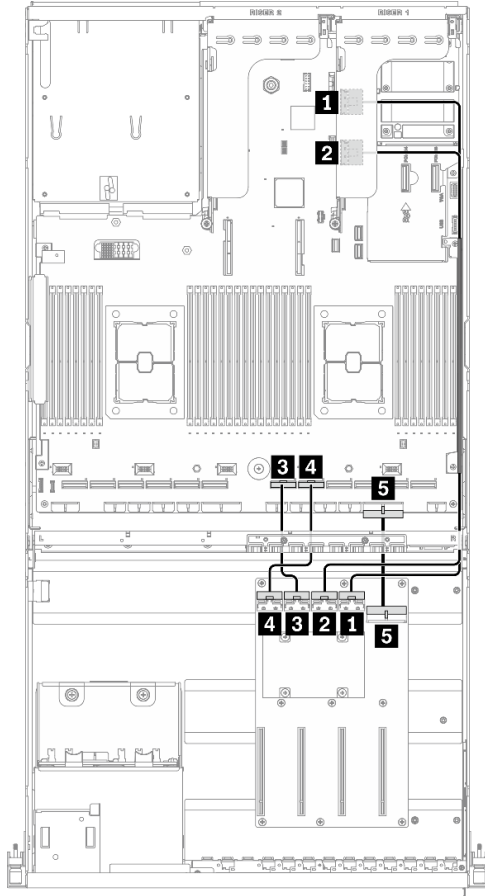| From			To		
GPU distribution board	**1** MCIO connector A	GPU #3	System board	**1** PCIe connector 4
	2 MCIO connector B			**2** PCIe connector 3
	3 MCIO connector C	GPU #4		**3** PCIe connector 6
	4 MCIO connector D			**4** PCIe connector 5
	5 MCIO connector E	GPU #5		**5** PCIe connector 8
	6 MCIO connector F			**6** PCIe connector 7
	7 MCIO connector G	GPU #6		**7** PCIe connector 10
	8 MCIO connector H			**8** PCIe connector 9
	9 Power connector			**9** PCIe adapter distribution board power 1 connector

Front I/O expansion board cable routing

Connect the front I/O expansion board signal cables and power cable as illustrated.

Figure 42. Front I/O expansion board cable routing – Configuration C

From			To		
Front I/O expansion board	**1** MCIO connector A	Slot #1	System board	**1** PCIe connector 2	
	2 MCIO connector B			**2** PCIe connector 1	
	3 MCIO connector C	Slot #2		**3** PCIe connector 12	
	4 MCIO connector D			**4** PCIe connector 11	
	5 Power connector			**5** Front I/O expansion board power connector	

Configuration H cable routing

Follow the instructions in this section to learn how to do cable routing for Configuration H.

Configuration H cable routing includes the following items:

1. Drive backplane cable routing
2. GPU distribution board cable routing
3. Rear riser 1 and rear riser 2 cable routing
4. OCP Ethernet adapter cable routing

Cabling for these components are illustrated below.

Drive backplane cable routing

Connect the drive backplane signal cables and power cable as illustrated.
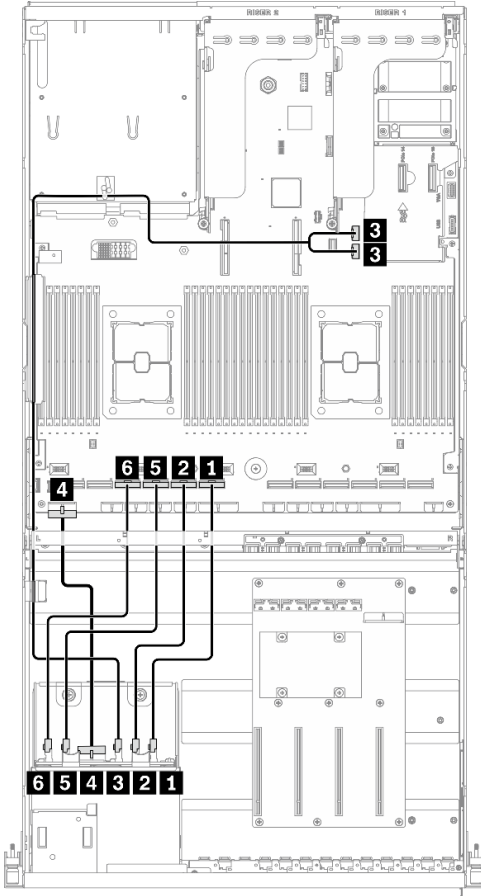
Figure 43. Drive backplane cable routing – Configuration H

From		To	
Drive backplane	**1** NVMe 6-7	System board	**1** PCIe connector 7
	2 NVMe 4-5		**2** PCIe connector 8
	3 SAS		**3** SATA 1 connector and SATA 2 connector
	4 Power connector		**4** Backplane power 1 connector
	5 NVMe 2-3		**5** PCIe connector 9
	6 NVMe 0-1		**6** PCIe connector 10

GPU distribution board cable routing

Connect the GPU distribution board signal cables and power cable as illustrated.

Figure 44. GPU distribution board cable routing – Configuration H

From			To		
GPU distribution board	**1** MCIO connector A	GPU #3	Rear riser 1	**1** MCIO connector A	
	2 MCIO connector B	GPU #4		**2** MCIO connector B	
	3 MCIO connector C	GPU #5	System board	**3** PCIe connector 6	
	4 MCIO connector D	GPU #6		**4** PCIe connector 5	
	5 Power connector			**5** PCIe adapter distribution board power 1 connector	

Rear riser 1 and rear riser 2 cable routing

Connect the rear riser 1 and rear riser 2 signal cables as illustrated.

Figure 45. Rear riser 1 and rear riser 2 cable routing – Configuration H

From		To	
Rear riser 1	**1** MCIO connector A	GPU distribution board	**1** MCIO connector A
	2 MCIO connector B		**2** MCIO connector B
Rear riser 2	**3** MCIO connector A	System board	**3** PCIe connector 12
	4 MCIO connector B		**4** PCIe connector 11

OCP Ethernet adapter cable routing

Connect the OCP Ethernet adapter signal cable as illustrated.
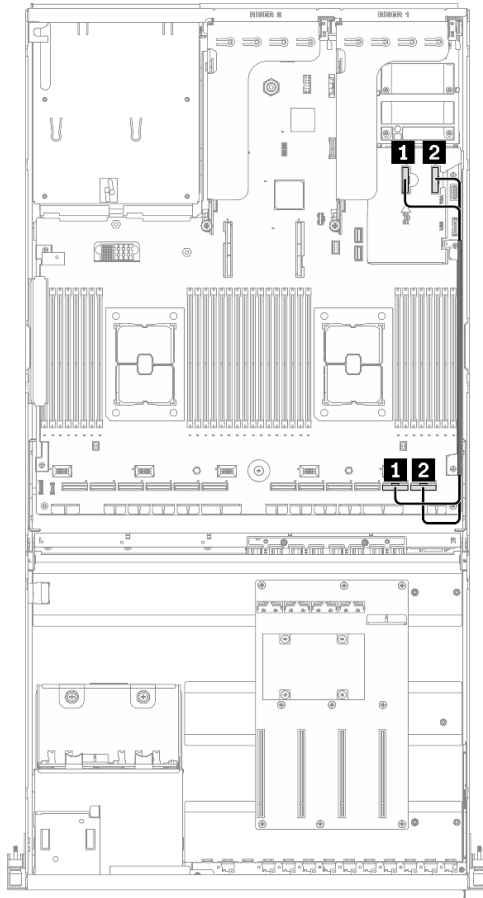
Figure 46. OCP Ethernet adapter cable routing – Configuration H

From		To	
System board	**1** PCIe connector 14	System board	**1** PCIe connector 2
	2 PCIe connector 13		**2** PCIe connector 1

Configuration H with HBA/RAID adapter cable routing

Follow the instructions in this section to learn how to do cable routing for Configuration H with HBA/RAID adapter.

Configuration H with HBA/RAID adapter cable routing includes the following items:

1. Drive backplane cable routing
2. GPU distribution board cable routing
3. Rear riser 1, rear riser 2, and HBA/RAID adapter cable routing
4. OCP Ethernet adapter cable routing

Cabling for these components are illustrated below.

Drive backplane cable routing

Connect the drive backplane signal cables and power cable as illustrated.

Figure 47. Drive backplane cable routing – Configuration H with HBA/RAID adapter

From		To	
Drive backplane	**1** NVMe 6-7	System board	**1** PCIe connector 7
	2 NVMe 4-5		**2** PCIe connector 8
	3 SAS		**3** HBA/RAID adapter installed on rear riser 2
	4 Power connector		**4** Backplane power 1 connector
	5 NVMe 2-3		**5** PCIe connector 9
	6 NVMe 0-1		**6** PCIe connector 10

GPU distribution board cable routing

Connect the GPU distribution board signal cables and power cable as illustrated.
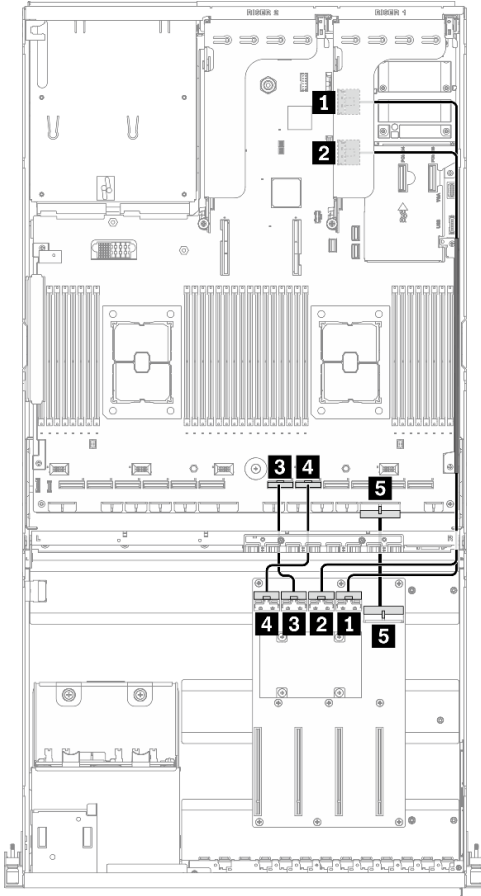
Figure 48. GPU distribution board cable routing – Configuration H with HBA/RAID adapter

From			To	
GPU distribution board	**1** MCIO connector A	GPU #3	Rear riser 1	**1** MCIO connector A
	2 MCIO connector B	GPU #4		**2** MCIO connector B
	3 MCIO connector C	GPU #5	System board	**3** PCIe connector 6
	4 MCIO connector D	GPU #6		**4** PCIe connector 5
	5 Power connector			**5** PCIe adapter distribution board power 1 connector

Rear riser 1, rear riser 2, and HBA/RAID adapter cable routing

Connect the rear riser 1, rear riser 2, and HBA/RAID adapter signal cables as illustrated.

Figure 49. Rear riser 1, rear riser 2, and HBA/RAID adapter cable routing – Configuration H with HBA/RAID adapter

From		To	
Rear riser 1	**1** MCIO connector A	GPU distribution board	**1** MCIO connector A
	2 MCIO connector B		**2** MCIO connector B
Rear riser 2	**3** MCIO connector A	System board	**3** PCIe connector 12
	4 MCIO connector B		**4** PCIe connector 11
	5 HBA/RAID adapter installed on rear riser 2	Drive backplane	**5** SAS

OCP Ethernet adapter cable routing

Connect the OCP Ethernet adapter signal cable as illustrated.
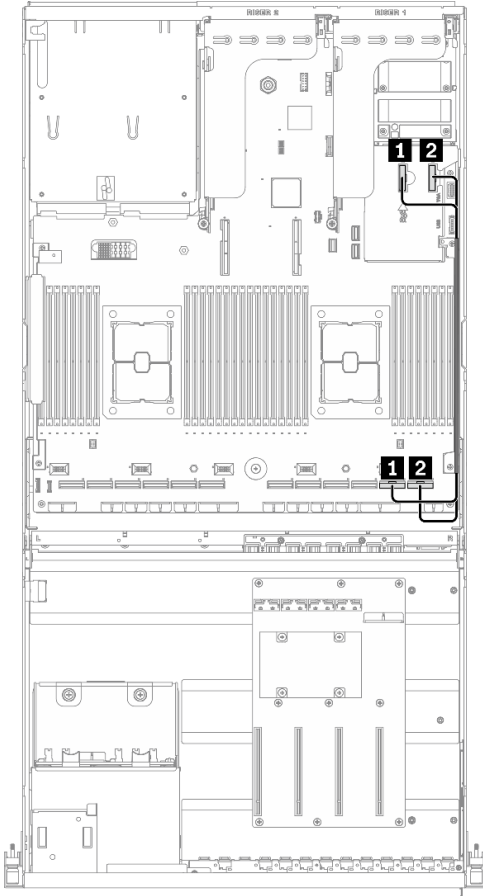
Figure 50. OCP Ethernet adapter cable routing – Configuration H with HBA/RAID adapter

From		To	
System board	**1** PCIe connector 14	System board	**1** PCIe connector 2
	2 PCIe connector 13		**2** PCIe connector 1

Configuration I cable routing

Follow the instructions in this section to learn how to do cable routing for Configuration I.

Configuration I cable routing includes the following items:

1. Drive backplane cable routing
2. GPU distribution board cable routing
3. Front I/O expansion board cable routing
4. OCP Ethernet adapter cable routing

Cabling for these components are illustrated below.

Drive backplane cable routing

Connect the drive backplane signal cables and power cable as illustrated.
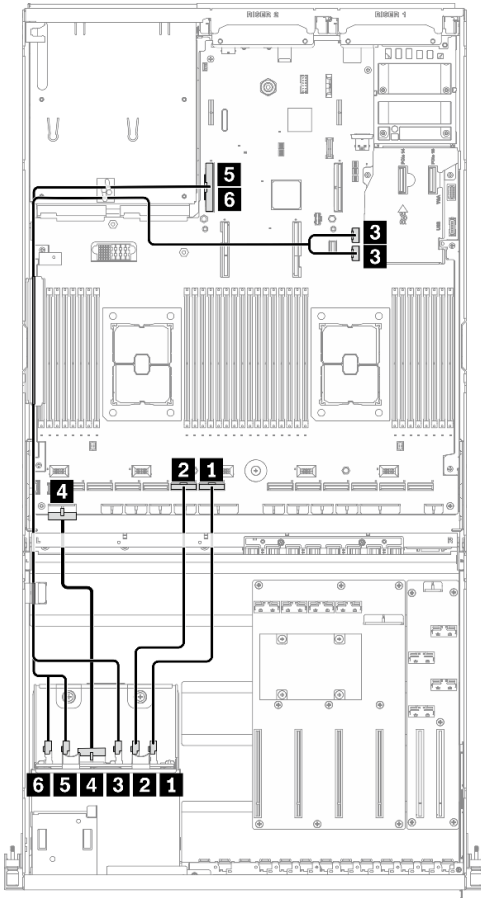
Figure 51. Drive backplane cable routing – Configuration I

From		To	
Drive backplane	**1** NVMe 6-7	System board	**1** PCIe connector 7
	2 NVMe 4-5		**2** PCIe connector 8
	3 SAS		**3** SATA 1 connector and SATA 2 connector
	4 Power connector		**4** Backplane power 1 connector
	5 NVMe 2-3		**5** PCIe connector 16
	6 NVMe 0-1		**6** PCIe connector 16

GPU distribution board cable routing

Connect the GPU distribution board signal cables and power cable as illustrated.

Figure 52. GPU distribution board cable routing – Configuration I

From			To	
GPU distribution board	**1** MCIO connector A	GPU #3	Front I/O expansion board	**1** MCIO connector A
	2 MCIO connector B	GPU #4		**2** MCIO connector B
	3 MCIO connector C	GPU #5	System board	**3** PCIe connector 6
	4 MCIO connector D	GPU #6		**4** PCIe connector 5
	5 Power connector			**5** PCIe adapter distribution board power 1 connector

Front I/O expansion board cable routing

Connect the front I/O expansion board signal cables and power cable as illustrated.

Figure 53. Front I/O expansion board cable routing – Configuration I

From			To		
Front I/O expansion board	**1** MCIO connector A	Slot #1	GPU distribution board	**1** MCIO connector A	
	2 MCIO connector B			**2** MCIO connector B	
	3 MCIO connector C	Slot #2	System board	**3** PCIe connector 12	
	4 MCIO connector D			**4** PCIe connector 11	
	5 Power connector			**5** Front I/O expansion board power connector	

OCP Ethernet adapter cable routing

Connect the OCP Ethernet adapter signal cable as illustrated.
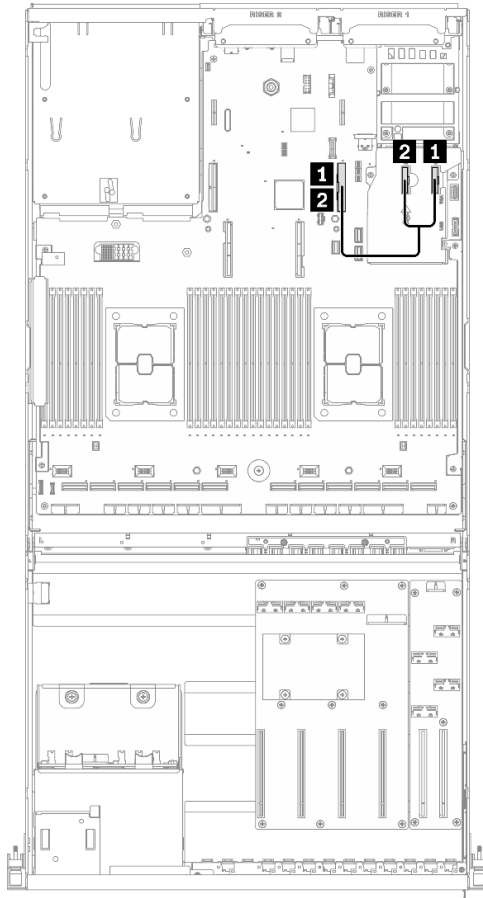
Figure 54. OCP Ethernet adapter cable routing – Configuration I

From		To	
System board	**1** PCIe connector 13	System board	**1** PCIe connector 15
	2 PCIe connector 14		**2** PCIe connector 15

4-DW GPU Model with 4x 3.5-inch drives cable routing

Follow the instructions in this section to learn how to do cable routing for 4-DW GPU Model with4x 3.5-inch drives.

Identifying connectors

Go through the following sections to acquire necessary information before starting cable routing.

- For the connectors on system board, see "System-board connectors" on page 34.
- For the connectors on the drive backplane, GPU distribution board, rear riser, and front I/O expansion board, see "Identifying connectors" on page 58.

4-DW GPU Model with 4x 3.5-inch drives configurations

Cable routing is different by configuration. See the table below for the configuration that matches your server, and refer to the corresponding cable routing guide.

Rear riser 1	Rear riser 2	Rear rise 2 installed with HBA/RAID adapter	OCP Ethernet adapter	Configuration
V	V		V	Configuration B
V		V	V	Configuration B with HBA/RAID adapter

Refer to the corresponding cable routing guide:

- For Configuration B, see "Configuration B cable routing" on page 98
- For Configuration B with HBA/RAID adapter, see "Configuration B with HBA/RAID adapter cable routing" on page 103

Make sure to route the cables through cable guide and cable clip as instructed in the cable routing guides. See the illustration below for the cable guide and cable clip locations.
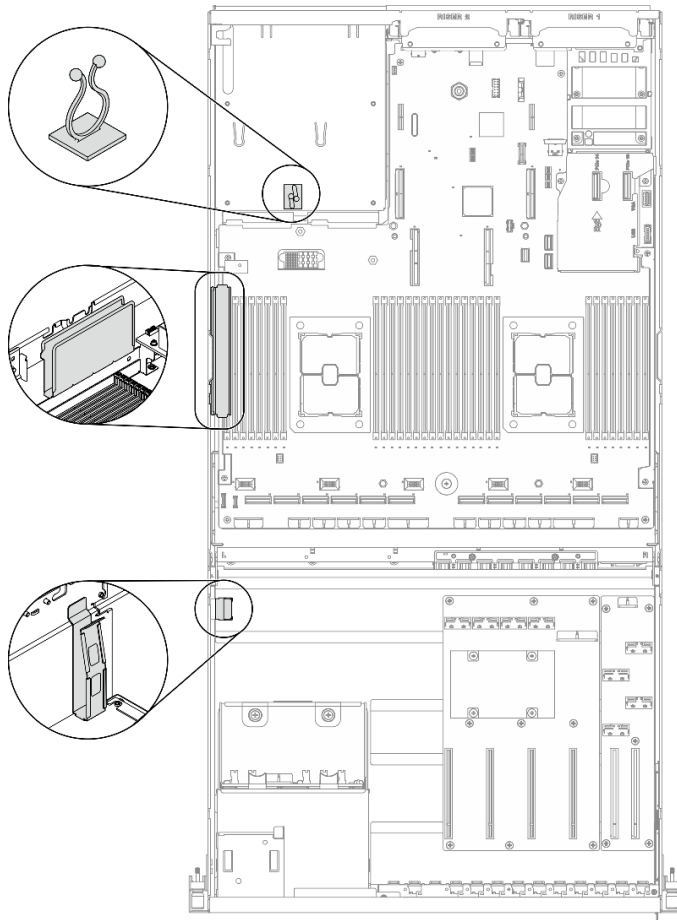
Figure 55. Cable guide and cable clip locations in the chassis

Configuration B cable routing

Follow the instructions in this section to learn how to do cable routing for Configuration B.

Configuration B cable routing includes the following items:

1. Drive backplane cable routing
2. GPU distribution board cable routing
3. Rear riser 1 and rear riser 2 cable routing
4. OCP Ethernet adapter routing

Cabling for these components are illustrated below.

Drive backplane cable routing

Connect the drive backplane signal cable and power cable as illustrated.
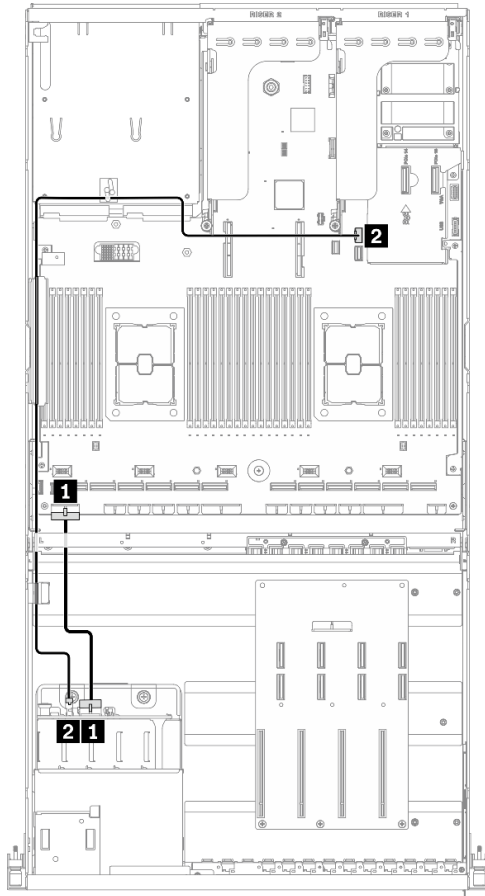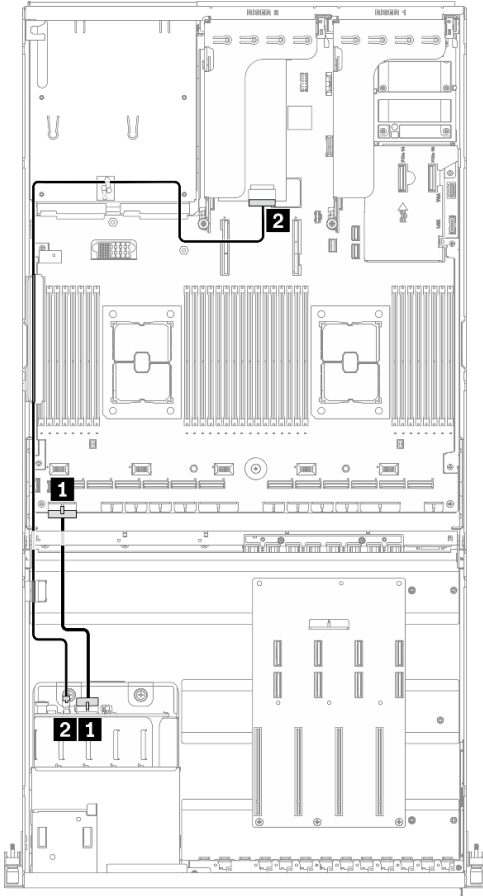

Figure 56. Drive backplane cable routing – Configuration B

From		To	
Drive backplane	**1** Power connector	System board	**1** Backplane power 1 connector
	2 SAS		**2** SATA 1 connector

GPU distribution board cable routing

Connect the GPU distribution board signal cables and power cable as illustrated.
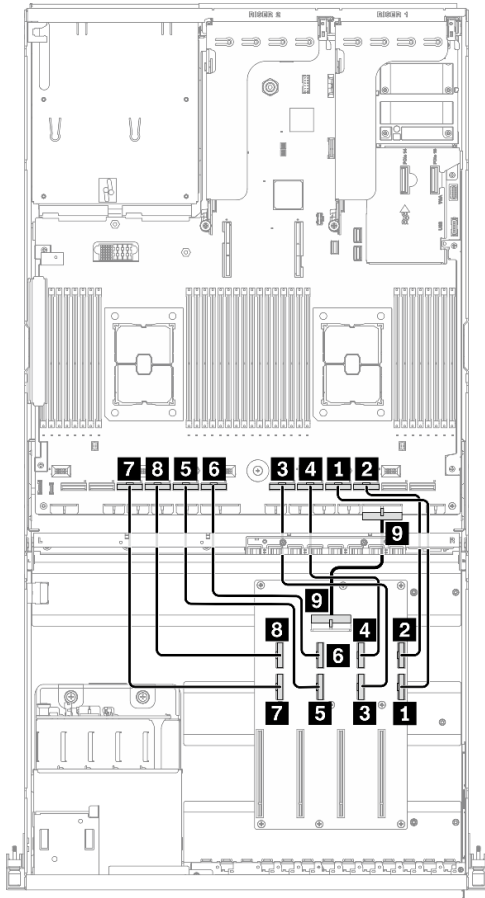
Figure 57. GPU distribution board cable routing – Configuration B

From			To		
GPU distribution board	**1** MCIO connector A	GPU #3	System board	**1** PCIe connector 4	
	2 MCIO connector B			**2** PCIe connector 3	
	3 MCIO connector C	GPU #4		**3** PCIe connector 6	
	4 MCIO connector D			**4** PCIe connector 5	
	5 MCIO connector E	GPU #5		**5** PCIe connector 8	
	6 MCIO connector F			**6** PCIe connector 7	
	7 MCIO connector G	GPU #6		**7** PCIe connector 10	
	8 MCIO connector H			**8** PCIe connector 9	
	9 Power connector			**9** PCIe adapter distribution board power 1 connector	

Rear riser 1 and rear riser 2 cable routing

Connect the rear riser 1 and rear riser 2 cables as illustrated.
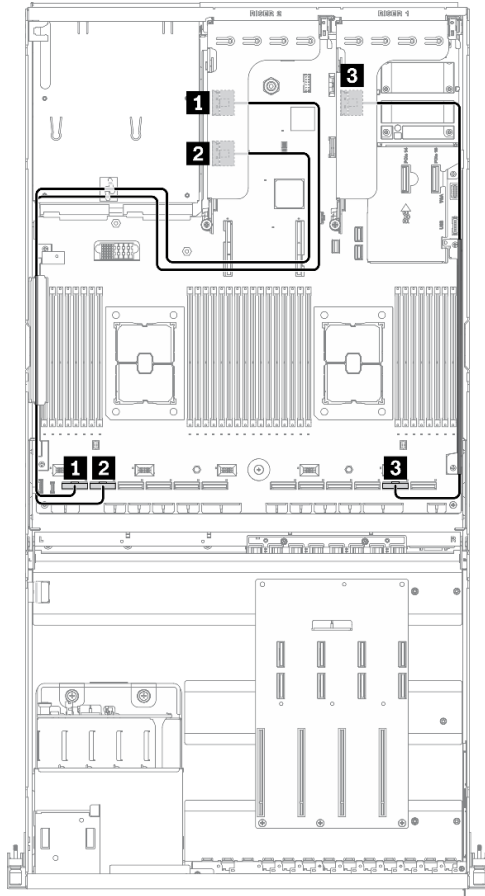
Figure 58. Rear riser 1 and rear riser 2 cable routing – Configuration B

From		To	
Rear riser 2	**1** MCIO connector A	System board	**1** PCIe connector 12
	2 MCIO connector B		**2** PCIe connector 11
Rear riser 1	**3** MCIO connector A		**3** PCIe connector 2

OCP Ethernet adapter cable routing

Connect the OCP Ethernet adapter signal cable as illustrated.
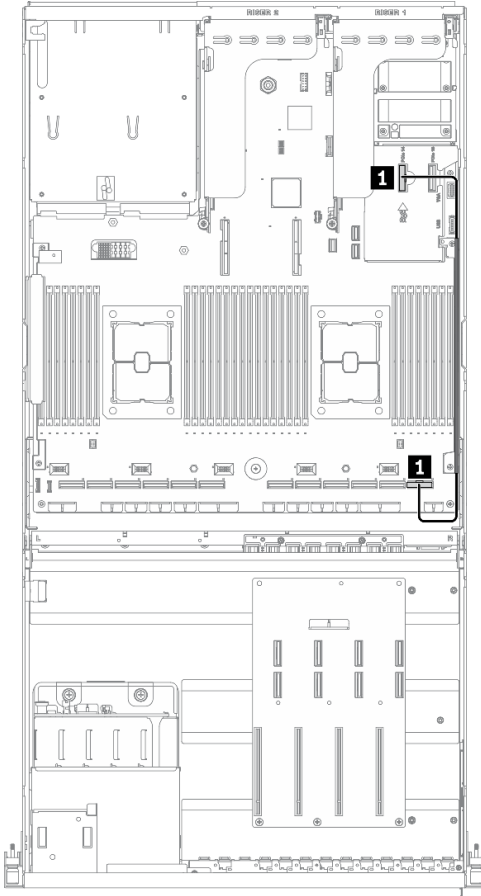
Figure 59. OCP Ethernet adapter cable routing – Configuration B

From		To	
System board	**1** PCIe connector 14	System board	**1** PCIe connector 1

Configuration B with HBA/RAID adapter cable routing

Follow the instructions in this section to learn how to do cable routing for Configuration B with HBA/RAID adapter.

Configuration B with HBA/RAID adapter cable routing includes the following items:

1. Drive backplane cable routing
2. GPU distribution board cable routing
3. Rear riser 1, rear riser 2, and HBA/RAID adapter cable routing
4. OCP Ethernet adapter routing

Cabling for these components are illustrated below.

Drive backplane cable routing

Connect the drive backplane signal cable and power cable as illustrated.

Figure 60. Drive backplane cable routing – Configuration B with HBA/RAID adapter

From		To	
Drive backplane	**1** Power connector	System board	**1** Backplane power 1 connector
	2 SAS		**2** HBA/RAID adapter installed on rear riser 2

GPU distribution board cable routing

Connect the GPU distribution board signal cables and power cable as illustrated.
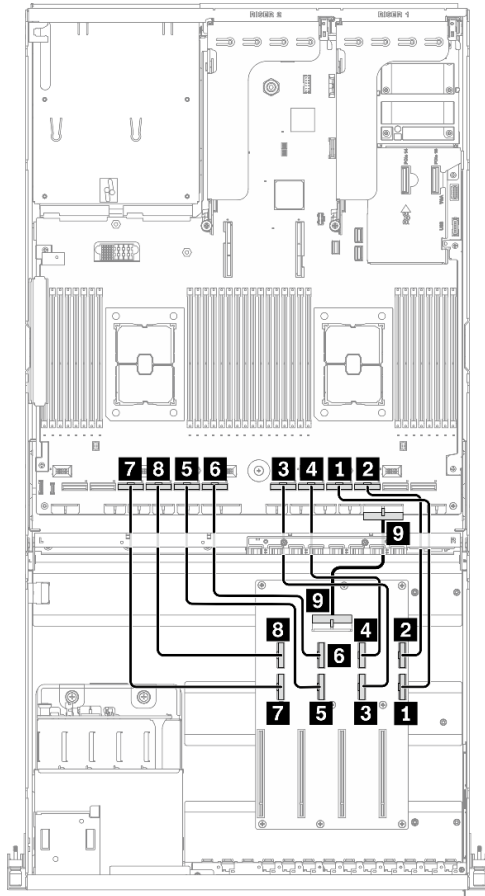
Figure 61. GPU distribution board cable routing – Configuration B with HBA/RAID adapter

From			To		
GPU distribution board	**1** MCIO connector A	GPU #3	System board	**1** PCIe connector 4	
	2 MCIO connector B			**2** PCIe connector 3	
	3 MCIO connector C	GPU #4		**3** PCIe connector 6	
	4 MCIO connector D			**4** PCIe connector 5	
	5 MCIO connector E	GPU #5		**5** PCIe connector 8	
	6 MCIO connector F			**6** PCIe connector 7	
	7 MCIO connector G	GPU #6		**7** PCIe connector 10	
	8 MCIO connector H			**8** PCIe connector 9	
	9 Power connector			**9** PCIe adapter distribution board power 1 connector	

Rear riser 1, rear riser 2, and HBA/RAID adapter cable routing

Connect the rear riser 1, rear riser 2, and HBA/RAID adapter cables as illustrated.
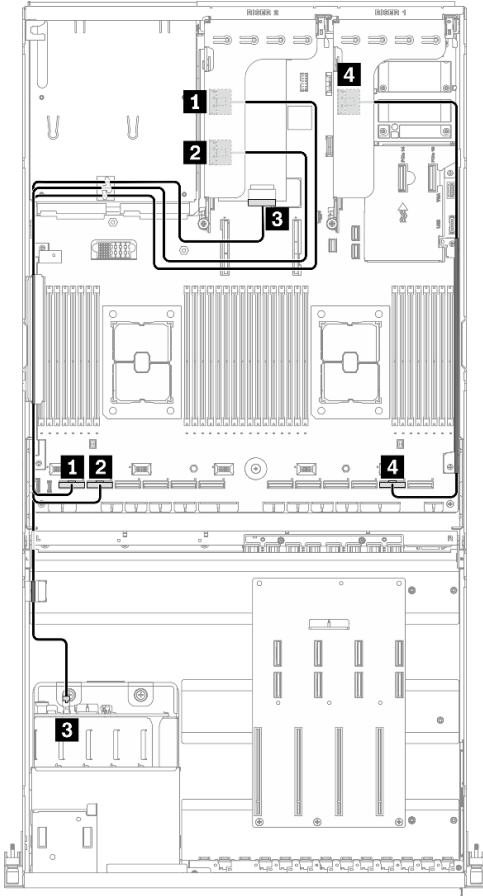
Figure 62. Riser 1, rear riser 2, and HBA/RAID adapter cable routing – Configuration B with HBA/RAID adapter

From		To	
Rear riser 2	**1** MCIO connector A	System board	**1** PCIe connector 12
	2 MCIO connector B		**2** PCIe connector 11
	3 HBA/RAID adapter installed on rear riser 2	Drive backplane	**3** SAS
Rear riser 1	**4** MCIO connector A	System board	**4** PCIe connector 2

OCP Ethernet adapter cable routing

Connect the OCP Ethernet adapter signal cable as illustrated.

Figure 63. OCP Ethernet adapter cable routing – Configuration B with HBA/RAID adapter

From		To	
System board	**1** PCIe connector 14	System board	**1** PCIe connector 1

8-DW GPU Model cable routing

Follow the instructions in this section to learn how to do cable routing for8-DW GPU Model.

Identifying connectors

Go through the following sections to acquire necessary information before starting cable routing.

- For the connectors on system board, see "System-board connectors" on page 34.
- For the connectors on the drive backplane, GPU distribution board, rear riser, and front I/O expansion board, see "Identifying connectors" on page 58.

8-DW GPU Model configurations

Cable routing is different by configuration. See the table below for the configuration that matches your server, and refer to the corresponding cable routing guide.

Rear riser 1	Rear riser 2	OCP Ethernet adapter	Front I/O expansion board	Configurations
	V	V		Configuration D
			V	Configuration E
V	V	V		Configuration J
		V	V	Configuration K

Refer to the corresponding cable routing guide:

- For Configuration D, see "Configuration D cable routing" on page 110
- For Configuration E, see "Configuration E cable routing" on page 116
- For Configuration J, see "Configuration J cable routing" on page 121
- For Configuration K, see "Configuration K cable routing" on page 127

Make sure to route the cables through cable guide and cable clip as instructed in the cable routing guides. See the illustration below for the cable guide and cable clip locations.
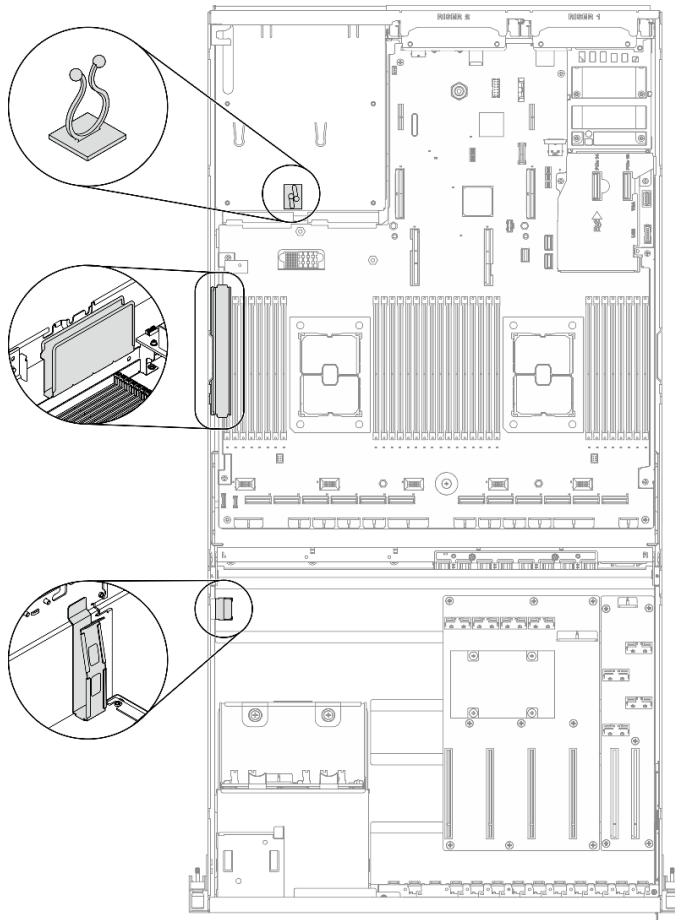
Figure 64. Cable guide and cable clip locations in the chassis

Configuration D cable routing

Follow the instructions in this section to learn how to do cable routing for Configuration D.

Configuration D cable routing includes the following items:

1. Drive backplane cable routing
2. GPU distribution board cable routing
3. Rear riser 2 cable routing
4. OCP Ethernet adapter cable routing

Cabling for these components are illustrated below.

Drive backplane cable routing

Connect the drive backplane signal cables and power cable as illustrated.
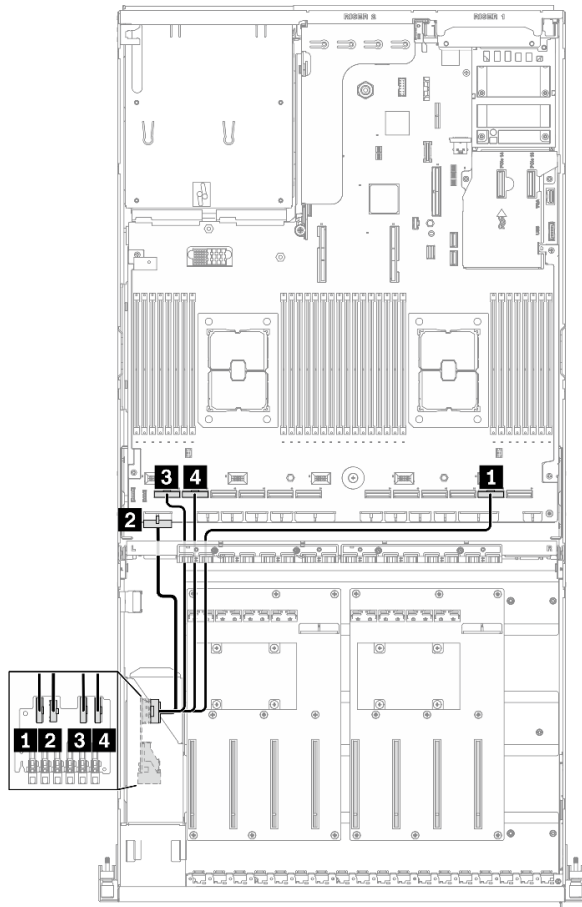
Figure 65. Drive backplane cable routing – Configuration D

From		To	
Drive backplane	**1** EDSFF 0-1	System board	**1** PCIe connector 2
	2 Power connector		**2** Backplane power 1 connector
	3 EDSFF 2-3		**3** PCIe connector 12
	4 EDSFF 4-5		**4** PCIe connector 11

GPU distribution board cable routing

Connect the GPU distribution board signal cables and power cable as illustrated.

Figure 66. GPU distribution board cable routing – Configuration D

From		To	
	1 MCIO connector A		**1** PCIe connector 4
	2 MCIO connector B		**2** PCIe connector 3
GPU distribution board (Right side)	**3** MCIO connector C		**3** PCIe connector 6
	4 MCIO connector D		**4** PCIe connector 5
	5 Power connector	System board	**5** PCIe adapter distribution board power 1 connector
	6 MCIO connector A		**6** PCIe connector 8
GPU distribution board (Left side)	**7** MCIO connector B		**7** PCIe connector 7
	8 MCIO connector C		**8** PCIe connector 10

From		To	
	9 MCIO connector D		**9** PCIe connector 9
	10 Power connector		**10** PCIe adapter distribution board power 2 connector

Rear riser 2 cable routing

Connect the rear riser 2 signal cable as illustrated.
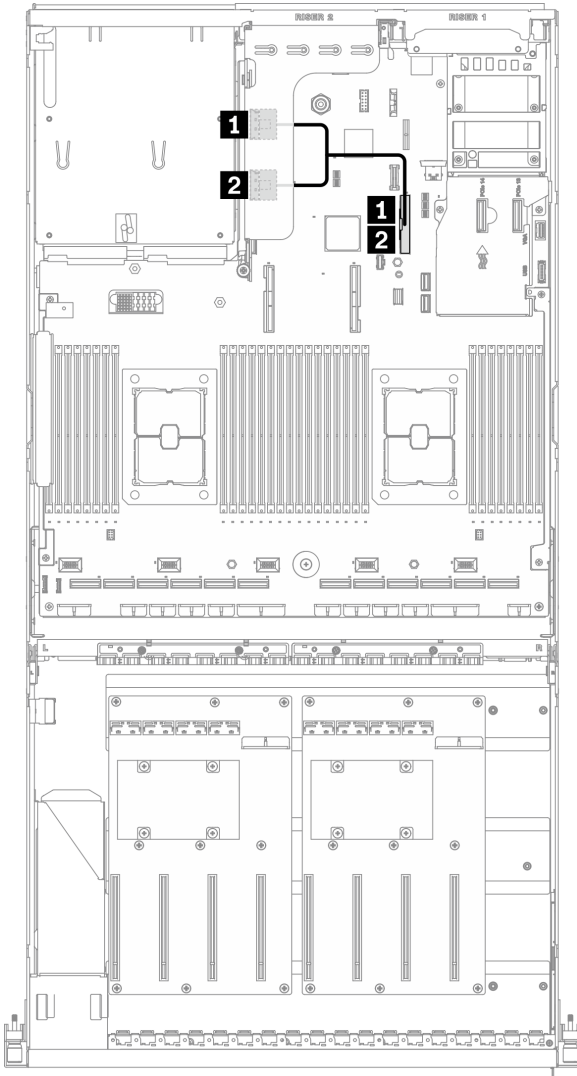
Figure 67. Rear riser 2 cable routing – Configuration D

From		To	
Rear riser 2	**1** MCIO connector A	System board	**1** PCIe connector 15
	2 MCIO connector B		**2** PCIe connector 15

OCP Ethernet adapter cable routing

Connect the OCP Ethernet adapter signal cable as illustrated.
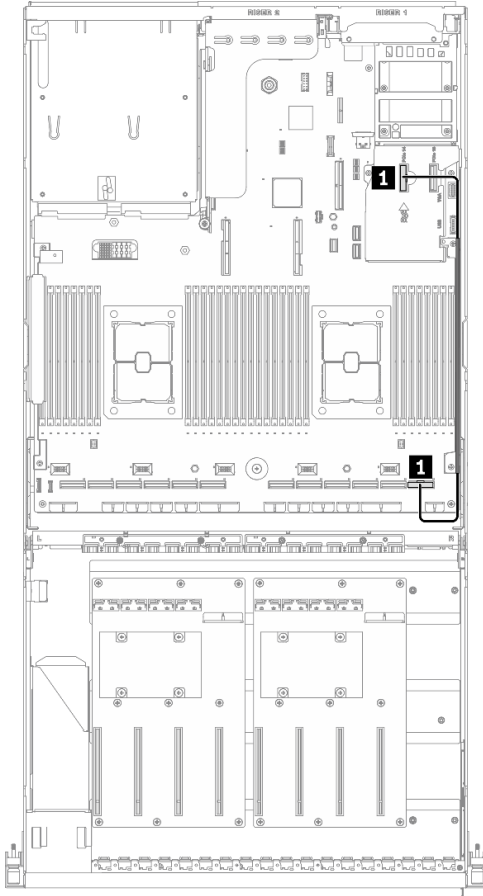
Figure 68. OCP Ethernet adapter cable routing – Configuration D

From		To	
System board	**1** PCIe connector 14	System board	**1** PCIe connector 1

Configuration E cable routing

Follow the instructions in this section to learn how to do cable routing for Configuration E.

Configuration E cable routing includes the following items:

1. Drive backplane cable routing
2. GPU distribution board cable routing
3. Front I/O expansion board cable routing

Cabling for these components are illustrated below.

Drive backplane cable routing

Connect the drive backplane signal cables and power cable as illustrated.
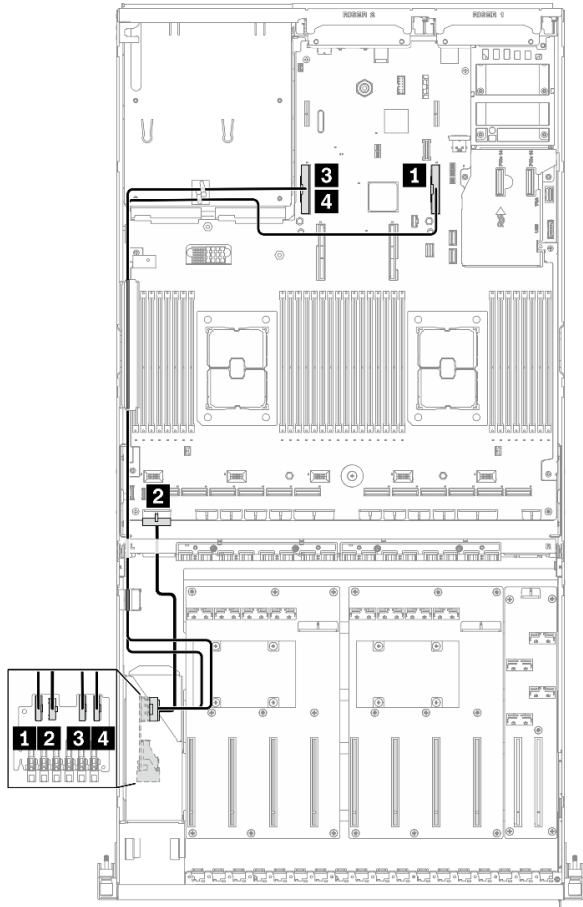
Figure 69. Drive backplane cable routing – Configuration E

From		To	
Drive backplane	**1** EDSFF 0-1	System board	**1** PCIe connector 15
	2 Power connector		**2** Backplane power 1 connector
	3 EDSFF 2-3		**3** PCIe connector 16
	4 EDSFF 4-5		**4** PCIe connector 16
System board	**5** PCIe connector 14		**5** PCIe connector 15

GPU distribution board cable routing

Connect the GPU distribution board signal cables and power cable as illustrated.
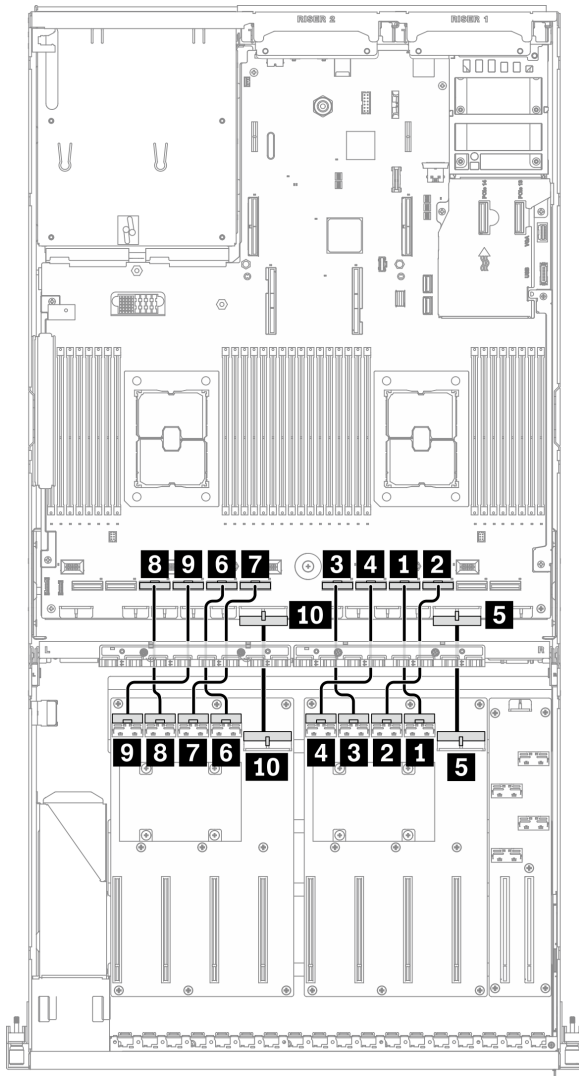
Figure 70. GPU distribution board cable routing – Configuration E

From		To	
GPU distribution board (Right side)	**1** MCIO connector A	System board	**1** PCIe connector 4
	2 MCIO connector B		**2** PCIe connector 3
	3 MCIO connector C		**3** PCIe connector 6
	4 MCIO connector D		**4** PCIe connector 5
	5 Power connector		**5** PCIe adapter distribution board power 1 connector
GPU distribution board (Left side)	**6** MCIO connector A		**6** PCIe connector 8
	7 MCIO connector B		**7** PCIe connector 7
	8 MCIO connector C		**8** PCIe connector 10

From		To	
	9 MCIO connector D		**9** PCIe connector 9
	10 Power connector		**10** PCIe adapter distribution board power 2 connector

Front I/O expansion board cable routing

Connect the front I/O expansion board signal cables and power cable as illustrated.

Figure 71. Front I/O expansion board cable routing – Configuration E

From			To		
Front I/O expansion board	**1** MCIO connector A	Slot #1	System board	**1** PCIe connector 2	
	2 MCIO connector B			**2** PCIe connector 1	
	3 MCIO connector C	Slot #2		**3** PCIe connector 12	
	4 MCIO connector D			**4** PCIe connector 11	
	5 Power connector			**5** Front I/O expansion board power connector	

Configuration J cable routing

Follow the instructions in this section to learn how to do cable routing for Configuration J.

Configuration J cable routing includes the following items:

1. Drive backplane cable routing
2. GPU distribution board cable routing
3. Rear riser 1 and rear riser 2 cable routing
4. OCP Ethernet adapter cable routing

Cabling for these components are illustrated below.

Drive backplane cable routing

Connect the drive backplane signal cables and power cable as illustrated.
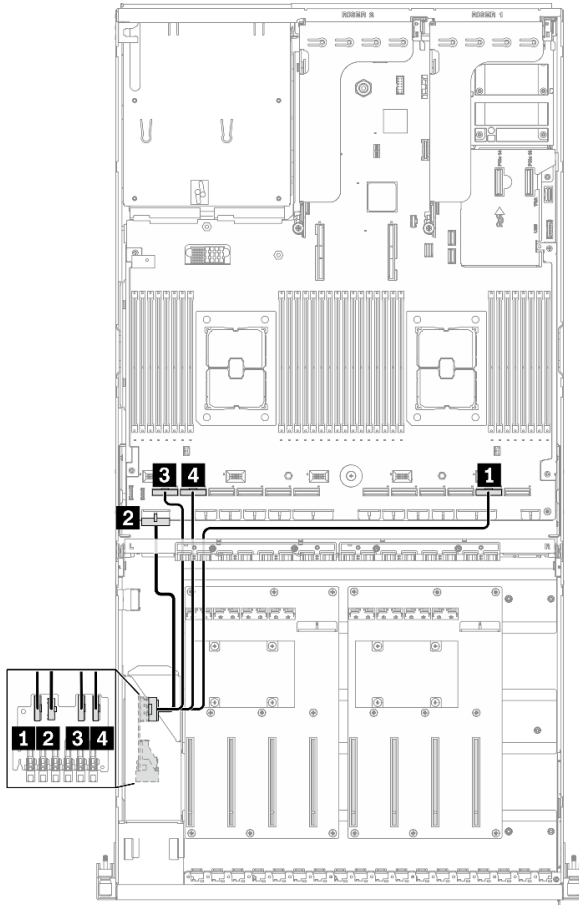
Figure 72. Drive backplane cable routing – Configuration J

From		To	
Drive backplane	**1** EDSFF 0-1	System board	**1** PCIe connector 2
	2 Power connector		**2** Backplane power 1 connector
	3 EDSFF 2-3		**3** PCIe connector 12
	4 EDSFF 4-5		**4** PCIe connector 11

GPU distribution board cable routing

Connect the GPU distribution board signal cables and power cable as illustrated.

Figure 73. GPU distribution board cable routing – Configuration J

From			To	
GPU distribution board (Right side)	**1** MCIO connector A	GPU #3	Rear riser 1	**1** MCIO connector A
	2 MCIO connector B	GPU #4		**2** MCIO connector B
	3 MCIO connector C	GPU #5	System board	**3** PCIe connector 6
	4 MCIO connector D	GPU #6		**4** PCIe connector 5
	5 Power connector			**5** PCIe adapter distribution board power 1 connector
GPU distribution board (Left side)	**6** MCIO connector A	GPU #7	Rear riser 2	**6** MCIO connector A
	7 MCIO connector B	GPU #8		**7** MCIO connector B
	8 MCIO connector C	GPU #9	System board	**8** PCIe connector 10

From			To	
	9 MCIO connector D	GPU #10		**9** PCIe connector 9
	10 Power connector			**10** PCIe adapter distribution board power 2 connector

Rear riser 1 and rear riser 2 cable routing

Connect the rear riser 1 and rear riser 2 signal cables as illustrated.

Figure 74. Rear riser 1 and rear riser 2 cable routing – Configuration J

From		To	
Rear riser 1	**1** MCIO connector A	GPU distribution board (Right side)	**1** MCIO connector A
	2 MCIO connector B		**2** MCIO connector B
Rear riser 2	**3** MCIO connector A	GPU distribution board (Left side)	**3** MCIO connector A
	4 MCIO connector B		**4** MCIO connector B

OCP Ethernet adapter cable routing

Connect the OCP Ethernet adapter signal cable as illustrated.
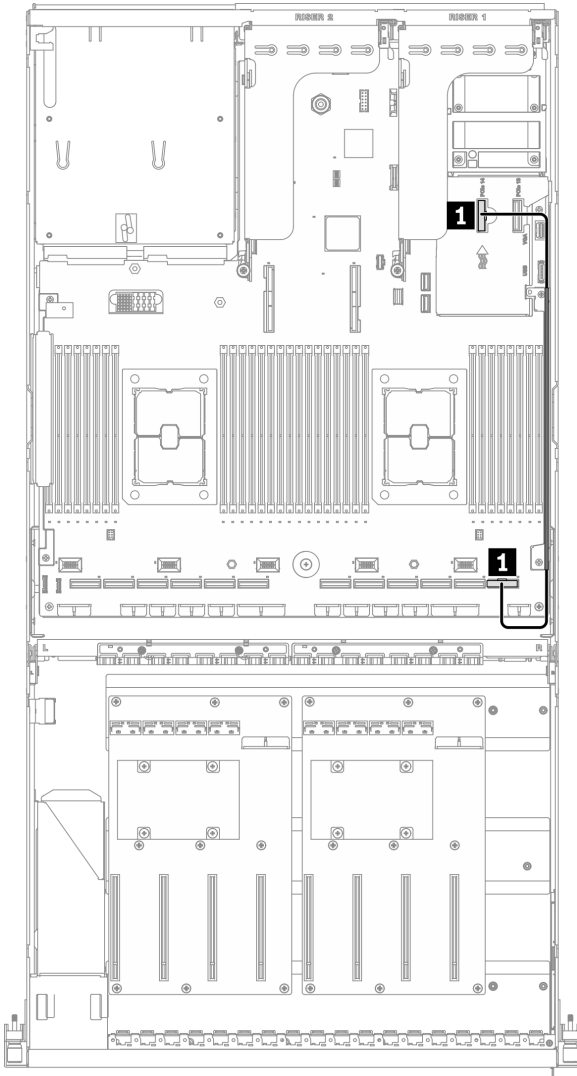
Figure 75. OCP Ethernet adapter cable routing – Configuration J

From		To	
System board	**1** PCIe connector 14	System board	**1** PCIe connector 1

Configuration K cable routing

Follow the instructions in this section to learn how to do cable routing for Configuration K.

Configuration K cable routing includes the following items:

1. Drive backplane cable routing
2. GPU distribution board cable routing
3. Front I/O expansion board cable routing
4. OCP Ethernet adapter cable routing

Cabling for these components are illustrated below.

Drive backplane cable routing

Connect the drive backplane signal cables and power cable as illustrated.
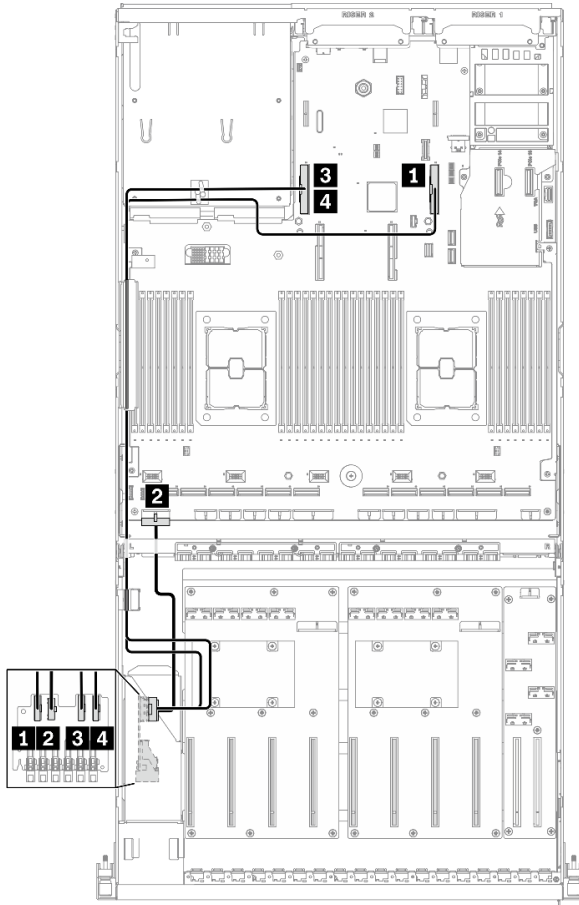
Figure 76. Drive backplane cable routing – Configuration K

From		To	
Drive backplane	**1** EDSFF 0-1	System board	**1** PCIe connector 15
	2 Power connector		**2** Backplane power 1 connector
	3 EDSFF 2-3		**3** PCIe connector 16
	4 EDSFF 4-5		**4** PCIe connector 16

GPU distribution board cable routing

Connect the GPU distribution board signal cables and power cable as illustrated.

Figure 77. GPU distribution board cable routing – Configuration K

From			To	
GPU distribution board (Right side)	**1** MCIO connector A	GPU #3	Front I/O expansion board	**1** MCIO connector A
	2 MCIO connector B	GPU #4		**2** MCIO connector B
	3 MCIO connector C	GPU #5	System board	**3** PCIe connector 6
	4 MCIO connector D	GPU #6		**4** PCIe connector 5
	5 Power connector			**5** PCIe adapter distribution board power 1 connector
GPU distribution board (Left side)	**6** MCIO connector A	GPU #7	Front I/O expansion board	**6** MCIO connector C
	7 MCIO connector B	GPU #8		**7** MCIO connector D
	8 MCIO connector C	GPU #9	System board	**8** PCIe connector 10

From			To	
	9 MCIO connector D	GPU #10		**9** PCIe connector 9
	10 Power connector			**10** PCIe adapter distribution board power 2 connector

Front I/O expansion board cable routing

Connect the front I/O expansion board signal cables and power cable as illustrated.

Figure 78. Front I/O expansion board cable routing – Configuration K

From			To	
Front I/O expansion board	**1** MCIO connector A	Slot #1	GPU distribution board (Right side)	**1** MCIO connector A
	2 MCIO connector B			**2** MCIO connector B
	3 MCIO connector C	Slot #2	GPU distribution board (Left side)	**3** MCIO connector A
	4 MCIO connector D			**4** MCIO connector B
	5 Power connector		System board	**5** Front I/O expansion board power connector

OCP Ethernet adapter cable routing

Connect the OCP Ethernet adapter signal cable as illustrated.
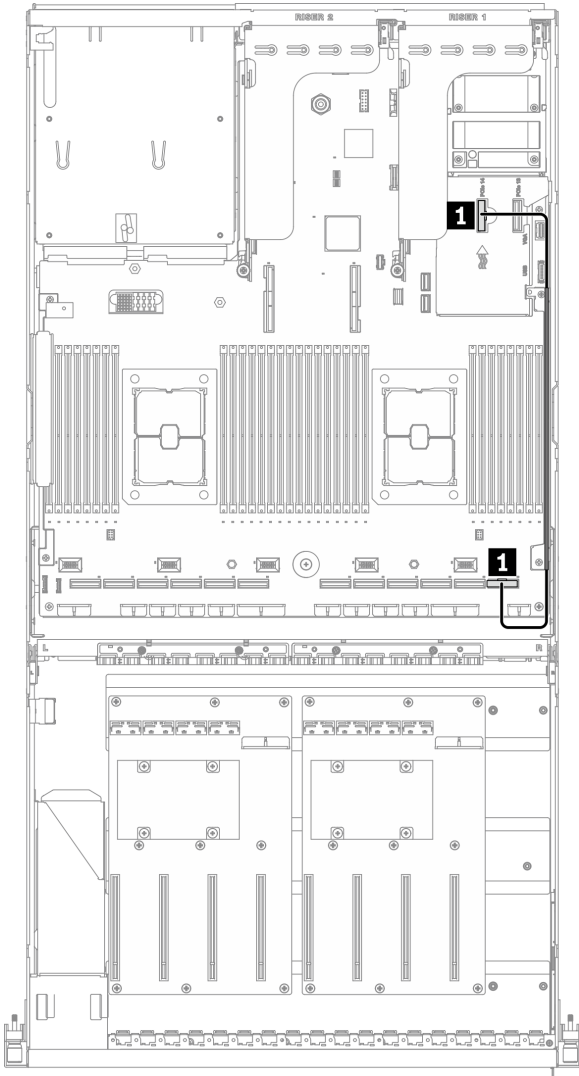
Figure 79. OCP Ethernet adapter cable routing – Configuration K

From		To	
System board	**1** PCIe connector 1	System board	**1** PCIe connector 14

SXM GPU Model cable routing

Follow the instructions in this section to learn how to do cable routing forSXM GPU Model.

Identifying connectors

Go through the following sections to acquire necessary information before starting cable routing.

- For the connectors on system board, see "System-board connectors" on page 34.
- For the connectors on the drive backplane, front I/O expansion board, and retimer assembly, see "Identifying connectors" on page 58.

SXM GPU Model configurations

Cable routing is different by configuration. See the table below for the configuration that matches your server, and refer to the corresponding cable routing guide.

Drive quantity	OCP Ethernet adapter	Configurations
Eight drives		Configuration F
Four drives	V	Configuration G

Refer to the corresponding cable routing guide:

- For Configuration F, see "Configuration F cable routing" on page 135
- For Configuration G, see "Configuration G cable routing" on page 141

Make sure to route the cables through cable guide and cable clip as instructed in the cable routing guides. See the illustration below for the cable guide and cable clip locations.
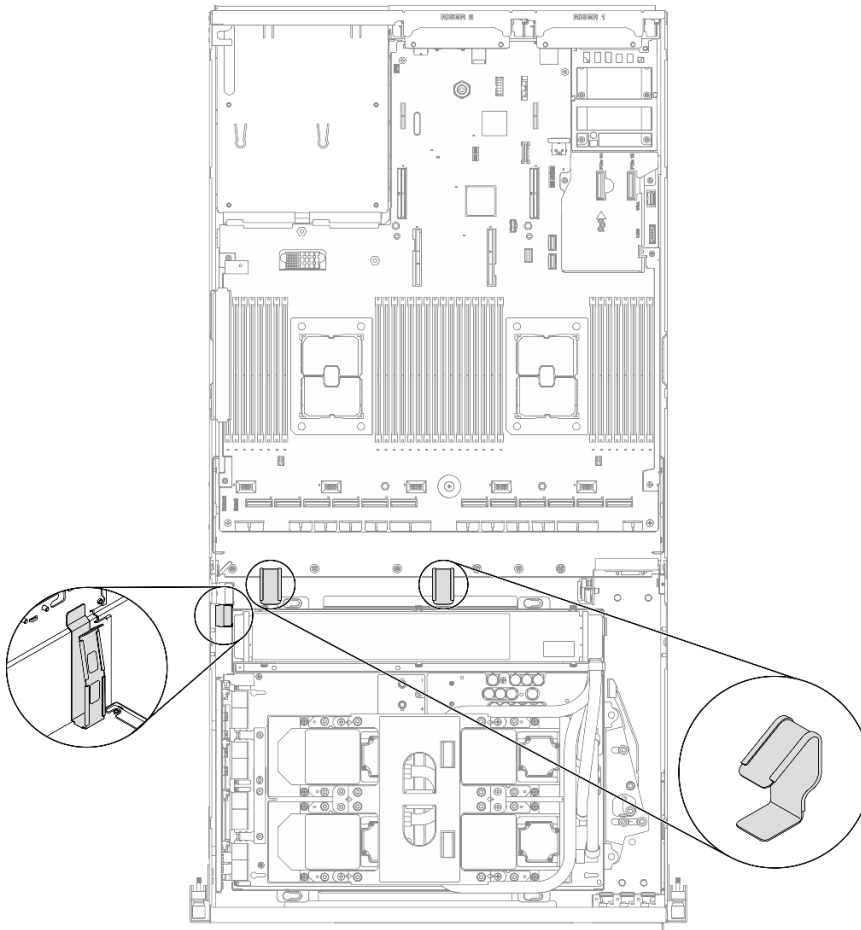
Figure 80. Cable guide and cable clip locations in the chassis

Configuration F cable routing

Follow the instructions in this section to learn how to do cable routing for Configuration F.

Configuration F cable routing includes the following components:

1. Drive backplane cable routing
2. Front I/O expansion board cable routing
3. Retimer assembly cable routing
4. Cold plate assembly cable routing

Cabling for these components are illustrated below.

Drive backplane cable routing

Connect the drive backplane signal cables and power cables as illustrated.
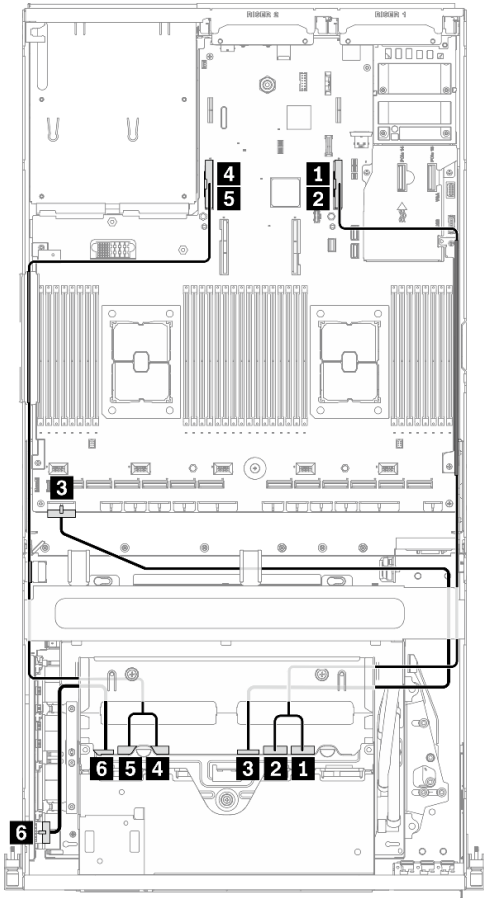
Figure 81. Drive backplane cable routing – Configuration F

From		To	
Drive backplane (right side)	**1** NVMe 2-3	System board	**1** PCIe connector 16
	2 NVMe 0-1		**2** PCIe connector 16
	3 Power connector		**3** Backplane power 1 connector
Drive backplane (left side)	**4** NVMe 2-3		**4** PCIe connector 15
	5 NVMe 0-1		**5** PCIe connector 15
	6 Power connector	Retimer assembly	**6** Backplane power connector

Front I/O expansion board cable routing

Connect the front I/O expansion board signal cables and power cable as illustrated.
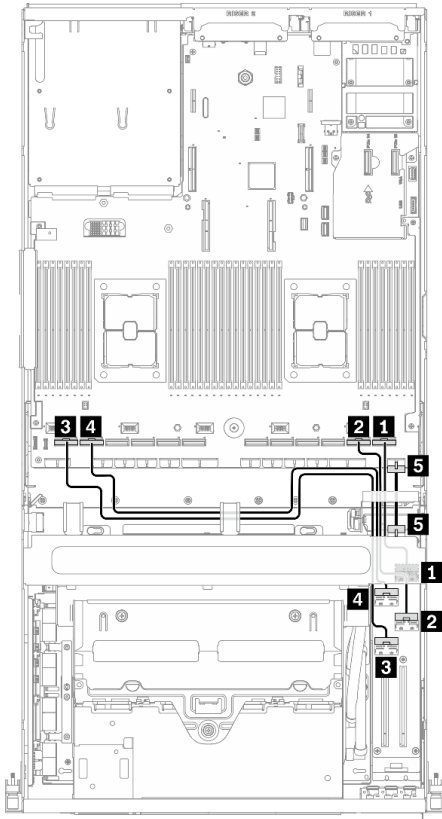
Figure 82. Front I/O expansion board cable routing – Configuration F

From			To		
Front I/O expansion board	**1** MCIO connector B	Slot #1	System board	**1** PCIe connector 1	
	2 MCIO connector A			**2** PCIe connector 2	
	3 MCIO connector C	Slot #2		**3** PCIe connector 12	
	4 MCIO connector D			**4** PCIe connector 11	
	5 Power connector			**5** Front I/O expansion board power connector	

Retimer assembly cable routing

Retimer assembly cable routing includes the following items:

1. Retimer assembly power cable
2. Retimer assembly signal cables

Retimer assembly power cable

Connect the retimer assembly power cable as illustrated.

Figure 83. Retimer assembly cable routing (power cable) – Configuration F

From		To	
Retimer assembly	**1** Power connector	System board	**1** PCIe adapter distribution board power 2 connector

Retimer assembly signal cables

Connect the retimer assembly signal cables as illustrated.
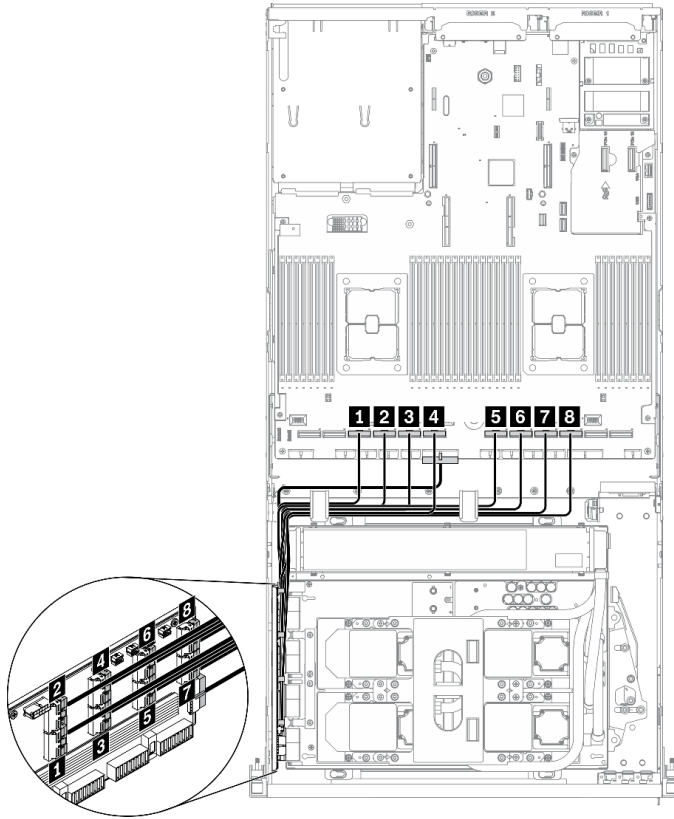
Figure 84. Retimer assembly cable routing (signal cables) – Configuration F

From		To	
	1 MCIO connector A		**1** PCIe connector 10
	2 MCIO connector B		**2** PCIe connector 9
	3 MCIO connector C		**3** PCIe connector 8
Retimer assembly	**4** MCIO connector D	System board	**4** PCIe connector 7
	5 MCIO connector E		**5** PCIe connector 6
	6 MCIO connector F		**6** PCIe connector 5
	7 MCIO connector G		**7** PCIe connector 4
	8 MCIO connector H		**8** PCIe connector 3

Cold plate assembly cable routing

Connect the cold plate assembly pump cables to the retimer assembly as illustrated.

Figure 85. Cold plate assembly pump cables to the retimer assembly cable routing – Configuration F

From		To	
Retimer assembly	**1** Cold plate assembly pump cable connector 1	Cold plate assembly	**1** Cold plate 1
	2 Cold plate assembly pump cable connector 2		**2** Cold plate 2
	3 Cold plate assembly pump cable connector 3		**3** Cold plate 3
	4 Cold plate assembly pump cable connector 4		**4** Cold plate 4

Configuration G cable routing

Follow the instructions in this section to learn how to do cable routing for Configuration G.

Configuration G cable routing includes the following components:

1. Drive backplane cable routing
2. OCP Ethernet adapter cable routing
3. Front I/O expansion board cable routing
4. Retimer assembly cable routing
5. Cold plate assembly cable routing

Cabling for these components are illustrated below.

Drive backplane cable routing

Connect the drive backplane signal cables and power cable as illustrated.
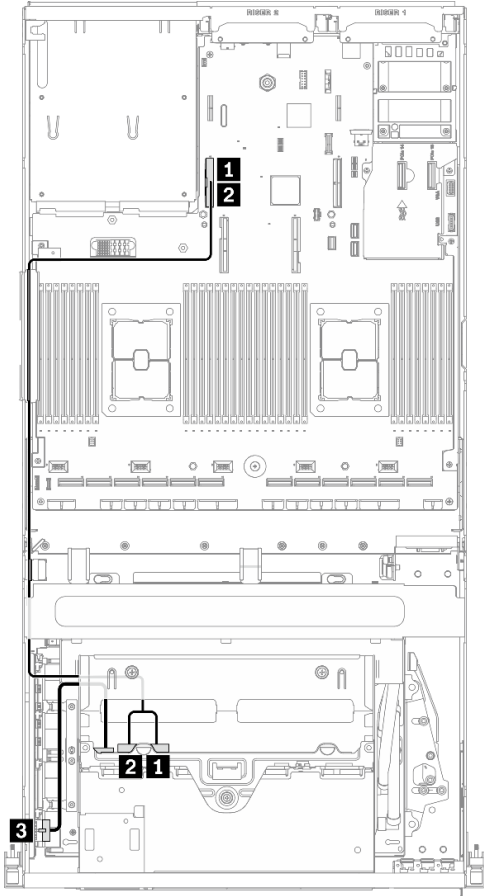
Figure 86. Drive backplane cable routing – Configuration G

From		To		
Drive backplane	**1** NVMe 2-3	System board	**4** PCIe connector 15
	2 NVMe 0-1		**5** PCIe connector 15
	3 Power connector	Retimer assembly	**6** Backplane power connector

OCP Ethernet adapter cable routing

Connect the OCP Ethernet adapter signal cables as illustrated.
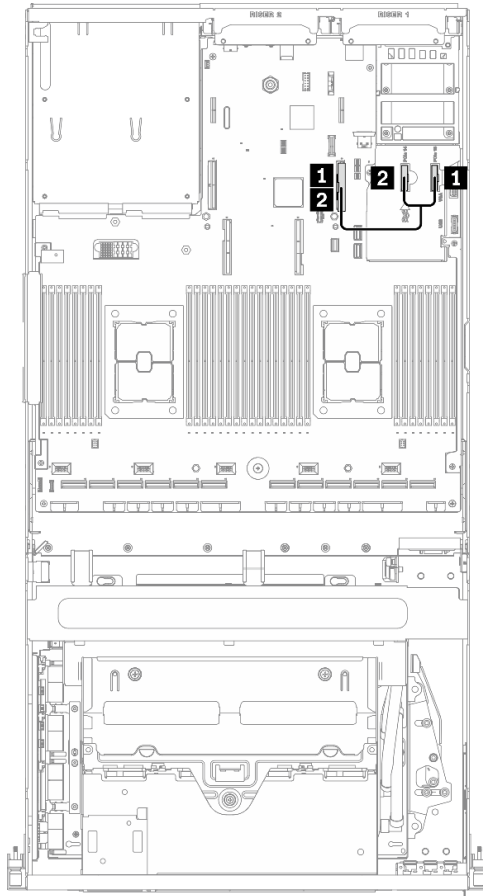
Figure 87. OCP Ethernet adapter cable routing – Configuration G

From		To	
System board	**1** PCIe connector 13	System board	**1** PCIe connector 15
	2 PCIe connector 14		**2** PCIe connector 15

Front I/O expansion board cable routing

Connect the front I/O expansion board signal cables and power cable as illustrated.
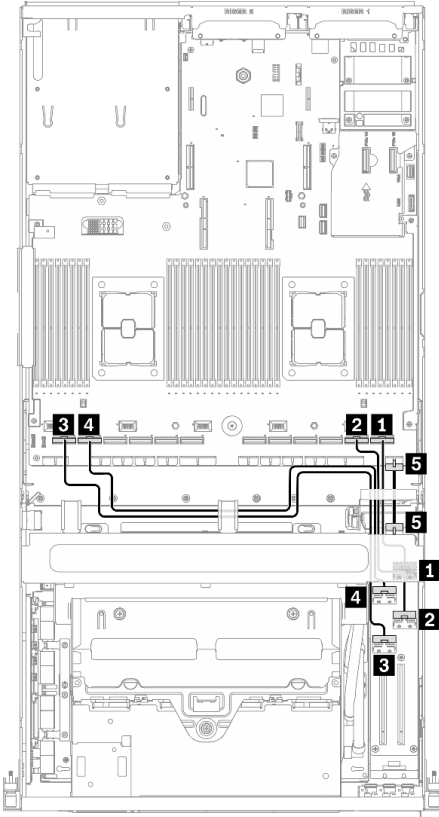
Figure 88. Front I/O expansion board cable routing – Configuration G

From			To		
Front I/O expansion board	**1** MCIO connector B	Slot #1	System board	**1** PCIe connector 1	
	2 MCIO connector A			**2** PCIe connector 2	
	3 MCIO connector C	Slot #2		**3** PCIe connector 12	
	4 MCIO connector D			**4** PCIe connector 11	
	5 Power connector			**5** Front I/O expansion board power connector	

Retimer assembly cable routing

Retimer assembly cable routing includes the following items:

1. Retimer assembly power cable
2. Retimer assembly signal cables

Retimer assembly power cable

Connect the retimer assembly power cable as illustrated.

Figure 89. Retimer assembly cable routing (power cable) – Configuration G

From		To	
From		**To**	
Retimer assembly	**1** Power connector	System board	**1** PCIe adapter distribution board power 2 connector

Retimer assembly signal cables

Connect the retimer assembly signal cables as illustrated.

Figure 90. Retimer assembly cable routing (signal cables) – Configuration G

From		To	
	1 MCIO connector A		**1** PCIe connector 10
	2 MCIO connector B		**2** PCIe connector 9
	3 MCIO connector C		**3** PCIe connector 8
Retimer assembly	**4** MCIO connector D	System board	**4** PCIe connector 7
	5 MCIO connector E		**5** PCIe connector 6
	6 MCIO connector F		**6** PCIe connector 5
	7 MCIO connector G		**7** PCIe connector 4
	8 MCIO connector H		**8** PCIe connector 3

Cold plate assembly cable routing

Connect the cold plate assembly pump cables to the retimer assembly as illustrated.

Figure 91. Cold plate assembly pump cables to the retimer assembly cable routing – Configuration G

From		To	
Retimer assembly	**1** Cold plate assembly pump cable connector 1	Cold plate assembly	**1** Cold plate 1
	2 Cold plate assembly pump cable connector 2		**2** Cold plate 2
	3 Cold plate assembly pump cable connector 3		**3** Cold plate 3
	4 Cold plate assembly pump cable connector 4		**4** Cold plate 4

Chapter 4. Server hardware setup

To set up the server, install any options that have been purchased, cable the server, configure and update the firmware, and install the operating system.

Server setup checklist

Use the server setup checklist to ensure that you have performed all tasks that are required to set up your server.

The server setup procedure varies depending on the configuration of the server when it was delivered. In some cases, the server is fully configured and you just need to connect the server to the network and an ac power source, and then you can power on the server. In other cases, the server needs to have hardware options installed, requires hardware and firmware configuration, and requires an operating system to be installed.

The following steps describe the general procedure for setting up a server:

1. Unpack the server package. See "Server package contents" on page 1.

2. Set up the server hardware.

   a. Install any required hardware or server options. See the related topics in "Install server hardware options" on page 172.

   b. If necessary, install the server into a standard rack cabinet by using the rail kit shipped with the server. See the *Rack Installation Guide* that comes with optional rail kit.

   c. Connect the Ethernet cables and power cords to the server. See "Rear view" on page 22 to locate the connectors. See "Cable the server" on page 256 for cabling best practices.

   d. Power on the server. See "Power on the server" on page 257.

      Note: You can access the management processor interface to configure the system without powering on the server. Whenever the server is connected to power, the management processor interface is available. For details about accessing the management server processor, see:

      "Opening and Using the XClarity Controller Web Interface" section in the XCC documentation version compatible with your server at https://pubs.lenovo.com/lxcc-overview/.

   e. Validate that the server hardware was set up successfully. See "Validate server setup" on page 257.

3. Configure the system.

   a. Connect the Lenovo XClarity Controller to the management network. See "Set the network connection for the Lenovo XClarity Controller" on page 259.

   b. Update the firmware for the server, if necessary. See "Update the firmware" on page 261.

   c. Configure the firmware for the server. See "Configure the firmware" on page 264.

      The following information is available for RAID configuration:

      • https://lenovopress.com/lp0578-lenovo-raid-introduction

      • https://lenovopress.com/lp0579-lenovo-raid-management-tools-and-resources

   d. Install the operating system. See "Deploy the operating system" on page 267.

   e. Back up the server configuration. See "Back up the server configuration" on page 268.

   f. Install the applications and programs for which the server is intended to be used.

Installation Guidelines

Use the installation guidelines to install components in your server.

Before installing optional devices, read the following notices carefully:

Attention: Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

- Read the safety information and guidelines to ensure to ensure your safety at work:
  - A complete list of safety information for all products is available at:

    https://pubs.lenovo.com/safety_documentation/
  - The following guidelines are available as well: "Handling static-sensitive devices" on page 152.
- Make sure the components you are installing are supported by your server. For a list of supported optional components for the server, see https://serverproven.lenovo.com/.
- When you install a new server, download and apply the latest firmware. This will help ensure that any known issues are addressed, and that your server is ready to work with optimal performance. Go to ThinkSystem SR670 V2 Drivers and Software to download firmware updates for your server.

  Important: Some cluster solutions require specific code levels or coordinated code updates. If the component is part of a cluster solution, verify the latest Best Recipe code level menu for cluster supported firmware and driver before you update the code.
- It is good practice to make sure that the server is working correctly before you install an optional component.
- Keep the working area clean, and place removed components on a flat and smooth surface that does not shake or tilt.
- Do not attempt to lift an object that might be too heavy for you. If you have to lift a heavy object, read the following precautions carefully:
  - Make sure that you can stand steadily without slipping.
  - Distribute the weight of the object equally between your feet.
  - Use a slow lifting force. Never move suddenly or twist when you lift a heavy object.
  - To avoid straining the muscles in your back, lift by standing or by pushing up with your leg muscles.
- Back up all important data before you make changes related to the disk drives.
- Have a small flat-blade screwdriver, a small Phillips screwdriver, and a T8 torx screwdriver available.
- To view the error LEDs on the system board and internal components, leave the power on.
- You do not have to turn off the server to remove or install hot-swap power supplies or hot-plug USB devices. However, you must turn off the server before you perform any steps that involve removing or installing adapter cables, and you must disconnect the power source from the server before you perform any steps that involve removing or installing a riser card.
- Blue on a component indicates touch points, where you can grip to remove a component from or install it in the server, open or close a latch, and so on.
- Terra-cotta on a component or a Terra-cotta label on or near a component indicates that the component can be hot-swapped if the server and operating system support hot-swap capability, which means that you can remove or install the component while the server is still running. (Terra-cotta can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.

- The Red strip on the drives, adjacent to the release latch, indicates that the drive can be hot-swapped if the server and operating system support hot-swap capability. This means that you can remove or install the drive while the server is still running.

    Note: See the system specific instructions for removing or installing a hot-swap drive for any additional procedures that you might need to perform before you remove or install the drive.
- After finishing working on the server, make sure you reinstall all safety shields, guards, labels, and ground wires.

Safety inspection checklist

Use the information in this section to identify potentially unsafe conditions with your server. As each machine was designed and built, required safety items were installed to protect users and service technicians from injury.

Notes:

1. The product is not suitable for use at visual display workplaces according to §2 of the Workplace Regulations.
2. The set-up of the server is made in the server room only.

CAUTION:
This equipment must be installed or serviced by trained personnel, as defined by the NEC, IEC 62368-1 & IEC 60950-1, the standard for Safety of Electronic Equipment within the Field of Audio/Video, Information Technology and Communication Technology. Lenovo assumes you are qualified in the servicing of equipment and trained in recognizing hazards energy levels in products. Access to the equipment is by the use of a tool, lock and key, or other means of security, and is controlled by the authority responsible for the location.

Important: Electrical grounding of the server is required for operator safety and correct system function. Proper grounding of the electrical outlet can be verified by a certified electrician.

Use the following checklist to verify that there are no potentially unsafe conditions:

1. Make sure that the power is off and the power cord is disconnected.
2. Check the power cord.

    - Make sure that the third-wire ground connector is in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and the frame ground.
    - Make sure that the power cord is the correct type.

        To view the power cords that are available for the server:

        a. Go to:

            http://dcsc.lenovo.com/#/

        b. Click **Preconfigured Model** or **Configure to order**.
        c. Enter the machine type and model for your server to display the configurator page.
        d. Click **Power ➙ Power Cables** to see all line cords.
    - Make sure that the insulation is not frayed or worn.
3. Check for any obvious non-Lenovo alterations. Use good judgment as to the safety of any non-Lenovo alterations.
4. Check inside the server for any obvious unsafe conditions, such as metal filings, contamination, water or other liquid, or signs of fire or smoke damage.
5. Check for worn, frayed, or pinched cables.

6. Make sure that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

System reliability guidelines

Review the system reliability guidelines to ensure proper system cooling and reliability.

Make sure the following requirements are met:

*   When the server comes with redundant power, a power supply must be installed in each power-supply bay.
*   Adequate space around the server must be spared to allow server cooling system to work properly. Leave approximately 50 mm (2.0 in.) of open space around the front and rear of the server. Do not place any object in front of the fans.
*   For proper cooling and airflow, refit the server cover before you turn the power on. Do not operate the server for more than 30 minutes with the server cover removed, for it might damage server components.
*   Cabling instructions that come with optional components must be followed.
*   A failed fan must be replaced within 48 hours after malfunction.
*   A removed hot-swap fan must be replaced within 30 seconds after removal.
*   A removed hot-swap drive must be replaced within two minutes after removal.
*   A removed hot-swap power supply must be replaced within two minutes after removal.
*   Every air baffle that comes with the server must be installed when the server starts (some servers might come with more than one air baffle). Operating the server with a missing air baffle might damage the processor.
*   All processor sockets must contain either a socket cover or a processor with heat sink.
*   When more than one processor is installed, fan population rules for each server must be strictly followed.

Handling static-sensitive devices

Use this information to handle static-sensitive devices.

Attention: Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

*   Limit your movement to prevent building up static electricity around you.
*   Take additional care when handling devices during cold weather, for heating would reduce indoor humidity and increase static electricity.
*   Always use an electrostatic-discharge wrist strap or other grounding system, particularly when working inside the server with the power on.
*   While the device is still in its static-protective package, touch it to an unpainted metal surface on the outside of the server for at least two seconds. This drains static electricity from the package and from your body.
*   Remove the device from the package and install it directly into the server without putting it down. If it is necessary to put the device down, put it back into the static-protective package. Never place the device on the server or on any metal surface.
*   When handling a device, carefully hold it by the edges or the frame.
*   Do not touch solder joints, pins, or exposed circuitry.
*   Keep the device from others' reach to prevent possible damages.

Memory module installation rules and order

Memory modules must be installed in a specific order based on the memory configuration that you implement and the number of processors and memory modules installed in the server.

Information about optimizing memory performance and configuring memory is available at the Lenovo Press website:

https://lenovopress.com/servers/options/memory

In addition, you can take advantage of a memory configurator, which is available at the following site:

http://1config.lenovo.com/#/memory_configuration

Specific information about the required installation order of memory modules in your server based on the system configuration and memory mode that you are implementing is shown below.

Memory modules and processors layout
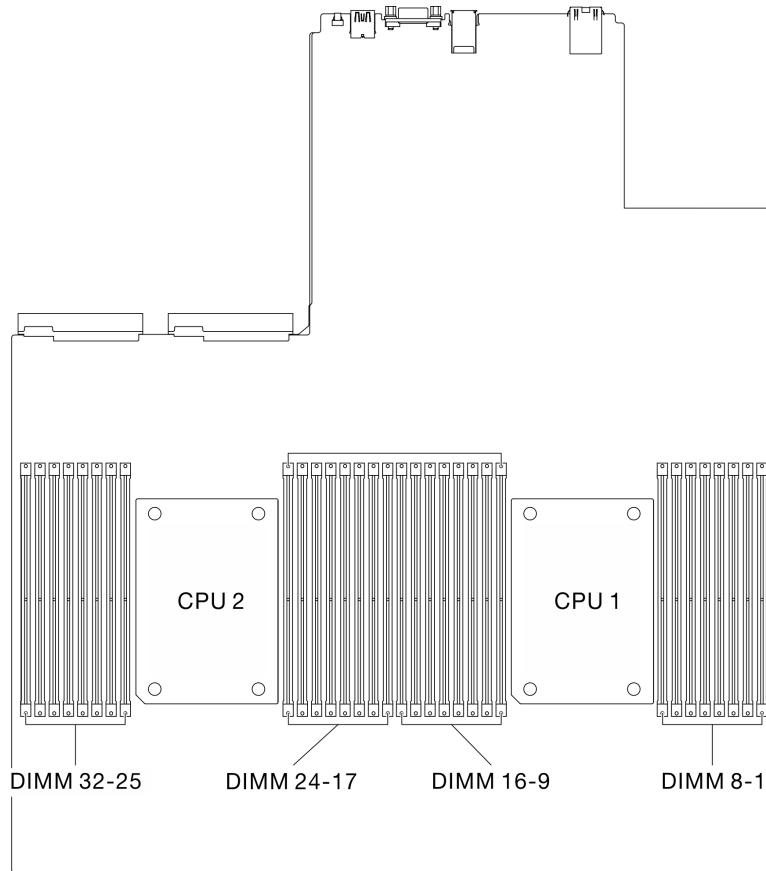
Figure 92. Memory modules and processors layout

The memory-channel configuration table below shows the relationship between the processors, memory controllers, memory channels, and memory module slot numbers.

Table 22. Channel and slot information of DIMMs around a processor

Channel	Channel 1		Channel 0		Channel 3		Channel 2		Channel 6		Channel 7		Channel 4		Channel 5	
DIMM	0	1	0	1	0	1	0	1	1	0	1	0	1	0	1	0
DIMM slot number **(Processor 1)**	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
DIMM slot number **(Processor 2)**	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17

Memory module installation guideline

- Two types of configurations are supported. Consider corresponding rules and population sequence accordingly:

  - (RDIMMs or 3DS RDIMMs)

  -

- A label on each DIMM identifies the DIMM type. This information is in the format **xxxxx *n*Rxxx PC4-xxxxx-xx-xx-xxx**. Where ***n*** indicates if the DIMM is single-rank (n=1) or dual-rank (n=2).

- At least one DIMM is required for each processor. Install at least eight DIMMs per processor for good performance.
- When you replace a DIMM, the server provides automatic DIMM enablement capability without requiring you to use the Setup utility to enable the new DIMM manually.

Attention:

- Mixing x4 and x8 DIMMs in the same channel is allowed.
- Install DIMMs of the same speed for optimal performance. Otherwise, the BIOS will find and run the lowest speed among all channels.
- Within a channel, always populate DIMMs with the maximum number of ranks in the farthest DIMM slot, followed by the nearest DIMM slot.

DRAM DIMMs installation order

This section contains information of how to install DRAM DIMMs properly.

Independent memory mode installation order

In independent memory mode, memory channels can be populated with DIMMs in any order and you can populate all channels for each processor in any order with no matching requirements. Independent memory mode provides the highest level of memory performance, but lacks failover protection. The DIMM installation order for independent memory mode varies based on the number of processors and memory modules installed in the server.

Independent memory mode guidelines:

- Individual memory channels can run at different DIMM timings, but all channels must run at the same interface frequency.
- Populate memory channel 0 first.
- In each memory channel, populate slot 0 first.
- Memory channel 1 is empty or identically populated as memory channel 0.
- Memory channel 2 is empty or identically populated as memory channel 1.
- If a memory channel has two DIMMs, populate the DIMM with a higher number of ranks in slot 0.

With one processor

The following table shows the DIMM population sequence for independent memory mode when one processor is installed.

Note: When installing 2, 4, 6, or 12 DIMMs, refer to installation order for same-capacity DIMMs or for different-capacity DIMMs according the type of DIMMs you are installing. **S** stands for same-capacity while **D** stands for different capacity.

Table 23. Independent mode memory population sequence for one processor

Total DIMMs	Processor 1															
	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
1			14													
2 (*S*)			14				10									
2 (*D*)			14		12											
4 (*S*)†			14				10			7				3		
4 (*D*)*			14		12							5		3		
6 (*S*)	16		14				10			7				3		1
8†‡	16		14		12		10			7		5		3		1
12 (*S*)	16	15	14	13			10	9	8	7			4	3	2	1
12 (*D*)*†‡	16		14	13	12		10	9	8	7		5	4	3		1
16†‡	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Notes:
* Each of the following DIMM slot groups should be populated with DIMMS of the same capacity:

- Group of DIMM slot 1, 2, 5, 6, 11, 12, 15, and 16.

- Group of DIMM slot 3, 4, 7, 8, 9, 10, 13, and 14.

† Sub NUMA Clustering (SNC2) feature can only be enabled when DIMMs are populated in this specified sequence. The SNC2 feature can be enabled via UEFI.

‡DIMM configurations that support Software Guard Extensions (SGX), see "Enable Software Guard Extensions (SGX)" on page 266 to enable this feature.

With two processors

The following tables show the DIMM population sequence for independent memory mode when two processors are installed.

Note: When installing 4, 8, 12, or 24 DIMMs, refer to installation order for same-capacity DIMMs or for different-capacity DIMMs according the type of DIMMs you are installing. **S** stands for same-capacity while **D** stands for different capacity.

Table 24. Independent mode memory population sequence for two processor

Total DIMMs	Processor 1															
	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
2			14													
4 (S)			14				10									
4 (D)			14		12											
8 (S)†			14				10			7				3		
8 (D)*			14		12							5		3		
12 (S)	16		14				10			7				3		1
16†‡	16		14		12		10			7		5		3		1
24 (S)	16	15	14	13			10	9	8	7			4	3	2	1
24 (D) *†‡	16		14	13	12		10	9	8	7		5	4	3		1
32†‡	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Total DIMMs	Processor 2															
	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
2			30													
4 (S)			30				26									
4 (D)			30		28											
8(S)†			30				26			23				19		

Table 24. Independent mode memory population sequence for two processor (continued)

Total	Processor 1															
DIMMs	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
8(*D*)*			30		28							21		19		
12 (S)	32		30				26			23				19		17
16†‡	32		30		28		26			23		21		19		17
24 (S)	32	31	30	29			26	25	24	23			20	19	18	17
24 (*D*) *†‡	32		30	29	28		26	25	24	23		21	20	19		17
32†‡	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17

Notes:
* Each of the following DIMM slot groups should be populated with DIMMS of the same capacity:

- Group of DIMM slot 1, 2, 5, 6, 11, 12, 15, 16, 17, 18, 21, 22, 27, 28, 31, and 32.

- Group of DIMM slot 3, 4, 7, 8, 9, 10, 13, 14, 19, 20, 23, 24, 25, 26, 29, and 30.

† Sub NUMA Clustering (SNC2) feature can only be enabled when DIMMs are populated in this specified sequence. The SNC2 feature can be enabled via UEFI.

‡DIMM configurations that support Software Guard Extensions (SGX), see "Enable Software Guard Extensions (SGX)" on page 266 to enable this feature.

Memory mirroring mode installation order

Memory-mirroring mode provides full memory redundancy while reducing the total system memory capacity in half. Memory channels are grouped in pairs with each channel receiving the same data. If a failure occurs, the memory controller switches from the DIMMs on the primary channel to the DIMMs on the backup channel. The DIMM installation order for memory mirroring varies based on the number of processors and DIMMs installed in the server.

Memory mirroring guidelines:

- Memory mirroring reduces the maximum available memory by half of the installed memory. For example, if the server has 64 GB of installed memory, only 32 GB of addressable memory is available when memory mirroring is enabled.
- Each DIMM must be identical in size and architecture.
- DIMMs on each memory channel must be of equal density.
- If two memory channels have DIMMs, mirroring occurs across two DIMMs (channels 0/1 will both contain the primary/secondary memory caches).
- If three memory channels have DIMMs, mirroring occurs across all three DIMMs (channels 0/1, channels 1/2, and channels 2/0 will all contain primary/secondary memory caches).

With one processors

The following table shows the DIMM population sequence for memory mirroring when one processor is installed.

Table 25. Memory Mirroring with one processor

Total	Processor 1															
DIMMs	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
8*	16		14		12		10			7		5		3		1
16*	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Note: * Sub NUMA Clustering (SNC2) feature can only be enabled when DIMMs are populated in this specified sequence. The SNC2 feature can be enabled via UEFI.																

With two processors

The following table shows the DIMM population sequence for memory mirroring mode when two processors are installed.

Table 26. Memory mirroring with two processors

Total	Processor 1															
DIMMs	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
16*	16		14		12		10			7		5		3		1
32*	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Total	Processor 2															
DIMMs	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
16*	32		30		28		26			23		21		19		17
32*	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
Note: * Sub NUMA Clustering (SNC2) feature can only be enabled when DIMMs are populated in this specified sequence. The SNC2 feature can be enabled via UEFI.																

PMEM and DRAM DIMM installation order

This section contains information of how to install PMEMs and DRAM DIMMs properly.

When PMEMs and DRAM DIMMs are mixed in the system, the following modes are supported:

- "**App Direct Mode**" on page 168
- **Memory Mode**

See the following topics to learn how to set up and configure PMEMs.

- "PMEM rules" on page 163
- "Setting up the system for PMEM for the first time" on page 163
- "PMEM Management options" on page 163
- "Adding or replacing PMEMs in App Direct Mode" on page 166

PMEM rules

Make sure to meet the following requirements when applying PMEMs in the system.

- All the PMEMs that are installed must be of the same part number.
- All the DRAM DIMMs that are installed must be of the same type, rank, and capacity with minimum capacity of 16 GB. It is recommended to use Lenovo DRAM DIMMs with the same part number.
- Supported types of DRAM DIMMs and capacity vary with processors:
  - Processors with model name ending in **H**:
    - DRAM: 32/64 GB RDIMMs
    - PMEM: 128 GB
  - Processors with model name ending in **HL**:
    - DRAM: 128 GB 3DS RDIMMs
    - PMEM: 128, 256 or 512 GB

Setting up the system for PMEM for the first time

Complete the following steps when installing PMEMs to the system for the first time.

1. Consider "PMEM rules" on page 163 and acquire the PMEMs and DRAM DIMMs that meet the requirements.
2. Remove all the memory modules that are presently installed (see "Remove a memory module" in *Maintenance Manual*).
3. Follow the adopted combination to install all the PMEMs and DRAM DIMMs (see "Install a memory module" on page 203).
4. Disable security on all the installed PMEMs (see "PMEM Management options" on page 163).
5. Make sure the PMEM firmware is the latest version. If not, update it to the latest version (see https://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/update_fw.html).
6. Configure the PMEMs so that the capacity is available for use (see "PMEM Management options" on page 163).

PMEM Management options

PMEMs can be managed with the following tools:

- **Lenovo XClarity Provisioning Manager (LXPM)**

To open LXPM, power on the system and press the key specified in the on-screen instructions as soon as the logo screen appears. If a password has been set, enter the password to unlock LXPM. For more information, see the "Startup" section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/

Go to **UEFI Setup ➔ System Settings ➔ Intel Optane PMEMs** to configure and manage PMEMs.

For more details, see the "UEFI setup" section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.

Note: If the text-based interface of Setup Utility opens instead of LXPM, go to **System Settings ➔ <F1> Start Control** and select **Tool Suite**. Then, reboot the system, and as soon as the logo screen appears, press the key specified in the on-screen instructions to open LXPM. (For more information, see the "Startup" section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/)

- **Setup Utility**

  To enter Setup Utility:

  1. Power on the system and press the key specified in the on-screen instructions to open LXPM.

     (For more information, see the "Startup" section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/)

  2. Go to **UEFI Settings ➔ System Settings**, click on the pull-down menu on the upper right corner of the screen, and select **Text Setup**.

  3. Reboot the system, and as soon as the logo screen appears, press the key specified in the on-screen instructions.

  Go to **System Configuration and Boot Management ➔ System Settings ➔ Intel Optane PMEMs** to configure and manage PMEMs.

- **Lenovo XClarity Essentials OneCLI**

  Some management options are available in commands that are executed in the path of Lenovo XClarity Essentials OneCLI in the operating system. See https://pubs.lenovo.com/lxce-onecli/download_use_onecli to learn how to download and use Lenovo XClarity Essentials OneCLI.

Following are the available management options:

- **Intel Optane PMEMs details**

  Select this option to view the following details concerning each of the installed PMEMs:

  - Number of Intel Optane PMEMs detected
  - Total raw capacity
  - Total memory capacity
  - Total App Direct capacity
  - Total unconfigured capacity
  - Total inaccessible capacity
  - Total reserved capacity

  Alternatively, view PMEM details with the following command in OneCLI:

  ```
  OneCli.exe config show IntelOptanePMEM --bmc XCC_Account:XCC_Password@XCC_IP
  ```

  Notes:
  - *XCC_Account* stands for XCC user ID.
  - *XCC_Password* stands for XCC user password.
  - *XCC_IP* stands for XCC IP address.

- **Regions**

  After the memory percentage is set and the system is rebooted, regions for the App Direct capacity will be generated automatically. Select this option to view the App Direct regions per processor.

- **Namespaces**

  App Direct capacity of PMEMs requires the following steps before it is truly available for applications.

  1. Namespaces must be created for region capacity allocation.
  2. Filesystem must be created and formatted for the namespaces in the operating system.

  Each App Direct region can be allocated into one namespace. Create namespaces in the following operating systems:

  – Windows: Use *powershell* command. To create a namespace, use Windows Server 2019 or later versions.

  – Linux: Use *ndctl* command.

  – VMware: Reboot the system, and VMware will create namespaces automatically.

  After creating namespaces for App Direct capacity allocation, make sure to create and format filesystem in the operating system so that the App Direct capacity is accessible for applications.

- **Security**

  – Enable Security

    Attention: By default, PMEM security is disabled. Before enabling security, make sure all the country or local legal requirements regarding data encryption and trade compliance are met. Violation could cause legal issues.

    PMEMs can be secured with passphrases. Two types of passphrase protection scope are available for PMEM:

  – **Platform:** Choose this option to run security operation on all the installed PMEM units at once. A platform passphrase is stored and automatically applied to unlock PMEMs before operating system starts running, but the passphrase still has to be disabled manually for secure erase.

    Alternatively, enable/disable platform level security with the following commands in OneCLI:

    - Enable security:

      1. Enable security.
         ```
         onecli.exe config set IntelOptanePMEM.SecurityOperation "Enable Security" --imm
         USERID:PASSWORD@10.104.195.86
         ```

      2. Set the security passphrase.
         ```
         onecli.exe config set IntelOptanePMEM.SecurityPassphrase "123456" --imm
         USERID:PASSWORD@10.104.195.86 --imm USERID:PASSWORD@10.104.195.86
         ```

         Where *123456* stands for the passphrase.

      3. Reboot the system.

    - Disable security:

      1. Disable security.
         ```
         onecli.exe config set IntelOptanePMEM.SecurityOperation "Disable Security" --imm
         USERID:PASSWORD@10.104.195.86
         ```

      2. Enter passphrase.
         ```
         onecli.exe config set IntelOptanePMEM.SecurityPassphrase "123456" --imm
         USERID:PASSWORD@10.104.195.86
         ```

      3. Reboot the system.

– **Single PMEM:** Choose this option to run security operation on one or more selected PMEM units.

   Notes:

   - Single PMEM passphrases are not stored in the system, and security of the locked units needs to be disabled before the units are available for access or secure erase.

   - Always make sure to keep records of the slot number of locked PMEMs and corresponding passphrases. In the case the passphrases are lost or forgotten, the stored data cannot be backed up or restored, but you can contact Lenovo service for administrative secure erase.

   - After three failed unlocking attempts, the corresponding PMEMs enter "exceeded" state with a system warning message, and the PMEM unit can only be unlocked after the system is rebooted.

   To enable passphrase, go to **Security ➙ Press to Enable Security**.

– Secure Erase

   Notes:

   – Password is required to perform Secure Erase when security enabled.

   – Before executing secure erase, make sure ARS (Address Range Scrub) is done on all PMEMs or on the specific PMEMs selected. Otherwise, secure erase cannot be started on all PMEMs or the specific PMEM selected, and the following text message will pop out:

   ```
   The passphrase is incorrect for single or multiple or all Intel Optane PMEMs selected, or maybe there is
   namespace on the selected PMEMs. Secure erase operation is not done on all Intel Optane PMEMs selected.
   ```

Secure erase cleanses all the data that is stored in the PMEM unit, including encrypted data. This data deletion method is recommended before returning or disposing a malfunctioning unit, or changing PMEM mode. To perform secure erase, go to **Security ➙ Press to Secure Erase**.

Alternatively, perform platform level secure erase with the following command in OneCLI:

```
OneCli.exe config set IntelOptanePMEM.SecurityOperation "Secure Erase Without Passphrase" --bmc
USERID:PASSWORD@10.104.195.86
```

- **PMEM Configuration**

   PMEM contains spared internal cells to stand in for the failed ones. When the spared cells are exhausted to 0%, there will be an error message, and it is advised to back up data, collect service log, and contact Lenovo support.

   There will also be a warning message when the percentage reaches 1% and a selectable percentage (10% by default). When this message appears, it is advised to back up data and run PMEM diagnostics (see the "Diagnostics" section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/). To adjust the selectable percentage that the warning message requires, go to **Intel Optane PMEMs ➙ PMEM Configuration**, and input the percentage.

   Alternatively, change the selectable percentage with the following command in OneCLI:

   ```
   onecli.exe config set IntelOptanePMEM.PercentageRemainingThresholds 20 --imm USERID:PASSWORD@10.104.195.86
   ```

   Where *20* is the selectable percentage.

Adding or replacing PMEMs in App Direct Mode

Complete the following steps before adding or replacing PMEMs in App Direct Mode.

1. Back up stored data in PMEM namespaces.

2. Disable PMEM security with one of the following options:

   - **LXPM**

Go to **UEFI Setup ➜ System Settings ➜ Intel Optane PMEMs ➜ Security ➜ Press to Disable Security**, and input passphrase to disable security.

- **Setup Utility**

  Go to **System Configuration and Boot Management ➜ System Settings ➜ Intel Optane PMEMs ➜ Security ➜ Press to Disable Security**, and input passphrase to disable security.

3. Delete namespaces with command corresponding to the operating system that is installed:

   - **Linux** command:
     ```
     ndctl destroy-namespace all -f
     ```
   - **Windows** Powershell command:
     ```
     Get-PmemDisk | Remove-PmemDisk
     ```

4. Clear Platform Configuration Data (PCD) and Namespace Label Storage Area (LSA) with the following ipmctl command (for both Linux and Windows).
   ```
   ipmctl delete -pcd
   ```

   Notes: See the following links to learn how to download and use impctl in different operating systems:

   - Windows: https://datacentersupport.lenovo.com/us/en/videos/YTV101407
   - Linux: https://datacentersupport.lenovo.com/us/en/solutions/HT508642

5. Reboot the system.

App Direct Mode

In this mode, PMEMs act as independent and persistent memory resources directly accessible by specific applications, and DRAM DIMMs act as system memory.

With one processor

Table 27. Memory population in App Direct Mode with one processor

• **D: DRAM DIMMs with 16 GB or larger capacity** • **P: Persistent Memory Module (PMEM)**																
Configuration	**Processor 1**															
	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
8 DIMMs and 8 PMEMs	D	P	D	P	D	P	D	P	P	D	P	D	P	D	P	D
8 DIMMs and 4 PMEMs	D		D	P	D		D	P	P	D		D	P	D		D
4 DIMMs and 4 PMEMs	P		D		P		D			D		P		D		P
6 DIMMs and 1 PMEM*	D		D		P		D			D				D		D
8 DIMMs and 1 PMEM*	D		D	P	D		D			D		D		D		D
12 DIMMs and 2 PMEMs	D	D	D	D	P		D	D	D	D		P	D	D	D	D
Note: * Not-interleaved mode only. Does not support 100% interleaved mode.																

With two processors

Table 28. Memory population in App Direct Mode with two processors

• **D: DRAM DIMMs with 16 GB or larger capacity** • **P: Persistent Memory Module (PMEM)**																
Configuration	**Processor 1**															
	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
16 DIMMs and 16 PMEMs	D	P	D	P	D	P	D	P	P	D	P	D	P	D	P	D
16 DIMMs and 8 PMEMs	D		D	P	D		D	P	P	D		D	P	D		D
8 DIMMs and 8 PMEMs	P		D		P		D			D		P		D		P
12 DIMMs and 2 PMEMs*	D		D		P		D			D				D		D
16 DIMMs and 2 PMEMs*	D		D	P	D		D			D		D		D		D
24 DIMMs and 4 PMEMs	D	D	D	D	P		D	D	D	D		P	D	D	D	D
Note: * Not-interleaved mode only. Does not support 100% interleaved mode.																
Configuration	**Processor 2**															

Table 28. Memory population in App Direct Mode with two processors (continued)

	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
16 DIMMs and 16 PMEMs	D	P	D	P	D	P	D	P	P	D	P	D	P	D	P	D
16 DIMMs and 8 PMEMs	D		D	P	D		D	P	P	D		D	P	D		D
8 DIMMs and 8 PMEMs	P		D		P		D			D		P		D		P
12 DIMMs and 2 PMEMs*	D		D		P		D			D				D		D
16 DIMMs and 2 PMEMs*	D		D	P	D		D			D		D		D		D
24 DIMMs and 4 PMEMs	D	D	D	D	P		D	D	D	D		P	D	D	D	D
Note: * Not-interleaved mode only. Does not support 100% interleaved mode.																

Memory Mode

In this mode, PMEMs act as volatile system memory, while DRAM DIMMs act as cache.

With one processor

Table 29. Memory population in Memory Mode with one processor

• D: DRAM DIMMs with 16 GB or larger capacity															
• P: Persistent Memory Module (PMEM)															
Configuration	**Processor 1**														
	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
8 DIMMs and 8 PMEMs	D	P	D	P	D	P	D	P	P	D	P	D	P	D	P	D
8 DIMMs and 4 PMEMs	D		D	P	D		D	P	P	D		D	P	D		D
4 DIMMs and 4 PMEMs	P		D		P		D			D		P		D		P

With two processors

Table 30. Memory population in Memory Mode with two processors

• D: DRAM DIMMs with 16 GB or larger capacity															
• P: Persistent Memory Module (PMEM)															
Configuration	**Processor 1**														
	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
16 DIMMs and 16 PMEMs	D	P	D	P	D	P	D	P	P	D	P	D	P	D	P	D
16 DIMMs and 8 PMEMs	D		D	P	D		D	P	P	D		D	P	D		D
8 DIMMs and 8 PMEMs	P		D		P		D			D		P		D		P
Configuration	**Processor 2**														
	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
16 DIMMs and 16 PMEMs	D	P	D	P	D	P	D	P	P	D	P	D	P	D	P	D
16 DIMMs and 8 PMEMs	D		D	P	D		D	P	P	D		D	P	D		D
8 DIMMs and 8 PMEMs	P		D		P		D			D		P		D		P

Mixed Memory Mode

In this mode, some percentage of PMEM capacity is directly accessible to specific applications (App Direct), while the rest serves as system memory. The App Direct part of PMEM is displayed as persistent memory, while the rest of PMEM capacity is displayed as system memory. DRAM DIMMs act as cache in this mode.

With one processor

Table 31. Memory population in Mixed Memory Mode with one processor

- **D: DRAM DIMMs with 16 GB or larger capacity**
- **P: Persistent Memory Module (PMEM)**

Configuration	Processor 1															
	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
8 DIMMs and 8 PMEMs	D	P	D	P	D	P	D	P	P	D	P	D	P	D	P	D
8 DIMMs and 4 PMEMs	D		D	P	D		D	P	P	D		D	P	D		D
8 DIMMs and 1 PMEM*	D		D	P	D		D			D		D		D		D

Note: * Not-interleaved mode only. Does not support 100% interleaved mode.

With two processors

Table 32. Memory population in Mixed Memory Mode with two processors

- **D: DRAM DIMMs with 16 GB or larger capacity**
- **P: Persistent Memory Module (PMEM)**

Configuration	Processor 1															
	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
16 DIMMs and 16 PMEMs	D	P	D	P	D	P	D	P	P	D	P	D	P	D	P	D
16 DIMMs and 8 PMEMs	D		D	P	D		D	P	P	D		D	P	D		D
16 DIMMs and 2 PMEMs*	D		D	P	D		D			D		D		D		D

Note: * Not-interleaved mode only. Does not support 100% interleaved mode.

Configuration	Processor 2															
	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
16 DIMMs and 16 PMEMs	D	P	D	P	D	P	D	P	P	D	P	D	P	D	P	D
16 DIMMs and 8 PMEMs	D		D	P	D		D	P	P	D		D	P	D		D
16 DIMMs and 2 PMEMs*	D		D	P	D		D			D		D		D		D

Note: * Not-interleaved mode only. Does not support 100% interleaved mode.

Install server hardware options

This section includes instructions for performing initial installation of optional hardware. Each component installation procedure references any tasks that need to be performed to gain access to the component being replaced.

Installation procedures are presented in the optimum sequence to minimize work.

Attention: To ensure the components you install work correctly without problems, read the following precautions carefully.

- Make sure the components you are installing are supported by your server. For a list of supported optional components for the server, see https://serverproven.lenovo.com/.
- Always download and apply the latest firmware. This will help ensure that any known issues are addressed, and that your server is ready to work with optimal performance. Go to ThinkSystem SR670 V2 Drivers and Software to download firmware updates for your server.
- It is good practice to make sure that the server is working correctly before you install an optional component.
- Follow the installation procedures in this section and use appropriate tools. Incorrectly installed components can cause system failure from damaged pins, damaged connectors, loose cabling, or loose components.

Remove the hot-swap components

Follow instructions in this section to remove the hot-swap components.

Remove a 2.5-/3.5-inch hot-swap drive

Follow instructions in this section to remove a 2.5-inch or 3.5-inch hot-swap drive.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.
- To make sure that there is adequate system cooling, do not operate the solution for more than two minutes without either a drive or a filler installed in each bay.
- If one or more NVMe solid-state drives are to be removed, it is recommended to disable them beforehand via the operating system.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board), drive backplanes or drive cables, back up all important data that is stored on drives.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.

Note: Make sure you have the drive bay fillers available if some drive bays will be left empty after the removal.

Procedure

Step 1. Based on your configuration, follow the corresponding procedures to remove a 2.5-inch or 3.5-inch hot-swap drive.

Remove a 2.5-inch hot-swap drive:

a. ❶ Slide the release latch to unlock the drive handle.

b. ❷ Rotate the drive handle to the open position.

c. ❸ Grasp the handle and slide the drive out of the drive bay.

Note: Install a drive bay filler or replacement drive as soon as possible. See "Install a 2.5-/3.5-inch hot-swap drive" on page 177.
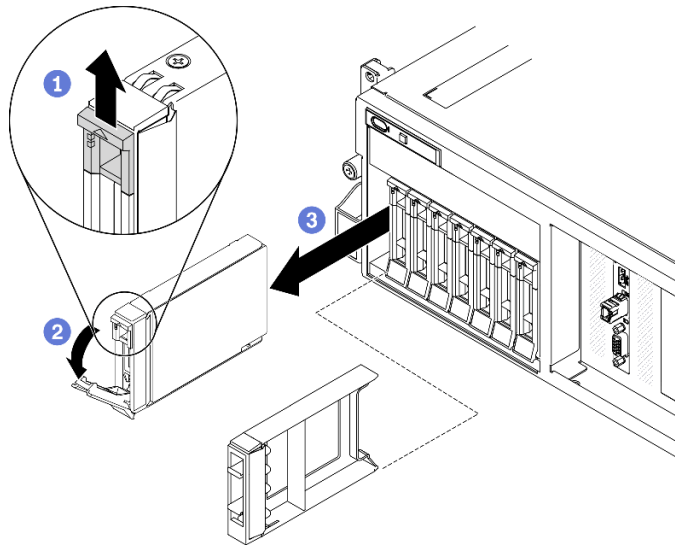
Figure 93. Removing a 2.5-inch hot-swap drive

Remove a 3.5-inch hot-swap drive:

a. ❶ Slide the release latch to unlock the drive handle.

b. ❷ Rotate the drive handle to the open position.

c. ❸ Grasp the handle and slide the drive out of the drive bay.

Note: Install a drive bay filler or replacement drive as soon as possible. See "Install a 2.5-/3.5-inch hot-swap drive" on page 177.
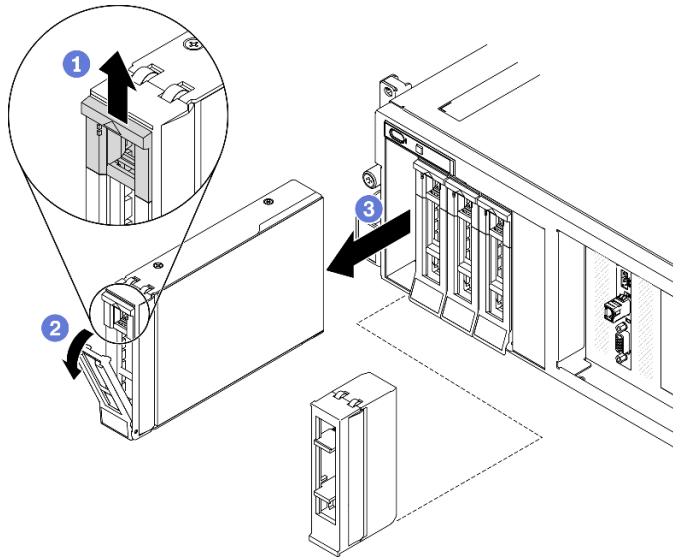
Figure 94. Removing a 3.5-inch hot-swap drive

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Remove an EDSFF hot-swap drive

Follow instructions in this section to remove an EDSFF hot-swap drive.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.
- To make sure that there is adequate system cooling, do not operate the solution for more than two minutes without either a drive or a filler installed in each bay.
- If one or more EDSFF drives are to be removed, it is recommended to disable them beforehand via the operating system.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board), drive backplanes or drive cables, back up all important data that is stored on drives.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.

Note: Make sure you have the drive bay fillers available if some drive bays will be left empty after the removal.

Procedure

Step 1. Hold the handle of the EDSFF drive cage cover and pull it out of the server.

Figure 95. Removing the EDSFF drive cage cover

Step 2. Remove the EDSFF hot-swap drive.

a. ❶ Slide the release latch to unlock the drive handle.

b. ❷ Rotate the drive handle to the open position.

c. ❸ Grasp the handle and slide the drive out of the drive bay.
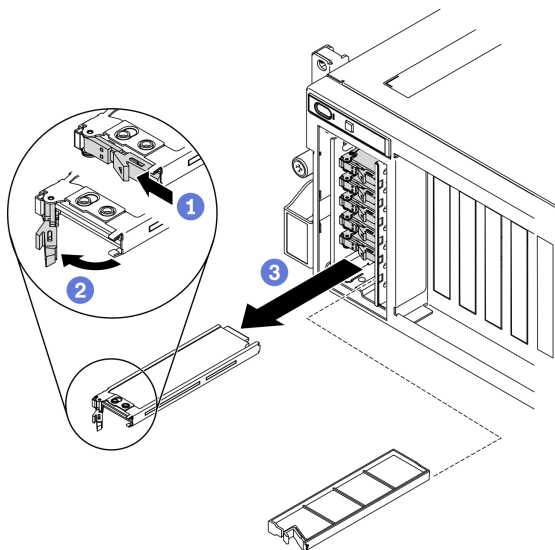
Figure 96. Removing an EDSFF hot-swap drive

Step 3. Install a drive bay filler or replacement drive as soon as possible. See "Install an EDSFF hot-swap drive" on page 180.

Step 4. Reinstall the EDSFF drive cage cover back to the server.
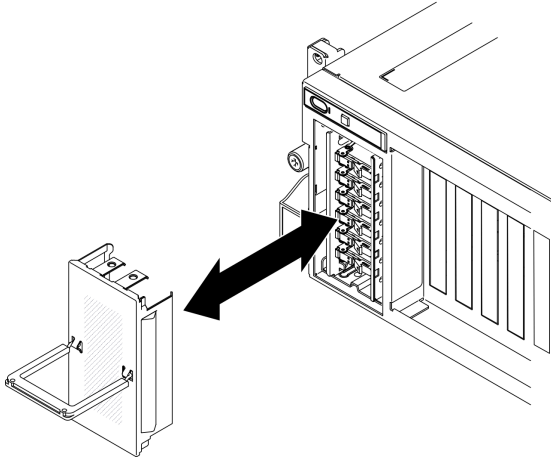
Figure 97. Reinstalling EDSFF drive cage cover

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

Remove a 2.5-inch hot-swap drive (SXM GPU Model)

Follow instructions in this section to remove a 2.5-inch hot-swap drive.

About this task

Attention:

- Read and to ensure that you work safely.
- To make sure that there is adequate system cooling, do not operate the solution for more than two minutes without either a drive or a filler installed in each bay.
- If one or more NVMe solid-state drives are to be removed, it is recommended to disable them beforehand via the operating system.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board), drive backplanes or drive cables, back up all important data that is stored on drives.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.

Note: Make sure you have the drive bay fillers available if some drive bays will be left empty after the removal.

Procedure

Step 1. Remove a 2.5-inch hot-swap drive.

    a. ❶ Slide the release latch to open the drive tray handle.

    b. ❷ Rotate the drive handle to the open position.

c. ❸ Grasp the handle and the slide the drive out of the drive bay.

Note: Install a drive bay filler or replacement drive as soon as possible. See "Install a 2.5-inch hot-swap drive (SXM GPU Model)" on page 183.
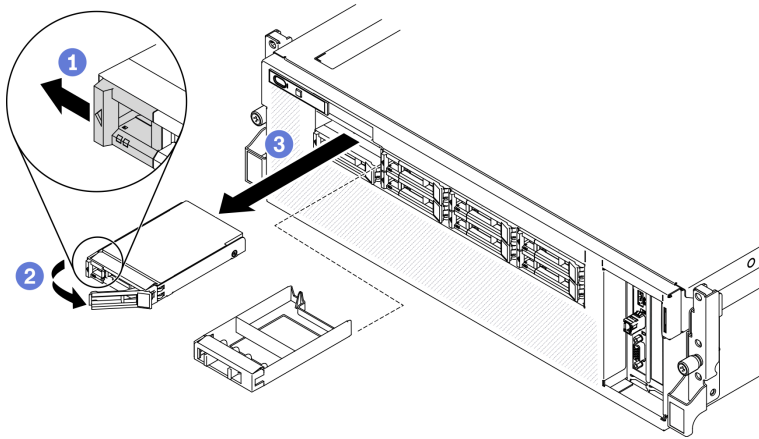
Figure 98. Removing a 2.5-inch drive in the SXM GPU Model

Install the hot-swap components

Follow instructions in this section to install the hot-swap components.

Install a 2.5-/3.5-inch hot-swap drive

Follow instructions in this section to install a 2.5-inch or 3.5-inch hot-swap drive.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.
- Touch the static-protective package that contains the drive to any unpainted metal surface on the solution; then, remove the drive from the package and place it on a static-protective surface.
- Make sure you save the data on your drive, especially if it is part of a RAID array, before you remove it from the server.
- To avoid damage to the drive connectors, make sure that the server top cover is in place and fully closed whenever you install or remove a drive.
- To make sure that there is adequate system cooling, do not operate the server for more than two minutes without either a drive or a drive bay filler installed in each bay.
- Before you make changes to drives, drive controllers (including controllers that are integrated on the system board), drive backplanes, or drive cables, back up all important data that is stored on drives.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.

The following notes describe the type of drives that the server supports and other information that you must consider when you install a drive. For a list of supported drives, see https://serverproven.lenovo.com/.

- Locate the documentation that comes with the drive and follow those instructions in addition to the instructions in this chapter.

- The electromagnetic interference (EMI) integrity and cooling of the solution are protected by having all bays and PCI and PCIe slots covered or occupied. When you install a drive, PCI, or PCIe adapter, save the EMC shield and filler panel from the bay or PCI or PCIe adapter slot cover in the event that you later remove the device.
- For a complete list of supported optional devices for the server, see https://serverproven.lenovo.com/.
- Depending on your server configuration for 4-DW GPU Model, the following drive types can be installed into each drive cage with their corresponding drive bay numbers:
 - Up to eight 2.5-inch SAS/SATA/NVMe drives
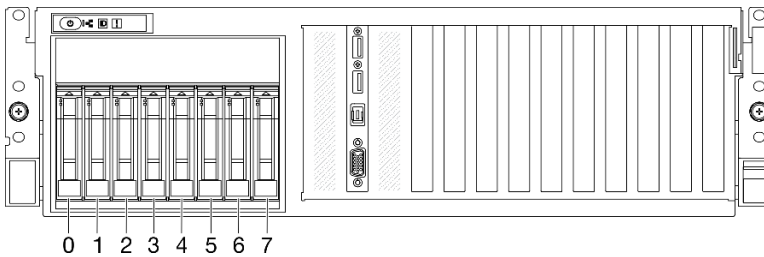
Figure 99. 2.5-inch drive bay numbering

  - Up to four 3.5-inch SATA drives
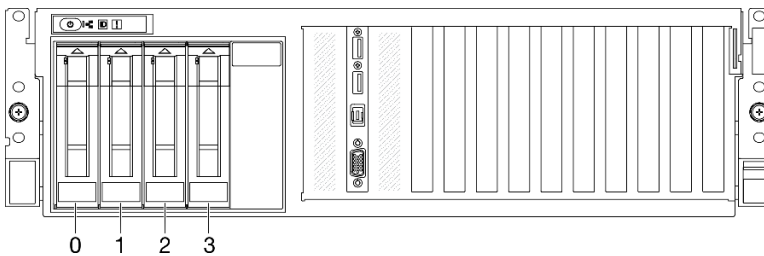
Figure 100. 3.5-inch drive bay numbering

Procedure

Step 1. Based on your configuration, follow the corresponding procedures to install a 2.5-inch or 3.5-inch hot-swap drive.
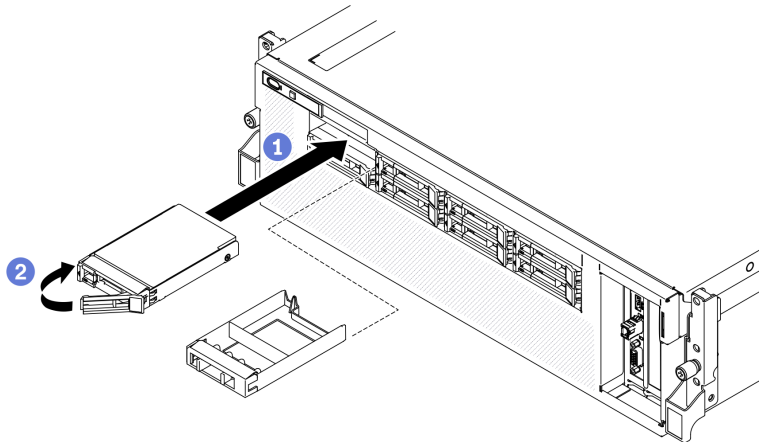
Install a 2.5-inch hot-swap drive:

Note: If a drive bay filler is installed in the drive bay, pull the release lever on the filler and slide it out of the server.

a. ❶ Make sure that the drive handle is in the open position. Then, align the drive with the guide rails in the bay and gently push the drive into the bay until the drive stops.

b. ❷ Rotate the drive handle to the fully closed position until the handle latch clicks.
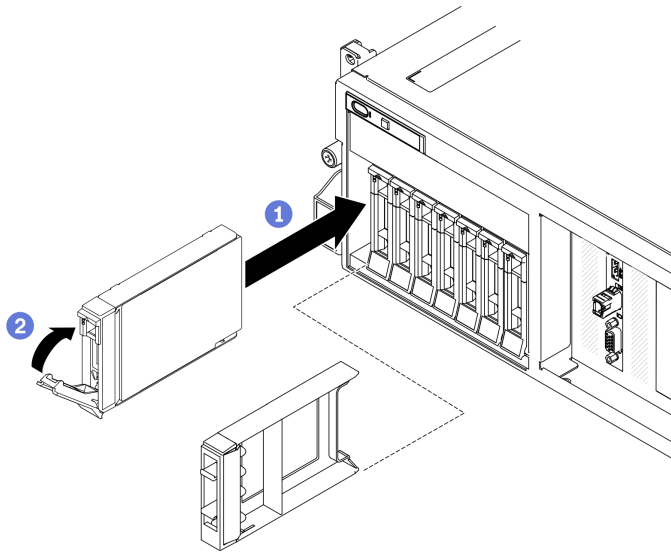
Figure 101. Installing a 2.5-inch hot-swap drive

Install a 3.5-inch hot-swap drive:

Note: If a drive bay filler is installed in the drive bay, pull the release lever on the filler and slide it out of the server.

a.   **1** Make sure that the drive handle is in the open position. Then, align the drive with the guide rails in the bay and gently push the drive into the bay until the drive stops.

b.   **2** Rotate the drive handle to the fully closed position until the handle latch clicks.
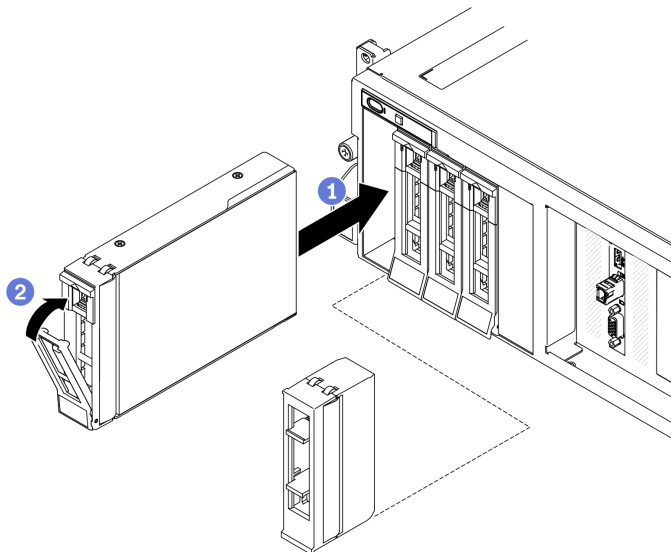
Figure 102. Installing a 3.5-inch hot-swap drive

Step 2.   If you have additional drives to install, do so now; if any of the drive bays is left empty, fill it with a drive bay filler.

After you finish

1. Check the drive status LED to verify that the drive is operating correctly.

   - If the yellow drive status LED of a drive is lit continuously, that drive is faulty and must be replaced.

   - If the green drive activity LED is flashing, the drive is being accessed.

2. If the server is configured for RAID operation through a ThinkSystem RAID adapter, you might have to reconfigure your disk arrays after you install drives. See the ThinkSystem RAID adapter documentation for additional information about RAID operation and complete instructions for using ThinkSystem RAID adapter.

3. If you have installed 2.5-inch drive backplane with U.3 NVMe drives for Trimode. Enable U.3 x1 mode for the selected drive slots on the backplane through the XCC web GUI. See "U.3 NMVe drive can be detected in NVMe connection, but cannot be detected in Tri-mode" on page 275.

Demo video

Watch the procedure on YouTube

Install an EDSFF hot-swap drive

Use this information to install an EDSFF hot-swap drive.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.

- Touch the static-protective package that contains the drive to any unpainted metal surface on the solution; then, remove the drive from the package and place it on a static-protective surface.

- Make sure you save the data on your drive, especially if it is part of a RAID array, before you remove it from the server.

- To avoid damage to the drive connectors, make sure that the server top cover is in place and fully closed whenever you install or remove a drive.

- To make sure that there is adequate system cooling, do not operate the server for more than two minutes without either a drive or a drive bay filler installed in each bay.

- Before you make changes to drives, drive controllers (including controllers that are integrated on the system board), drive backplanes, or drive cables, back up all important data that is stored on drives.

- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.

The following notes describe the type of drives that the server supports and other information that you must consider when you install a drive. For a list of supported drives, see https://serverproven.lenovo.com/.

- Locate the documentation that comes with the drive and follow those instructions in addition to the instructions in this chapter.

- The electromagnetic interference (EMI) integrity and cooling of the solution are protected by having all bays and PCI and PCIe slots covered or occupied. When you install a drive, PCI, or PCIe adapter, save the EMC shield and filler panel from the bay or PCI or PCIe adapter slot cover in the event that you later remove the device.

- For a complete list of supported optional devices for the server, see https://serverproven.lenovo.com/.

- Depending on your server configuration for 8-DW GPU Model, the following drive types can be installed into each drive cage with their corresponding drive bay numbers:

   – Up to six EDSFF drives
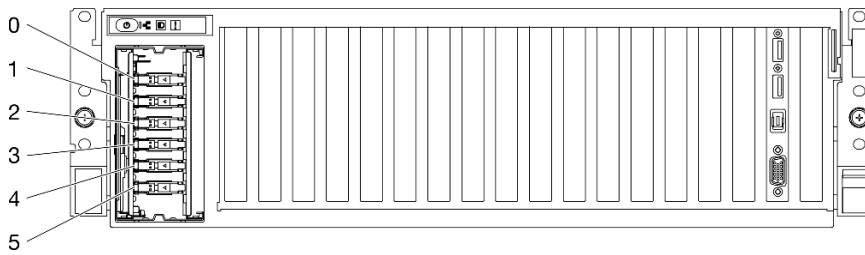
Figure 103. EDSFF drive bay numbering

Procedure

Step 1.   Hold the handle of the EDSFF drive cage cover and pull it out of the server.
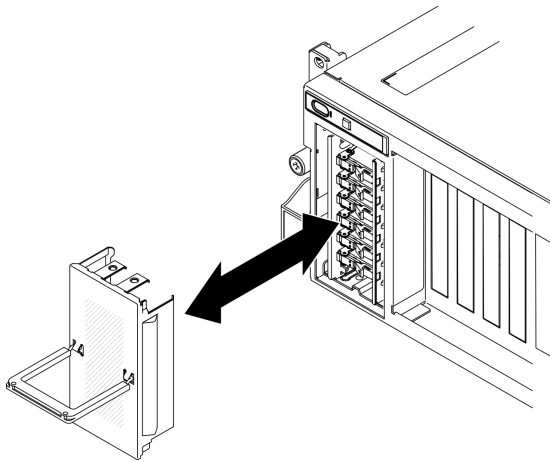
Figure 104. Removing the EDSFF drive cage cover

Step 2.   If a drive bay filler is installed in the drive bay, pull the release lever on the filler and slide it out of the server.

Step 3.   Install the EDSFF drive.

a.   ❶ Make sure that the drive handle is in the open position. Then, align the drive with the guide rails in the bay and gently push the drive into the bay until the drive stops.

b.   ❷ Rotate the drive handle to the fully closed position until the latch clicks.
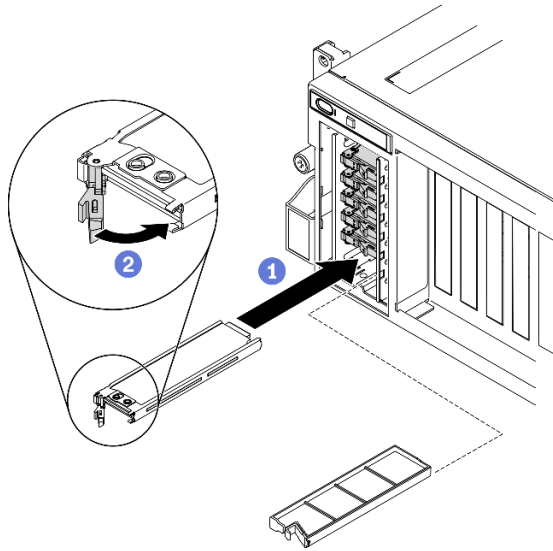
Figure 105. Installing an EDSFF hot-swap drive

Step 4. If you have additional drives to install, do so now; if any of the drive bays is left empty, fill it with a drive bay filler.

Step 5. Check the drive status LED to verify that the drive is operating correctly.

- If the yellow drive status LED is lit continuously, the drive is malfunctioning and must be replaced.
- If the green drive activity LED is flashing, the drive is functioning.

Step 6. Reinstall the EDSFF drive cage cover back to the server.
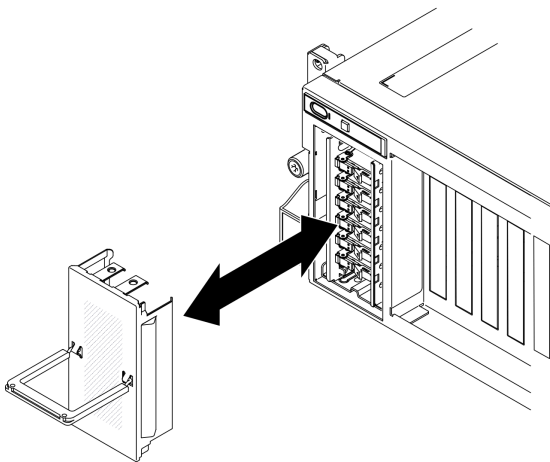
Figure 106. Reinstalling the EDSFF drive cage cover

After you finish

If the server is configured for RAID operation through a ThinkSystem RAID adapter, you might have to reconfigure your disk arrays after you install drives. See the ThinkSystem RAID adapter documentation for additional information about RAID operation and complete instructions for using ThinkSystem RAID adapter.

Demo video

Install a 2.5-inch hot-swap drive (SXM GPU Model)

Follow instructions in this section to install an 2.5-inch hot-swap drive.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.
- Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.
- Make sure you save the data on your drive, especially if it is part of a RAID array, before you remove it from the server.
- To avoid damage to the drive connectors, make sure that the server top cover is in place and fully closed whenever you install or remove a drive.
- To make sure that there is adequate system cooling, do not operate the server for more than two minutes without either a drive or a drive bay filler installed in each bay.
- Before you make changes to drives, drive controllers (including controllers that are integrated on the system board), drive backplanes, or drive cables, back up all important data that is stored on drives.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.

The following notes describe the type of drives that the server supports and other information that you must consider when you install a drive. For a list of supported drives, see https://serverproven.lenovo.com/.

- Locate the documentation that comes with the drive and follow those instructions in addition to the instructions in this chapter.
- The electromagnetic interference (EMI) integrity and cooling of the solution are protected by having all bays and PCI and PCIe slots covered or occupied. When you install a drive, PCI, or PCIe adapter, save the EMC shield and filler panel from the bay or PCI or PCIe adapter slot cover in the event that you later remove the device.
- For a complete list of supported optional devices for the server, see https://serverproven.lenovo.com/.
- Depending on your server configuration for SXM GPU Model, the following drive types can be installed into each drive cage with their corresponding drive bay numbers:
  - Supports four or eight 2.5-inch NVMe drives
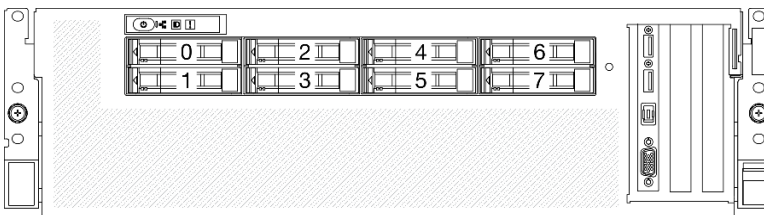
Figure 107. 2.5-inch drive bay numbering in SXM GPU Model

Procedure

Step 1. If a drive bay filler is installed in the drive bay, pull the release lever on the filler and slide it out of the server.

Step 2. Install a 2.5-inch drive.

  a. ❶ Make sure that the drive handle is in the open position. Then, align the drive with the guide rails in the bay and gently push the drive into the bay until the drive stops.

  b. ❷ Rotate the drive handle to the fully closed position until the latch clicks.

Figure 108. Installing a 2.5-inch hot-swap drive in SXM GPU Model

Step 3. If you have additional drives to install, do so now; if any of the drive bays is left empty, fill it with a drive bay filler.

After you finish

1. Check the drive status LED to verify that the drive is operating correctly.

   - If the yellow drive status LED of a drive is lit continuously, that drive is faulty and must be replaced.

   - If the green drive activity LED is flashing, the drive is being accessed.

2. If the server is configured for RAID operation through a ThinkSystem RAID adapter, you might have to reconfigure your disk arrays after you install drives. See the ThinkSystem RAID adapter documentation for additional information about RAID operation and complete instructions for using ThinkSystem RAID adapter.

Demo video

Watch the procedure on YouTube

Remove the server from rack

Follow instructions in this section to remove the server from the rack.

S036

18 - 32 kg (39 - 70 lb)

32 - 55 kg (70 - 121 lb)

R006

CAUTION:
Do not place any object on top of a rack-mounted device unless that rack-mounted device is intended for use as a shelf.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See "Power off the server" on page 257.

CAUTION:
Make sure to have three people operate the server removal procedures to prevent injury.

Procedure

Step 1. Loosen the two thumbscrews located on the front of the server to disengage it from the rack.

Rack front
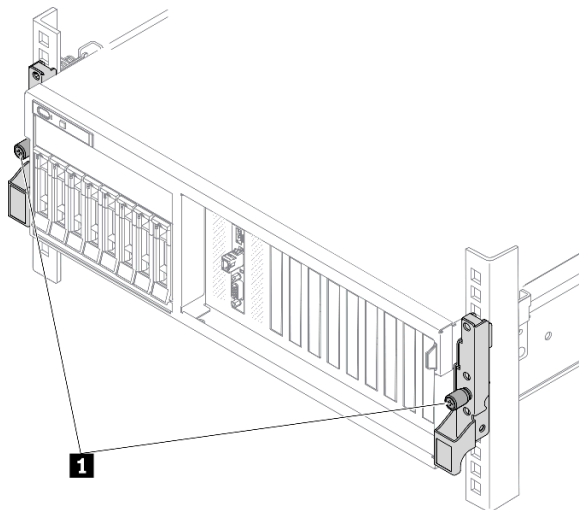
Figure 109. Disengaging server from the rack

1	Thumbscrew

Step 2. Hold the mounting ears on the front of the server; then, slide the server all the way out until it stops.
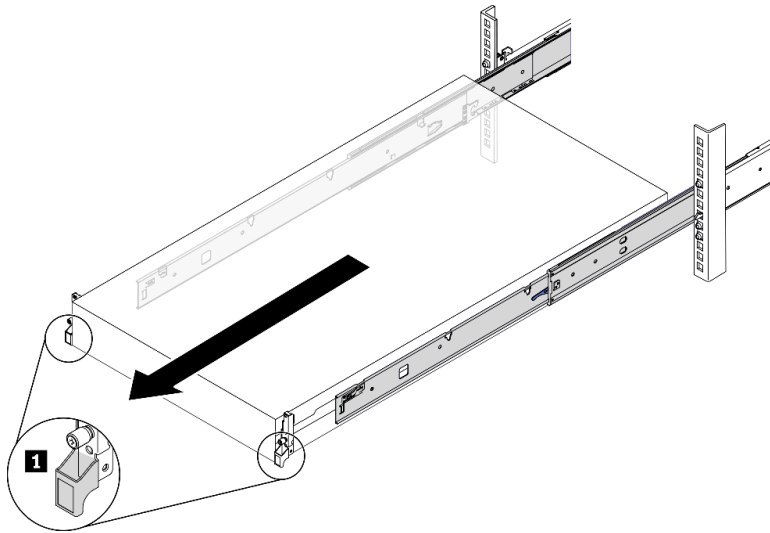
Figure 110. Pulling out the server

1	Mounting ear

Step 3. Remove the server from the rack.

CAUTION:
Make sure three people are lifting the sever by holding the lift points

Rack front
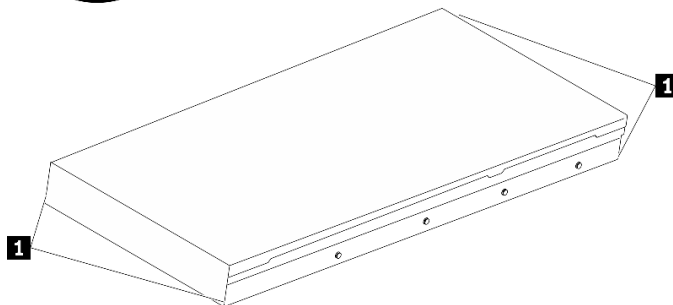
Figure 111. Lifting up the server

1	Lift point

a. **1** Press the release tabs to disengage the rails from the server.

b. **2** Carefully lift up the front end of the server slightly to detach the nailheads from the slots on the rails.

c. **3** With three people, lift up the serve to remove it from the rails completely. Place the server on a flat and sturdy surface.

Rack Front
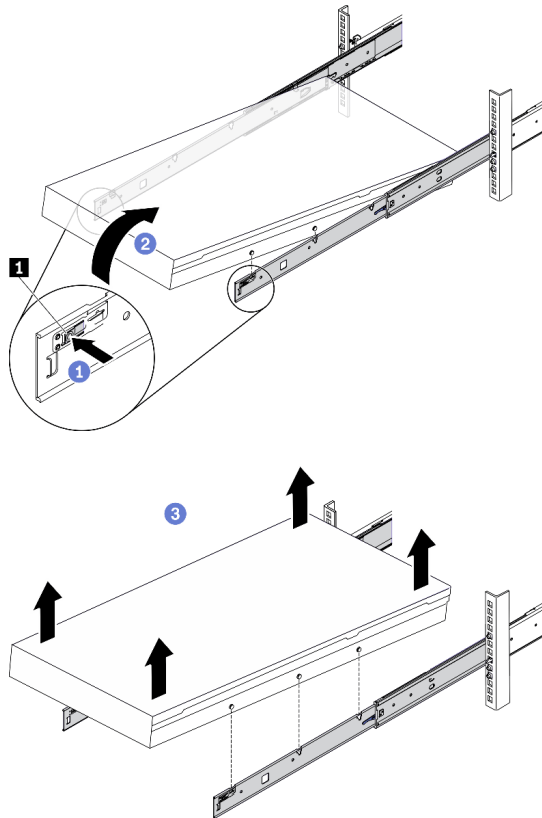
Figure 112. Removing the server from the rack.

1	Release tab

After you finish

Carefully lay the server on a flat, static-protective surface.

Remove the top cover

Follow instructions in this section to remove the top cover.

S014

CAUTION:
Hazardous voltage, current, and energy levels might be present. Only a qualified service technician is authorized to remove the covers where the label is attached.

S033

CAUTION:
Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in spattered metal, burns, or both.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.

- Power off the server and peripheral devices and disconnect the power cords and all external cables. See "Power off the server" on page 257.

- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See "Remove the server from rack" on page 184.

Procedure

Step 1. Remove the top cover.

    a. ❶ Press the release button on the top cover latch.

    b. ❷ Rotate the latch until the latch is fully open and the top cover is disengaged from the chassis.

    c. ❸ Lift up the top cover from the chassis, and place it on a flat clean surface.

    Attention:

    - Service label is located on the inside of the top cover.

    - For proper cooling and air flow, install the top cover before you power on the server. Operating the server with the top cover removed might damage server components.
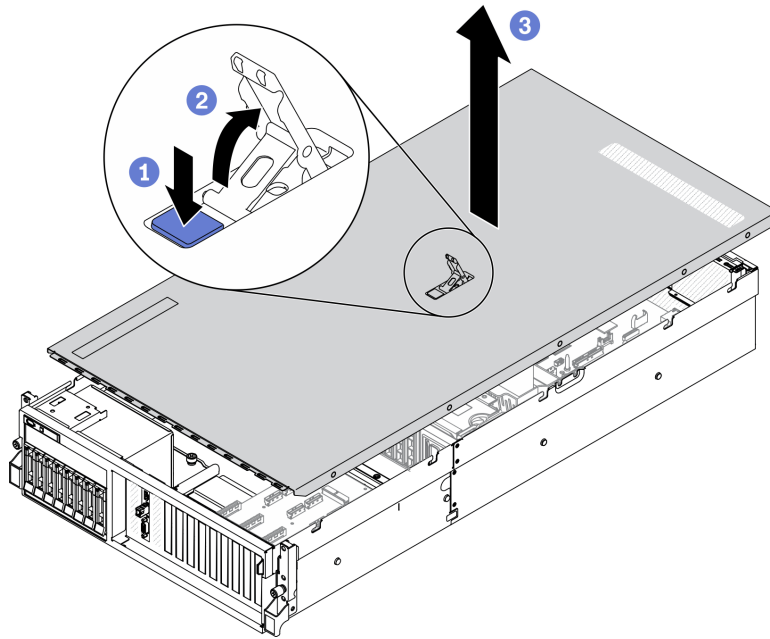
Figure 113. Removing top cover

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Remove the fan cage

Follow instructions in this section to remove the fan cage.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See "Power off the server" on page 257.
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See "Remove the server from rack" on page 184.

Procedure

Step 1. Prepare your server.

  a. Remove the top cover. See "Remove the top cover" on page 187.

Step 2. Remove the fan cage.

  a. ❶ Rotate the release latches on the fan cage up to disengage it from the chassis.

  b. ❷ Hold the handles, and lift the fan cage out of the chassis.
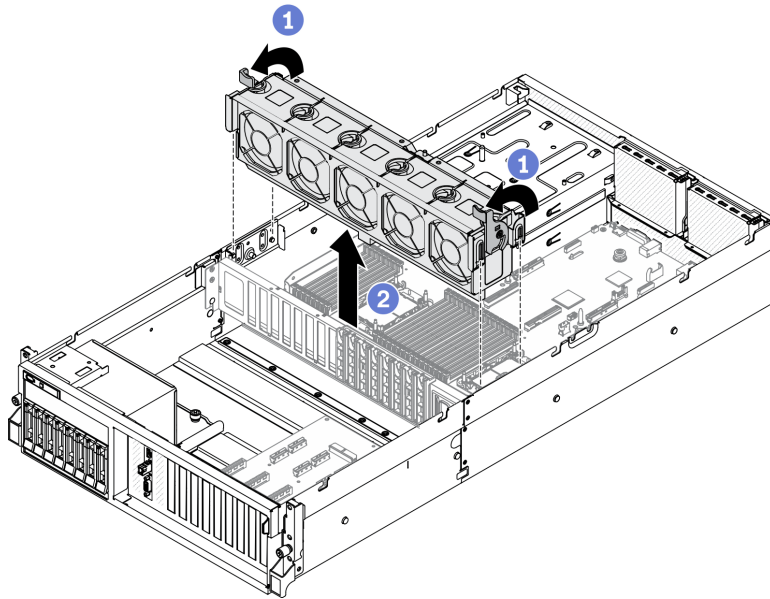
Figure 114. Removing the fan cage

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Remove the air baffle

Follow instructions in this section to remove the air baffle.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See "Power off the server" on page 257.
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See "Remove the server from rack" on page 184.
- If you intend to install memory modules in the server, you must first remove the air baffle from the server.

Procedure

Step 1. Prepare your server.

   a. Remove the top cover. See "Remove the top cover" on page 187.

Step 2. Disconnect the M.2 backplane cables from the system board.

   a. **1** Press and hold the latches on the M.2 cables.

b.   ❷ Disconnect the cables from system board.
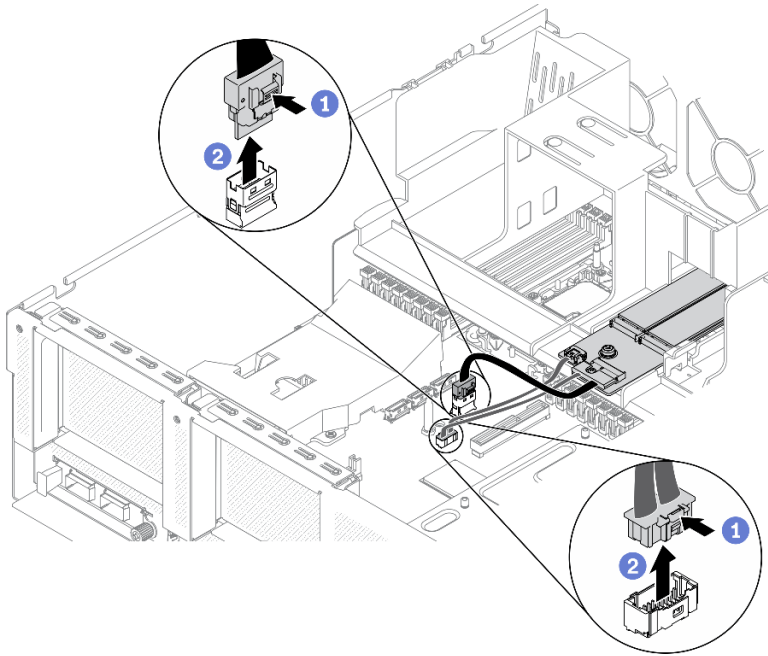
Figure 115. Disconnecting the M.2 backplane cables from system board

Step 3.   Grasp the air baffle and carefully lift it out of the chassis.

Attention: For proper cooling and airflow, reinstall the air baffle before you turn on the server. Operating the server with the air baffle removed might damage server components.
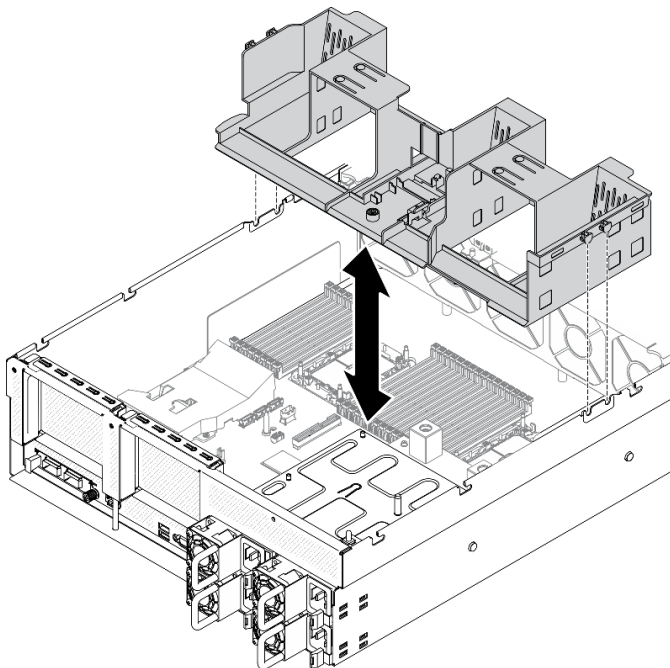
Figure 116. Removing the air baffle

Step 4. Remove the M.2 backplane from the air baffle. See
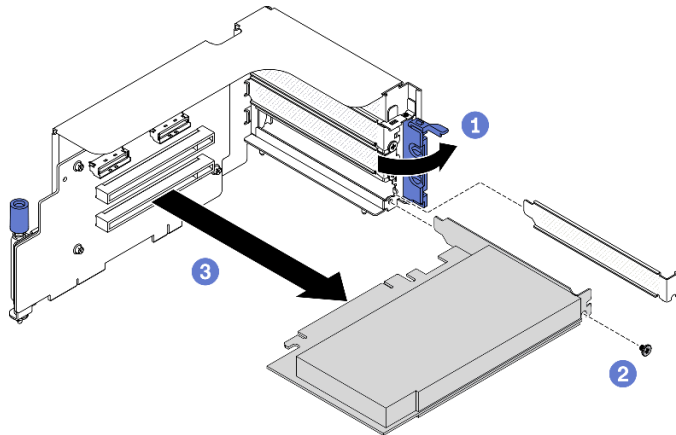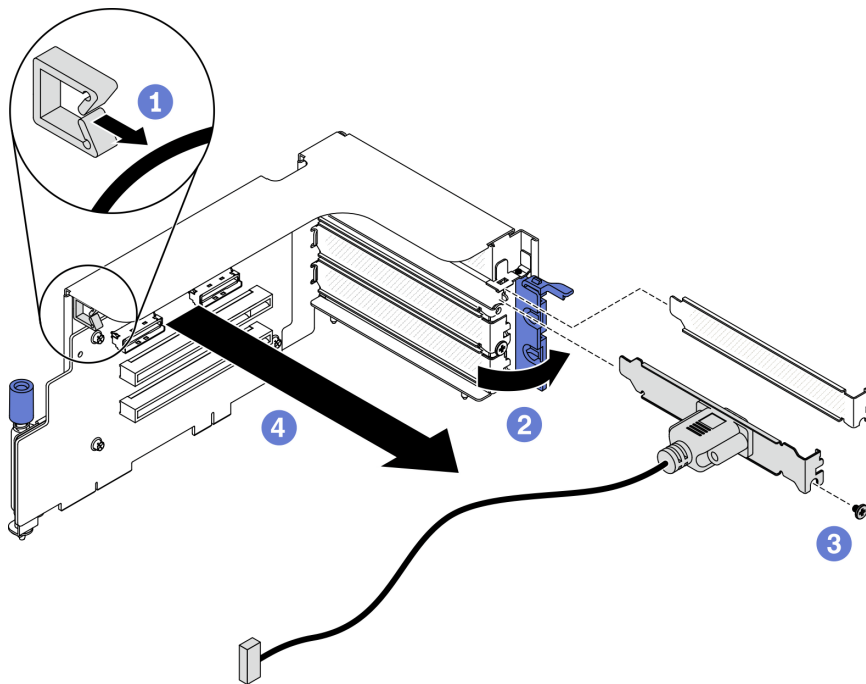
After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Remove the common components

Follow instructions in this section to remove the common components.

Remove the M.2 backplane

Follow instructions in this section to remove the M.2 backplane.

About this task

Attention:

- Read and to ensure that you work safely.
- If one or more NVMe solid-state drives are to be removed, it is recommended to disable them beforehand via the operating system.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board), drive backplanes or drive cables, back up all important data that is stored on drives.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.

Procedure

Step 1. Prepare your server.

   a. Remove the top cover. See .

Step 2. Disconnect the M.2 cable from system board

   a. ❶ Press and hold the latches on the M.2 cables.

   b. ❷ Disconnect the cables from system board.

Figure 117. Disconnecting M.2 cables

Step 3. Remove the M.2 backplane.

    a. ❶ Unfasten the screw that secures the M.2 backplane to the air baffle.

    b. ❷ Slide and release the M.2 backplane retention latch on the air baffle.

    c. ❸ Slide and lift the M.2 backplane out of the air baffle.
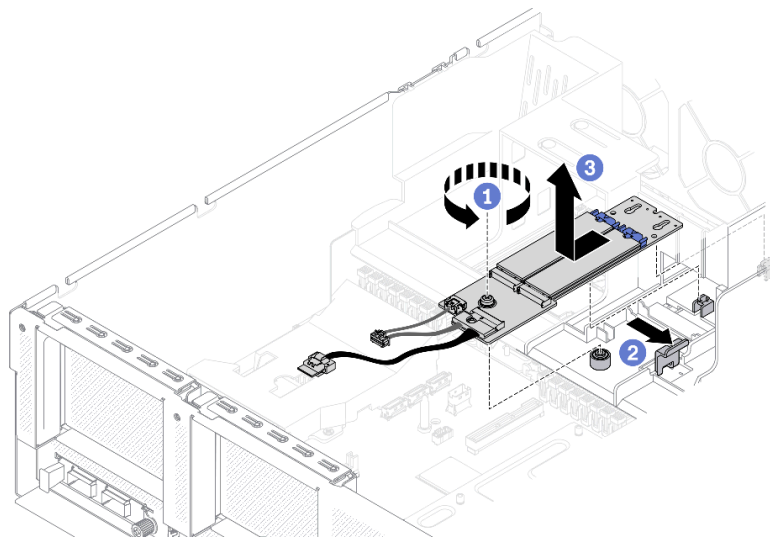
Figure 118. Removing the M.2 backplane

Step 4. (Optional) Remove the M.2 backplane cables from the M.2 backplane.

    a. ❶ Unfasten the screw on the signal cable.

    b. ❷ Remove the M.2 cables from the M.2 backplane.
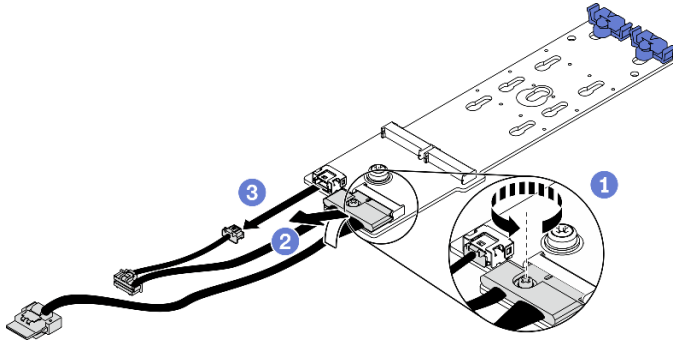
Figure 119. Removing M.2 cables from the M.2 backplane

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Remove an M.2 drive

Follow instructions in this section to remove the M.2 drive.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.
- If one or more NVMe solid-state drives are to be removed, it is recommended to disable them beforehand via the operating system.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board), drive backplanes or drive cables, back up all important data that is stored on drives.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.

Procedure

Step 1. Prepare your server.

    a. Remove the top cover. See "Remove the top cover" on page 187.

    b. Remove the M.2 backplane. See "Remove the M.2 backplane" on page 192.

Step 2. Remove the M.2 drive.

    a. ❶ Press the retainer from the both sides.

    b. ❷ Slide the retainer away from the M.2 drive

    c. ❸ Rotate the rear end of M.2 drive to an angle.
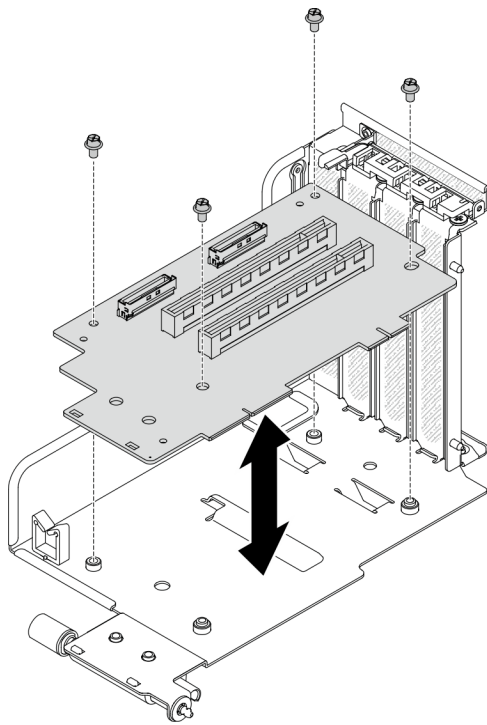
    d. ❹ Remove the M.2 drive from the M.2 backplane.
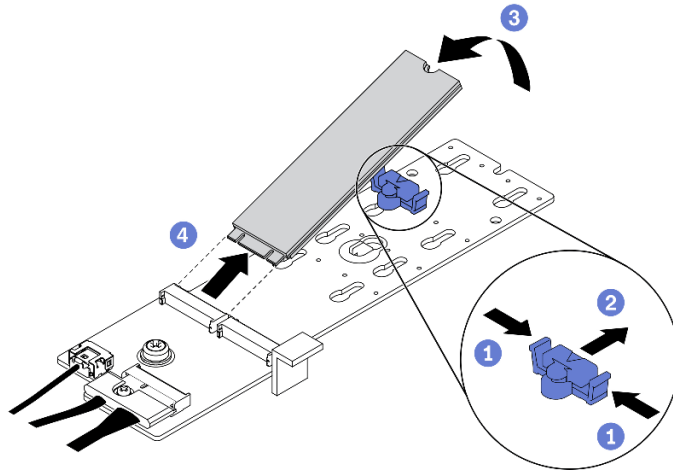
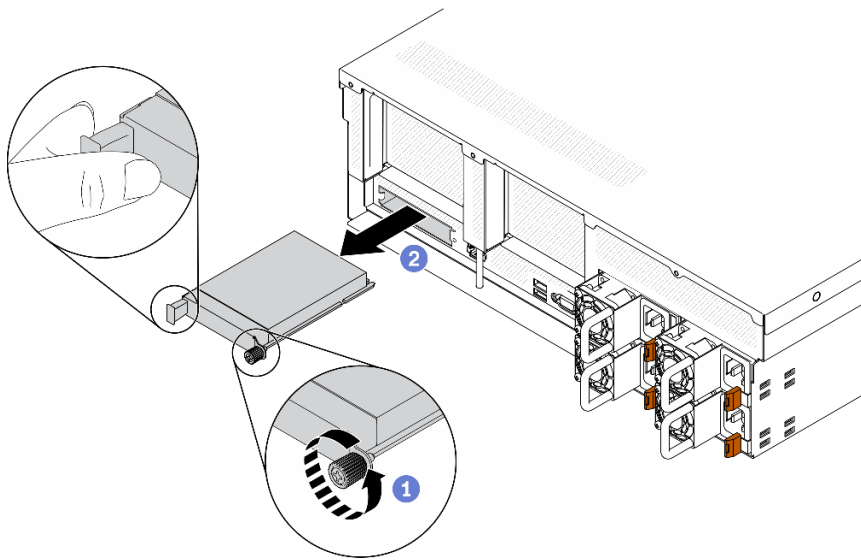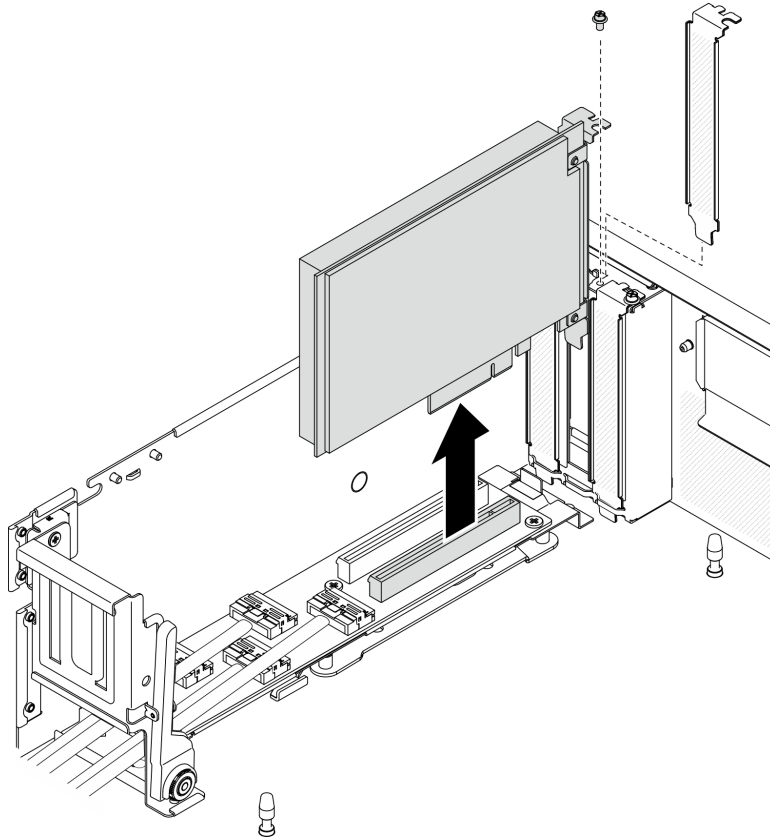*Figure 120. Removing M.2 drive*

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

Remove a PCIe riser

Follow instructions in this section to remove a PCIe riser.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.

Note: To maintain proper system cooling, do not operate the server without a PCIe riser or a rise filler installed in the chassis.

Select the PCIe removal scenario

There are three PCIe riser removal scenarios differentiated by PCIe riser location and serial port installation. See corresponding instructions below for proper removal procedure.
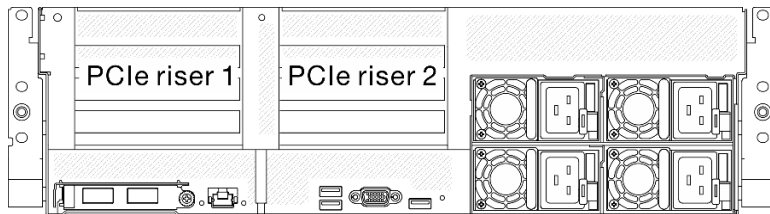
Figure 121. PCIe riser locations in the rear of the chassis

1. Removing PCIe riser 1 or PCIe riser 2 without serial port module installed. See "Remove a PCIe riser without serial port" on page 196.

2. Removing PCIe riser 1 installed with serial port module. See "Remove PCIe riser 1 installed with serial port" on page 196.

3. Removing PCIer riser 2 installed with serial port module. See "Remove PCIe riser 2 installed with serial port" on page 197.

Remove a PCIe riser without serial port

Procedure

Step 1. Prepare your server.

    a. Remove the top cover. See "Remove the top cover" on page 187.

    b. Disconnect cables that are connected to the PCIe riser and the PCIe adapter.

Step 2. Remove the PCIe riser.

    a. ❶ Unfasten the thumbscrew on the PCIe riser.

    b. ❷ Lift the PCIe riser out of the chassis.
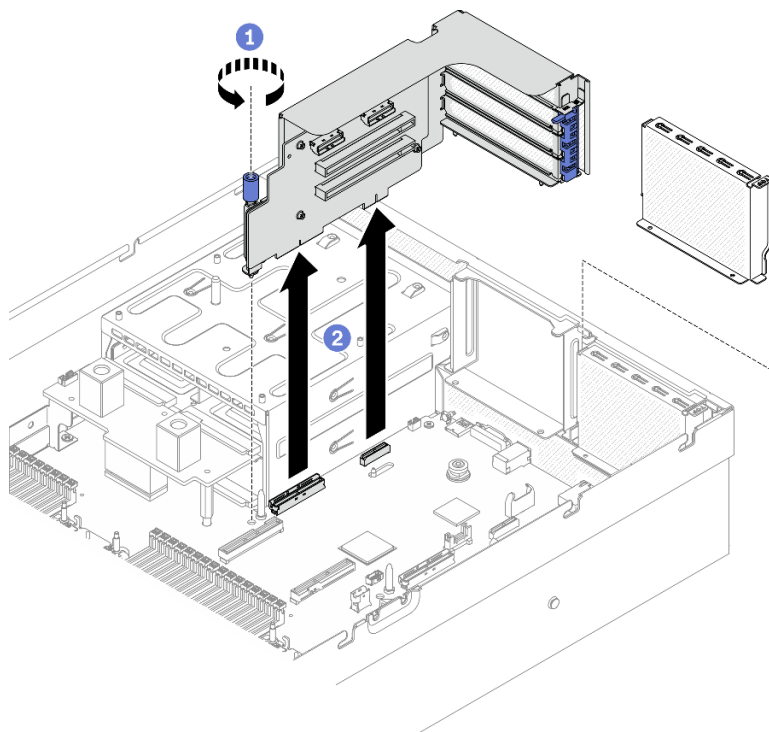
Figure 122. Removing the PCIe riser

Remove PCIe riser 1 installed with serial port

Procedure

Step 1. Prepare your server.

    a. Remove the top cover. See "Remove the top cover" on page 187.

    b. Disconnect cables that are connected to the PCIe riser and the PCIe adapter.

Step 2. If PCIe riser 2 is installed, remove it from chassis. See "Remove a PCIe riser without serial port" on page 196.

Step 3. Remove the PCIe riser 1 installed with serial port.

a. ❶ Disconnect serial port cable from system board.

b. ❷ Unfasten the thumbscrew on the PCIe riser.

c. ❸ Lift the PCIe riser out of the chassis.
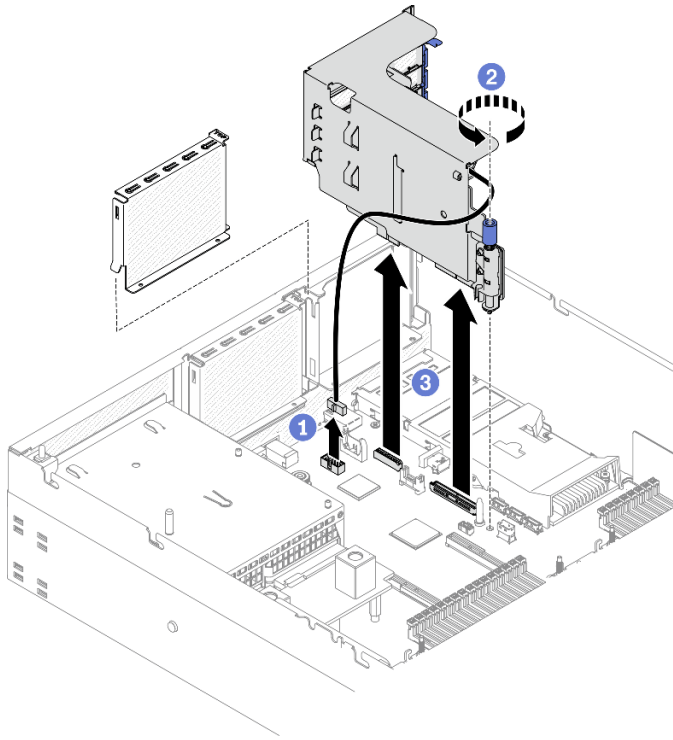
Figure 123. Removing PCIe riser 1 installed with serial port

Remove PCIe riser 2 installed with serial port

Procedure

Step 1. Prepare your server.

    a. Remove the top cover. See .

    b. Disconnect cables that are connected to the PCIe riser and the PCIe adapter.

Step 2. Remove the PCIe riser.

    a. ❶ Unfasten the thumbscrew on the PCIe riser.

    b. ❷ Slightly lift up the PCIe riser, and disconnect the serial port cable from the system board.

    c. ❸ Lift the PCIe riser out of the chassis.
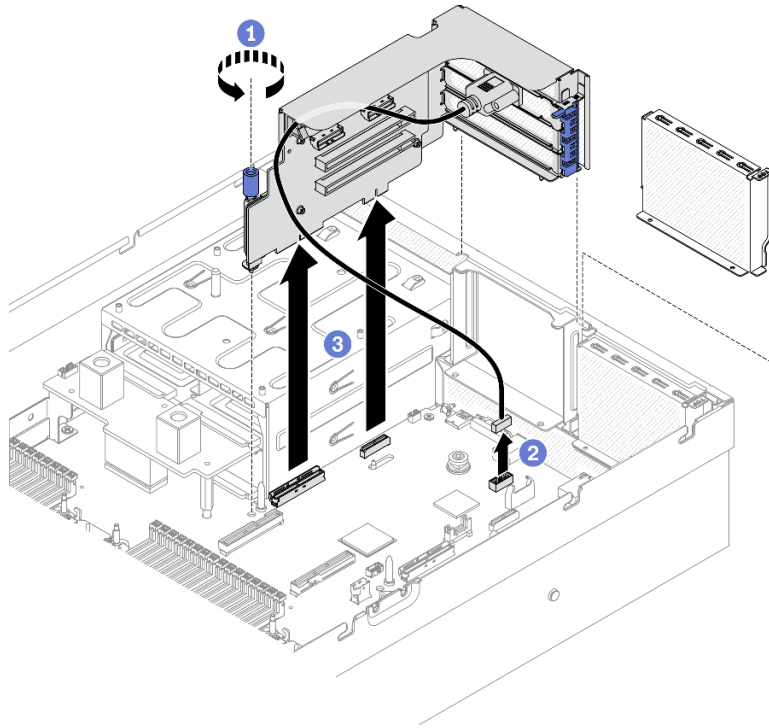
Figure 124. Removing the PCIe riser 2 installed with serial port

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

Remove a PCIe adapter

Follow instructions in this section to remove a PCIe adapter from the rear PCIe riser.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.

Procedure

Step 1.   Prepare your server.

  a.   Remove the top cover. See "Remove the top cover" on page 187.

  b.   Remove the PCIe riser. See "Remove a PCIe riser" on page 195.

Step 2.   Remove the PCIe adapter.

  a.   ❶ Open the retention latch on the PCIe riser.

  b.   ❷ Unfasten the screw that secures the PCIe adapter to the PCIe riser.

c. ❸ Remove the PCIe adapter from the PCIe riser.

Figure 125. Removing a PCIe adapter

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

Remove the serial port module

Follow instructions in this section to remove the serial port module from the rear PCIe riser.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.

Procedure

Step 1. Prepare your server.

  a. Remove the top cover. See "Remove the top cover" on page 187.

  b. Remove the PCIe riser. See "Remove a PCIe riser" on page 195.

Step 2. Remove the serial port module.

  a. ❶ Remove the serial port cable from the cable clip.

  b. ❷ Open the retention latch on the PCIe riser.

  c. ❸ Unfasten the screw that secures the serial port module to the PCIe riser.

  d. ❹ Remove the serial port module from the PCIe riser.

Figure 126. Removing the serial port module

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Remove a PCIe riser board

Follow instructions in this section to remove a PCIe riser board from the rear PCIe riser.

About this task

Attention:

• Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.

Note: To maintain proper system cooling, do not operate the server without a PCIe riser or a rise filler installed in the chassis.

Procedure

Step 1.   Prepare your server.

    a.   Remove the top cover. See "Remove the top cover" on page 187.

    b.   Remove the PCIe riser. See "Remove a PCIe riser" on page 195.

    c.   Remove the PCIe adapter or serial port module. See "Remove a PCIe adapter" on page 198 or "Remove the serial port module" on page 199.

Step 2.   Unfasten the four screws to remove the PCIe riser board from the PCIe riser cage.

Figure 127. Removing the riser board

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Remove the OCP Ethernet adapter

Follow instructions in this section to remove the OCP Ethernet adapter.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.

Procedure

Step 1. Remove the OCP Ethernet adapter.

    a. ❶ Loosen the captive screw.

    b. ❷ Grasp the handle and slide the adapter out.

Figure 128. Removing the OCP Ethernet adapter

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Remove a network adapter

Follow instructions in this section to remove a network adapter from the front I/O expansion board or the front I/O expansion board module.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.

Procedure

Step 1.   Prepare your server.

        a.   Remove the top cover. See "Remove the top cover" on page 187.

Step 2.   Unfasten the screw that secures the network adapter to the chassis; then, lift it out of the chassis.

Figure 129. Removing the network adapter

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Install the common components

Follow instructions in this section to install the common components.

Install a memory module

Follow instructions in this section to install a memory module.

About this task

See "Memory module installation rules and order" on page 154 for detailed information about memory configuration and setup.

Attention:

• Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.

- Make sure to adopt one of the supported configurations listed in .
- Memory modules are sensitive to static discharge and require special handling. Refer to the standard guidelines at :
  - Always wear an electrostatic-discharge strap when removing or installing memory modules. Electrostatic-discharge gloves can also be used.
  - Never hold two or more memory modules together so that they do not touch each other. Do not stack memory modules directly on top of each other during storage.
  - Never touch the gold memory module connector contacts or allow these contacts to touch the outside of the memory module connector housing.
  - Handle memory modules with care: never bend, twist, or drop a memory module.
  - Do not use any metal tools (such as jigs or clamps) to handle the memory modules, because the rigid metals may damage the memory modules.
  - Do not insert memory modules while holding packages or passive components, which can cause package cracks or detachment of passive components by the high insertion force.

Important: Remove or install memory modules for one processor at a time.

Procedure

Step 1. If any of the modules to be installed is PMEM, make sure to complete the following procedure before physically installing the module:

1. Back up stored data in PMEM namespaces.

2. Disable PMEM security with one of the following options:

   - **LXPM**

     Go to **UEFI Setup ➙ System Settings ➙ Intel Optane PMEMs ➙ Security ➙ Press to Disable Security**, and input passphrase to disable security.

   - **Setup Utility**

     Go to **System Configuration and Boot Management ➙ System Settings ➙ Intel Optane PMEMs ➙ Security ➙ Press to Disable Security**, and input passphrase to disable security.

3. Delete namespaces with command corresponding to the operating system that is installed:

   - **Linux** command:
     ```
     ndctl destroy-namespace all -f
     ```

   - **Windows** Powershell command:
     ```
     Get-PmemDisk | Remove-PmemDisk
     ```

4. Clear Platform Configuration Data (PCD) and Namespace Label Storage Area (LSA) with the following ipmctl command (for both Linux and Windows).
   ```
   ipmctl delete -pcd
   ```

   Notes: See the following links to learn how to download and use impctl in different operating systems:

   - Windows: https://datacentersupport.lenovo.com/us/en/videos/YTV101407
   - Linux: https://datacentersupport.lenovo.com/us/en/solutions/HT508642

5. Reboot the system.

Step 2. Prepare your server.

   a. Remove the top cover. See .

b.   Remove the air baffle. See "Remove the air baffle" on page 190.

Step 3.   Touch the static-protective package that contains the memory module to any unpainted surface on the outside of the server. Then, take the memory module out of the package and place it on a static-protective surface.

Step 4.   Locate the required memory module slot on the system board.

Note:

- Remove or install memory modules for one processor at a time.
- Ensure that you observe the installation rules and sequence order in "Memory module installation rules and order" on page 154.
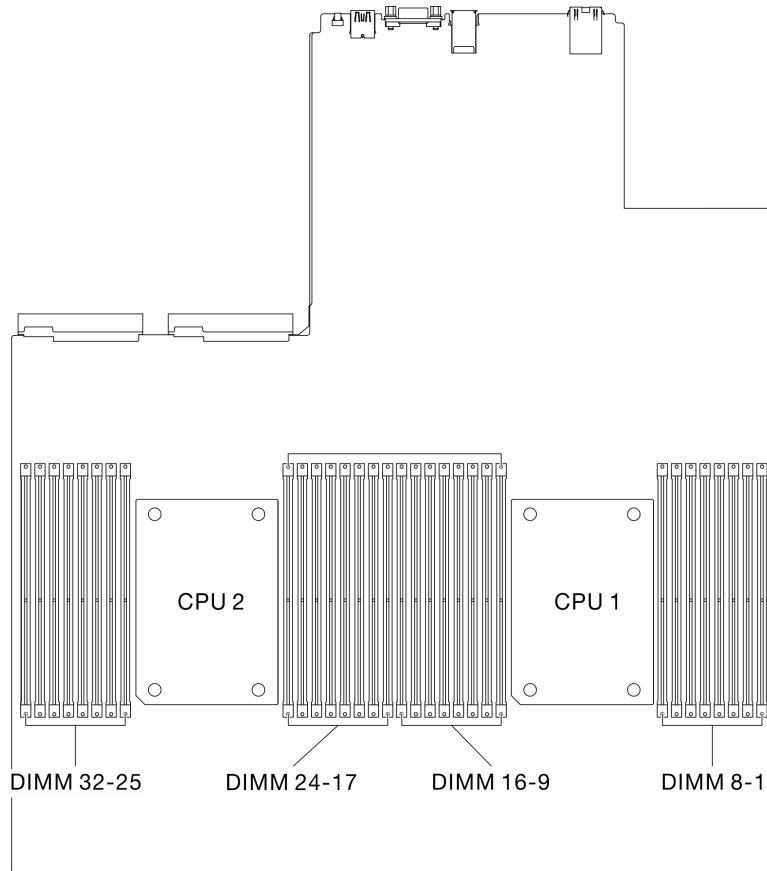
Figure 130. Location of memory module slots and processor sockets

Step 5. Install the memory module into the slot.

    a. ❶ Carefully use a common tool to press the retaining clips.

    b. ❷ Push the retaining clips outward on each end of the memory module slot.

    c. ❸ Align the memory module with the slot, and gently place the memory module on the slot with both hands. Firmly press both ends of the memory module straight down into the slot until the retaining clips snap into the locked position.

    Attention:

- To avoid breaking the retaining clips or damaging the memory module slots, open and close the clips gently.

- If there is a gap between the memory module and the retaining clips, the memory module has not been correctly inserted. In this case, open the retaining clips, remove the memory module, and then reinsert it.
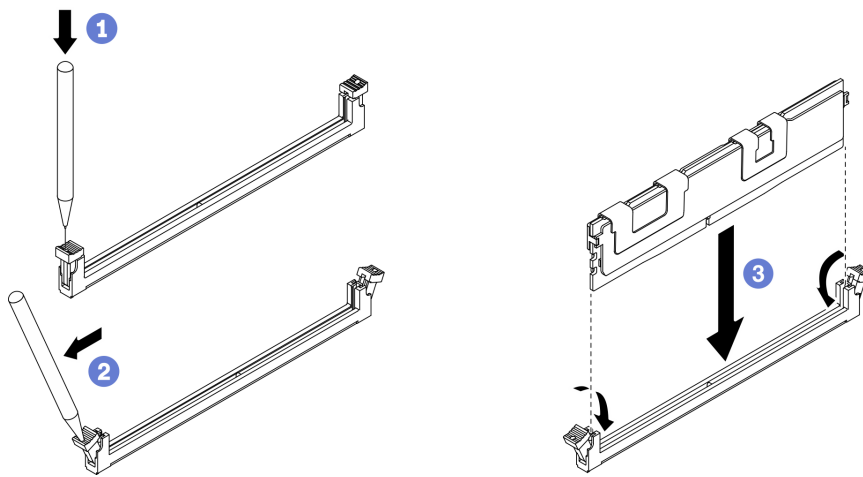
Figure 131. Memory module installation

Step 6. Align the cable guide with the guide pins; then, attach the cable guide to the chassis, and slide it down to secure it in place.
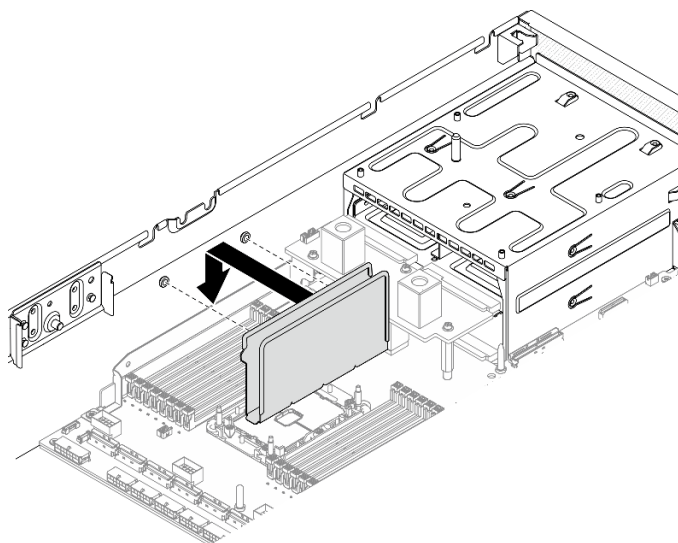
Figure 132. Installing the cable guide to the chassis

After you finish

Note: Change and save the new configuration information by using the Setup utility. When you turn on the server, a message indicates that the memory configuration has changed. Start the Setup utility and select **Save Settings** to save changes. See the *ThinkSystem SR670 V2 Setup Guide* for more information.

Demo video

[Watch the procedure on YouTube](#)

Install an M.2 drive

Follow instructions in this section to install an M.2 drive.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Locate the connector you want to install the M.2 drive on the M.2 backplane.

Step 2. If needed, adjust the position of the M.2 drive retainer so that it is compatible with the size of the M.2 drive you are installing.

Step 3. Slide the M.2 retainer backward to ensure enough space for the M.2 drive installation.

Step 4. Install the M.2 drive.

    a. ❶ Hold the M.2 drive at an angle, and insert it into the M.2 slot.

    b. ❷ Lower the M.2 drive.

    c. ❷ Slide the retainer toward the M.2 drive to secure it in place.
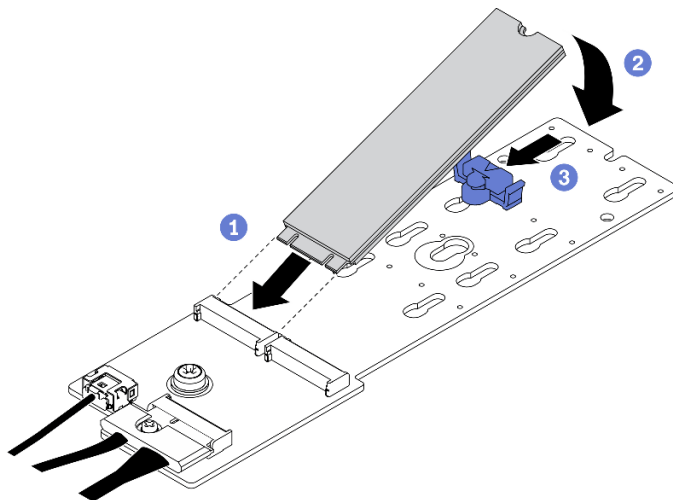
Figure 133. Installing an M.2 drive

After you finish

Complete the parts replacement. See "Complete the parts replacement" on page 256.

Demo video

Watch the procedure on YouTube

Install the M.2 backplane
Follow instructions in this section to install the M.2 backplane.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Make sure the air baffle is installed in chassis. See "Remove the air baffle" on page 190.

Step 2. (Optional) Connect the M.2 backplane cables to M.2 backplane.

   a.   ❶ Connect the M.2 backplane cables to the M.2 backplane.

   b.   ❷ Fasten the screw on the signal cable.
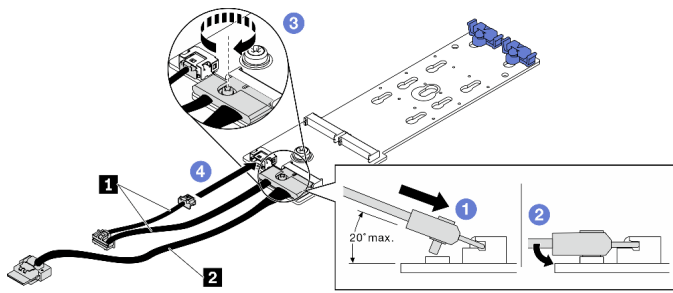
Figure 134. Connecting M.2 backplane cables to M.2 backplane

1 Power cable	**2** Signal cable

Step 3. Install the M.2 backplane.

   a. ❶ Open the M.2 backplane retention latch on the air baffle.

   b. ❷ Align the guide holes on the M.2 backplane with the guide pins on the air baffle; then, lower the M.2 backplane, and insert it into the air baffle.

   c. ❸ Fasten the screw that secures the M.2 backplane to the air baffle.
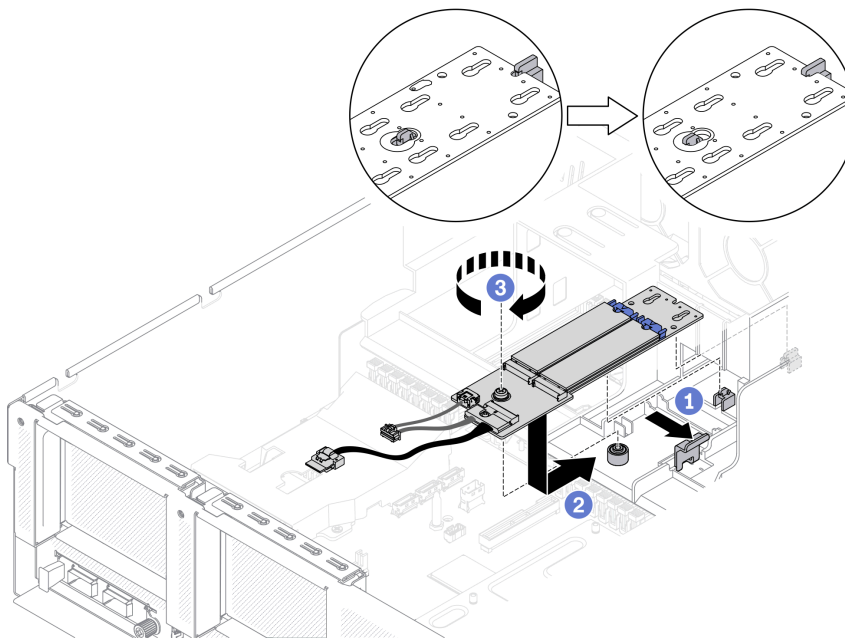
Figure 135. Installing M.2 backplane to the air baffle

Step 4. Connect M.2 cables to the M.2 power connector and signal connector on system board. See for more details.
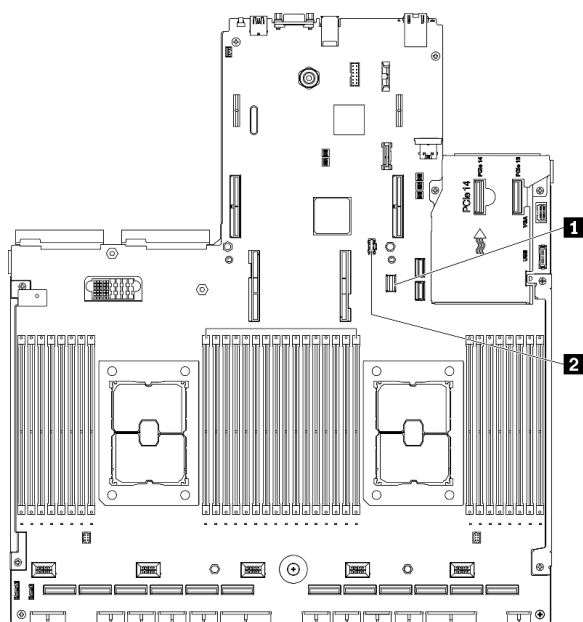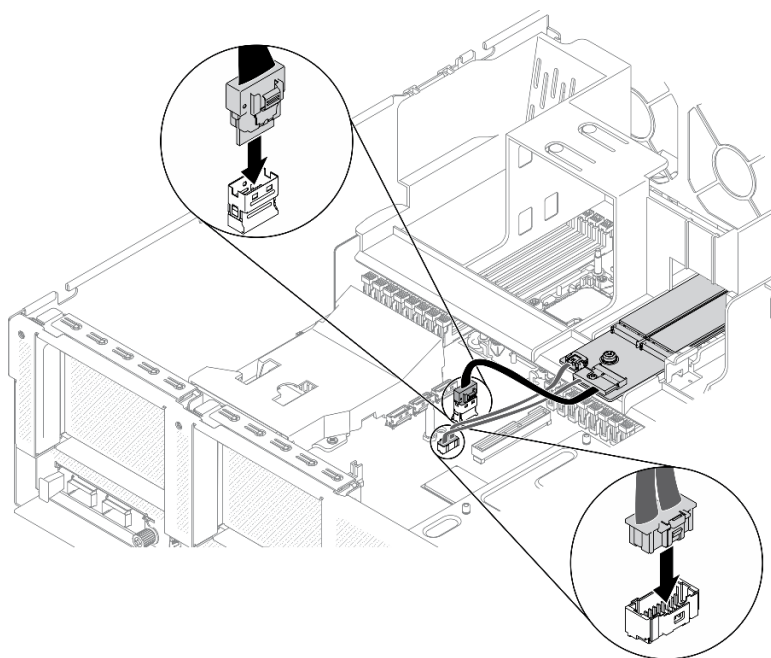
Figure 136. Connecting M.2 backplane cables to system board

1 M.2 signal connector	
2 M.2 power connector	

After you finish

Complete the parts replacement. See "Complete the parts replacement" on page 256.

Demo video

Watch the procedure on YouTube

Install a PCIe riser board

Follow instructions in this section to install a PCIe riser board to the rear PCIe riser.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.
- Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.

Procedure

Step 1.   Fasten the four screws to secure the PCIe riser board to the PCIe riser cage.
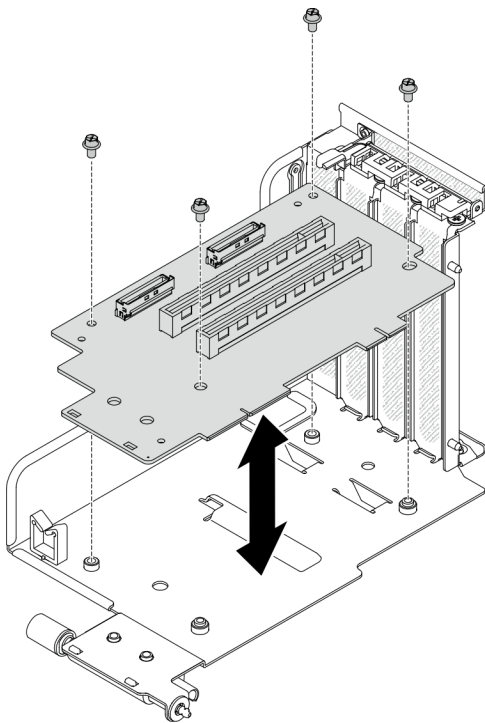
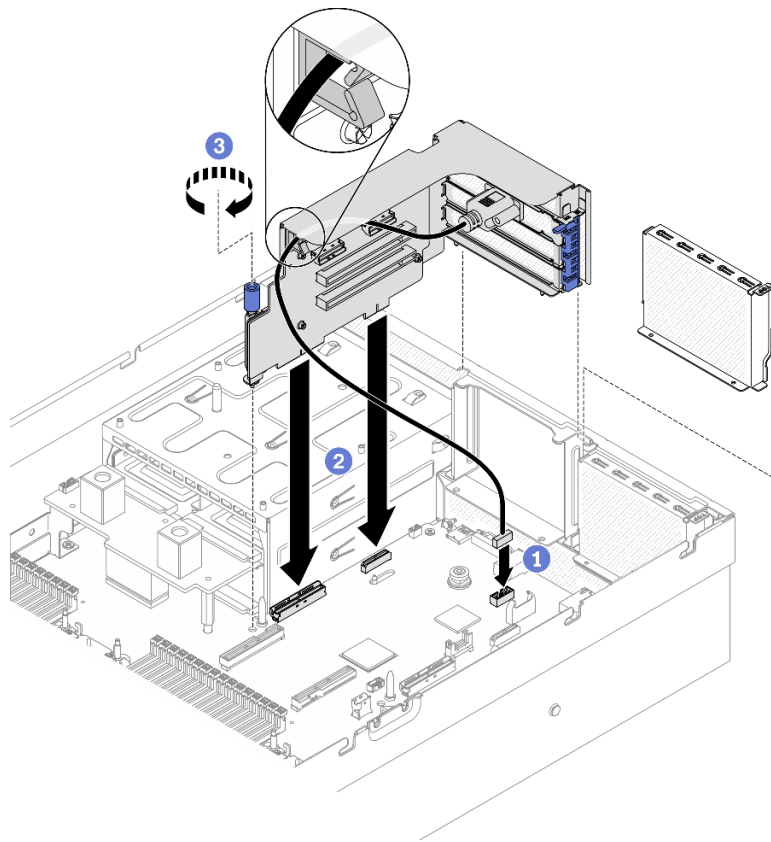*Figure 137. Installing the riser board*

After you finish

1.   Connect the required cables.
2.   Complete the parts replacement. See "Complete the parts replacement" on page 256.

Demo video

Watch the procedure on YouTube

Install a PCIe adapter

Follow instructions in this section to install a PCIe adapter.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Open the retention latch on the PCIe riser.

Step 2. Install the PCIe adapter.

      a. **❶** Insert the PCIe adapter into the PCIe riser.

      b. **❷** Fasten the screw to secure the PCIe adapter to the PCIe riser.

      c. **❸** Close the retention latch.
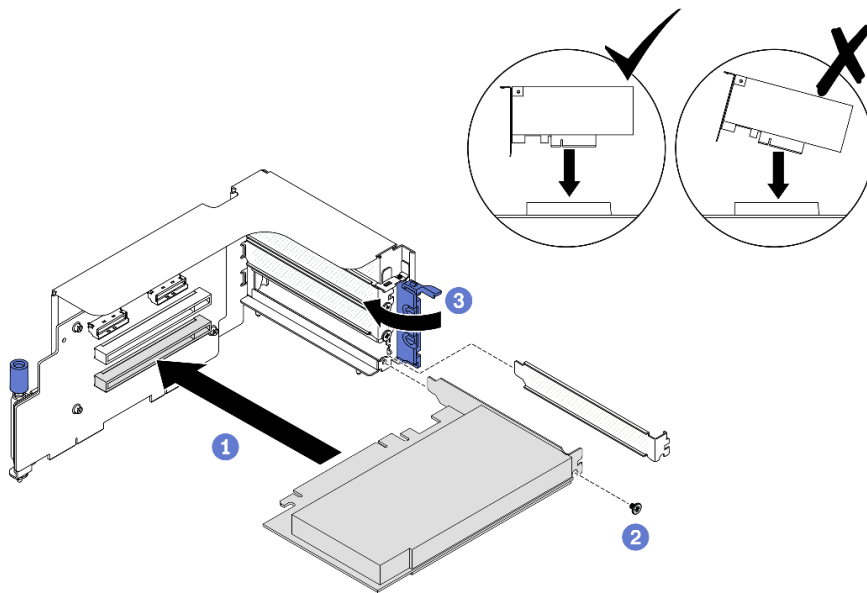
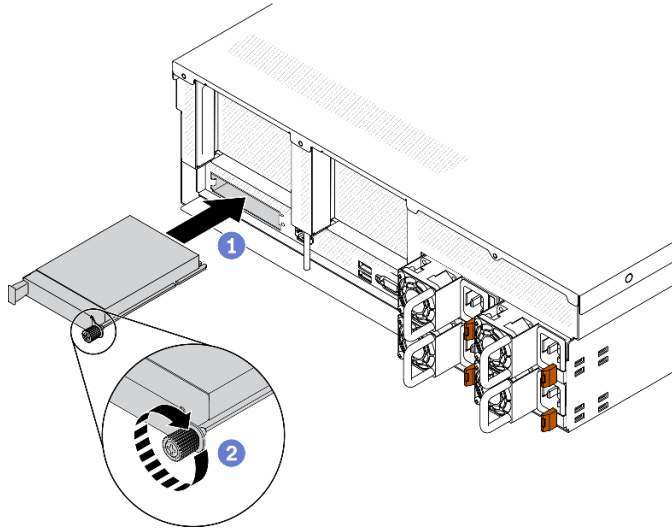*Figure 138. Installing a PCIe adapter*

After you finish

1. Connect the required cables.
2. Complete the parts replacement. See "Complete the parts replacement" on page 256.

Demo video

Watch the procedure on YouTube

Install the serial port module

Follow instructions in this section to install the serial port module.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.

Procedure

Step 1. Open the retention latch on the PCIe riser.

Step 2. Install the serial port module.

        a.   **❶** Insert the serial port module into the PCIe riser.

        b.   **❷** Fasten the screw to secure the serial port module to the PCIe riser.

        c.   **❸** Close the retention latch.

        d.   **❹** Route the serial port cable through the cable clip.
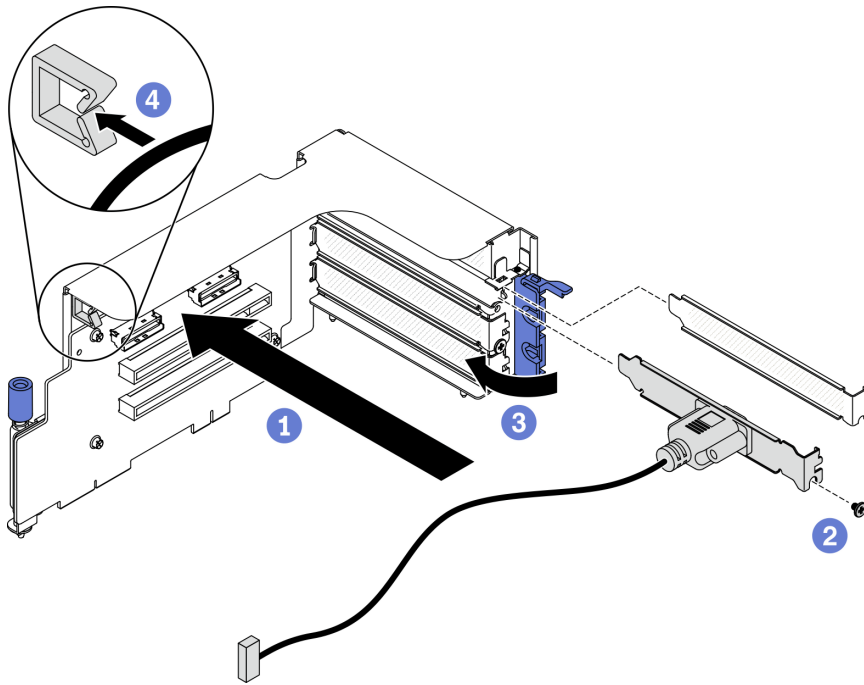
Figure 139. Installing the serial port module

After you finish

1. Connect the serial port cable to the serial port cable connector on the system board. To locate the connector, see "System-board connectors" on page 34.

2. Complete the parts replacement. See "Complete the parts replacement" on page 256.

Demo video

Watch the procedure on YouTube

Install a PCIe riser

Follow instructions in this section to install a PCIe riser.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.

- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Note: To maintain proper system cooling, do not operate the server without a PCIe riser or a rise filler installed in the chassis.

Select the PCIe installation scenario

There are three PCIe riser installation scenarios differentiated by PCIe riser location and serial port installation. See corresponding instructions below for proper installation procedure.
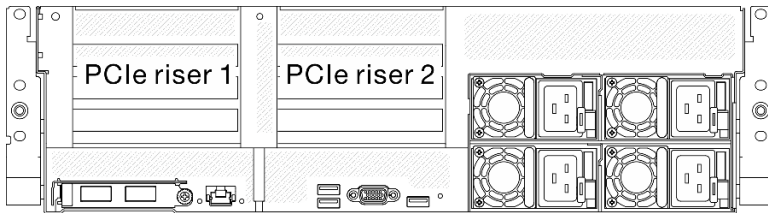
Figure 140. PCIe riser locations

1. Installing PCIe riser 1 or PCIe riser 2 without serial port module installed. See "Install a PCIe riser without serial port" on page 214.
2. Installing PCIe riser 1 installed with serial port module. See "Install PCIe riser 1 installed with serial port" on page 215.
3. Installing PCIer riser 2 installed with serial port module. See "Install PCIe riser 2 installed with serial port" on page 216.

Install a PCIe riser without serial port

Procedure

Step 1. Install the PCIe riser.

a. ❶ Align the guide hole on the PCIe riser to the guide post on system board, and insert the PCIe riser into the PCIe slots on system board.

b. ❷ Fasten the thumbscrew to secure the PCIe riser.
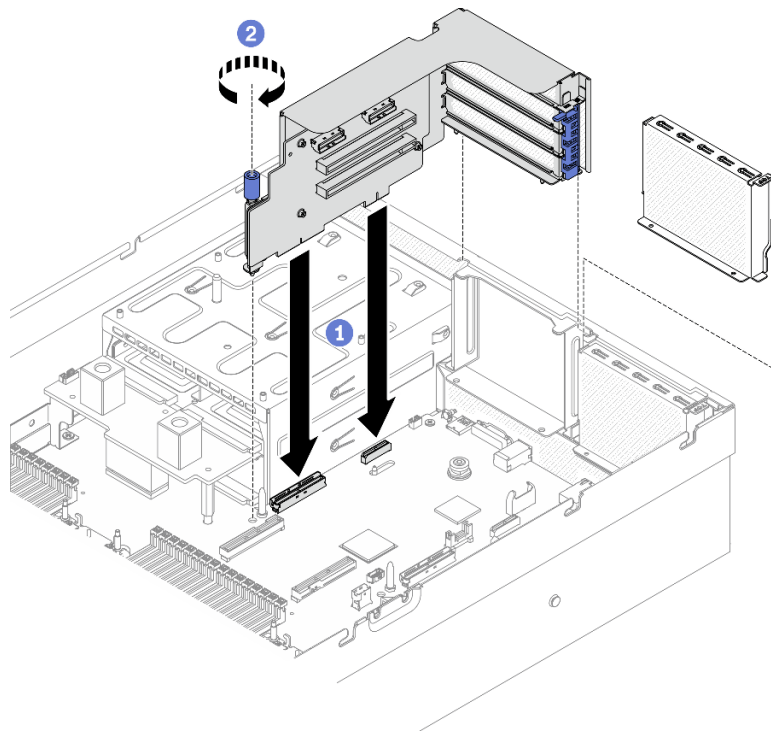
Figure 141. Installing a PCIe riser without serial port

Install PCIe riser 1 installed with serial port

Procedure

Step 1.   If PCIe riser 2 is installed, remove it. See "Remove a PCIe riser" on page 195.

Step 2.   Install the PCIe riser.

Attention: Make sure the serial port cable is routed through the cable clip inside the PCIe riser.

a.   ❶ Align the guide hole on the PCIe riser to the guide post on system board, and insert the PCIe riser into the PCIe slots on system board.

b.   ❷ Fasten the thumbscrew to secure the PCIe riser.

c.   ❸ Connect serial port cable to serial port connector on system board.
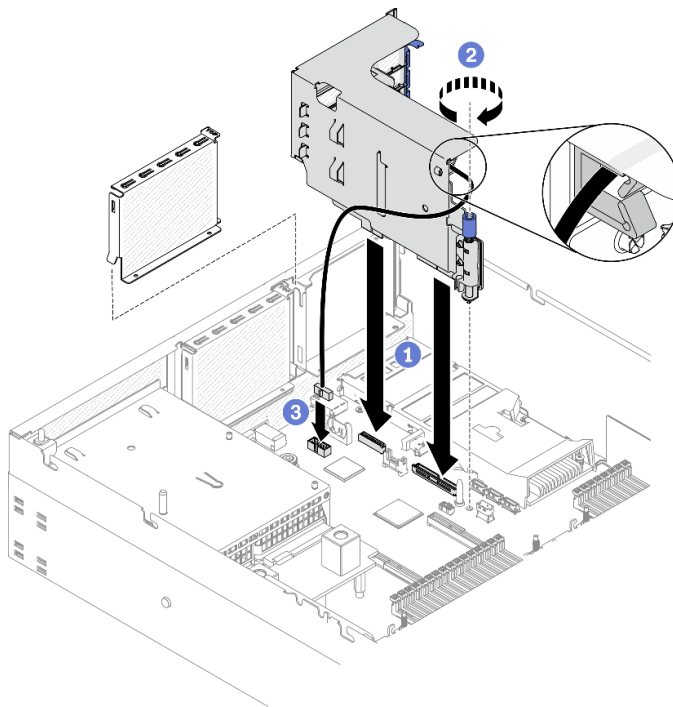
Figure 142. Installing PCIe riser 1 installed with serial port

Install PCIe riser 2 installed with serial port

Procedure

Step 1. 1. Install the PCIe riser.

Attention: Make sure the serial port cable is routed through the cable clip inside the PCIe riser.

a. ❶ Connect serial port cable to serial port connector on system board.

b. ❷ Align the guide hole on the PCIe riser to the guide post on system board, and insert the PCIe riser into the PCIe slots on system board.

c. ❸ Fasten the thumbscrew to secure the PCIe riser.

Figure 143. Installing PCIe riser 2 installed with serial port

After you finish

1. Connect the required cables.

2. Complete the parts replacement. See "Complete the parts replacement" on page 256.

Demo video

Watch the procedure on YouTube

Install the OCP Ethernet adapter

Follow instructions in this section to install the OCP Ethernet adapter.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.

- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Install the OCP Ethernet adapter.

Note: If the OCP is covered with a OCP filler, remove the filler from the chassis first.

a. ❶ Slide the adapter into the PCIe slot.

b. ❷ Tighten the captive screw to secure the adapter.

Figure 144. Installing the OCP Ethernet adapter

After you finish

1. Connect the required cables.

2. Complete the parts replacement. See "Complete the parts replacement" on page 256.

Demo video

Watch the procedure on YouTube

Install a network adapter

Follow instructions in this section to install a network adapter to the front I/O expansion board or the front I/O expansion board module.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.

- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Align the network adapter to the PCIe slot on the front I/O expansion board; then, press the network adapter into the slot until it is fully seated.

Step 2. Fasten the screw that secures the network adapter to the chassis.
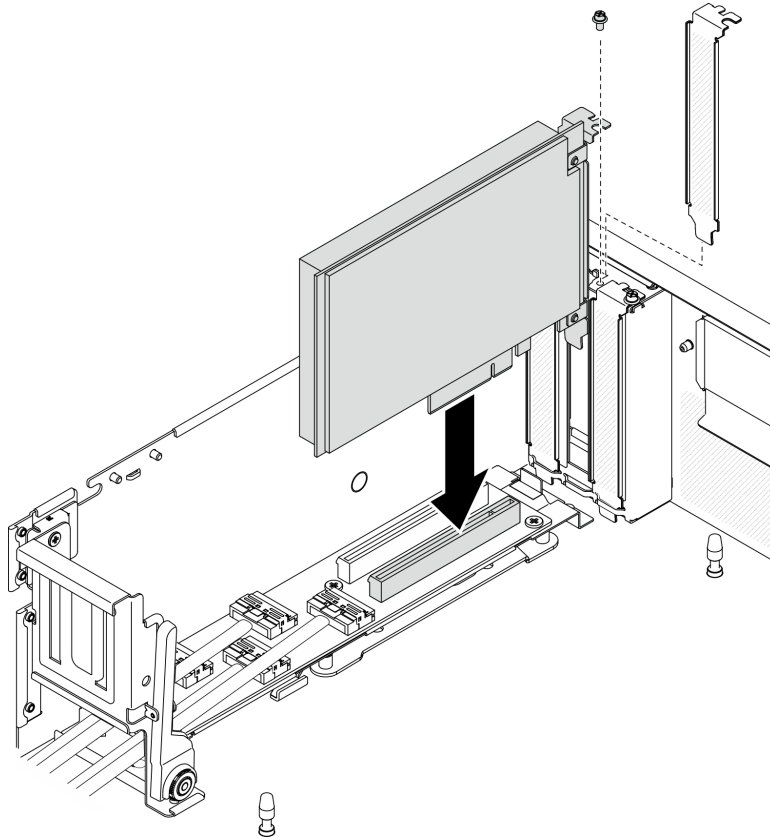
Figure 145. Installing a network adapter

After you finish

Complete the parts replacement. See .

Demo video

Watch the procedure on YouTube

Install the front I/O module
Follow instructions in this section to install the front I/O module.

About this task

Attention:

- Read and to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1. Locate the front I/O module slot based on the server front view of your configuration. See below for more details:

-

-
-

Step 2. Install the front I/O module.

Note: If the front I/O module slot is covered with a slot bracket, remove the bracket from the chassis first.

a. ❶ Insert the front I/O module into the front I/O module slot. Ensure that the module is fully seated.

b. ❷ Fasten the front I/O module retention screw.
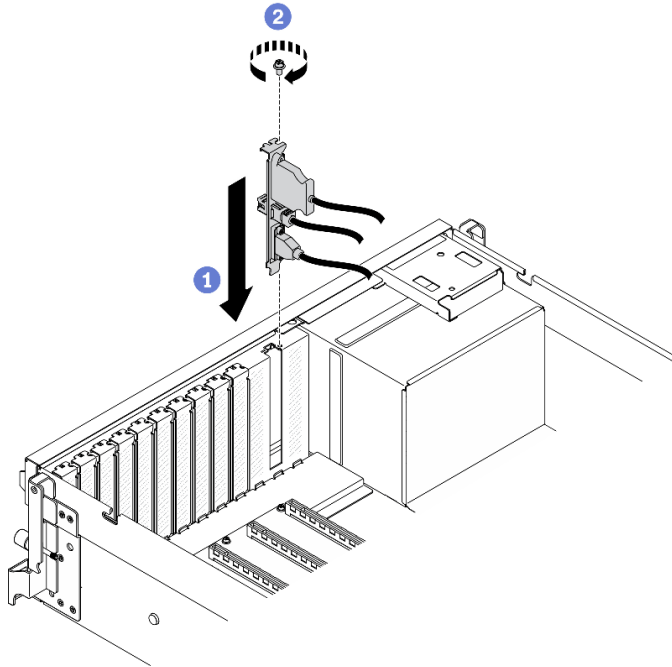
Figure 146. Installing the front I/O module

Step 3. Connect the front USB, video and external LCD diagnostics handset cables from the front I/O module to their respective connectors on the system board.

Note: The front I/O module cabling is different by server model. Refer to the front I/O module cable routing guide for each server model below. See for more details.

From		To	
Front I/O module	**1** Video cable	System board	**1** Front VGA connector
	2 External LCD diagnostics handset cables		**2** LCD connector
	3 USB cable		**3** Front USB connector
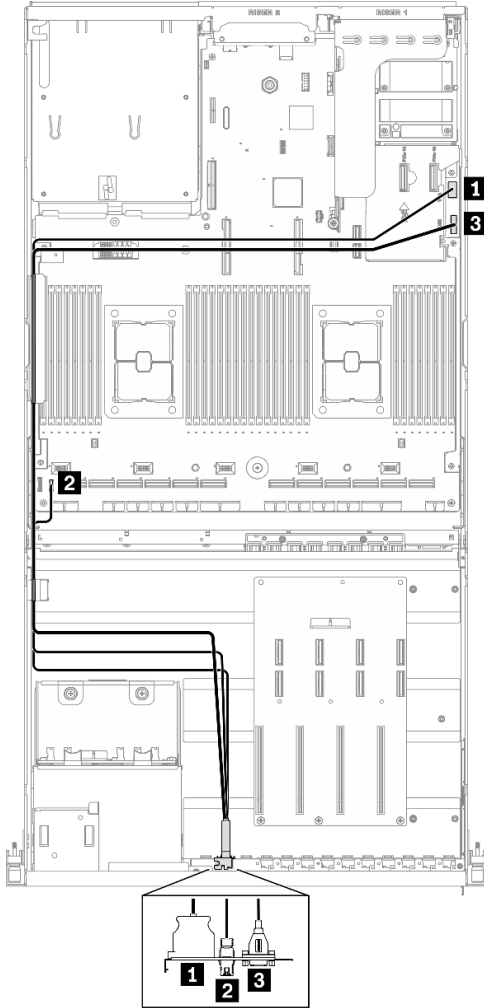
Figure 147. 4-DW GPU Model front I/O module cable routing
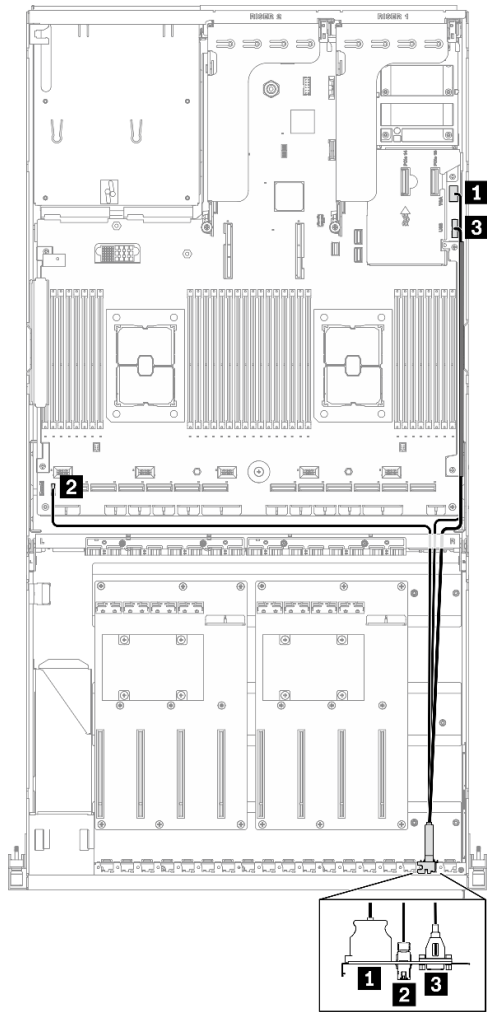
Figure 148. 8-DW GPU Model front I/O module cable routing
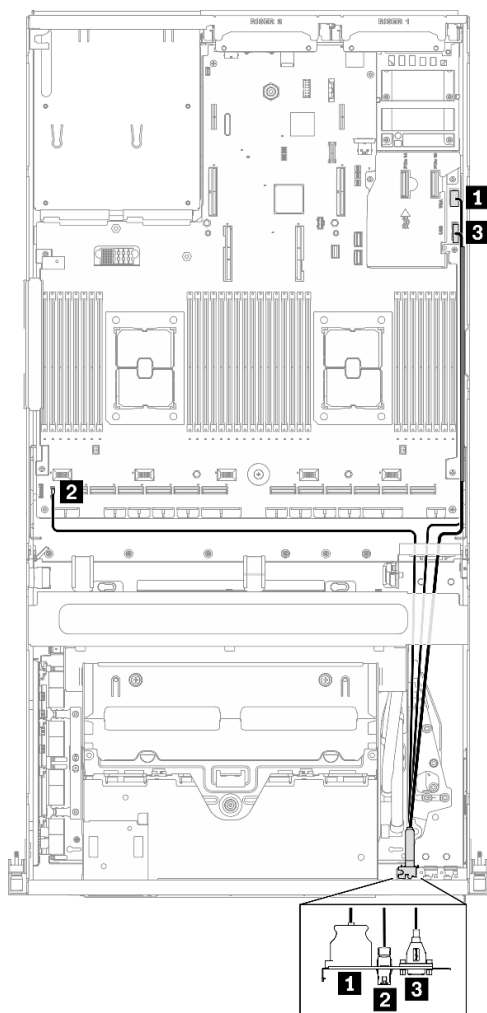
Figure 149. SXM GPU Model front I/O module cable routing

After you finish

Complete the parts replacement. See .

Demo video

[Watch the procedure on YouTube](#)

Remove the 4-DW GPU Model / 8-DW GPU Model components

Follow instructions in this section to remove the 4-DW GPU Model and 8-DW GPU Modelcomponents.

Remove a GPU adapter link bridge

Follow instructions in this section to remove a GPU adapter link bridge.

About this task

Important: Make sure you have a suction cup available for properly removing the GPU adapter link bridge.

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See "Power off the server" on page 257.
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See "Remove the server from rack" on page 184.
- Depending on the specific type, your GPU adapter might look slightly different from the illustrations in this section.
- Follow the additional instructions in any documentation that comes with your GPU adapter.

Procedure

Step 1. Prepare your server.

    a. Remove the top cover. See "Remove the top cover" on page 187.

Step 2. Remove the GPU adapter link bridge from the GPUs with a suction cup.

    a. ❶ Press the suction cup against the GPU adapter link bridge until it adheres to the GPU adapter link bridge.

    b. ❷ Pull up the suction cup and remove the GPU adapter link bridge together with the suction cup from the GPUs.

    Note: Depending on the configuration, there may be one or three GPU adapter link bridges on the GPU. Remove all GPU adapter link bridge from the GPUs.
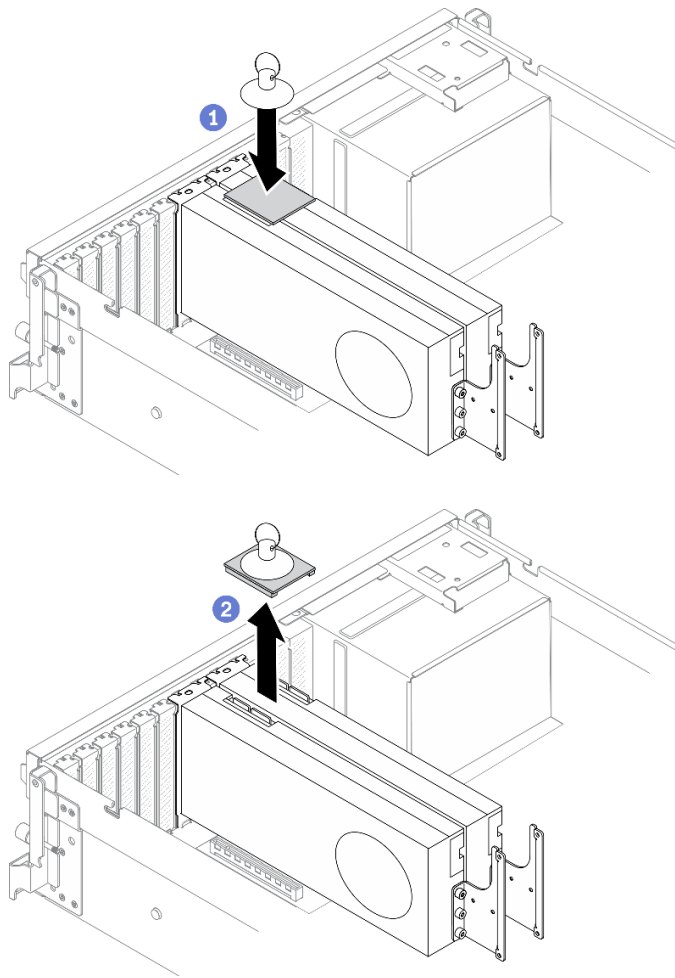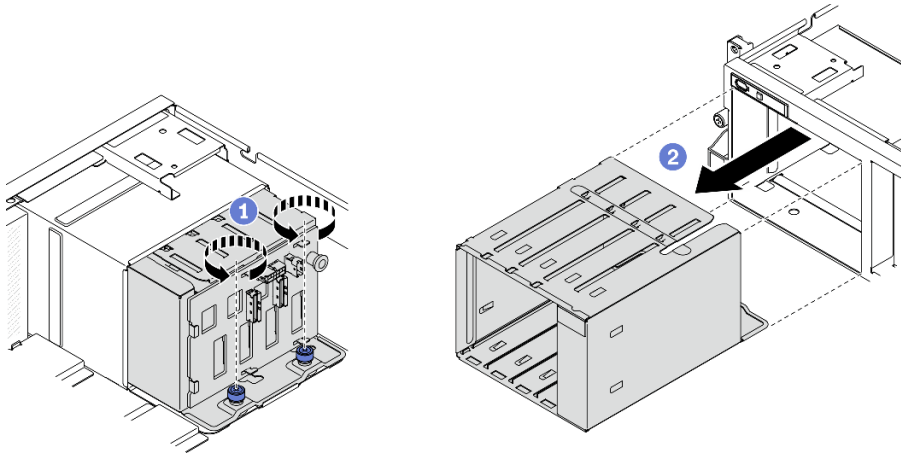
Figure 150. Removing the GPU adapter link bridge

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

Remove a GPU adapter

Follow instructions in this section to remove a GPU adapter.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.

Notes:

- Depending on the specific type, your GPU adapter might look slightly different from the illustrations in this section.
- Follow the additional instructions in any documentation that comes with your GPU adapter.

Procedure

Step 1. Prepare your server.

    a.   Remove the top cover. See "Remove the top cover" on page 187.

    b.   Remove the GPU adapter link bridge(s) if installed. See "Remove a GPU adapter link bridge" on page 223.

          Note: Depending on the configuration, there may be one or three GPU adapter link bridges on the GPU.

Step 2. Remove the GPU adapter.
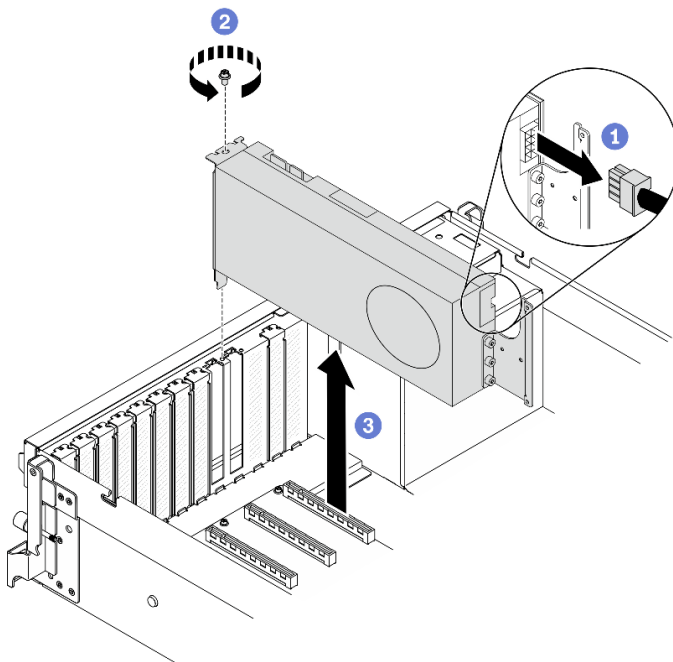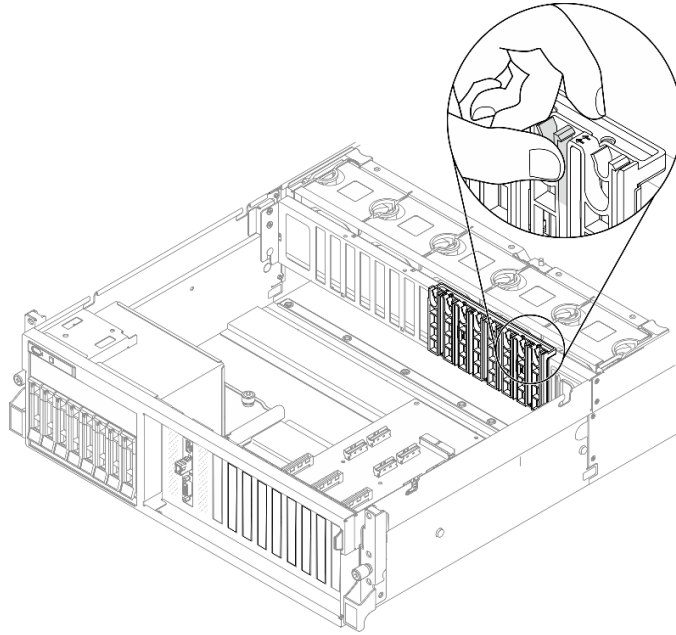
Figure 151. Removing a GPU adapter

    a.   ❶ Locate the GPU adapter that you want to remove and disconnect the power cable from the GPU adapter.

    b.   ❷ Remove the GPU adapter retention screw.

    c.   ❸ Grasp the GPU adapter by its edges and carefully pull it out of the PCIe slot.

          Note: Press on the plastic latch on the rear end to ensure that the GPU adapter can be removed from the chassis smoothly.

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Remove the 2.5-/3.5-inch drive cage assembly

Follow instructions in this section to remove the 2.5-inch or 3.5-inch drive cage assembly.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.

Procedure

Step 1. Prepare your server.

     a. Remove the top cover. See "Remove the top cover" on page 187.

     b. Remove all hot-swap drives and drive bay fillers (if any) from the drive bays. See "Remove a 2.5-/3.5-inch hot-swap drive" on page 172. Place the drives on a static protective surface.

     c. Disconnect the power and signal cables from the 2.5-inch or 3.5-inch drive backplane.

Step 2. Based on your configuration, follow the corresponding procedures to remove the 2.5-inch or 3.5-inch drive cage assembly.

Remove the 2.5-inch drive cage assembly:

     a. ❶ Loosen the two thumbscrews that secure the 2.5-inch drive cage assembly to the chassis.

b. ② Slide the drive cage assembly out of the chassis.
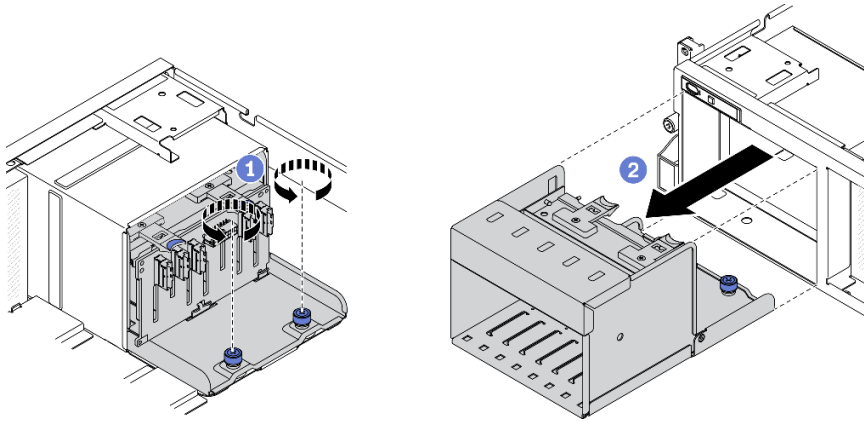
Figure 152. Removing the 2.5-inch drive cage assembly

Remove the 3.5-inch drive cage assembly:

a. ① Loosen the two thumbscrews that secure the 3.5-inch drive cage assembly to the chassis.

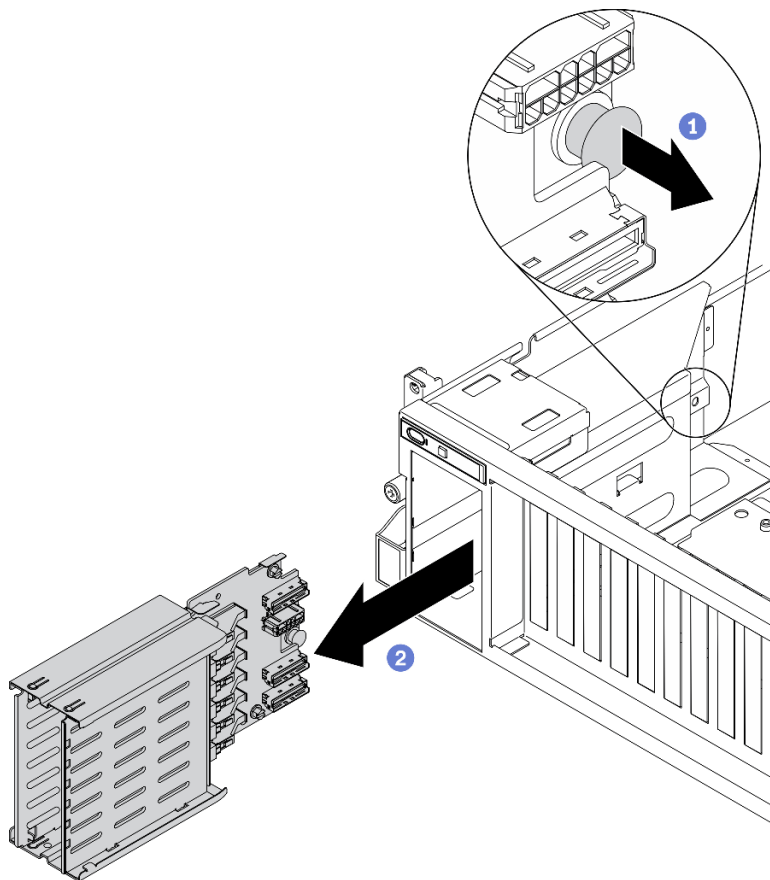b. ② Slide the drive cage assembly out of the chassis.

Figure 153. Removing the 3.5-inch drive cage assembly

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

Remove the 2.5-/3.5-inch drive backplane

Follow instructions in this section to remove the 2.5-inch or 3.5-inch drive backplane.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.

Procedure

Step 1. Prepare your server.

    a. Remove the top cover. See "Remove the top cover" on page 187.

    b. Remove all hot-swap drives and drive bay fillers (if any) from the drive bays. See "Remove a 2.5-/3.5-inch hot-swap drive" on page 172. Place the drives on a static protective surface.

    c. Disconnect the power and signal cables from the 2.5-inch or 3.5-inch drive backplane.

    d. Remove the 2.5-inch or 3.5-inch drive cage assembly. See "Remove the 2.5-/3.5-inch drive cage assembly" on page 227.

Step 2. Based on your configuration, follow the corresponding procedures to remove the 2.5-inch or 3.5-inch drive backplane.

Remove the 2.5-inch drive backplane:

    a. ❶ Lift and hold the retention latches on top of the 2.5-inch drive cage.

    b. ❷ Rotate the 2.5-inch drive backplane away to disengage it from the retention latches as illustrated.

    c. ❸ Remove the backplane from the drive cage.
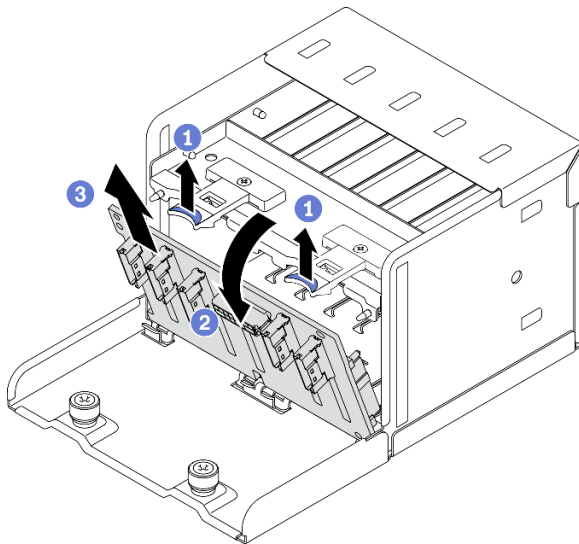
Figure 154. Removing the 2.5-inch drive backplane

Remove the 3.5-inch drive backplane:

    a. ❶ Pull out the blue plunger that secures the 3.5-inch drive backplane.

    b. ❷ Slide the 3.5-inch drive backplane as illustrated to disengage it from the drive cage; then, remove the backplane from the drive cage.
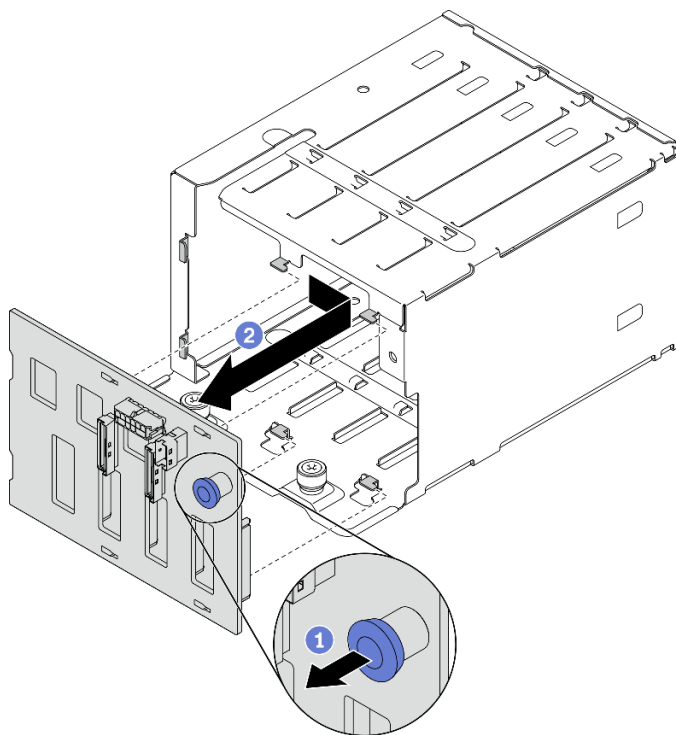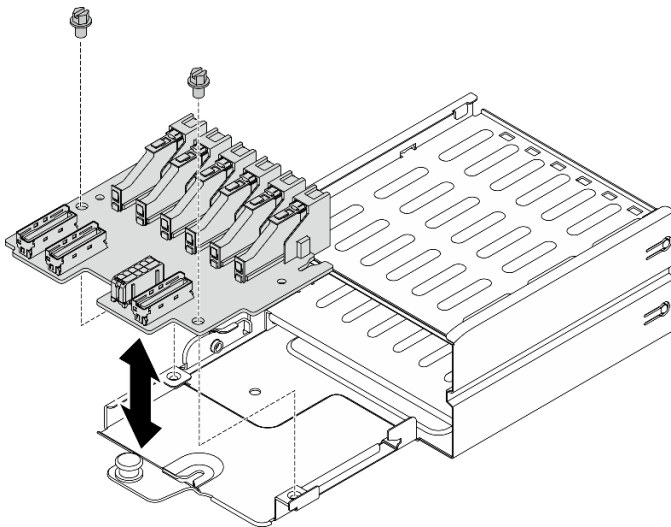
Figure 155. Removing the 3.5-inch drive backplane

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Remove the EDSFF drive cage assembly

Follow instructions in this section to remove the EDSFF drive cage assembly.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See "Power off the server" on page 257.
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See "Remove the server from rack" on page 184.
- To make sure that there is adequate system cooling, do not operate the solution for more than two minutes without either a drive or a filler installed in each bay.
- If one or more EDSFF drives are to be removed, it is recommended to disable them beforehand via the operating system.

- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board), drive backplanes or drive cables, back up all important data that is stored on drives.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.

Procedure

Step 1. Prepare your server.

    a. Remove the top cover. See "Remove the top cover" on page 187.

    b. Remove all EDSFF hot-swap drives and drive bay fillers (if any) from the chassis. See "Remove an EDSFF hot-swap drive" on page 174. Place the drives on a static protective surface.

Step 2. Disconnect the power and signal cables from the EDSFF drive backplane.

Step 3. Remove the EDSFF drive cage assembly.

    a. ❶ Pull out the plunger on the drive cage assembly.

    b. ❷ Slide the drive cage assembly out of the chassis.

Figure 156. Removing the EDSFF drive cage assembly

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Remove the EDSFF drive backplane

Follow instructions in this section to remove the EDSFF drive backplane.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.

Procedure

Step 1. Prepare your server.

    a.   Remove the top cover. See "Remove the top cover" on page 187.

    b.   Remove all EDSFF hot-swap drives and drive bay fillers (if any) from the drive bays. See "Remove an EDSFF hot-swap drive" on page 174. Place the drives on a static protective surface.

    c.   Disconnect the power and signal cables from the EDSFF drive backplane.

    d.   Remove the EDSFF drive cage assembly. See "Remove the EDSFF drive cage assembly" on page 230.

Step 2. Unfasten the two screws to remove the drive backplane from the drive cage.

Figure 157. Removing the EDSFF drive backplane

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Install the 4-DW GPU Model / 8-DW Model components

Follow instructions in this section to install the 4-DW GPU Model and 8-DW GPU Modelcomponents.

Install a GPU adapter

Follow instructions in this section to install a GPU adapter.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Notes:

- Depending on the specific type, your GPU adapter might look slightly different from the illustrations in this section.
- Follow the additional instructions in any documentation that comes with your GPU adapter.
- To prevent potential thermal issues, change the **Misc** setting in the BIOS from **Option3** (default value) to **Option1** if the following two conditions are met:
  - The server is equipped with a GPU adapter.
  - The UEFI firmware version is U8E128A or later.

  For the method of changing the **Misc** setting, see https://support.lenovo.com/us/en/solutions/TT1832.

Procedure

Step 1. Locate the PCIe slot based on the server front view of your configuration. Refer to the following sections for the PCIe slot numbering and supported GPU configurations:

- "The 4-DW GPU Model Front view" on page 16
- "The 8-DW GPU Model Front view" on page 18

Step 2. (Optional) If a GPU adapter link bridge is to be installed, remove the link connector cover from the GPU. Keep the link connector cover in case it is needed in the future.

Note: Depending on the configuration, there may be one or three GPU adapter link bridges on the GPU. When linking a GPU pair, all link connectors on the GPUs must be linked.
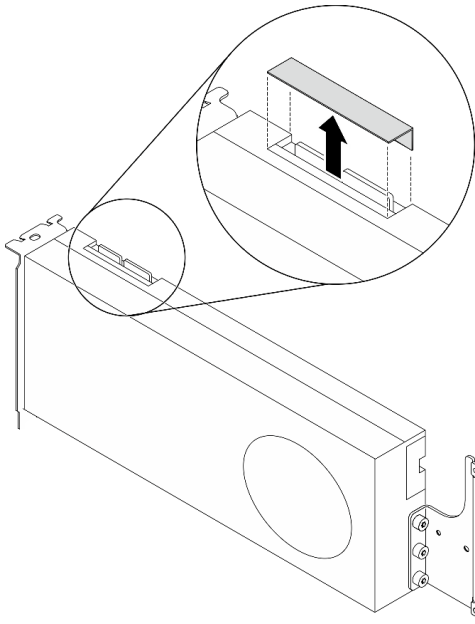
Figure 158. Removing the link connector cover from the GPU

Step 3.   Install the GPU adapter.

Note: If the PCIe slot is covered with a slot bracket, remove the bracket from the chassis first.
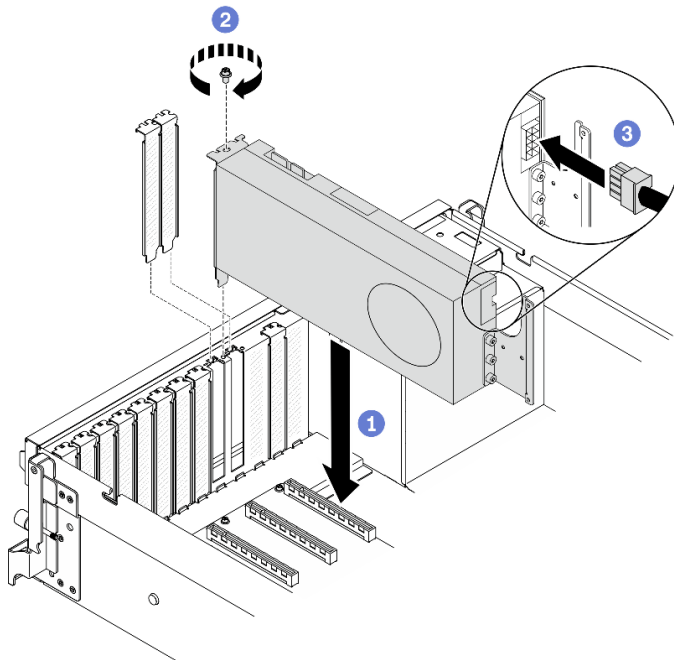
Figure 159. Installing a GPU adapter

a.   ❶ Align the GPU adapter with the PCIe slot on the chassis. Then, carefully press both ends of the GPU adapter straight into the slot until it is securely seated.

Note: Make sure that the rear end of each adapter is inserted into the slot next to the two imprinted arrows on the chassis.

b. ❷ Fasten the GPU adapter retention screw.

c. ❸ Connect the GPU adapter power cable to the GPU adapter. Refer to the GPU adapter and system board GPU power connector mapping table. For more details on GPU power connectors on system board, see "System-board connectors" on page 34.

Table 33. GPU adapter and system board GPU power connector mapping table

Item	Numbering							
GPU adapter (PCIe slot)	1 (Slot 3)	2 (Slot 4)	3 (Slot 5)	4 (Slot 6)	5 (Slot 7)	6 (Slot 8)	7 (Slot 9)	8 (Slot 10)
System board GPU power connector	1	2	3	4	5	6	7	8

After you finish

Complete the parts replacement. See "Complete the parts replacement" on page 256.

Demo video

Watch the procedure on YouTube

Install a GPU adapter link bridge

Follow instructions in this section to install a GPU adapter link bridge.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.
- Depending on the specific type, your GPU adapter might look slightly different from the illustrations in this section.
- Follow the additional instructions in any documentation that comes with your GPU adapter.

Procedure

Notes: Install the GPU adapter link bridge to connect the GPU pairs listed below:

- GPU 1 and GPU 2
- GPU 3 and GPU 4
- GPU 5 and GPU 6
- GPU 7 and GPU 8

Step 1. If the GPU is installed in the chassis, remove it from the chassis. See "Remove a GPU adapter" on page 225.

Step 2. Remove the link connector cover from the GPU.
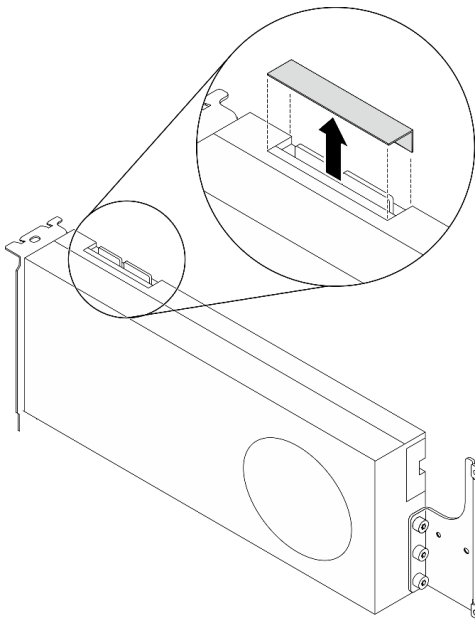
Figure 160. Removing the link connector cover from the GPU

Step 3. Install the GPU to the chassis. See "Install a GPU adapter" on page 233.

Step 4. Align the GPU adapter link bridge to the link connectors on the GPUs; then, install the GPU adapter link bridge to the GPUs until it clicks into place.

Note: Depending on the configuration, there may be one or three GPU adapter link bridges on the GPU. When linking a GPU pair, all link connectors on the GPUs must be linked.
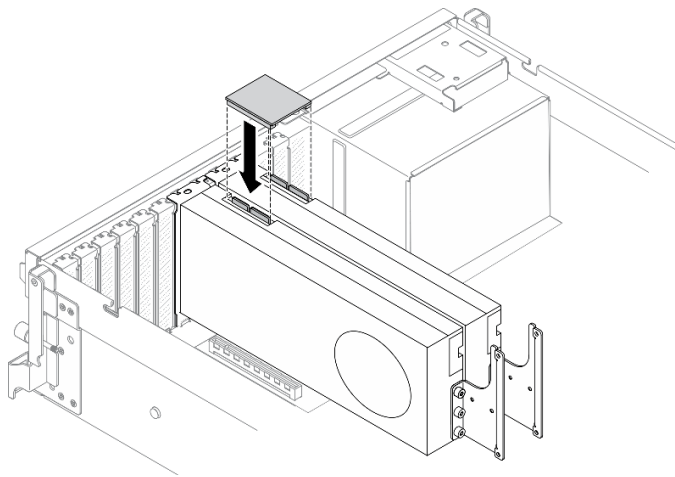
Figure 161. Installing the GPU adapter link bridge

After you finish

Complete the parts replacement. See "Complete the parts replacement" on page 256.

Demo video

Watch the procedure on YouTube

Install the 2.5-/3.5-inch drive backplane
Follow instructions in this section to install the 2.5-inch or 3.5-inch drive backplane.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

Procedure

Step 1.   Based on your configuration, follow the corresponding procedures to install the 2.5-inch or 3.5-inch drive backplane.

Install the 2.5-inch drive backplane:

a.   ❶ Align the tabs on the bottom of the 2.5-inch drive backplane with the slots on the drive cage, and insert them into the slots.

b.   ❷ Push the top of the backplane toward the drive cage until it clicks in place.
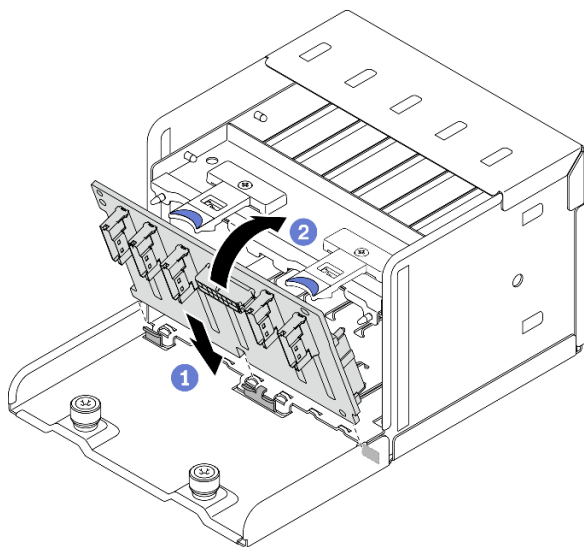
Figure 162. Installing the 2.5-inch drive backplane

Install the 3.5-inch drive backplane:

a. ❶ Align the four tabs on the drive cage with the slots on the 3.5-inch drive backplane; then, insert the tabs into the corresponding slots.

b. ❷ Slide the backplane toward the left as illustrated until it is seated in the drive cage.
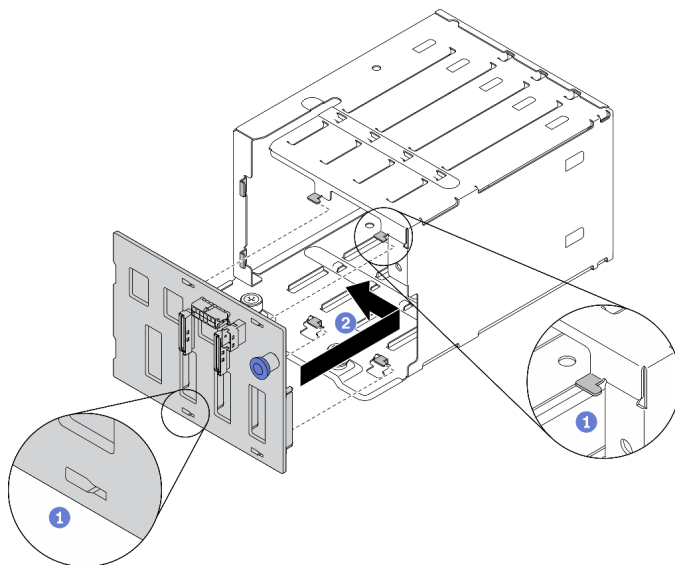
Figure 163. Installing the 3.5-inch drive backplane

After you finish

1. Connect the required cables.

2. Complete the parts replacement. See "Complete the parts replacement" on page 256.

3. If you have installed 2.5-inch drive backplane with U.3 NVMe drives for Trimode. Enable U.3 x1 mode for the selected drive slots on the backplane through the XCC web GUI. See "U.3 NMVe drive can be detected in NVMe connection, but cannot be detected in Tri-mode" on page 275.

Demo video

Install the 2.5-/3.5-inch drive cage assembly

Follow instructions in this section to install the 2.5-inch or 3.5-inch drive cage assembly.

About this task

Attention:

- Read and to ensure that you work safely.

- Touch the static-protective package that contains the drive to any unpainted metal surface on the solution; then, remove the drive from the package and place it on a static-protective surface.

Procedure

Step 1.   Based on your configuration, follow the corresponding procedures to install the 2.5-inch or 3.5-inch drive cage assembly.

Install the 2.5-inch drive cage assembly:

a.   ❶ Align the 2.5-inch drive cage assembly with the opening on the front of the server; then, slide it into the chassis until it is seated in place.

b.   ❷ Fasten the two thumbscrews to secure the drive cage assembly to the chassis.
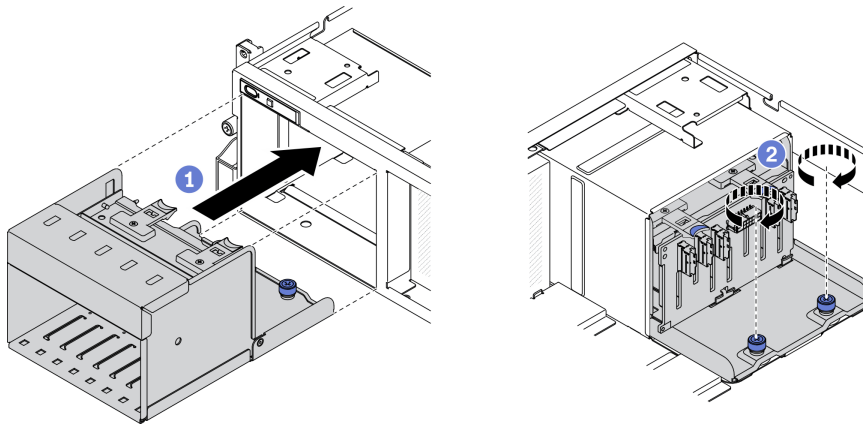
Figure 164. Installing the 2.5-inch drive cage assembly

Install the 3.5-inch drive cage assembly:

a.   ❶ Align the 3.5-inch drive cage assembly with the opening on the front of the server; then, slide it into the chassis until it is seated in place.

b.   ❷ Fasten the two thumbscrews to secure the drive cage assembly to the chassis.
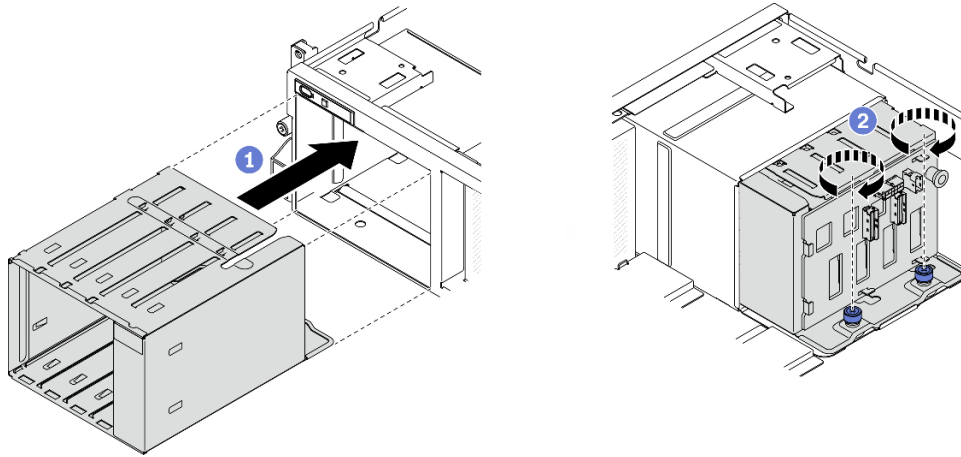
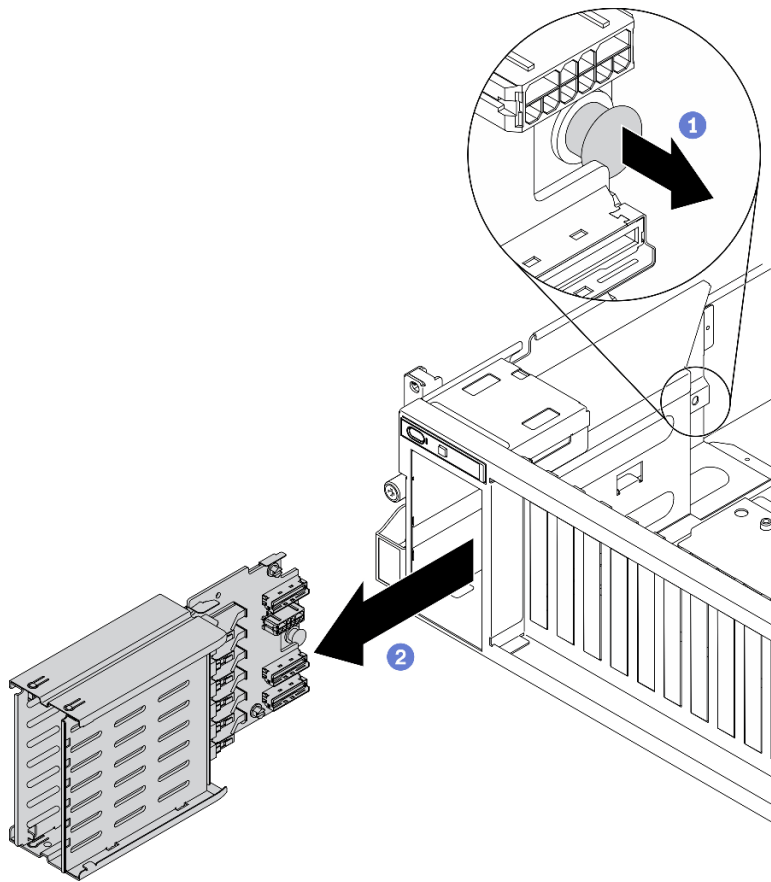*Figure 165. Installing the 3.5-inch drive cage assembly*

After you finish

1. Connect the required cables.
2. Complete the parts replacement. See "Complete the parts replacement" on page 256.

Demo video

Watch the procedure on YouTube

Install the EDSFF drive backplane

Follow instructions in this section to install the EDSFF drive backplane.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.
- Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.

Procedure

Step 1. Fasten the two screws to secure the drive backplane to the drive cage.
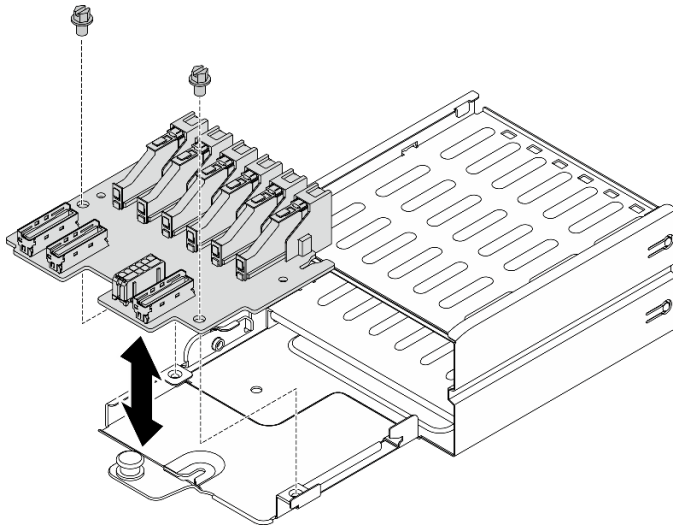
Figure 166. Installing the EDSFF drive backplane

After you finish

1. Connect the required cables.

2. Complete the parts replacement. See "Complete the parts replacement" on page 256.

Demo video

Watch the procedure on YouTube

Install the EDSFF drive cage assembly

Use this information to install the EDSFF drive cage assembly.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.

- Touch the static-protective package that contains the drive to any unpainted metal surface on the solution; then, remove the drive from the package and place it on a static-protective surface.

Procedure

Step 1. Prepare your server.

    a. Remove the top cover. See "Remove the top cover" on page 187.

    b. Remove all EDSFF hot-swap drives and drive bay fillers (if any) from the chassis. See "Remove an EDSFF hot-swap drive" on page 174. Place the drives on a static protective surface.

Step 2. Disconnect the power and signal cables from the EDSFF drive backplane.

Step 3. Remove the EDSFF drive cage assembly.

    a. ❶ Pull out the plunger on the drive cage assembly.

    b. ❷ Slide the drive cage assembly out of the chassis.

Figure 167. Removing the EDSFF drive cage assembly

After you finish

1. Connect the required cables.
2. Complete the parts replacement. See "Complete the parts replacement" on page 256.

Demo video

Watch the procedure on YouTube

Remove the SXM GPU Model components

Follow instructions in this section to remove the SXM GPU Model components.

Remove the 2.5-inch drive backplane module

Follow instructions in this section to remove the 2.5-inch drive backplane module.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.

Procedure

Step 1. Prepare your server.

    a. Remove the top cover. See "Remove the top cover" on page 187.

    b. Remove all 2.5-inch hot-swap drives from the chassis. See "Remove a 2.5-inch hot-swap drive (SXM GPU Model)" on page 176. Place the drives on a static protective surface.

Step 2. Disconnect the power and signal cables from 2.5-inch drive backplane.

Step 3. Remove the 2.5-inch drive backplane module.

    a. ❶ Unfasten the thumbscrew on the drive backplane module.

    b. ❷ Lift the drive backplane module out of the chassis.
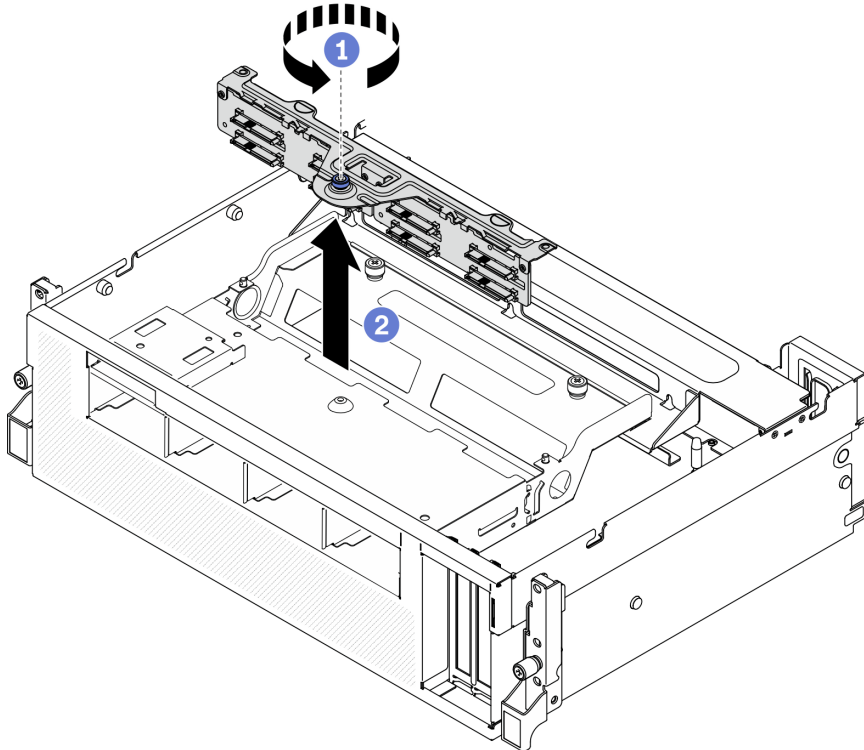
Figure 168. Removing the 2.5-inch drive backplane module

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Remove the 2.5-inch drive backplane

Follow instructions in this section to remove the 2.5-inch drive backplane.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.

Procedure

Step 1.   Prepare your server.

    a.   Remove the top cover. See "Remove the top cover" on page 187.

    b.   Remove all 2.5-inch and drive bay fillers (if any) from the drive bays. See "Remove a 2.5-inch hot-swap drive (SXM GPU Model)" on page 176. Place the drives on a static protective surface.

    c.   Remove the 2.5-inch drive backplane module. See "Remove the 2.5-inch drive backplane module" on page 242.

Step 2.   Remove the 2.5-inch drive backplane.

    a.   ❶ Unfasten the two screws on the backplane.

    b.   ❷ Remove the backplane from the backplane module.
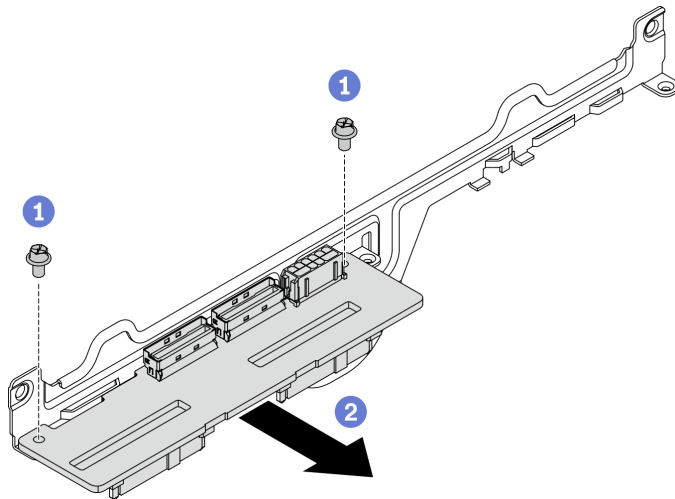
Figure 169. Removing the 2.5-inch drive backplane

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Install the SXM GPU Model components

Follow instructions in this section to install the SXM GPU Model components.

Install the 2.5-inch drive backplane

Follow instructions in this section to install the 2.5-inch drive backplane.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.

- Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.

Procedure

Step 1.   Position the 2.5-inch drive backplane and the backplane module as illustrated below. Align the square-shape guide slot on the drive backplane to the square-shape guide pin on backplane module, and align the screw holes on backplane and the backplane module. Then, insert the backplane into the backplane module.

   Note: Make sure the backplane and backplane module position is arranged as illustrated below.
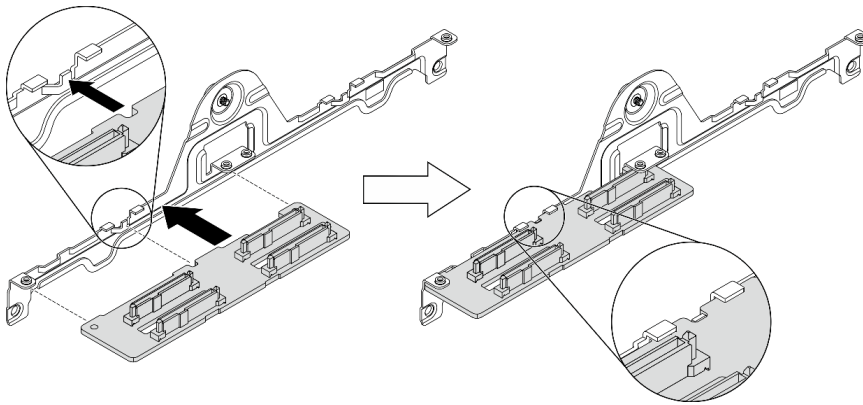
Figure 170. Inserting the 2.5-inch drive backplane into the module

Step 2.   Hold the backplane and the backplane module together; then, turn them over as illustrated below. Fasten the two screws to secure the backplane to the backplane module.
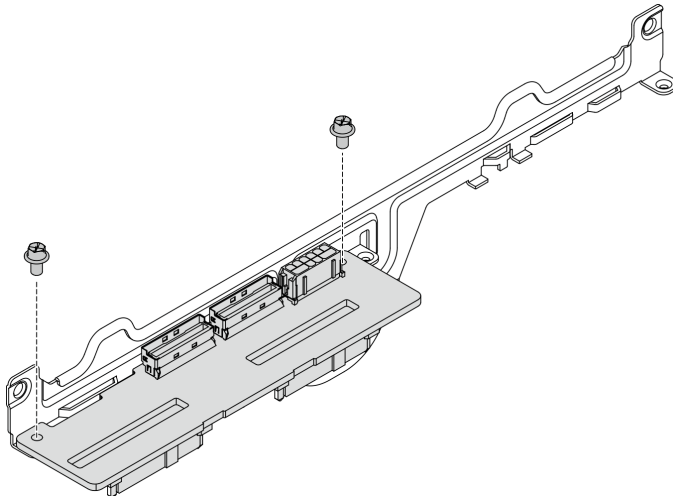
Figure 171. Installing the 2.5-inch drive backplane to the module

After you finish

Complete the parts replacement. See "Complete the parts replacement" on page 256.

Demo video

Watch the procedure on YouTube

Install the 2.5-inch drive backplane module

Follow instructions in this section to install the 2.5-inch drive backplane module.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.
- Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.

Procedure

Step 1.   Installing the 2.5-inch drive backplane module.

    a.   ❶ Align the guide holes on the drive backplane module with the guide pins on the 2.5-inch drive assembly; then, place the drive backplane module onto the assembly.

    b.   ❷ Fasten the thumbscrew to secure the drive backplane module to the assembly.
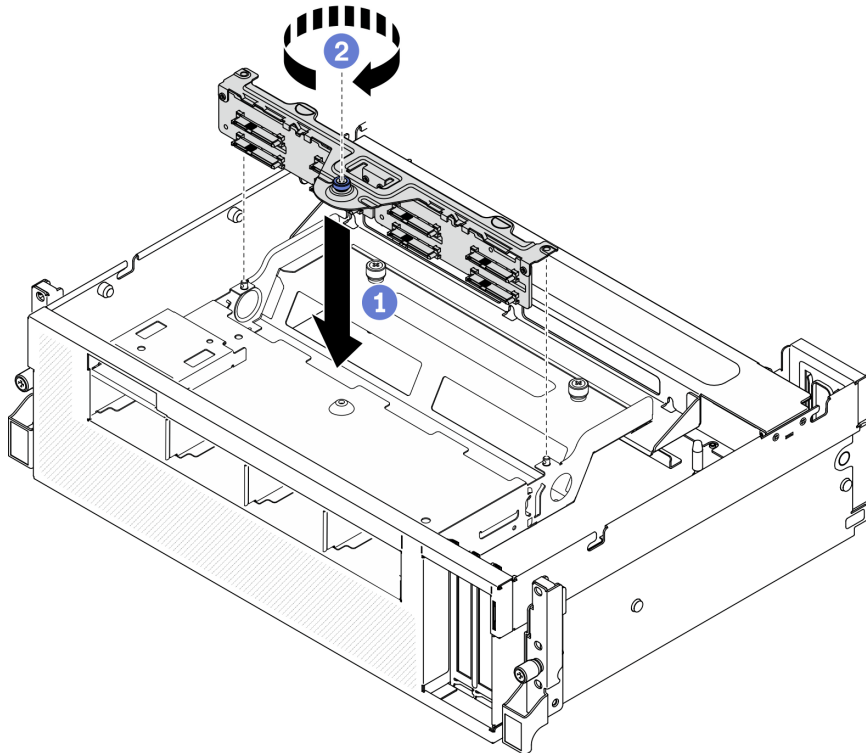
Figure 172. Installing the 2.5-inch drive backplane module

After you finish

1.   Connect the required cables.

2. Complete the parts replacement. See "Complete the parts replacement" on page 256.

Demo video

Watch the procedure on YouTube

Install the air baffle

Follow instructions in this section to install the air baffle.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.

Attention: For proper cooling and airflow, reinstall the air baffle before you turn on the server. Operating the server with the air baffle removed might damage server components.

Procedure

Note: Close the retaining clip on each end of the memory module connector before installing the air baffle for proper cooling.
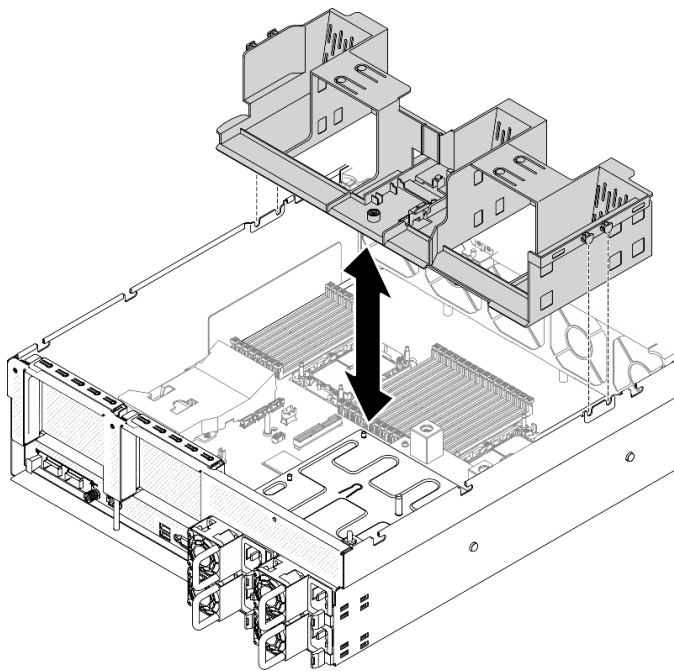
Figure 173. Installing air baffle

Step 1.   Align the air baffle tabs with the air baffle slots on both sides of the chassis; then, lower the air baffle into the server.

Step 2.   Slightly press the air baffle down until it is securely seated.

After you finish

Complete the parts replacement. See "Complete the parts replacement" on page 256.

Demo video

Install the fan cage

Follow instructions in this section to install the fan cage.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.

Procedure

Step 1. Install the fan cage.

    a. ❶ Align the guide slots on the fan cage with the guide pins on the chassis, and lower the fan cage into the chassis.

    b. ❷ Rotate the release latches down until they stop.

       Note: Press the fan modules to make sure they are seated correctly on the system board.
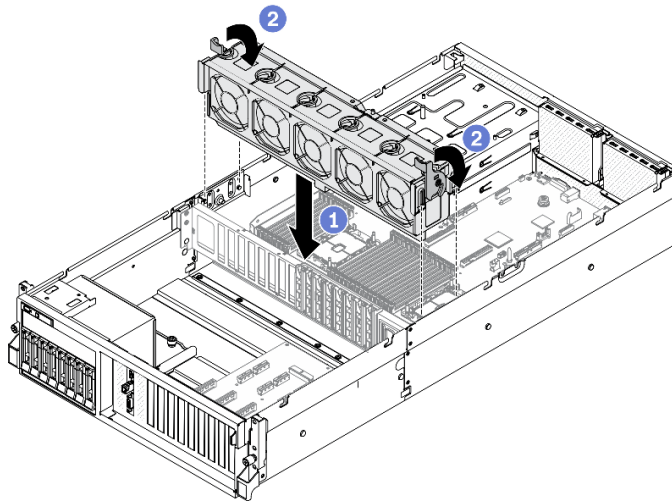
Figure 174. Installing the fan cage

After you finish

Complete the parts replacement. See "Complete the parts replacement" on page 256.

Demo video

Install the top cover

Follow instructions in this section to install the top cover.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.
- Make sure that all cables, adapters, and other components are installed and seated correctly and that you have not left loose tools or parts inside the server.
- Make sure that all internal cables are correctly routed.

Procedure

Step 1. Install the top cover.

   a. ❶ Align the top cover guide holes with the guide pins on chassis; then place the top cover on top of the server.

   b. ❷ Press down the top cover latch to lock the top cover in place.
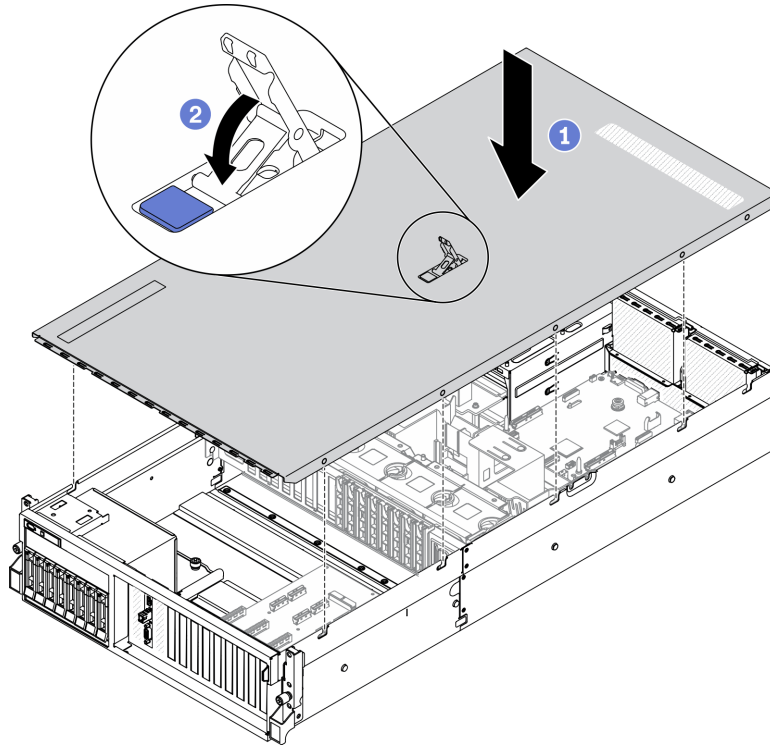
Figure 175. Installing top cover

After you finish

Complete the parts replacement. See "Complete the parts replacement" on page 256.

Demo video

Watch the procedure on YouTube

Install the server to rack

Follow instructions in this section to install the server to the rack.

S036

18 - 32 kg (39 - 70 lb)

32 - 55 kg (70 - 121 lb)

R006

CAUTION:
Do not place any object on top of a rack-mounted device unless that rack-mounted device is intended for use as a shelf.

About this task

Attention:

- Read "Installation Guidelines" on page 150 and "Safety inspection checklist" on page 151 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See "Power off the server" on page 257.

CAUTION:
Make sure to have three people operate the server installation procedures to prevent injury.

Procedure

Step 1. From the front of the rack, pull the rails all the way out until they stop

> **Attention:** You can only install the server successfully when the rails are fully extended.
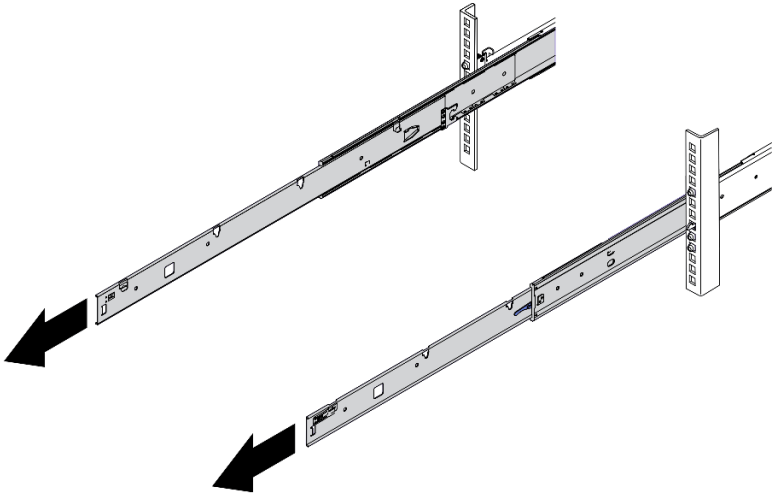
Rack front

Figure 176. Pulling out the rails

Step 2. Carefully lift up the server with three people.

  CAUTION:
  Make sure three people are lifting the sever by holding the lift points

  # Rack front
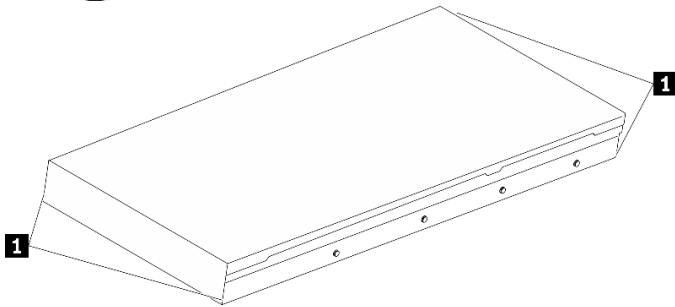
  Figure 177. Lifting up the server

1	Lift point

Step 3. From the front of the rack, install server into the rails.

 a. ❶ Tilt the server and slowly lower the rear end; then, push the rails toward the server and make sure the farthest nailheads on server's left and right side go into the slots on the rail.

 b. ❷ Slowly lower the server down and make sure the other 3 nailheads on server's left and right side slip into corresponding slots.

 Note: Inspect the sides of the rails to make sure the nailheads are placed in the slots.

 Attention: You can only install the server successfully when the rails are fully extended.

Rack front
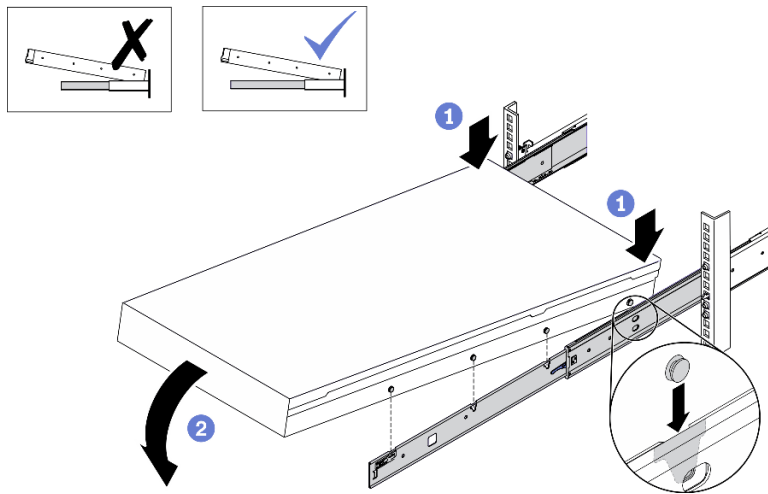
Figure 178. Installing the server into the rails

Step 4. Slide the server into rack.

 a. ❶ Push up the latches on the rails.

 b. ❷ Push the server all the way into the rack.
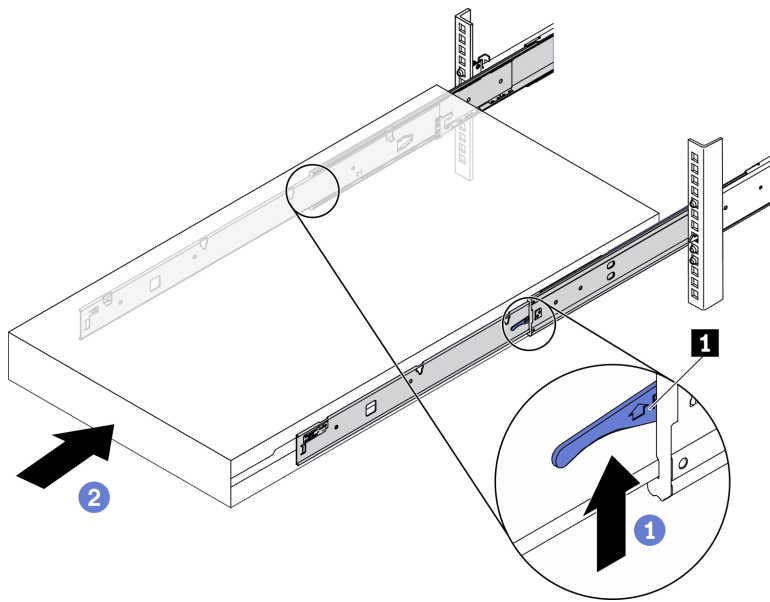
Figure 179. Installing the server into the rack

1	Latch

Step 5. (Optional) Secure the server to the rack.

a. Secure the server to the rear of the rack. Select the first rail you want to secure. Insert a washer and M5 screw; then, fasten the M5 screw. Repeat to secure the other rail.

Rack rear
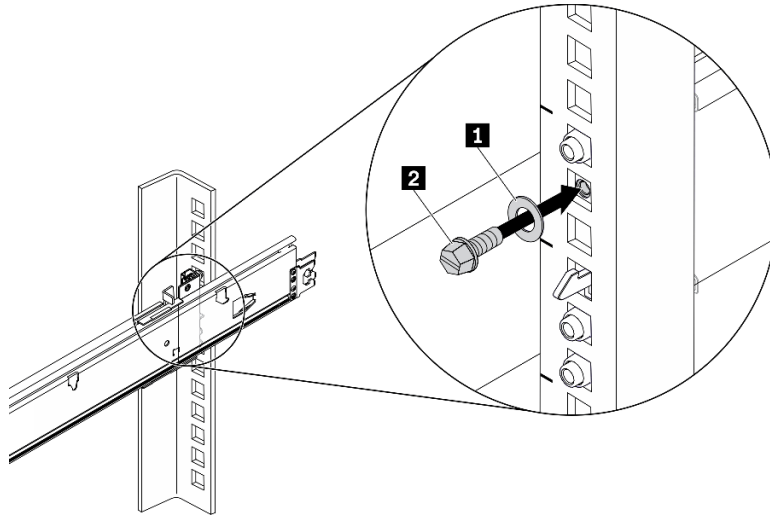
Figure 180. Securing the server to the rear of the rack

| **1** | Washer |
| **2** | M5 screw |

b. Secure the server to the front of the rack. Fasten the two thumbscrews located on the front of the server.

Rack front
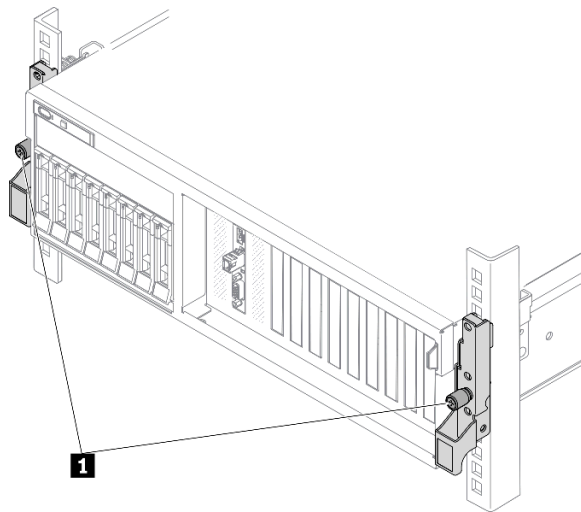
Figure 181. Securing the server to the front of the rack

1	Thumbscrew

After you finish

1. Reconnect the power cords and any cables that you removed.

2. Power on the server and any peripheral devices. See "Power on the server" on page 257.

3. Update the server configuration. See "Complete the parts replacement" on page 256.

Complete the parts replacement

Go through the checklist to complete parts replacement

To complete the parts replacement, do the following:

1. Ensure that all components have been reassembled correctly and that no tools or loose screws are left inside your server.

2. Properly route and secure the cables in the server. Refer to the cable connecting and routing information for each component.

3. Reinstall the air baffle. See "Install the air baffle" on page 247.

   Attention: For proper cooling and airflow, reinstall the air baffle before you turn on the server. Operating the server with the air baffle removed might damage server components.

4. Reinstall the top cover. See "Install the top cover" on page 248.

5. If the sever was installed in a rack, reinstall the server into the rack. See "Install the server to rack" on page 249.

6. Reconnect the power cords and any cables that you removed.

7. Power on the server and any peripheral devices. See "Power on the server" on page 257.

8. Update the server configuration.

   • Download and install the latest device drivers: http://datacentersupport.lenovo.com.

   • Update the system firmware. See "Update the firmware" on page 261.

   • Update the UEFI configuration. See https://pubs.lenovo.com/uefi-overview/.

   • Reconfigure the disk arrays if you have installed or removed a hot-swap drive or a RAID adapter. See the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.

Cable the server

Attach all external cables to the server. Typically, you will need to connect the server to a power source, to the data network, and to storage. In addition, you will need to connect the server to the management network.

Connect to power

Connect the server to power.

Connect to the network

Connect the server to the network.

Connect to storage

Connect the server to any storage devices.

Power on the server

After the server performs a short self-test (power status LED flashes quickly) when connected to input power, it enters a standby state (power status LED flashes once per second).

The server can be turned on (power LED on) in any of the following ways:

- You can press the power button.
- The server can restart automatically after a power interruption.
- The server can respond to remote power-on requests sent to the Lenovo XClarity Controller.

For information about powering off the server, see .

Validate server setup

After powering up the server, make sure that the LEDs are lit and that they are green.

Power off the server

The server remains in a standby state when it is connected to a power source, allowing the Lenovo XClarity Controller to respond to remote power-on requests. To remove all power from the server (power status LED off), you must disconnect all power cables.

To place the server in a standby state (power status LED flashes once per second):

Note: The Lenovo XClarity Controller can place the server in a standby state as an automatic response to a critical system failure.

- Start an orderly shutdown using the operating system (if supported by your operating system).
- Press the power button to start an orderly shutdown (if supported by your operating system).
- Press and hold the power button for more than 4 seconds to force a shutdown.

When in a standby state, the server can respond to remote power-on requests sent to the Lenovo XClarity Controller. For information about powering on the server, see .

Chapter 5. System configuration

Complete these procedures to configure your system.

Set the network connection for the Lenovo XClarity Controller

Before you can access the Lenovo XClarity Controller over your network, you need to specify how Lenovo XClarity Controller will connect to the network. Depending on how the network connection is implemented, you might need to specify a static IP address as well.

The following methods are available to set the network connection for the Lenovo XClarity Controller if you are not using DHCP:

- If a monitor is attached to the server, you can use Lenovo XClarity Provisioning Manager to set the network connection.

  Complete the following steps to connect the Lenovo XClarity Controller to the network using the Lenovo XClarity Provisioning Manager.

  1. Start the server.

  2. Press the key specified in the on-screen instructions to display the Lenovo XClarity Provisioning Manager interface. (For more information, see the "Startup" section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/)

  3. Go to **LXPM ➙ UEFI Setup ➙ BMC Settings** to specify how the Lenovo XClarity Controller will connect to the network.

     - If you choose a static IP connection, make sure that you specify an IPv4 or IPv6 address that is available on the network.
     - If you choose a DHCP connection, make sure that the MAC address for the server has been configured in the DHCP server.

  4. Click **OK** to apply the setting and wait for two to three minutes.

  5. Use an IPv4 or IPv6 address to connect Lenovo XClarity Controller.

     Important: The Lenovo XClarity Controller is set initially with a user name of USERID and password of PASSW0RD (with a zero, not the letter O). This default user setting has Supervisor access. It is required to change this user name and password during your initial configuration for enhanced security.

- If no monitor attached to the server, you can set the network connection through the Lenovo XClarity Controller interface. Connect an Ethernet cable from your laptop to Lenovo XClarity Controller connector, which is located at the rear of the server. For the location of the Lenovo XClarity Controller connector, see "Rear view" on page 22.

  Note: Make sure that you modify the IP settings on the laptop so that it is on the same network as the server default settings.

  The default IPv4 address and the IPv6 Link Local Address (LLA) is provided on the Lenovo XClarity Controller Network Access label that is affixed to the Pull Out Information Tab.

- If you are using the Lenovo XClarity Administrator Mobile app from a mobile device, you can connect to the Lenovo XClarity Controller through the Lenovo XClarity Controller USB connector on the front of the server. For the location of the Lenovo XClarity Controller USB connector, see one of the following:

  - "The 4-DW GPU Model Front view" on page 16
  - "The 8-DW GPU Model Front view" on page 18

Note: The Lenovo XClarity Controller USB connector mode must be set to manage the Lenovo XClarity Controller (instead of normal USB mode). To switch from normal mode to Lenovo XClarity Controller management mode, hold the blue ID button on the front panel for at least 3 seconds until its LED flashes slowly (once every couple of seconds).

To connect using the Lenovo XClarity Administrator Mobile app:

1. Connect the USB cable of your mobile device to the Lenovo XClarity Administrator USB connector on the front panel.

2. On your mobile device, enable USB tethering.

3. On your mobile device, launch the Lenovo XClarity Administrator mobile app.

4. If automatic discovery is disabled, click **Discovery** on the USB Discovery page to connect to the Lenovo XClarity Controller.

For more information about using the Lenovo XClarity Administrator Mobile app, see:

http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/lxca_usemobileapp.html

Set front USB port for Lenovo XClarity Controller connection

Before you can access the Lenovo XClarity Controller through the front USB port, you need to configure the USB port for Lenovo XClarity Controller connection.

Server support

To see if your server supports accessing Lenovo XClarity Controller through the front USB port, check one of the following:

- Refer to Chapter 2 "Server components" on page 15.

- If there is a wrench icon on the USB port of your server, you can set the USB port to connect to Lenovo XClarity Controller.

Setting the USB port for Lenovo XClarity Controller connection

You can switch the USB port between normal and Lenovo XClarity Controller management operation by performing one of the following steps.

- Hold the ID button for at least 3 second until its LED flashes slowly (once every couple of seconds). See Chapter 2 "Server components" on page 15 for ID button location.

- From the Lenovo XClarity Controller management controller CLI, run the `usbfp` command. For information about using the Lenovo XClarity Controller CLI, see the "Command-line interface" section in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/.

- From the Lenovo XClarity Controller management controller web interface, click **BMC Configuration ➙ Network ➙ Front Panel USB Port Manager**. For information about Lenovo XClarity Controller web interface functions, see the "Description of XClarity Controller functions on web interface" section in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/.

Checking USB port current setting

You can also check the current setting of the USB port using the Lenovo XClarity Controller management controller CLI (`usbfp` command) or the Lenovo XClarity Controller management controller web interface (**BMC Configuration ➙ Network ➙ Front Panel USB Port Manager**). See the "Command-line interface"

and "Description of XClarity Controller functions on web interface" sections in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/.

Update the firmware

Several options are available to update the firmware for the server.

You can use the tools listed here to update the most current firmware for your server and the devices that are installed in the server.

- Best practices related to updating firmware is available at the following site:
  - http://lenovopress.com/LP0656
- The latest firmware can be found at the following site:
  - https://datacentersupport.lenovo.com/products/servers/thinksystem/sr670v2/downloads/driver-list/
- You can subscribe to product notification to stay up to date on firmware updates:
  - https://datacentersupport.lenovo.com/tw/en/solutions/ht509500

UpdateXpress System Packs (UXSPs)

Lenovo typically releases firmware in bundles called UpdateXpress System Packs (UXSPs). To ensure that all of the firmware updates are compatible, you should update all firmware at the same time. If you are updating firmware for both the Lenovo XClarity Controller and UEFI, update the firmware for Lenovo XClarity Controller first.

Update method terminology

- **In-band update**. The installation or update is performed using a tool or application within an operating system that is executing on the server's core CPU.
- **Out-of-band update**. The installation or update is performed by the Lenovo XClarity Controller collecting the update and then directing the update to the target subsystem or device. Out-of-band updates have no dependency on an operating system executing on the core CPU. However, most out-of-band operations do require the server to be in the S0 (Working) power state.
- **On-Target update.** The installation or update is initiated from an installed operating system executing on the target server itself.
- **Off-Target update.** The installation or update is initiated from a computing device interacting directly with the server's Lenovo XClarity Controller.
- **UpdateXpress System Packs (UXSPs)**. UXSPs are bundled updates designed and tested to provide the interdependent level of functionality, performance, and compatibility. UXSPs are server machine-type specific and are built (with firmware and device driver updates) to support specific Windows Server, Red Hat Enterprise Linux (RHEL) and SUSE Linux Enterprise Server (SLES) operating system distributions. Machine-type-specific firmware-only UXSPs are also available.

Firmware updating tools

See the following table to determine the best Lenovo tool to use for installing and setting up the firmware:

Tool	Update Methods Supported	Core System Firmware Updates	I/O Devices Firmware Updates	Graphical user interface	Command line interface	Supports UXSPs
Lenovo XClarity Provisioning Manager (LXPM)	In-band[2] On-Target	√		√		
Lenovo XClarity Controller (XCC)	Out-of-band Off-Target	√	Selected I/O devices	√		
Lenovo XClarity Essentials OneCLI (OneCLI)	In-band Out-of-band On-Target Off-Target	√	All I/O devices		√	√
Lenovo XClarity Essentials UpdateXpress (LXCE)	In-band Out-of-band On-Target Off-Target	√	All I/O devices	√		√
Lenovo XClarity Essentials Bootable Media Creator (BoMC)	In-band Out-of-band Off-Target	√	All I/O devices	√ (BoMC application)	√ (BoMC application)	√
Lenovo XClarity Administrator (LXCA)	In-band[1] Out-of-band[2] Off-Target	√	All I/O devices	√		√
Lenovo XClarity Integrator (LXCI) for VMware vCenter	Out-of-band Off-Target	√	Selected I/O devices	√		
Lenovo XClarity Integrator (LXCI) for Microsoft Windows Admin Center	In-band Out-of-band On-Target Off-Target	√	All I/O devices	√		√
Lenovo XClarity Integrator (LXCI) for Microsoft System Center Configuration Manager	In-band On-Target	√	All I/O devices	√		√
Notes: 1. For I/O firmware updates. 2. For BMC and UEFI firmware updates.						

- **Lenovo XClarity Provisioning Manager**

  From Lenovo XClarity Provisioning Manager, you can update the Lenovo XClarity Controller firmware, the UEFI firmware, and the Lenovo XClarity Provisioning Manager software.

  Note: By default, the Lenovo XClarity Provisioning Manager Graphical User Interface is displayed when you start the server and press the key specified in the on-screen instructions. If you have changed that default to be the text-based system setup, you can bring up the Graphical User Interface from the text-based system setup interface.

  For additional information about using Lenovo XClarity Provisioning Manager to update firmware, see:

  "Firmware Update" section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/

- **Lenovo XClarity Controller**

  If you need to install a specific update, you can use the Lenovo XClarity Controller interface for a specific server.

  Notes:

  – To perform an in-band update through Windows or Linux, the operating system driver must be installed and the Ethernet-over-USB (sometimes called LAN over USB) interface must be enabled.

    For additional information about configuring Ethernet over USB, see:

    "Configuring Ethernet over USB" section in the XCC documentation version compatible with your server at https://pubs.lenovo.com/lxcc-overview/

  – If you update firmware through the Lenovo XClarity Controller, make sure that you have downloaded and installed the latest device drivers for the operating system that is running on the server.

  For additional information about using Lenovo XClarity Controller to update firmware, see:

  "Updating Server Firmware" section in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/

- **Lenovo XClarity Essentials OneCLI**

  Lenovo XClarity Essentials OneCLI is a collection of command line applications that can be used to manage Lenovo servers. Its update application can be used to update firmware and device drivers for your servers. The update can be performed within the host operating system of the server (in-band) or remotely through the BMC of the server (out-of-band).

  For additional information about using Lenovo XClarity Essentials OneCLI to update firmware, see:

  https://pubs.lenovo.com/lxce-onecli/onecli_c_update

- **Lenovo XClarity Essentials UpdateXpress**

  Lenovo XClarity Essentials UpdateXpress provides most of OneCLI update functions through a graphical user interface (GUI). It can be used to acquire and deploy UpdateXpress System Pack (UXSP) update packages and individual updates. UpdateXpress System Packs contain firmware and device driver updates for Microsoft Windows and for Linux.

  You can obtain Lenovo XClarity Essentials UpdateXpress from the following location:

  https://datacentersupport.lenovo.com/solutions/lnvo-xpress

- **Lenovo XClarity Essentials Bootable Media Creator**

  You can use Lenovo XClarity Essentials Bootable Media Creator to create bootable media that is suitable for firmware updates, VPD updates, inventory and FFDC collection, advanced system configuration, FoD Keys management, secure erase, RAID configuration, and diagnostics on supported servers.

You can obtain Lenovo XClarity Essentials BoMC from the following location:

https://datacentersupport.lenovo.com/solutions/lnvo-bomc

- **Lenovo XClarity Administrator**

  If you are managing multiple servers using the Lenovo XClarity Administrator, you can update firmware for all managed servers through that interface. Firmware management is simplified by assigning firmware-compliance policies to managed endpoints. When you create and assign a compliance policy to managed endpoints, Lenovo XClarity Administrator monitors changes to the inventory for those endpoints and flags any endpoints that are out of compliance.

  For additional information about using Lenovo XClarity Administrator to update firmware, see:

  http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/update_fw.html

- **Lenovo XClarity Integrator offerings**

  Lenovo XClarity Integrator offerings can integrate management features of Lenovo XClarity Administrator and your server with software used in a certain deployment infrastructure, such as VMware vCenter, Microsoft Admin Center, or Microsoft System Center.

  For additional information about using Lenovo XClarity Integrator to update firmware, see:

  https://pubs.lenovo.com/lxci-overview/

Configure the firmware

Several options are available to install and set up the firmware for the server.

Important: Do not configure option ROMs to be set to **Legacy** unless directed to do so by Lenovo Support. This setting prevents UEFI drivers for the slot devices from loading, which can cause negative side effects for Lenovo software, such as Lenovo XClarity Administrator and Lenovo XClarity Essentials OneCLI, and to the Lenovo XClarity Controller. The side effects include the inability to determine adapter card details, such as model name and firmware levels. When adapter card information is not available, generic information for the model name, such as "Adapter 06:00:00" instead of the actually model name, such as "ThinkSystem RAID 930-16i 4GB Flash." In some cases, the UEFI boot process might also hang.

- **Lenovo XClarity Provisioning Manager**

  From Lenovo XClarity Provisioning Manager, you can configure the UEFI settings for your server.

  Notes: The Lenovo XClarity Provisioning Manager provides a Graphical User Interface to configure a server. The text-based interface to system configuration (the Setup Utility) is also available. From Lenovo XClarity Provisioning Manager, you can choose to restart the server and access the text-based interface. In addition, you can choose to make the text-based interface the default interface that is displayed when you start LXPM. To do this, go to **Lenovo XClarity Provisioning Manager ➙ UEFI Setup ➙ System Settings ➙ <F1>Start Control ➙ Text Setup**. To start the server with Graphic User Interface, select **Auto** or **Tool Suite**.

  See the following documentations for more information:

  - *Lenovo XClarity Provisioning Manager User Guide*

    - Search for the LXPM documentation version compatible with your server at https://pubs.lenovo.com/lxpm-overview/

  - *UEFI User Guide*

    - https://pubs.lenovo.com/uefi-overview/

- **Lenovo XClarity Essentials OneCLI**

You can use the config application and commands to view the current system configuration settings and make changes to Lenovo XClarity Controller and UEFI. The saved configuration information can be used to replicate or restore other systems.

For information about configuring the server using Lenovo XClarity Essentials OneCLI, see:

https://pubs.lenovo.com/lxce-onecli/onecli_c_settings_info_commands

- **Lenovo XClarity Administrator**

  You can quickly provision and pre-provision all of your servers using a consistent configuration. Configuration settings (such as local storage, I/O adapters, boot settings, firmware, ports, and Lenovo XClarity Controller and UEFI settings) are saved as a server pattern that can be applied to one or more managed servers. When the server patterns are updated, the changes are automatically deployed to the applied servers.

  Specific details about updating firmware using Lenovo XClarity Administrator are available at:

  http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/server_configuring.html

- **Lenovo XClarity Controller**

  You can configure the management processor for the server through the Lenovo XClarity Controller Web interface or through the command-line interface.

  For information about configuring the server using Lenovo XClarity Controller, see:

  "Configuring the Server" section in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/

Memory module configuration

Memory performance depends on several variables, such as memory mode, memory speed, memory ranks, memory population and processor.

Information about optimizing memory performance and configuring memory is available at the Lenovo Press website:

https://lenovopress.com/servers/options/memory

In addition, you can take advantage of a memory configurator, which is available at the following site:

http://1config.lenovo.com/#/memory_configuration

Specific information about the required installation order of memory modules in your server based on the system configuration and memory mode that you are implementing is shown below.

Memory module installation guideline

- Two types of configurations are supported. Consider corresponding rules and population sequence accordingly:
  - "DRAM DIMMs installation order" on page 157 (RDIMMs or 3DS RDIMMs)
  - "PMEM and DRAM DIMM installation order" on page 163
- A label on each DIMM identifies the DIMM type. This information is in the format **xxxxx _n_Rxxx PC4-xxxxx-xx-xx-xxx**. Where **_n_** indicates if the DIMM is single-rank (n=1) or dual-rank (n=2).
- At least one DIMM is required for each processor. Install at least eight DIMMs per processor for good performance.
- When you replace a DIMM, the server provides automatic DIMM enablement capability without requiring you to use the Setup utility to enable the new DIMM manually.

Attention:

- Mixing x4 and x8 DIMMs in the same channel is allowed.
- Install DIMMs of the same speed for optimal performance. Otherwise, the BIOS will find and run the lowest speed among all channels.
- Within a channel, always populate DIMMs with the maximum number of ranks in the farthest DIMM slot, followed by the nearest DIMM slot.

Enable Software Guard Extensions (SGX)

Intel® Software Guard Extensions (Intel® SGX) operates under the assumption that the security perimeter includes only the internals of the CPU package, and leaves the DRAM untrusted.

Complete the following steps to enable SGX.

Step 1.   Make sure you follow the memory module population sequence for SGX configurations in "**Independent memory mode installation order**" on page 157. (DIMM configuration must be at least 8 DIMMs per socket to support SGX).

Step 2.   Restart the system. Before the operating system starts up, press the key specified in the on-screen instructions to enter the Setup Utility. (For more information, see the "Startup" section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/)

Step 3.   Go to **System settings ➙ Processors ➙ UMA-Based Clustering** and disable the option.

Step 4. Go to **System settings** ➙ **Processors** ➙ **Total Memory Encryption (TME)** and enable the option.

Step 5. Save the changes, then go to **System settings** ➙ **Processors** ➙ **SW Guard Extension (SGX)** and enable the option.

Note: For more information, see https://lenovopress.lenovo.com/lp1471.pdf.

RAID configuration

Using a Redundant Array of Independent Disks (RAID) to store data remains one of the most common and cost-efficient methods to increase server's storage performance, availability, and capacity.

RAID increases performance by allowing multiple drives to process I/O requests simultaneously. RAID can also prevent data loss in case of a drive failure by reconstructing (or rebuilding) the missing data from the failed drive using the data from the remaining drives.

RAID array (also known as RAID drive group) is a group of multiple physical drives that uses a certain common method to distribute data across the drives. A virtual drive (also known as virtual disk or logical drive) is a partition in the drive group that is made up of contiguous data segments on the drives. Virtual drive is presented up to the host operating system as a physical disk that can be partitioned to create OS logical drives or volumes.

An introduction to RAID is available at the following Lenovo Press website:

https://lenovopress.com/lp0578-lenovo-raid-introduction

Detailed information about RAID management tools and resources is available at the following Lenovo Press website:

https://lenovopress.com/lp0579-lenovo-raid-management-tools-and-resources

Notes:

- Before setting up RAID for NVMe drives, follow the below steps to enable VROC:
    1. Restart the system. Before the operating system starts up, press the key specified in the on-screen instructions to enter the Setup Utility. (For more information, see the "Startup" section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/)
    2. Go to **System settings** ➙ **Devices and I/O Ports** ➙ **Intel VMD** and enable the option.
    3. Save the changes and reboot the system.
- VROC Intel-SSD-Only supports RAID levels 0, 1, 5, and 10 with Intel NVMe drives.
- VROC Premium requires an activation key and supports RAID levels 0, 1, 5, and 10 with non-Intel NVMe drives. For more information about acquiring and installing the activation key, see https://fod.lenovo.com/lkms

Deploy the operating system

Several options are available to deploy an operating system on the server.

Available operating systems
- Microsoft Windows Server
- VMware ESXi
- Red Hat Enterprise Linux
- SUSE Linux Enterprise Server

Complete list of available operating systems: https://lenovopress.lenovo.com/osig.

Tool-based deployment

- **Multi-server**

  Available tools:

  – Lenovo XClarity Administrator

    http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/compute_node_image_deployment.html

  – Lenovo XClarity Essentials OneCLI

    https://pubs.lenovo.com/lxce-onecli/onecli_r_uxspi_proxy_tool

  – Lenovo XClarity Integrator deployment pack for SCCM (for Windows operating system only)

    https://pubs.lenovo.com/lxci-deploypack-sccm/dpsccm_c_endtoend_deploy_scenario

- **Single-server**

  Available tools:

  – Lenovo XClarity Provisioning Manager

    "OS Installation" section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/

  – Lenovo XClarity Essentials OneCLI

    https://pubs.lenovo.com/lxce-onecli/onecli_r_uxspi_proxy_tool

  – Lenovo XClarity Integrator deployment pack for SCCM (for Windows operating system only)

    https://pubs.lenovo.com/lxci-deploypack-sccm/dpsccm_c_endtoend_deploy_scenario

Manual deployment

If you cannot access the above tools, follow the instructions below, download the corresponding *OS Installation Guide*, and deploy the operating system manually by referring to the guide.

1. Go to https://datacentersupport.lenovo.com/solutions/server-os.

2. Select an operating system from the navigation pane and click **Resources**.

3. Locate the "OS Install Guides" area and click the installation instructions. Then, follow the instructions to complete the operation system deployment task.

Back up the server configuration

After setting up the server or making changes to the configuration, it is a good practice to make a complete backup of the server configuration.

Make sure that you create backups for the following server components:

- **Management processor**

  You can back up the management processor configuration through the Lenovo XClarity Controller interface. For details about backing up the management processor configuration, see:

  "Backing up the BMC configuration" section in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/.

  Alternatively, you can use the `save` command from Lenovo XClarity Essentials OneCLI to create a backup of all configuration settings. For more information about the `save` command, see:

  https://pubs.lenovo.com/lxce-onecli/onecli_r_save_command

- **Operating system**

    Use your backup methods to back up the operating system and user data for the server.

Update the Vital Product Data (VPD)

After initial setup of the system, you can update some Vital Product Data (VPD), such as asset tag and Universal Unique Identifier (UUID).

Update the Universal Unique Identifier (UUID)

Optionally, you can update the Universal Unique Identifier (UUID).

There are two methods available to update the UUID:

- From Lenovo XClarity Provisioning Manager

    To update the UUID from Lenovo XClarity Provisioning Manager:

    1. Start the server and press the key according to the on-screen instructions. (For more information, see the "Startup" section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/) The Lenovo XClarity Provisioning Manager interface is displayed by default.

    2. If the power-on Administrator password is required, enter the password.

    3. From the System Summary page, click **Update VPD**.

    4. Update the UUID.

- From Lenovo XClarity Essentials OneCLI

    Lenovo XClarity Essentials OneCLI sets the UUID in the Lenovo XClarity Controller. Select one of the following methods to access the Lenovo XClarity Controller and set the UUID:

    - Operate from the target system, such as LAN or keyboard console style (KCS) access

    - Remote access to the target system (TCP/IP based)

    To update the UUID from Lenovo XClarity Essentials OneCLI:

    1. Download and install Lenovo XClarity Essentials OneCLI.

        To download Lenovo XClarity Essentials OneCLI, go to the following site:

        https://datacentersupport.lenovo.com/solutions/HT116433

    2. Copy and unpack the OneCLI package, which also includes other required files, to the server. Make sure that you unpack the OneCLI and the required files to the same directory.

    3. After you have Lenovo XClarity Essentials OneCLI in place, type the following command to set the UUID:
       `onecli config createuuid SYSTEM_PROD_DATA.SysInfoUUID [access_method]`

        Where:

        [access_method]
            The access method that you select to use from the following methods:

            - Online authenticated LAN access, type the command:
              `[--bmc-username <xcc_user_id> --bmc-password <xcc_password>]`

                Where:

                xcc_user_id

The BMC/IMM/XCC account name (1 of 12 accounts). The default value is USERID.

xcc_password
The BMC/IMM/XCC account password (1 of 12 accounts).

Example command is as follows:
```
onecli config createuuid SYSTEM_PROD_DATA.SysInfoUUID --bmc-username <xcc_user_id> --bmc-
password <xcc_password>
```

– Online KCS access (unauthenticated and user restricted):

You do not need to specify a value for *access_method* when you use this access method.

Example command is as follows:
```
onecli config createuuid SYSTEM_PROD_DATA.SysInfoUUID
```

Note: The KCS access method uses the IPMI/KCS interface, which requires that the IPMI driver be installed.

– Remote LAN access, type the command:
```
[--bmc <xcc_user_id>:<xcc_password>@<xcc_external_ip>]
```

Where:

xcc_external_ip
The BMC/IMM/XCC external IP address. There is no default value. This parameter is required.

xcc_user_id
The BMC/IMM/XCC account name (1 of 12 accounts). The default value is USERID.

xcc_password
The BMC/IMM/XCC account password (1 of 12 accounts).

Note: BMC, IMM, or XCC external IP address, account name, and password are all valid for this command.

Example command is as follows:
```
onecli config createuuid SYSTEM_PROD_DATA.SysInfoUUID --bmc <xcc_user_id>:<xcc_password>@<xcc_
external_ip>
```

4. Restart the Lenovo XClarity Controller.
5. Restart the server.

Update the asset tag

Optionally, you can update the asset tag.

There are two methods available to update the asset tag:

• From Lenovo XClarity Provisioning Manager

To update the asset tag from Lenovo XClarity Provisioning Manager:

1. Start the server and press the key specified in the on-screen instructions to display the Lenovo XClarity Provisioning Manager interface.

2. If the power-on Administrator password is required, enter the password.

3. From the System Summary page, click **Update VPD**.

4. Update the asset tag information.

• From Lenovo XClarity Essentials OneCLI

Lenovo XClarity Essentials OneCLI sets the asset tag in the Lenovo XClarity Controller. Select one of the following methods to access the Lenovo XClarity Controller and set the asset tag:

– Operate from the target system, such as LAN or keyboard console style (KCS) access

– Remote access to the target system (TCP/IP based)

To update the asset tag from Lenovo XClarity Essentials OneCLI:

1. Download and install Lenovo XClarity Essentials OneCLI.

    To download Lenovo XClarity Essentials OneCLI, go to the following site:

    https://datacentersupport.lenovo.com/solutions/HT116433

2. Copy and unpack the OneCLI package, which also includes other required files, to the server. Make sure that you unpack the OneCLI and the required files to the same directory.

3. After you have Lenovo XClarity Essentials OneCLI in place, type the following command to set the DMI:
   ```
   onecli config set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag> [access_method]
   ```

    Where:

    <asset_tag>
    > The server asset tag number. Type `aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa`, where *aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa* is the asset tag number.

    [access_method]
    > The access method that you select to use from the following methods:

    > – Online authenticated LAN access, type the command:
    >   ```
    >   [--bmc-username <xcc_user_id> --bmc-password <xcc_password>]
    >   ```

    >   Where:

    >   *xcc_user_id*
    >   >> The BMC/IMM/XCC account name (1 of 12 accounts). The default value is USERID.

    >   *xcc_password*
    >   >> The BMC/IMM/XCC account password (1 of 12 accounts).

    >   Example command is as follows:

    >   ```
    >   onecli config set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag> --bmc-username <xcc_user_id> --bmc-password <xcc_password>
    >   ```

    > – Online KCS access (unauthenticated and user restricted):

    >   You do not need to specify a value for *access_method* when you use this access method.

    >   Example command is as follows:

    >   ```
    >   onecli config set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag>
    >   ```

    >   **Note:** The KCS access method uses the IPMI/KCS interface, which requires that the IPMI driver be installed.

    > – Remote LAN access, type the command:
    >   ```
    >   [--bmc <xcc_user_id>:<xcc_password>@<xcc_external_ip>]
    >   ```

    >   Where:

    >   *xcc_external_ip*

The BMC/IMM/XCC IP address. There is no default value. This parameter is required.

xcc_user_id

The BMC/IMM/XCC account (1 of 12 accounts). The default value is USERID.

xcc_password

The BMC/IMM/XCC account password (1 of 12 accounts).

Note: BMC, IMM, or XCC internal LAN/USB IP address, account name, and password are all valid for this command.

Example command is as follows:

```
onecli config set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag> --bmc <xcc_user_id>:<xcc_
password>@<xcc_external_ip>
```

4. Reset the Lenovo XClarity Controller to the factory defaults. See "Resetting the BMC to Factory Default" section in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/.

Chapter 6.   Resolving installation issues

Use this information to resolve issues that you might have when setting up your system.

Use the information in this section to diagnose and resolve problems that you might encounter during the initial installation and setup of your server.

Server does not power on

Complete the following steps until the problem is resolved:

1. Check the event log for any events related to the server not powering on.
2. Check for any LEDs that are flashing amber.
3. Check the power LED on the system board.
4. Check if AC power LED is lit on or the amber LED is lit on at the PSU rear side.
5. AC cycle the system.
6. Remove the CMOS battery for at least ten seconds, then, reinstall the CMOS battery.
7. Try to power on the system by IPMI command through XCC or by the power button.
8. Implement the minimum configuration (one processor, one DIMM and one PSU without any adapter and any drive installed).
9. Reseat all power supplies and make sure that AC LEDs on the PSU rear side are lit.
10. Replace the each power supply and check the power button function after installing the each one.
11. If the issue cannot be resolved by above actions, call service to review the issue symptom and see whether the system board replacement is necessary.

The server immediately displays the POST Event Viewer when it is turned on

Complete the following steps until the problem is solved.

1. Correct any errors that are indicated by the light path diagnostics LEDs.
2. Make sure that the server supports all the processors and that the processors match in speed and cache size.

   You can view processor details from system setup.

   To determine if the processor is supported for the server, see https://serverproven.lenovo.com/.
3. (Trained technician only) Make sure that processor 1 is seated correctly
4. (Trained technician only) Remove processor 2 and restart the server.
5. Replace the following components one at a time, in the order shown, restarting the server each time:
   a. (Trained technician only) Processor

b. (Trained technician only) System board

Embedded hypervisor is not in the boot list

Complete the following steps until the problem is solved.

1. If the server has been installed, moved, or serviced recently, or if this is the first time the embedded hypervisor is being used, make sure that the device is connected properly and that there is no physical damage to the connectors.

2. See the documentation that comes with the optional embedded hypervisor flash device for setup and configuration information.

3. Check https://serverproven.lenovo.com/ to validate that the embedded hypervisor device is supported for the server.

4. Make sure that the embedded hypervisor device is listed in the list of available boot options. From the management controller user interface, click **Server Configuration ➙ Boot Options**.

   For information about accessing the management controller user interface, see "Opening and Using the XClarity Controller Web Interface" section in the XCC documentation compatible with your server at:

   https://pubs.lenovo.com/lxcc-overview/

5. Check http://datacentersupport.lenovo.com for any tech tips (service bulletins) related to the embedded hypervisor and the server.

6. Make sure that other software works on the server to ensure that it is working properly.

Server cannot recognize a hard drive

Complete the following steps until the problem is solved.

1. Observe the associated yellow hard disk drive status LED. If the LED is lit, it indicates a drive fault.

2. If the status LED is lit, remove the drive from the bay, wait 45 seconds, and reinsert the drive, making sure that the drive assembly connects to the hard disk drive backplane.

3. Observe the associated green hard disk drive activity LED and the yellow status LED and perform corresponding operations in different situations:

   - If the green activity LED is flashing and the yellow status LED is not lit, the drive is recognized by the controller and is working correctly. Run the diagnostics tests for the hard disk drives. When you start a server and press the key according to the on-screen instructions, the LXPM is displayed by default. (For more information, see the "Startup" section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.)You can perform hard drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic ➙ HDD test/Disk Drive Test**.*

   - If the green activity LED is flashing and the yellow status LED is flashing slowly, the drive is recognized by the controller and is rebuilding.

   - If neither LED is lit or flashing, check whether the hard disk drive backplane is correctly seated. For details, go to step 4.

   - If the green activity LED is flashing and the yellow status LED is lit, replace the drive. If the activity of the LEDs remains the same, go to step Hard disk drive problems. If the activity of the LEDs changes, return to step 1.

4. Make sure that the hard disk drive backplane is correctly seated. When it is correctly seated, the drive assemblies correctly connect to the backplane without bowing or causing movement of the backplane.

5. Reseat the backplane power cable and repeat steps 1 through 3.

6. Reseat the backplane signal cable and repeat steps 1 through 3.

7. Suspect the backplane signal cable or the backplane:

   - Replace the affected backplane signal cable.

- Replace the affected backplane.

8. Run the diagnostics tests for the hard disk drives. When you start a server and press the key according to the on-screen instructions, the LXPM is displayed by default. (For more information, see the "Startup" section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.) You can perform hard drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic ➔ HDD test/Disk Drive Test**.[*]

Based on those tests:

- If the backplane passes the test but the drives are not recognized, replace the backplane signal cable and run the tests again.
- Replace the backplane.
- If the adapter fails the test, disconnect the backplane signal cable from the adapter and run the tests again.
- If the adapter fails the test, replace the adapter.

U.3 NVMe drive can be detected in NVMe connection, but cannot be detected in Tri-mode

In Tri-mode, NVMe drives are connected via a PCIe x1 link to the controller. To support Tri-mode with U.3 NVMe drives, **U.3 x1 mode** must be enabled for the selected drive slots on the backplane through the XCC Web GUI. By default, the backplane setting is **U.2 x4 mode**.

Complete the following steps to enable **U.3 x1 mode**:

1. Log into the XCC Web GUI, and choose **Storage ➔ Detail** from the navigation tree on the left.
2. In the window that is displayed, click the icon ⚙ next to **Backplane**.
3. In the dialog box that is displayed, select the target drive slots and click **Apply**.
4. Do a DC power cycle to make the setting take effect.

Displayed system memory is less than installed physical memory

Complete the following procedure to solve the problem.

Note: Each time you install or remove a memory module, you must disconnect the server from the power source; then, wait 10 seconds before restarting the server.

1. Make sure that:
   - No error LEDs are lit on the operator information panel.
   - No memory module error LEDs are lit on the system board.
   - Memory mirrored channel does not account for the discrepancy.
   - The memory modules are seated correctly.
   - You have installed the correct type of memory module (see "PMEM rules" on page 163 for requirements).
   - After changing or replacing a memory module, memory configuration is updated accordingly in the Setup Utility.
   - All banks of memory are enabled. The server might have automatically disabled a memory bank when it detected a problem, or a memory bank might have been manually disabled.
   - There is no memory mismatch when the server is at the minimum memory configuration.
   - When PMEMs are installed:
     a. If the memory is set in App Direct Mode, all the saved data have been backed up, and created namespaces are deleted before any PMEM is replaced or added.
     b. Refer to "PMEM rules" on page 163 and see if the displayed memory fits the mode description.

c. If PMEMs are recently set in Memory Mode, turn it back to App Direct Mode and examine if there is namespace that has not been deleted.

d. Go to the Setup Utility, select **System Configuration and Boot Management → Intel Optane PMEMs → Security**, and make sure security of all the PMEM units is disabled.

2. Reseat the memory modules, and then restart the server.

3. Check the POST error log:

   • If a memory module was disabled by a systems-management interrupt (SMI), replace the memory module.

   • If a memory module was disabled by the user or by POST, reseat the memory module; then, run the Setup Utility and enable the memory module.

4. Run memory diagnostics. When you start a solution and press the key according to the on-screen instructions, the LXPM interface is displayed by default. (For more information, see the "Startup" section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.) You can perform memory diagnostics with this interface. From the Diagnostic page, go to **Run Diagnostic → Memory test** or **PMEM test**.

   Notes: When PMEMs are installed, run diagnostics based on the mode that is set presently:

   • App Direct Mode:

     – Run Memory Test for DRAM memory modules.

     – Run PMEM Test for PMEMs.

   • Memory Mode:

     Run both Memory Test and PMEM Test for PMEMs.

5. Reverse the modules between the channels (of the same processor), and then restart the server. If the problem is related to a memory module, replace the failing memory module.

   Note: When PMEMs are installed, only adopt this method in Memory Mode.

6. Re-enable all memory modules using the Setup Utility, and then restart the server.

7. (Trained technician only) Install the failing memory module into a memory module connector for processor 2 (if installed) to verify that the problem is not the processor or the memory module connector.

8. (Trained technician only) Replace the system board.

A Lenovo optional device that was just installed does not work.

1. Make sure that:
   • The device is supported for the server (see https://serverproven.lenovo.com/).
   • You followed the installation instructions that came with the device and the device is installed correctly.
   • You have not loosened any other installed devices or cables.
   • You updated the configuration information in system setup. When you start a server and press the key according to the on-screen instructions to display the Setup Utility. (For more information, see the "Startup" section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.) Whenever memory or any other device is changed, you must update the configuration.

2. Reseat the device that you have just installed.

3. Replace the device that you have just installed.

4. Reseat the cable connection and check there is no physical damage to the cable.

5. If there is any cable damages, then replace the cable.

Voltage planar fault is displayed in the event log

Complete the following steps until the problem is solved.

1. Revert the system to the minimum configuration. See "Specifications" on page 3 for the minimally required number of processors and DIMMs.

2. Restart the system.

    - If the system restarts, add each of the removed items one at a time and restart the system each time until the error occurs. Replace the item for which the error occurs.

    - If the system does not restart, suspect the system board.

Appendix A. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about Lenovo products, you will find a wide variety of sources available from Lenovo to assist you.

On the World Wide Web, up-to-date information about Lenovo systems, optional devices, services, and support are available at:

http://datacentersupport.lenovo.com

Note: IBM is Lenovo's preferred service provider for ThinkSystem.

Before you call

Before you call, there are several steps that you can take to try and solve the problem yourself. If you decide that you do need to call for assistance, gather the information that will be needed by the service technician to more quickly resolve your problem.

Attempt to resolve the problem yourself

You can solve many problems without outside assistance by following the troubleshooting procedures that Lenovo provides in the online help or in the Lenovo product documentation. The Lenovo product documentation also describes the diagnostic tests that you can perform. The documentation for most systems, operating systems, and programs contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

You can find the product documentation for your ThinkSystem products at https://pubs.lenovo.com/

You can take these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Check for updated software, firmware, and operating-system device drivers for your Lenovo product. The Lenovo Warranty terms and conditions state that you, the owner of the Lenovo product, are responsible for maintaining and updating all software and firmware for the product (unless it is covered by an additional maintenance contract). Your service technician will request that you upgrade your software and firmware if the problem has a documented solution within a software upgrade.
- If you have installed new hardware or software in your environment, check https://serverproven.lenovo.com/ to make sure that the hardware and software are supported by your product.
- Go to http://datacentersupport.lenovo.com and check for information to help you solve the problem.
  - Check the Lenovo forums at https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv_eg to see if someone else has encountered a similar problem.

Gathering information needed to call Support

If you require warranty service for your Lenovo product, the service technicians will be able to assist you more efficiently if you prepare the appropriate information before you call. You can also go to http://datacentersupport.lenovo.com/warrantylookup for more information about your product warranty.

Gather the following information to provide to the service technician. This data will help the service technician quickly provide a solution to your problem and ensure that you receive the level of service for which you might have contracted.

- Hardware and Software Maintenance agreement contract numbers, if applicable
- Machine type number (Lenovo 4-digit machine identifier)
- Model number
- Serial number
- Current system UEFI and firmware levels
- Other pertinent information such as error messages and logs

As an alternative to calling Lenovo Support, you can go to https://support.lenovo.com/servicerequest to submit an Electronic Service Request. Submitting an Electronic Service Request will start the process of determining a solution to your problem by making the pertinent information available to the service technicians. The Lenovo service technicians can start working on your solution as soon as you have completed and submitted an Electronic Service Request.

Collecting service data

To clearly identify the root cause of a server issue or at the request of Lenovo Support, you might need collect service data that can be used for further analysis. Service data includes information such as event logs and hardware inventory.

Service data can be collected through the following tools:

- **Lenovo XClarity Provisioning Manager**

  Use the Collect Service Data function of Lenovo XClarity Provisioning Manager to collect system service data. You can collect existing system log data or run a new diagnostic to collect new data.

- **Lenovo XClarity Controller**

  You can use the Lenovo XClarity Controller web interface or the CLI to collect service data for the server. The file can be saved and sent to Lenovo Support.

  – For more information about using the web interface to collect service data, see the "Downloading service data" section in the XCC documentation version compatible with your server at https://pubs.lenovo.com/lxcc-overview/.

  – For more information about using the CLI to collect service data, see the "ffdc command" section in the XCC documentation version compatible with your server at https://pubs.lenovo.com/lxcc-overview/.

- **Lenovo XClarity Administrator**

  Lenovo XClarity Administrator can be set up to collect and send diagnostic files automatically to Lenovo Support when certain serviceable events occur in Lenovo XClarity Administrator and the managed endpoints. You can choose to send diagnostic files to Lenovo Support using Call Home or to another service provider using SFTP. You can also manually collect diagnostic files, open a problem record, and send diagnostic files to the Lenovo Support Center.

  You can find more information about setting up automatic problem notification within the Lenovo XClarity Administrator at http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/admin_setupcallhome.html.

- **Lenovo XClarity Essentials OneCLI**

  Lenovo XClarity Essentials OneCLI has inventory application to collect service data. It can run both in-band and out-of-band. When running in-band within the host operating system on the server, OneCLI can collect information about the operating system, such as the operating system event log, in addition to the hardware service data.

  To obtain service data, you can run the `getinfor` command. For more information about running the `getinfor`, see https://pubs.lenovo.com/lxce-onecli/onecli_r_getinfor_command.

Contacting Support

You can contact Support to obtain help for your issue.

You can receive hardware service through a Lenovo Authorized Service Provider. To locate a service provider authorized by Lenovo to provide warranty service, go to https://datacentersupport.lenovo.com/serviceprovider and use filter searching for different countries. For Lenovo support telephone numbers, see https://datacentersupport.lenovo.com/supportphonelist for your region support details.

Index