Lenovo

ThinkSystem SR655 V3
User Guide



Machine Type: 7D9E, 7D9F

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

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Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

Antes de instalar este produto, leia as Informações de Segurança.

在安装本产品之前，请仔细阅读 Safety Information （安全信息）。

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφάλειας (safety information).

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

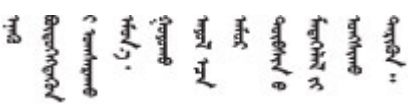
A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.



Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Antes de instalar este produto, leia as Informações sobre Segurança.

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Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto, lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

ཐོན་རྫས་འདི་བདེ་སྐྱོང་མ་བྱས་གོང་། ·སྐྲ་ཐྱི་ཡིད་གཟབ· བྱ་འདྲ་མིན་ཡོད་པའི་འོད་སྣེར་བལྟ་དགོས།

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

ھەزكۇر مەھسۇلاتنى ئورنىتىشتىن بۇرۇن بىخەتەرلىك ئۇچۇرلىرىنى ئوقۇپ چىقىڭ.

Youq mwngz yungh canjbinj neix gaxgonq, itdingh aeu doeg aen canjbinj soengq cungj vahgangj ancien siusik.

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.

Note: The product is not suitable for use at visual display workplaces according to §2 of the Workplace Regulations.

Note: 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.

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Chapter 1. Introduction

The ThinkSystem SR655 V3 server (7D9E and 7D9F) is a 1-socket 2U server that features AMD® EPYC™ 9004 or 9005 series processors. The server offers a broad selection of drive and slot configurations, high performance, and expansion for various IT workloads. Combining performance and flexibility, the server is a great choice for enterprises of all sizes.

Figure 1. ThinkSystem SR655 V3



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 assembly. Some of the features that are unique to the Lenovo XClarity Controller are enhanced performance, higher-resolution remote video, and expanded security options.

  The server supports Lenovo XClarity Controller 2 (XCC2). For additional information about Lenovo XClarity Controller 2 (XCC2), refer 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).

- **Large system-memory capacity**

  The server supports up to 12 TruDDR5 dual inline memory modules (DIMMs) with error correcting code (ECC). For more information about the specific types and maximum amount of memory, see “Technical specifications” on page 3.

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

  With the hot-swap feature, you can add, remove, or replace hard disk drives without turning off the server.

  Storage capacity is different depending on server model. See "Technical specifications" on page 3 for more information.

- **Lightpath Diagnostics**

  Lightpath Diagnostics provides LEDs to help you diagnose problems. For more information about the Lightpath Diagnostics, see "Troubleshooting by system LEDs and diagnostics display" on page 504.

- **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**

  The redundant cooling by the fans in the server enables continued operation if one rotor of a fan fails.

- **ThinkSystem RAID support**

  The ThinkSystem RAID adapter provides hardware redundant array of independent disks (RAID) support to create configurations, supporting RAID levels 0, 1, 5, 6, 10, 50, and 60.

Tech Tips

Lenovo continually updates the support website with the latest tips and techniques that you can use to solve issues that your server might encounter. These Tech Tips (also called retain tips or service bulletins) provide procedures to work around issues or solve problems related to the operation of your server.

To find the Tech Tips available for your server:

1. Go to http://datacentersupport.lenovo.com and navigate to the support page for your server.
2. Click on **How To's** from the navigation pane.
3. Click **Article Type → Solution** from the drop-down menu.

   Follow the on-screen instructions to choose the category for the problem that you are having.

Security advisories

Lenovo is committed to developing products and services that adhere to the highest security standards in order to protect our customers and their data. When potential vulnerabilities are reported, it is the responsibility of the Lenovo Product Security Incident Response Team (PSIRT) to investigate and provide

information to our customers so they may put mitigation plans in place as we work toward providing solutions.

The list of current advisories is available at the following site:

https://datacentersupport.lenovo.com/product_security/home

Specifications

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 latest specifications information is always available at https://lenovopress.lenovo.com/.

Refer to the below table for specifications categories and the content of each category.

Specification category	Technical specifications	Mechanical specifications	Environmental specifications
Content	• Processor • Memory • Internal drives • Expansion slots • Storage controller • Graphics processing unit (GPU) • Integrated functions and I/O connectors • Network • System fan • Power supplies • Minimal configuration for debugging • Operating systems	• Dimension • Weight	• Acoustical noise emissions • Ambient temperature management • Environmental

Technical specifications

Summary of the technical specifications of server. Depending on the model, some features might not be available, or some specifications might not apply. The latest specifications information is always available at https://lenovopress.lenovo.com/.

Processor
Supports AMD® EPYC™ 9004 or 9005 series processors, with 5nm process technology. • One processor with the new LGA 6096 (SP5) socket • Up to 96 Zen4 cores (192 threads), 128 Zen4c cores (256 threads), 128 Zen5 cores (256 threads), or 128 Zen5c cores (384 threads) per socket • Up to 4 xGMI3 links at up to 32 GT/s • Maximum Configurable Thermal Design Power (cTDP): up to 400 watts For a list of supported processors, see https://serverproven.lenovo.com.

Memory

See “Memory module installation rules and order” on page 53 for detailed information about memory configuration and setup.

- Slots: 12 memory module (DIMM) slots
- Memory module type for 9004 series processors:
  - TruDDR5 4800 MHz x8 RDIMM: 16 GB (1Rx8), 32 GB (2Rx8), 48 GB (2Rx8)
  - TruDDR5 4800 MHz 10x4 RDIMM: 32 GB (1Rx4), 64 GB (2Rx4), 96 GB (2Rx4)
  - TruDDR5 4800 MHz 9x4 RDIMM: 32 GB (1Rx4), 64 GB (2Rx4)
  - TruDDR5 4800 MHz 3DS RDIMM: 128 GB (4Rx4), 256 GB (8Rx4)
  - TruDDR5 5600 MHz 10x4 RDIMM: 128GB (2Rx4)
- Memory module type for 9005 series processors:
  - TruDDR5 6400 MHz x8 RDIMM: 16 GB (1Rx8), 32 GB (2Rx8), 48 GB (2Rx8)
  - TruDDR5 6400 MHz 10x4 RDIMM: 32 GB (1Rx4), 64 GB (2Rx4), 96 GB (2Rx4), 128GB (2Rx4)
- Capacity:
  - Minimum: 16 GB (1 x 16 GB RDIMM)
  - Maximum:
    - 3 TB (12 x 256 GB 3DS RDIMM) for 9004 series processors
    - 1.5 TB (12 x 128 GB RDIMM) for 9005 series processors
- Maximum speed:
  - 4800/5600 MHz RDIMMs: 4800 MT/s
  - 6400 MHz RDIMMs: 6400 MT/s

Notes:

- Operating speed depends on processor model and UEFI settings.
- Some 6400 MHz RDIMMs (see the table in the “Memory options” section in https://lenovopress.lenovo.com/lp1610.pdf) can operate at a maximum speed of 6400 MT/s provided that the latest system firmware is applied. All other 6400 MHz DIMMs operate at a maximum speed of 6000 MT/s.

For a list of supported memory modules, see https://serverproven.lenovo.com.

Internal drives

- Front drive bays:
  - Up to 24 x 2.5-inch hot-swap SAS/SATA/NVMe drives
  - Up to 12 x 3.5-inch hot-swap SAS/SATA drives
  - Up to 4 x 3.5-inch hot-swap NVMe drives
- Middle drive bays:
  - Up to 8 x 2.5-inch hot-swap SAS/SATA/NVMe drives
  - Up to 4 x 3.5-inch hot-swap SAS/SATA drives
- Rear drive bays:
  - Up to 8 x 2.5-inch hot-swap SAS/SATA drives
  - Up to 4 x 2.5-inch hot-swap NVMe drives
  - Up to 4 x 3.5-inch hot-swap SAS/SATA drives
  - Up to two 7mm drives
- Up to two internal M.2 drives

Expansion slots

- Up to ten PCIe slots
- One OCP module slot

PCIe slot availability is based on riser selection. See “Rear view” on page 25 and “PCIe slots and PCIe adapters” on page 55.

Storage controller

- HBA adapters:
  - ThinkSystem 450W-16e SAS/SATA PCIe Gen4 24Gb HBA
  - ThinkSystem 440-16i SAS/SATA PCIe Gen4 12Gb Internal HBA
  - ThinkSystem 440-16e SAS/SATA PCIe Gen4 12Gb HBA
  - ThinkSystem 440-16i SAS/SATA PCIe Gen4 12Gb HBA
  - ThinkSystem 440-8i SAS/SATA PCIe Gen4 12Gb HBA
  - ThinkSystem 440-8e SAS/SATA PCIe Gen4 12Gb HBA
  - ThinkSystem 4350-16i SAS/SATA 12Gb HBA
  - ThinkSystem 4350-8i SAS/SATA 12Gb HBA
  - ThinkSystem 4450-16i SAS/SATA PCIe Gen4 24Gb HBA
- RAID adapters:
  - ThinkSystem RAID 540-16i PCIe Gen4 12Gb Adapter
  - ThinkSystem RAID 540-8i PCIe Gen4 12Gb Adapter
  - ThinkSystem RAID 940-32i 8GB Flash PCIe Gen4 12Gb Adapter
  - ThinkSystem RAID 940-8e 4GB Flash PCIe Gen4 12Gb Adapter
  - ThinkSystem RAID 5350-8i PCIe 12Gb Internal Adapter
  - ThinkSystem RAID 5350-8i PCIe 12Gb Adapter
  - ThinkSystem RAID 9350-16i 4GB Flash PCIe 12Gb Internal Adapter
  - ThinkSystem RAID 9350-16i 4GB Flash PCIe 12Gb Adapter
  - ThinkSystem RAID 9350-8i 2GB Flash PCIe 12Gb Internal Adapter
  - ThinkSystem RAID 5450-16i PCIe Gen4 24Gb Adapter
  - ThinkSystem RAID 940-16i 8GB Flash PCIe Gen4 12Gb Internal Adapter
  - ThinkSystem RAID 940-16i 8GB Flash PCIe Gen4 12Gb Adapter
  - ThinkSystem RAID 940-16i 4GB Flash PCIe Gen4 12Gb Adapter
  - ThinkSystem RAID 940-8i 8GB Flash PCIe Gen4 12Gb Adapter
  - ThinkSystem RAID 940-8i 4GB Flash PCIe Gen4 12Gb Adapter
  - ThinkSystem RAID 9450-8i 4GB Flash PCIe Gen4 24Gb Adapter
  - ThinkSystem RAID 9450-16i 8GB Flash PCIe Gen4 24Gb Adapter
  - ThinkSystem RAID 9450-32i 8GB Flash PCIe Gen4 24Gb Adapter
- Switch adapter:
  - ThinkSystem 1611-8P PCIe Gen4 NVMe Switch Adapter

Note: For more information about the RAID/HBA adapters, see Lenovo ThinkSystem RAID Adapter and HBA Reference.

Graphics processing unit (GPU)

Your server supports the following GPUs:

- Double-wide:
  - NVIDIA® A30, A40, A16, L40, L40S, A100, H100, H100 NVL, RTX A2000, RTX A4500, RTX A6000, RTX 4500 Ada, RTX 6000 Ada
  - AMD® Instinct MI210
- Single-wide: NVIDIA® A2, L4

For GPU supporting rules, see “Thermal rules” on page 60.

Integrated functions and I/O connectors

- Lenovo XClarity Controller (XCC), which provides service processor control and monitoring functions, video controller, and remote keyboard, video, mouse, and remote drive capabilities.
  - The server supports Lenovo XClarity Controller 2 (XCC2). For additional information about Lenovo XClarity Controller 2 (XCC2), refer to https://pubs.lenovo.com/lxcc-overview/.
- Front connectors:
  - One VGA connector (optional)
  - One USB 3.1 Gen 1 (5 Gbps) connector
  - One USB 2.0 connector with XCC system management function
  - One external diagnostics connector
  - One Integrated Diagnostics Panel (optional)
- Rear connectors:
  - One VGA connector
  - Three USB 3.1 Gen 1 (5 Gbps) connectors
  - One XCC system management port (10/100/1000 Mbps RJ-45)
  - Two or four Ethernet connectors on the OCP module (optional)

Network

- OCP module

Note:
If ThinkSystem V3 Management NIC Adapter Kit is installed on the server, it will not be displayed on the PCIe card list of system management software, such as XCC, LXPM, and so on.

System fan

- Supported fan types:
  - Standard fan 6038 (single-rotor, 17000 RPM)
  - Performance fan 6056 (dual-rotor, 21000 RPM)
- Fan redundancy: N + 1 redundancy, one redundant fan rotor
  - Supports fan redundancy when using six 6038 fans, four 6056 fans or six 6056 fans
  - Not support fan redundancy when using four 6038 fans

Notes:

- Single-rotor hot-swap fans cannot be mixed with dual-rotor hot-swap fans.
- The redundant cooling by the fans in the server enables continued operation if one rotor of a fan fails.
- When the system is powered off but still plugged in to AC power, fans 1 and 2 may continue to spin at a much lower speed. This is the system design to provide proper cooling.

Power supplies

The server supports up to two hot-swap power supplies for redundancy.

Power supply	100–127 V ac	200–240 V ac	240 V dc	-48 V dc
750W Platinum	√	√	√	
750W Titanium		√	√	
1100W Platinum	√	√	√	
1100W Titanium		√	√	
1800W Platinum		√	√	
1800W Titanium		√	√	

Power supplies				
2400W Platinum		√	√	
2600W Titanium		√	√	
1100W -48V DC				√

CAUTION:

- **240 V dc input (input range: 180-300 V dc) is supported in Chinese Mainland ONLY.**
- **Power supply with 240 V dc input cannot support hot plugging power cord function. Before removing the power supply with dc input, please turn off server or disconnect dc power sources at the breaker panel or by turning off the power source. Then, remove the power cord.**

Minimal configuration for debugging

- One processor
- One memory module in slot 7
- One power supply
- One HDD/SSD drive or one M.2 drive (if OS is needed for debugging)
- Five system fans

Operating systems

Supported and certified operating systems:
- Microsoft Windows Server
- Microsoft Windows
- VMware ESXi
- Red Hat Enterprise Linux
- SUSE Linux Enterprise Server
- Canonical Ubuntu

References:

- Complete list of available operating systems: https://lenovopress.lenovo.com/osig.
- OS deployment instructions, see "Deploy the operating system" on page 500.

Notes:

- VMware ESXi does not support ThinkSystem 2.5 U.3 6500 ION 30.72TB Read Intensive NVMe PCIe 4.0 x4 HS SSD or P5336 NVMe SSDs.
- Windows OSs do not support 440 8i/16i HBAs in configurations including the 12 x 3.5-inch SAS/SATA expander backplane and a middle or rear backplane.

Mechanical specifications

Summary of the mechanical specifications of server. Depending on the model, some features might not be available, or some specifications might not apply. The latest specifications information is always available at https://lenovopress.lenovo.com/.

Dimension
• Form factor: 2U • Height: 86.5 mm (3.4 inches) • Width: – With rack latches: 482.0 mm (19.0 inches)   – Without rack latches: 444.6 mm (17.5 inches) • Depth: 763.7 mm (30.1 inches) **Note:** The depth is measured with rack latches installed, but without the security bezel installed.

Weight
Up to 37 kg (82 lb), depending on the server configuration

Environmental specifications

Summary of the environmental specifications of server. Depending on the model, some features might not be available, or some specifications might not apply. The latest specifications information is always available at https://lenovopress.lenovo.com/.

Acoustical noise emissions

Acoustical noise emissions

The server has the following acoustic noise emissions declaration.

	Standard	Storage	GPU
Sound power levels (L_{WAd})			
Idling	6.6 Bel	7.4 Bel	7.4 Bel
Operating	8.1 Bel	7.5 Bel	8.6 Bel
Sound pressure level (L_{pAm})			
Idling	49.9 dBA	59.5 dBA	59.5 dBA
Operating	65.4 dBA	61.3 dBA	71.2 dBA

The declared sound levels are based on the following configurations, which may change depending on configurations or conditions.

Config.	Standard	Storage	GPU
Chassis (2U)	Front 16 x 2.5''	Front 12 x 3.5''	Front 16 x 2.5''
Fan	4 x performance fans	6 x performance fans	6 x performance fans
Processor	1 x 300 W	1 x 240 W	1 x 300 W
DIMM	12 x 64 GB	12 x 64 GB	12 x 64 GB
Drive	16 x 2.4 TB SAS HDDs	Front 12 x 2 TB + rear 4 x 2 TB HDDs	16 x 2.4 TB SAS HDDs
RAID	1 x RAID 940-8i	1 x RAID 940-16i	1 x RAID 940-16i
OCP	Intel E810-DA2 10/25GbE SFP28 2-Port OCP		
PSU	2 x 1800 W	2 x 1800 W	2 x 2400 W
GPU	None	None	3 x A100

Notes:

- These sound levels were measured in controlled acoustical environments according to procedures specified by ISO7779 and are reported in accordance with ISO 9296.
- 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 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

Environment
ThinkSystem SR655 V3 complies with ASHRAE Class A2 specifications with most configurations, and depending on the hardware configuration, also complies with ASHRAE Class A3, and Class A4 specifications. System performance may be impacted when operating temperature is outside ASHRAE A2 specification. Depending on the hardware configuration, SR655 V3 server also complies with ASHRAE Class H1 specification. System performance may be impacted when operating temperature is outside ASHRAE H1 specification. The restrictions to ASHRAE support are as follows (cooling by air): • The ambient temperature must be limited to 35°C if the server has any of the following components: – Broadcom 57454 10GBASE-T 4-port OCP – Broadcom 57416 10GBASE-T 2-port OCP – PCIe network interface cards (NICs) at a rate greater than or equal to 100 GB – Parts with active optical cable (AOC) and at a rate of 25 GB • The ambient temperature must be limited to 30°C if the server has any of the following components: – 24 x 2.5" or 12 x 3.5" front bay, middle bay, or rear bay – GPU adapters – Parts with AOC and at a rate of greater than 25 GB – Group E (320W <= cTDP <= 400W) processors – 9754/9734/9654(P)/9554(P)/9174F processor in a front 8 x 2.5"/8 x 3.5"/16 x 2.5" standard configuration • The ambient temperature must be limited to 25°C if the server has any of the following components: – 9754/9734/9654(P)/9554(P)/9174F processor in a front 24 x 2.5"/12 x 3.5" configuration without middle/rear bay – 9754/9734/9654(P)/9554(P)/9174F processor in a front 8 x 2.5"/8 x 3.5"/16 x 2.5" + GPU configuration – Gen5 7.68 TB or larger capacity NVMe drives in a configuration with middle/rear bay – 24 x 2.5" front bay + GPU – Group A (240 W < cTDP ≤ 300 W) processor in a configuration with middle/rear bay For detailed thermal information, see “Thermal rules” on page 60. **Note:** When the ambient temperature is greater than the supported max temperature, the server will shut down (ASHRAE 45° C). The server will not power on again until the ambient temperature falls within the supported temperature range. • **Air temperature**: – Operating – ASHRAE class H1: 5°C to 25°C (41°F to 77°F) The maximum ambient temperature decreases by 1°C for every 500 m (1640 ft) increase in altitude above 900 m (2,953 ft) – ASHRAE 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) – ASHRAE class A3: 5°C to 40°C (41°F to 104°F) The maximum ambient temperature decreases by 1°C for every 175 m (574 ft) increase in altitude above 900 m (2,953 ft) – ASHRAE class A4: 5°C to 45°C (41°F to 113°F) The maximum ambient temperature decreases by 1°C for every 125 m (410 ft) increase in altitude above 900 m (2,953 ft)

Environment
– Server off: 5°C to 45°C (41°F to 113°F) – Shipment/storage: -40°C to 60°C (-40°F to 140°F) • **Maximum altitude**: 3,050 m (10,000 ft) • **Relative Humidity** (non-condensing): – Operating – ASHRAE class H1: 8%–80%; maximum dew point: 17°C (62.6°F) – ASHRAE class A2: 8%–80%; maximum dew point: 21°C (70°F) – ASHRAE class A3: 8%–85%; maximum dew point: 24°C (75°F) – ASHRAE class A4: 8%–90%; maximum dew point: 24°C (75°F) – Shipment/storage: 8% to 90%

Water requirements

Water requirements

ThinkSystem SR655 V3 is supported in the following environment:

- Maximum pressure: 3 bars
- Water inlet temperature and flow rates:

Water inlet temperature	Water flow rate
50°C (122°F)	**1.5** liters per minute (lpm) per server
45°C (113°F)	**1** liter per minute (lpm) per server
40°C (104°F) or lower	**0.5** liters per minute (lpm) per server

Attention: The water required to initially fill the system side cooling loop must be reasonably clean, bacteria-free water (<100 CFU/ml) such as de-mineralized water, reverse osmosis water, de-ionized water, or distilled water. The water must be filtered with an in-line 50 micron filter (approximately 288 mesh). The water must be treated with anti-biological and anti-corrosion measures. Environment quality must be maintained over the lifetime of the system to receive warranty and support on affecting components. For more information please see Lenovo Neptune Direct Water-Cooling Standards.

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.

Attention: Environment quality must be maintain over the lifetime of the system to receive warranty and support on affecting components. For water quality requirement, see Lenovo Neptune Direct Water-Cooling Standards.

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 1. 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 300 Angstroms per month (Å/month ≈ 0.0039 μg/cm^2-hour weight gain).[2] • The silver reactivity level shall be less than 200 Å/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.

Water quality requirement

Attention: The water required to initially fill the system side cooling loop must be reasonably clean, bacteria-free water (<100 CFU/ml) such as de-mineralized water, reverse osmosis water, de-ionized water, or distilled water. The water must be filtered with an in-line 50 micron filter (approximately 288 mesh). The water must be treated with anti-biological and anti-corrosion measures. Environment quality must be maintained over the lifetime of the system to receive warranty and support on affecting components. For more information please see Lenovo Neptune Direct Water-Cooling Standards.

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 (system board assembly). **Interface** • CLI application • Web GUI interface • Mobile application • Redfish API **Usage and downloads** https://pubs.lenovo.com/lxcc-overview/
Lenovo XCC Logger Utility	Application that reports the XCC events to local OS system log. **Interface** • CLI application **Usage and downloads** • https://pubs.lenovo.com/lxcc-logger-linux/ • https://pubs.lenovo.com/lxcc-logger-windows/
Lenovo XClarity Administrator	Centralized interface for multi-server management. **Interface** • Web GUI interface • Mobile application • REST API **Usage and downloads** https://pubs.lenovo.com/lxca/
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

Options		Functions							
		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 XCC Logger Utility						√			
Lenovo XClarity Administrator		√	√	√	√[2]	√	√[4]		
Lenovo XClarity Essen-tials toolset	OneCLI	√		√	√[2]	√	√		
	Bootable Media Creator			√	√[2]		√[4]		
	UpdateXpress			√	√[2]				
Lenovo XClarity Provisioning Manager			√	√	√[3]		√[5]		
Lenovo XClarity Integrator		√		√	√	√	√	√[6]	
Lenovo XClarity Energy Manager		√				√		√	
Lenovo Capacity Planner									√[7]

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

Front view

The front view of the server varies by model. Depending on the model, your server might look slightly different from the illustrations in this topic.

Refer to the following front views for different server models:

- “Front view with eight 2.5-inch front drive bays” on page 17
- “Front view with sixteen 2.5-inch front drive bays” on page 18
- “Front view with sixteen 2.5-inch front drive bays (with riser 5)” on page 18
- “Front view with twenty-four 2.5-inch front drive bays” on page 19
- “Front view with 2.5-inch front drive bays (backplane-less)” on page 19
- “Front view with eight 3.5-inch front drive bays” on page 19
- “Front view with twelve 3.5-inch front drive bays” on page 20
- “Front view with 3.5-inch front drive bays (backplane-less)” on page 20

Front view with eight 2.5-inch front drive bays

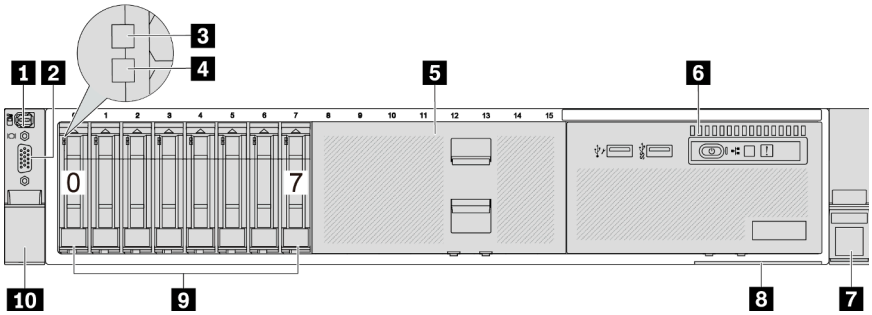


Table 2. Components on the front of the server

Callout	Callout
1 “External diagnostics connector (optional)” on page 22	2 “VGA connector (optional)” on page 22
3 “Drive activity LED” on page 21	4 “Drive status LED” on page 21
5 “Drive bay filler” on page 21	6 “Front I/O module (on media bay)” on page 22
7 “Rack latch (right)” on page 22	8 “Pull-out information tab” on page 22
9 “Drive bays” on page 21	10 “Rack latch (left)” on page 22

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Front view with sixteen 2.5-inch front drive bays

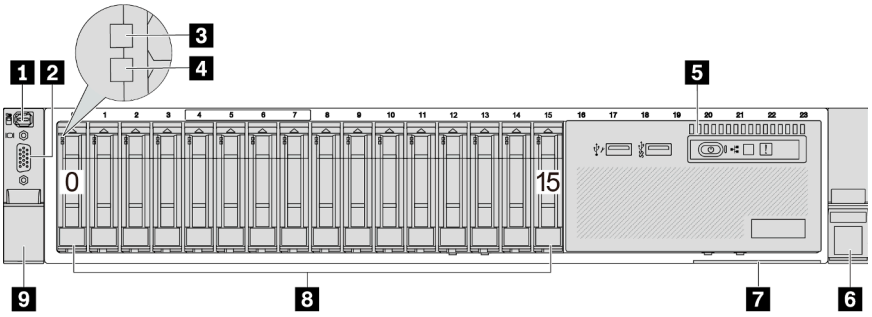


Table 3. Components on the front of the server

Callout	Callout
1 “External diagnostics connector (optional)” on page 22	2 “VGA connector (optional)” on page 22
3 “Drive activity LED” on page 21	4 “Drive status LED” on page 21
5 “Front I/O module (on media bay)” on page 22	6 “Rack latch (right)” on page 22
7 “Pull-out information tab” on page 22	8 “Drive bays” on page 21
9 “Rack latch (left)” on page 22	

Front view with sixteen 2.5-inch front drive bays (with riser 5)

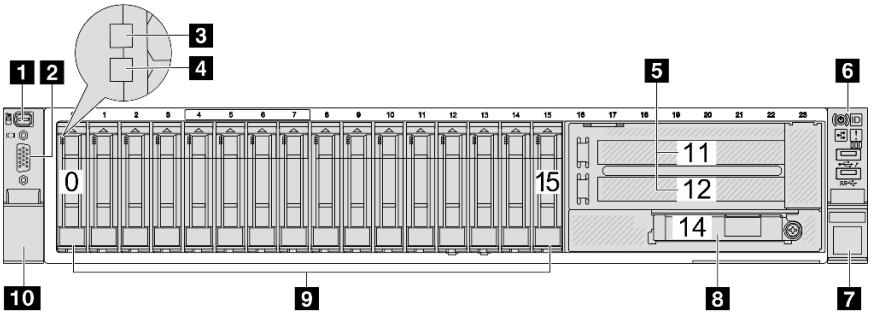


Table 4. Components on the front of the server

Callout	Callout
1 “External diagnostics connector (optional)” on page 22	2 “VGA connector (optional)” on page 22
3 “Drive activity LED” on page 21	4 “Drive status LED” on page 21
5 “PCIe slots” on page 22	6 “Front I/O module (on rack latch)” on page 22
7 “Rack latch (right)” on page 22	8 “Ethernet connectors on OCP module (optional)” on page 21
9 “Drive bays” on page 21	10 “Rack latch (left)” on page 22

Front view with twenty-four 2.5-inch front drive bays

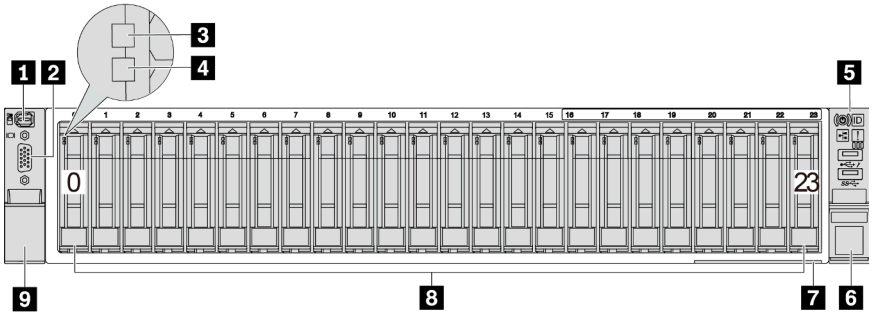


Table 5. Components on the front of server models

Callout	Callout
1 “External diagnostics connector (optional)” on page 22	2 “VGA connector (optional)” on page 22
3 “Drive activity LED” on page 21	4 “Drive status LED” on page 21
5 “Front I/O module (on rack latch)” on page 22	6 “Rack latch (right)” on page 22
7 “Pull-out information tab” on page 22	8 “Drive bays” on page 21
9 “Rack latch (left)” on page 22	

Front view with 2.5-inch front drive bays (backplane-less)

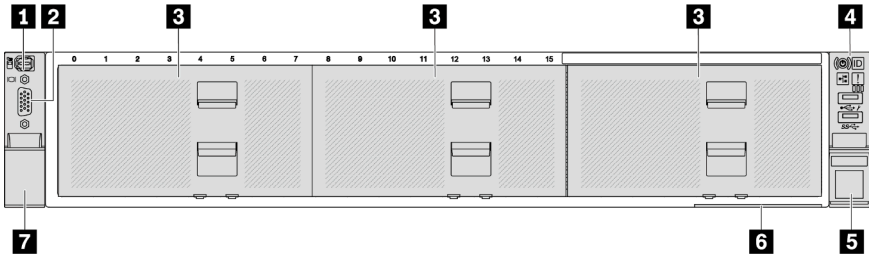


Table 6. Components on the front of server models

Callout	Callout
1 “External diagnostics connector (optional)” on page 22	2 “VGA connector (optional)” on page 22
3 “Drive bay fillers” on page 21	4 “Front I/O module (on rack latch)” on page 22
5 “Rack latch (right)” on page 22	6 “Pull-out information tab” on page 22
7 “Rack latch (left)” on page 22	

Front view with eight 3.5-inch front drive bays

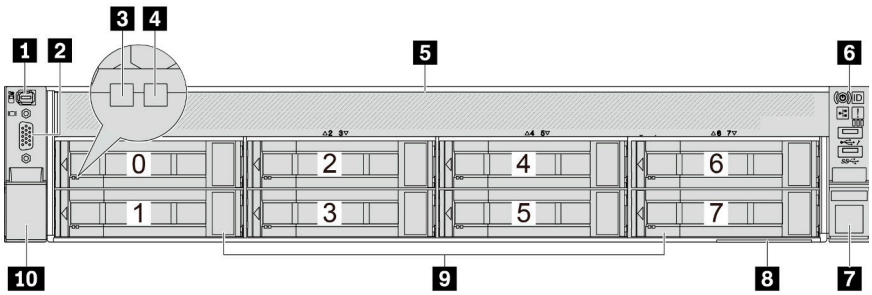


Table 7. Components on the front of server models

Callout	Callout
1 “External diagnostics connector (optional)” on page 22	2 “VGA connector (optional)” on page 22
3 “Drive activity LED” on page 21	4 “Drive status LED” on page 21
5 “Drive bay filler” on page 21	6 “Front I/O module (on rack latch)” on page 22
7 “Rack latch (right)” on page 22	8 “Pull-out information tab” on page 22
9 “Drive bays” on page 21	10 “Rack latch (left)” on page 22

Front view with twelve 3.5-inch front drive bays

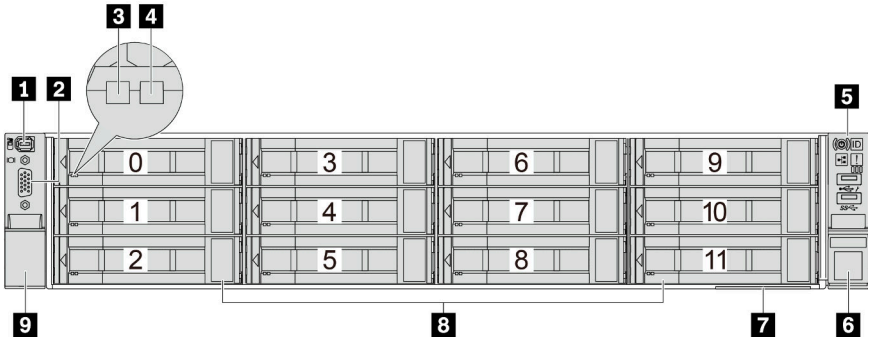


Table 8. Components on the front of server models

Callout	Callout
1 “External diagnostics connector (optional)” on page 22	2 “VGA connector (optional)” on page 22
3 “Drive activity LED” on page 21	4 “Drive status LED” on page 21
5 “Front I/O module (on rack latch)” on page 22	6 “Rack latch (right)” on page 22
7 “Pull-out information tab” on page 22	8 “Drive bays” on page 21
9 “Rack latch (left)” on page 22	

Front view with 3.5-inch front drive bays (backplane-less)

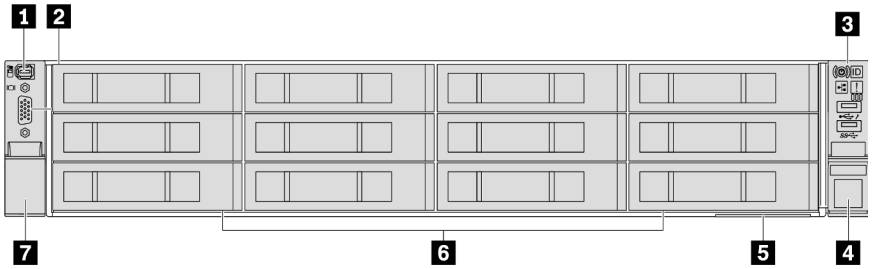


Table 9. Components on the front of server models

Callout	Callout
1 “External diagnostics connector (optional)” on page 22	2 “VGA connector (optional)” on page 22
3 “Front I/O module (on rack latch)” on page 22	4 “Rack latch (right)” on page 22

Table 9. Components on the front of server models (continued)

Callout	Callout
5 “Pull-out information tab” on page 22	6 “Drive bay fillers” on page 21
7 “Rack latch (left)” on page 22	

Front components overview

Drive bays

The drive bays on the front and rear of your server are designed for hot-swap drives. The number of the installed drives in your server varies by model. When you install drives, follow the order of the drive bay numbers.

Drive bay filler

The drive bay filler is used to cover a vacant drive bay. The EMI integrity and cooling of the server are protected by having all drive bays occupied. The vacant drive bays must be occupied by drive bay fillers or drive fillers.

Drive LEDs

Each hot-swap drive comes with an activity LED and status LED and the signals are controlled by the backplanes. Different colors and speeds indicate different activities or status of the drive. The following illustration shows the LEDs on a hard disk drive or solid-state drive.

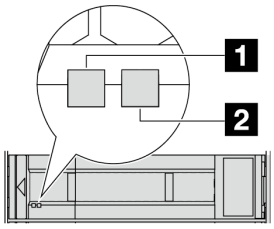


Figure 2. Drive LEDs

Drive LED	Status	Description
1 Drive activity LED (left)	Solid green	The drive is powered but not active.
	Blinking green	The drive is active.
2 Drive status LED (right)	Solid yellow	The drive has an error.
	Blinking yellow (blinking slowly, about one flash per second)	The drive is being rebuilt.
	Blinking yellow (blinking rapidly, about four flashes per second)	The drive is being identified.

Ethernet connectors

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

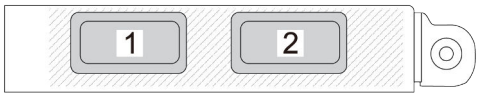


Figure 3. Port numbering — 2-port OCP module

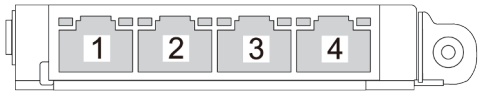


Figure 4. Port numbering — 4-port OCP 3.0 module

The OCP module provides two or four extra Ethernet connectors for network connections. By default, any of the connectors on the OCP module can function as share management connectors.

External diagnostics connector

The connector is for connecting an External Diagnostics Handset. For more about its functions, see "External diagnostics handset" on page 512.

Front I/O module

The front I/O module provides controls, connectors, and LEDs. The front I/O module varies by model. For more information, see "Front I/O module" on page 22.

PCIe slots

The PCIe slots are on the rear of the server and your server supports up to ten PCIe slots. For more information, see "PCIe slots and PCIe adapters" on page 55.

Pull-out information tab

The Lenovo XClarity Controller network access label is attached on the pull-out information tab. The default Lenovo XClarity Controller hostname and the IPv6 Link Local Address (LLA) are provided on the tab.

For more information, see Set the network connection for the Lenovo XClarity Controller.

Rack latches

If your server is installed in a rack, you can use the rack latches to help you slide the server out of the rack. You also can use the rack latches and screws to secure the server in the rack so that the server cannot slide out, especially in vibration-prone areas.

VGA connector

The VGA connectors on the front and rear of the server can be used to attach a high-performance monitor, a direct-drive monitor, or other devices that use a VGA connector.

Front I/O module

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

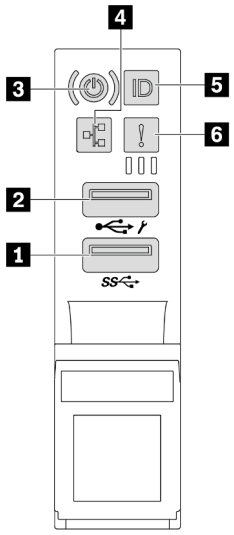
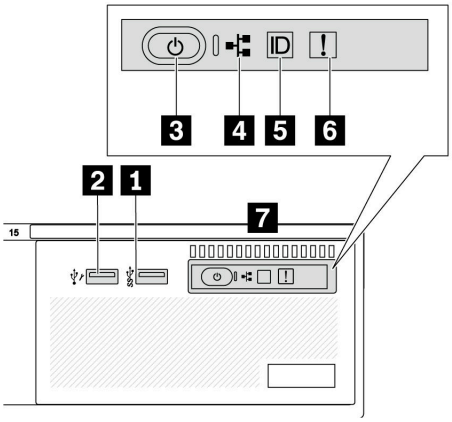
Front I/O module (on rack latch)	Front I/O module (on media bay)
	

Table 10. Components on the front I/O module

Callout	Callout
1 USB 3 (5 Gbps) connector	2 USB 2.0 connector with XClarity Controller management
3 Power button with power status LED	4 Network activity LED (for OCP module)
5 System ID button with system ID LED	6 System error LED
7 Front operator panel or Integrated Diagnostics Panel	

1 USB 3 (5 Gbps) connector

The USB 3.2 Gen 1 (5 Gbps) connector can be used to attach a USB-compatible device, such as a USB keyboard, USB mouse, or USB storage device.

2 USB 2.0 connector with XClarity Controller management

Depending on the setting, this connector supports USB 2.0 function, XClarity Controller management function, or both. It is the only USB port that supports USB automation update of the firmware and RoT security module.

- If the connector is set for USB 2.0 function, it can be used to attach a USB-compatible device, such as a USB keyboard, USB mouse, or USB storage device.
- If the connector is set for XClarity Controller management function, it can be used to connect the server to an android or iOS device, where you can then install and launch the Lenovo XClarity Mobile app to manage the system using XClarity Controller.

  For details about using the Lenovo XClarity Mobile app, refer to https://pubs.lenovo.com/lxca/lxca_usemobileapp.
- If the connector is set to have both functions, you can press the system ID button for three seconds to switch between the two functions.

3 Power button with power status LED

You can press this button to turn the server on and off manually. The power status LED helps you determine the current power status.

Status	Color	Description
Off	None	Power is not present, or the power supply has failed.
Fast blinking (about four flashes per second)	Green	The server is off, but the XClarity Controller is initializing, and the server is not ready to be powered on.
Slow blinking (about one flash per second)	Green	The server is off and is ready to be powered on (standby state).
Solid on	Green	The server is on and running.

4 Network activity LED

Compatibility of the NIC adapter and the network activity LED:

NIC adapter	Network activity LED
OCP module	Support
PCIe NIC adapter	Not support

When an OCP module is installed, the network activity LED on the front I/O assembly helps you identify the network connectivity and activity. If no OCP module is installed, this LED is off.

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. **Note:** If the network activity LED is off when an OCP module is installed, check the network ports in the rear of your server to determine which port is disconnected.

5 System ID button with system ID LED

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 LED changes. The LED 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 LED to assist in visually locating the server among other servers.

If the XClarity Controller USB connector is set to have both the USB 2.0 function and XClarity Controller management function, you can press the system ID button for three seconds to switch between the two functions.

6 System error LED

The system error LED provides basic diagnostic functions for your server. If the system error LED is lit, one or more LEDs elsewhere in the server might also be lit to direct you to the source of the error.

Status	Color	Description	Action
On	Yellow	An error has been detected on the server. Causes might include but are not limited to the following errors: • A fan failure • A memory error • A storage failure • A PCIe device failure • A power supply failure • A processor error • A system I/O board or processor board error	• Check the Lenovo XClarity Controller event log and the system event log to determine the exact cause of the error. • Check if additional LEDs elsewhere in the server are also lit that will direct you to the source of the error. See "Troubleshooting by system LEDs and diagnostics display" on page 504. • Save the log if necessary.
Off	None	The server is off, or the server is on and is working correctly.	None.

7 Front operator panel or Integrated Diagnostics Panel

The front operator panel provides controls and LEDs, including the power button with power status LED, network activity LED, system ID button with system ID LED, and system error LED.

Depending on the server model, the server comes with the front operator panel with LCD display (called Integrated Diagnostics Panel) or the front operator panel without LCD display.

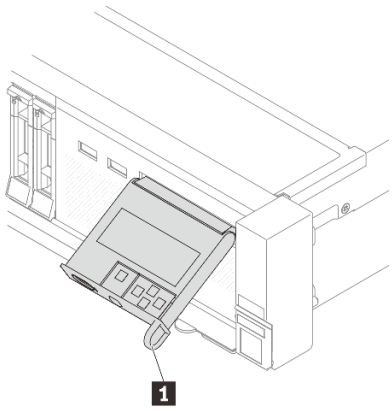


Figure 5. Integrated Diagnostics Panel (with LCD display)

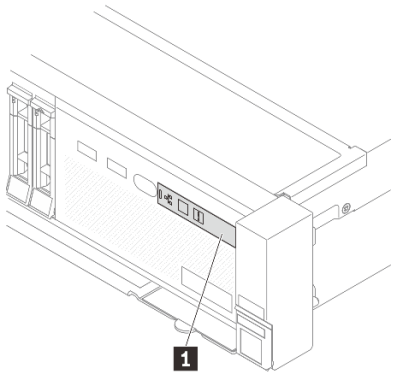


Figure 6. Front operator panel (without LCD display)

Note: The Integrated Diagnostics Panel provides an LCD display to quickly access system information such as active errors, system status, firmware information, network information, and health information. For details, see "Integrated diagnostics panel" on page 507.

Rear view

The rear of the server provides access to several connectors and components.

Refer to the following rear views for different server models:

- "Rear view with six PCIe slots" on page 26

- “Rear view with eight PCIe slots” on page 26
- “Rear view with ten PCIe slots” on page 27
- “Rear view with four 2.5-inch rear drive bays and six PCIe slots” on page 27
- “Rear view with eight 2.5-inch rear drive bays and four PCIe slots” on page 28
- “Rear view with two 3.5-inch rear drive bays and four PCIe slots” on page 28
- “Rear view with four 3.5-inch rear drive bays and two PCIe slots” on page 29

Rear view with six PCIe slots

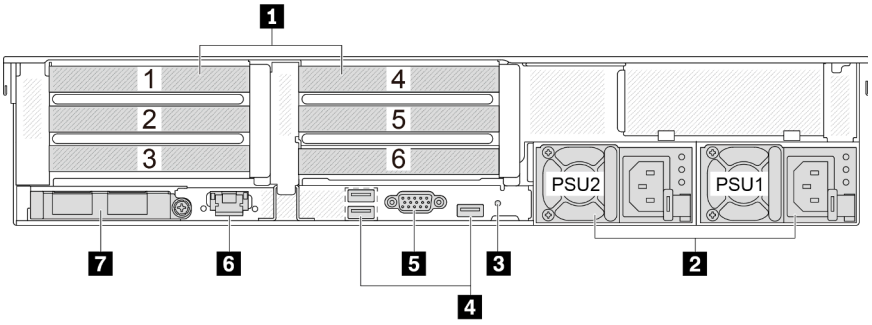


Table 11. Components on the rear of the server

Callout	Callout
1 “PCIe slots” on page 29	2 “Power supply units” on page 29
3 “NMI button” on page 29	4 “USB 3 (5 Gbps) connectors (3)” on page 30
5 “VGA connector” on page 30	6 “XCC system management port” on page 30
7 “Ethernet connectors on OCP module (optional)” on page 30	

Rear view with eight PCIe slots

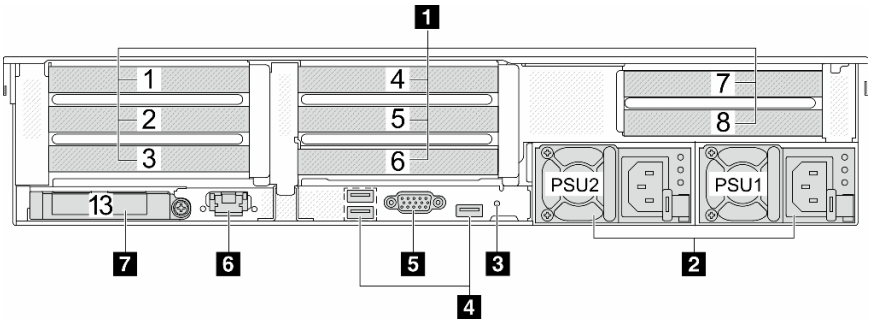


Table 12. Components on the rear of the server

Callout	Callout
1 “PCIe slots” on page 29	2 “Power supply units” on page 29
3 “NMI button” on page 29	4 “USB 3 (5 Gbps) connectors (3)” on page 30
5 “VGA connector” on page 30	6 “XCC system management port” on page 30
7 “Ethernet connectors on OCP module (optional)” on page 30	

Rear view with ten PCIe slots

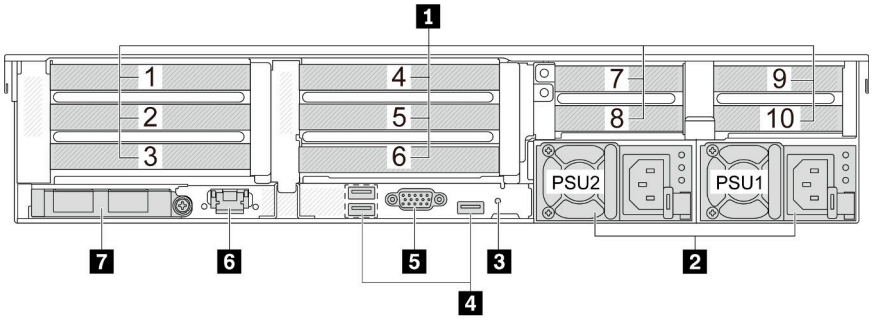


Table 13. Components on the rear of the server

Callout	Callout
1 “PCIe slots” on page 29	2 “Power supply units” on page 29
3 “NMI button” on page 29	4 “USB 3 (5 Gbps) connectors (3)” on page 30
5 “VGA connector” on page 30	6 “XCC system management port” on page 30
7 “Ethernet connectors on OCP module (optional)” on page 30	

Rear view with four 2.5-inch rear drive bays and six PCIe slots

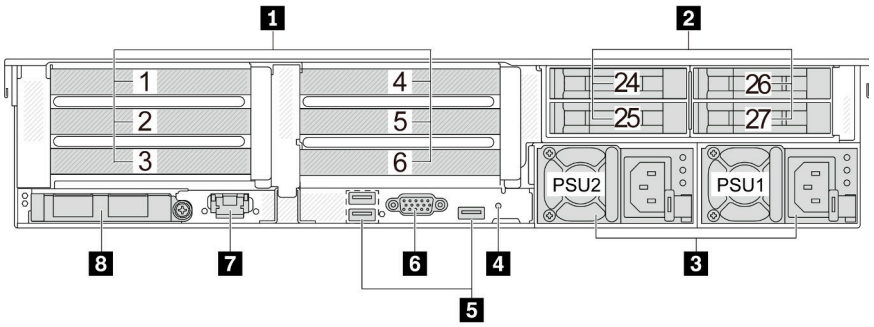


Table 14. Components on the rear of the server

Callout	Callout
1 “PCIe slots” on page 29	2 “Rear 2.5-inch drive bays (4)” on page 29
3 “Power supply units” on page 29	4 “NMI button” on page 29
5 “USB 3 (5 Gbps) connectors (3)” on page 30	6 “VGA connector” on page 30
7 “XCC system management port” on page 30	8 “Ethernet connectors on OCP module (optional)” on page 30

Rear view with eight 2.5-inch rear drive bays and four PCIe slots

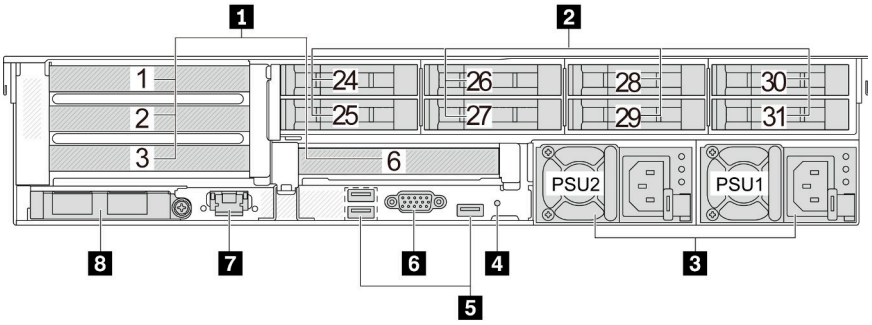


Table 15. Components on the rear of the server

Callout	Callout
1 “PCIe slots” on page 29	2 “Rear 2.5-inch drive bays (8)” on page 29
3 “Power supply units” on page 29	4 “NMI button” on page 29
5 “USB 3 (5 Gbps) connectors (3)” on page 30	6 “VGA connector” on page 30
7 “XCC system management port” on page 30	8 “Ethernet connectors on OCP module (optional)” on page 30

Rear view with two 3.5-inch rear drive bays and four PCIe slots

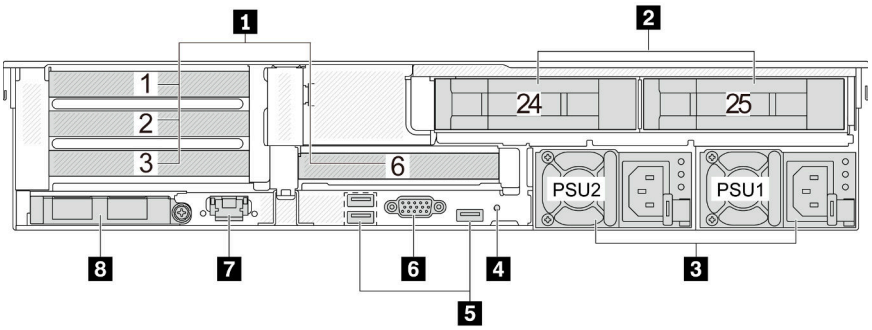


Table 16. Components on the rear of the server

Callout	Callout
1 “PCIe slots” on page 29	2 “Rear 3.5-inch drive bays (2)” on page 29
3 “Power supply units” on page 29	4 “NMI button” on page 29
5 “USB 3 (5 Gbps) connectors (3)” on page 30	6 “VGA connector” on page 30
7 “XCC system management port” on page 30	8 “Ethernet connectors on OCP module (optional)” on page 30

Rear view with four 3.5-inch rear drive bays and two PCIe slots

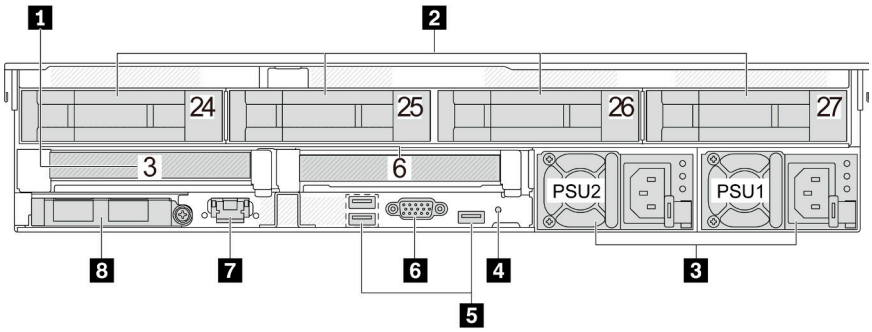


Table 17. Components on the rear of the server

Callout	Callout
1 “PCIe slots” on page 29	2 “Rear 3.5-inch drive bays (4)” on page 29
3 “Power supply units” on page 29	4 “NMI button” on page 29
5 “USB 3 (5 Gbps) connectors (3)” on page 30	6 “VGA connector” on page 30
7 “XCC system management port” on page 30	8 “Ethernet connectors on OCP module (optional)” on page 30

Rear components overview

PCIe slots

The PCIe slots are on the rear of the server and your server supports up to ten PCIe slots. For more information, see “PCIe slots and PCIe adapters” on page 55.

Hot-swap drives and drive bays

The drive bays on the front and rear of your server are designed for hot-swap drives. The number of the installed drives in your server varies by model. When you install drives, follow the order of the drive bay numbers.

The EMI integrity and cooling of the server are protected by having all drive bays occupied. Vacant drive bays must be occupied by drive fillers.

Power supply units

The hot-swap redundant power supply units help you avoid significant interruption to the operation of the system when a power supply unit fails. You can purchase a power supply option from Lenovo and install the power supply unit to provide power redundancy without turning off the server.

On each power supply unit, there are three status LEDs near the power cord connector. For information about the LEDs, see “Power supply LEDs” on page 519.

NMI button

Use this button only when you are directed to do so by Lenovo Support. Press this button to force a nonmaskable interrupt (NMI) to the processor. By this way, you can make the operating system halt (such as Windows Blue Screen of Death) and take a memory dump. You might have to use a pen or the end of a straightened paper clip to press the button.

USB 3 (5 Gbps) connectors

The USB 3.1 Gen 1 (5 Gbps) connectors are direct connect interfaces (DCIs) for debugging, which can be used to attach a USB-compatible device, such as a USB keyboard, USB mouse, or USB storage device.

VGA connector

The VGA connectors on the front and rear of the server can be used to attach a high-performance monitor, a direct-drive monitor, or other devices that use a VGA connector.

XCC system management port

The server has a 1 GB RJ-45 connector dedicated to Lenovo XClarity Controller (XCC) functions. Through the system 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.

For more information, see:

- Set the network connection for the Lenovo XClarity Controller
- "XCC system management port LEDs" on page 518

Ethernet connectors

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

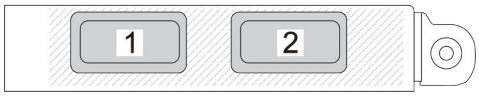


Figure 7. Port numbering — 2-port OCP module

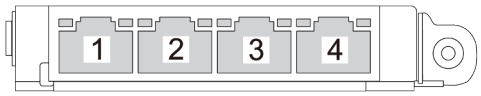


Figure 8. Port numbering — 4-port OCP 3.0 module

The OCP module provides two or four extra Ethernet connectors for network connections. By default, any of the connectors on the OCP module can function as share management connectors.

Top view

This section contains information on the top view of the server.

Notes:

- The following illustration shows the top view of the server without any top cover, air baffle, middle cage, or rear cage installed.

- The illustration shows the server rear configuration with two riser assemblies. The server rear configurations vary by server model. For details, see “Rear view” on page 25.

Top view with standard heat sinks

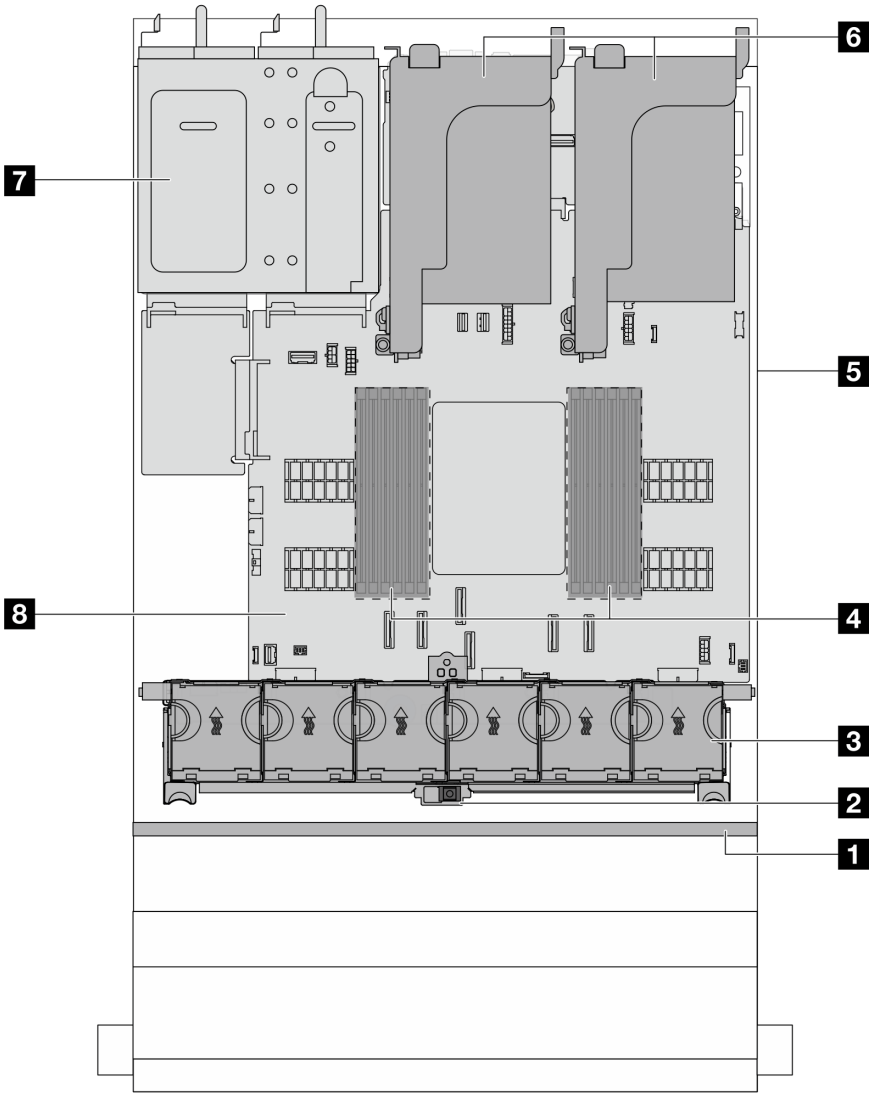


Figure 9. Server top view

Table 18. Component identification (top view)

1 Front backplane(s)	2 Intrusion switch
3 System fans	4 Memory modules
5 Processor and heat sink	6 Riser assemblies
7 Power supply unit	8 system board assembly

Top view with DWCM

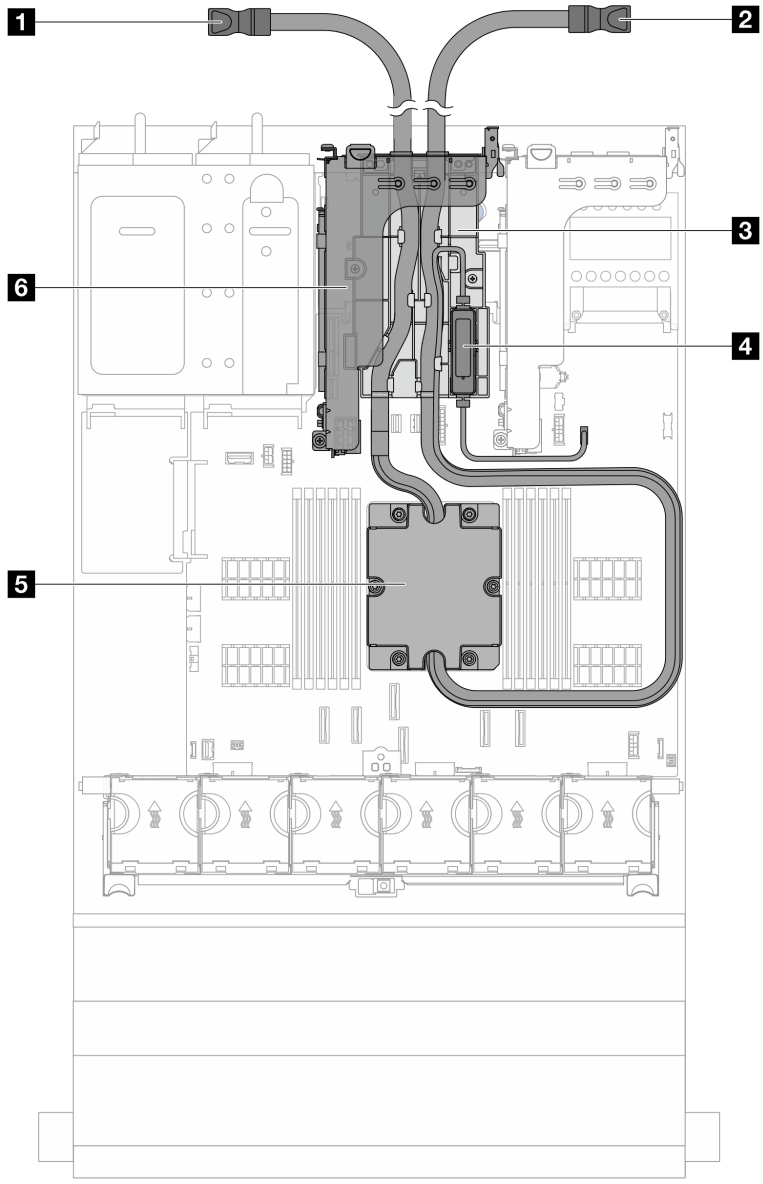


Figure 10. Top view with DWCM

Table 19. Components identification (top view with DWCM)

1 Outlet hose	2 Inlet hose
3 Hose holder	4 Liquid detection sensor module
5 Cold plate assembly	6 Riser cage for DWCM

System-board-assembly layout

This section provides information about the connectors, switches, and jumpers that are available on the system board assembly.

The following illustration shows the layout of the system board assembly that contains the system I/O board, firmware and RoT security module, fan board, power inverter board (PIB) and processor board.

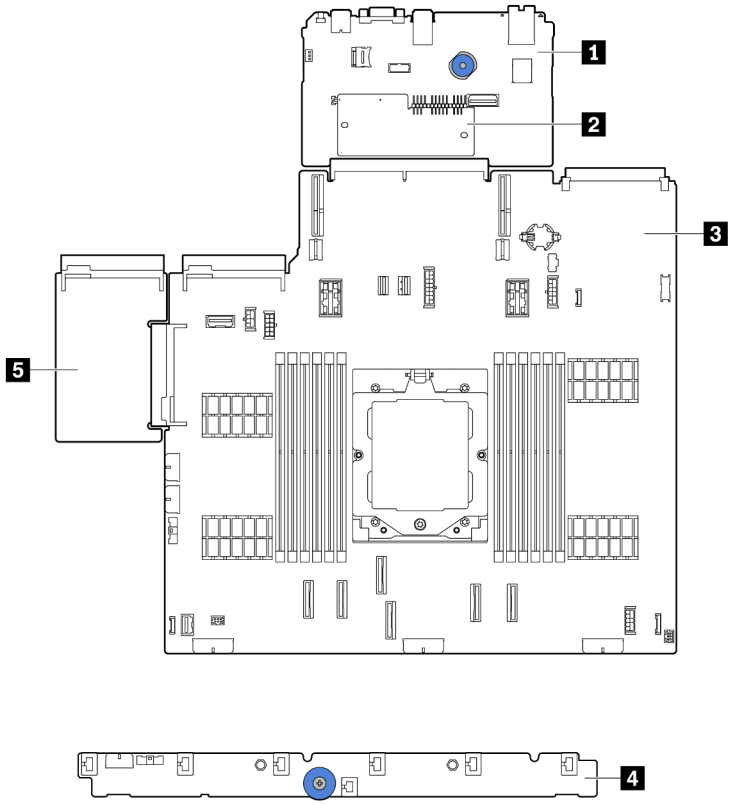


Figure 11. System-board-assembly layout

1 System I/O board	2 Firmware and RoT security module	3 Processor board
4 Fan board	5 Power inverter board (PIB)	

For information about the LEDs that are available on the system board assembly, see:

- “System-board-assembly LEDs” on page 521
- “LEDs on the firmware and RoT security module” on page 523
- “System-board-assembly connectors” on page 33
- “System-board-assembly switch” on page 35

System-board-assembly connectors

This section provides information about the internal connectors on the system board assembly that contains the system I/O board and processor board.

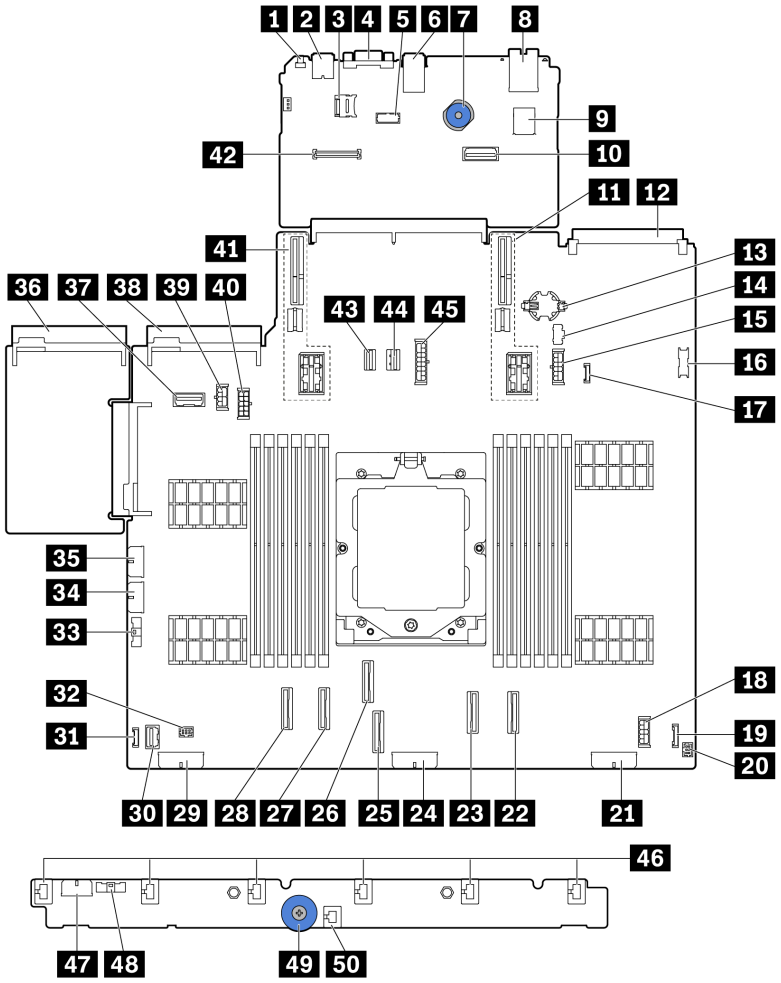


Figure 12. System-board-assembly connectors

Table 20. System-board-assembly connectors

1 NMI button	2 Rear USB connector
3 MicroSD connector	4 VGA connector
5 Serial port connector	6 Rear USB connectors
7 Lift handle	8 XCC system management port
9 Internal USB connector	10 Second management Ethernet connector
11 Riser 1 slot	12 OCP module connector
13 CMOS battery (CR2032)	14 M.2 power connector
15 7mm backplane power connector	16 Front USB connector
17 Leak detection connector	18 Internal Expander Power Connector
19 Front I/O connector[note]	20 Front I/O connector for Y cable[note]
21 Backplane 3 power connector	22 PCIe connector 8 / SATA connector 1

Table 20. System-board-assembly connectors (continued)

23 PCIe connector 7 / SATA connector 0	24 Backplane 2 power connector
25 PCIe connector 3	26 PCIe connector 4
27 PCIe connector 2	28 PCIe connector 1
29 Backplane 1 power connector	30 Front VGA connector
31 External LCD connector	32 Pump connector
33 Fan board sideband connector	34 Fan board power connector
35 Internal RAID power connector	36 Power supply 1 connector
37 Riser 3/ rear backplane sideband connector	38 Power supply 2 connector
39 GPU power connector	40 Riser 3 / rear backplane power connector
41 Riser 2 slot	42 RoT Connector
43 M.2 signal connector	44 7mm backplane signal connector
45 Middle backplane power connector	46 Fan 1–6 connectors
47 Fan board power connector	48 Fan board sideband connector
49 Lift handle	50 Intrusion switch connector

Notes:

- The front I/O module on rack latch or the Integrated Diagnostics Panel on media bay is connected to connector 19. See “Front I/O module” on page 22.
- The front operator panel on media bay is connected to connector 19 and connector 20 using a Y cable.

System-board-assembly switch

This section provides information about locations and functions of the switch block on the system board assembly that contains the system I/O board and processor board.

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 following information:
   - https://pubs.lenovo.com/safety_documentation/
   - “Installation Guidelines” on page 49
   - “Handling static-sensitive devices” on page 52
   - “Power off the server” on page 68
2. Any system-board-assembly switch or jumper block that is not shown in the illustrations in this document are reserved.

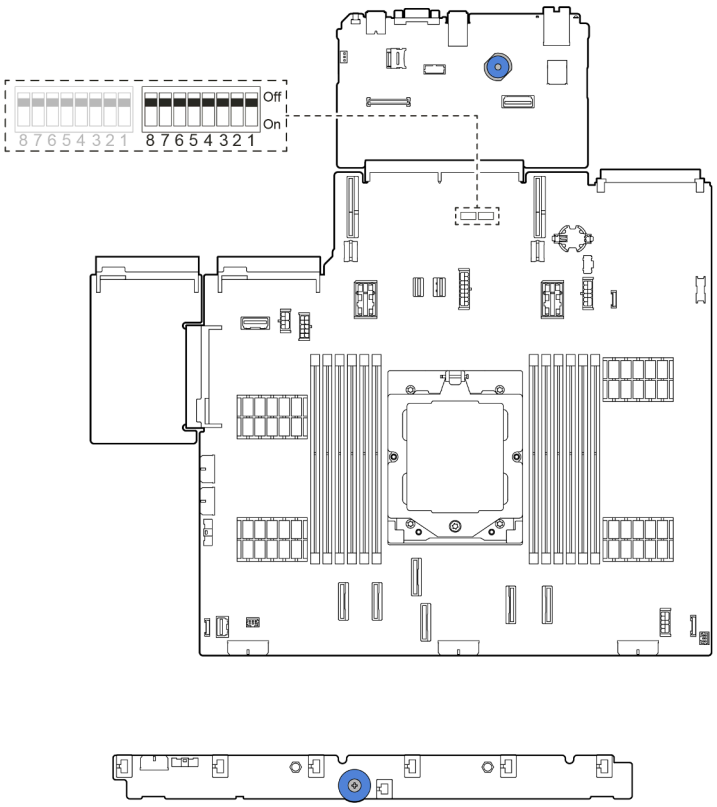


Figure 13. Switch block on the system board assembly

SW5 switch block

The following table describes the functions of the SW5 switch block on the system board assembly.

Table 21. SW5 switch block on the system board assembly

Switch number	Switch name	Default position	Description
SW5-1	Force BMC CPU reset	Off	Forces BMC and CPU into reset when changing it to the ON position.
SW5-2	Clear CMOS	Off	Clears the real-time clock (RTC) registry when changing it to the ON position.
SW5-3	Override power-on password	Off	Overrides the power-on password when changing it to the ON position.
SW5-4	FPGA reset	Off	Forces FPGA into reset when changing it to the ON position.
SW5-5	Reserved	Off	Reserved
SW5-6	Reserved	Off	Reserved
SW5-7	Reserved	Off	Reserved
SW5-8	Reserved	Off	Reserved

System LEDs and diagnostics display

For information on available system LEDs and diagnostics display, refer to “Troubleshooting by system LEDs and diagnostics display” on page 504.

Chapter 3. Parts list

Identify each of the components that is available for your server with the parts list.

For more information about ordering parts:

1. Go to **http://datacentersupport.lenovo.com** and navigate to the support page for your server.
2. Click **Parts**.
3. Enter the serial number to view a listing of 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. Some parts are available only on some models.

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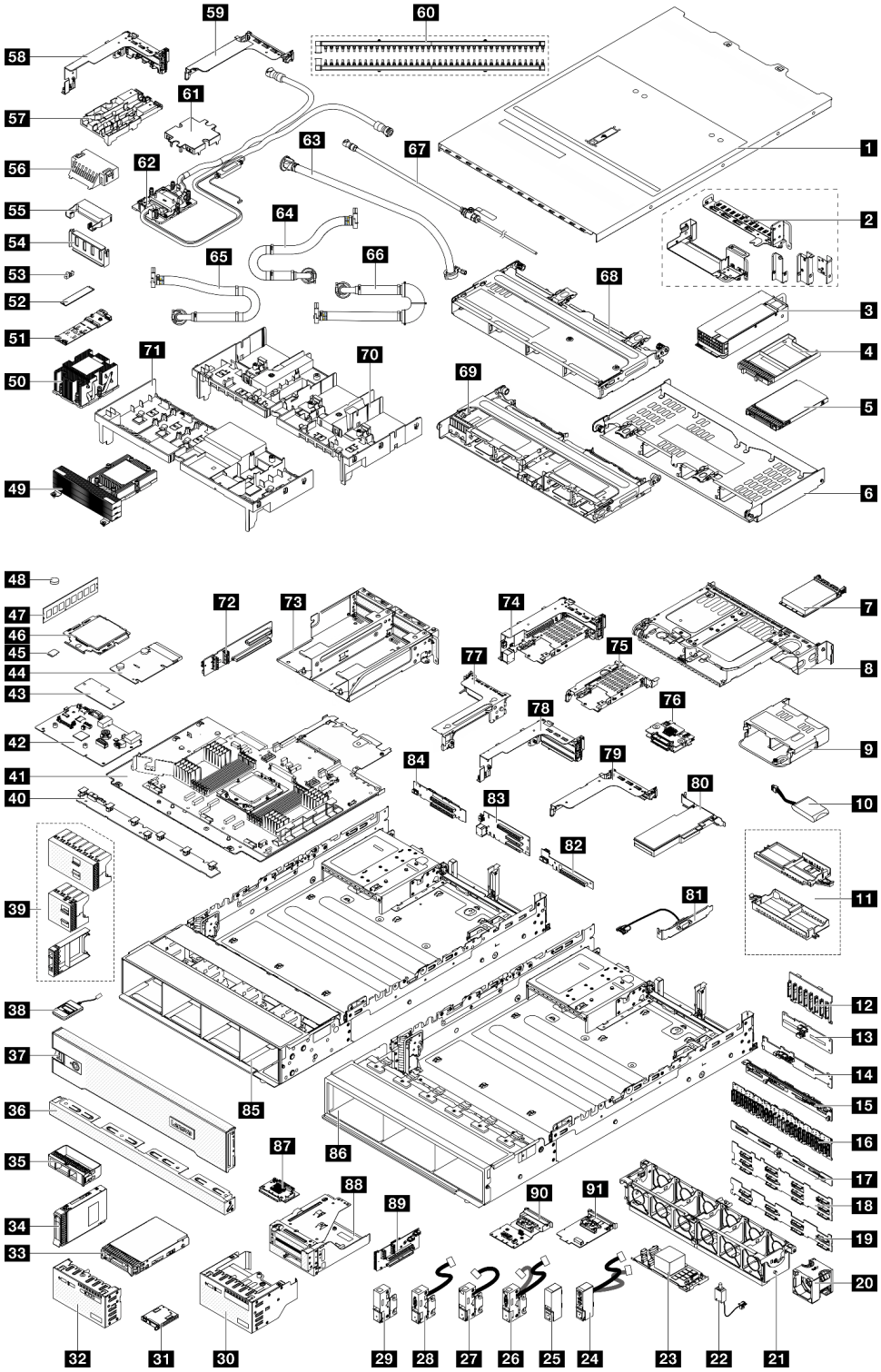


Figure 14. Server components

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

- **T1:** 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.

- **T2:** 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.
- **F:**Field replaceable unit (FRU). FRUs must be installed only by trained service technicians.
- **C:** Consumable and Structural parts. Purchase and replacement of consumable and structural parts (components, such as a filler or bezel) is your responsibility. If Lenovo acquires or installs a structural component at your request, you will be charged for the service.

Table 22. Parts list

Description	Type	Description	Type
1 Top cover	T1	47 Memory module	T1
2 Rear wall brackets	T1	48 CMOS battery (CR2032)	C
3 Power supply unit	T1	49 T-shape performance heat sink	F
4 7mm drive bay filler	C	50 2U standard heat sink	F
5 7mm drive	T1	51 M.2 drive backplane	T1
6 Rear 4 x 3.5-inch drive cage	T1	52 M.2 drive	T1
7 OCP module	T1	53 M.2 retainer clip	T1
8 Rear 2 x 3.5-inch drive cage	T1	54 GPU air baffle filler	C
9 Rear 4 x 2.5-inch drive cage	T1	55 Add-on air baffle (for GPU air baffle)	T1
10 RAID flash power module	T1	56 Standard air baffle filler	T1
11 RAID flash power module holder	T1	57 Hose holder	C
12 Front 8 x 2.5-inch drive backplane	T1	58 1FH riser cage for DWCM	C
13 Middle/Rear 4 x 2.5-inch drive backplane	T1	59 3FH riser cage for DWCM	C
14 Rear 2 x 3.5-inch drive backplane	T1	60 Manifolds	FRU
15 Rear 8 x 2.5-inch drive backplane	T1	61 Cold plate cover	C
16 Front 24 x 2.5-inch expander backplane	T1	62 Direct water cooling module	F
17 Rear 4 x 3.5-inch drive backplane	T1	63 42U in-row hose kit	FRU
18 Front 12 x 3.5-inch drive backplane: • 12 x 3.5-inch SAS/SATA drive backplane • 12 x 3.5-inch AnyBay drive backplane • 12 x 3.5-inch expander backplane	T1	64 42U/48U in-rack connection hose (return side)	FRU
19 Front 8 x 3.5-inch drive backplane	T1	65 48U in-rack connection hose (supply side)	FRU
20 System fan	T1	66 42U in-rack connection hose (supply side)	FRU
21 System fan cage	T1	67 Bleeder kit	FRU
22 Intrusion switch	T1	68 Middle 4 x 3.5-inch drive cage	T1
23 CFF RAID adapter/expander	T2	69 Middle 8 x 2.5-inch drive cage	T1
24 Right rack latch with front I/O module	T1	70 GPU air baffle	T1
25 Standard right rack latch	T1	71 Standard air baffle	C

Table 22. Parts list (continued)

Description	Type	Description	Type
26 Left rack latch with VGA and external diagnostics ports	T1	72 Riser card (LP)	T2
27 Left rack latch with external diagnostics port	T1	73 4LP riser 3/4 cage	T1
28 Left rack latch with VGA port	T1	74 7mm drive cage (2FH + 7mm)	T1
29 Standard left rack latch	T1	75 7mm drive cage (1U)	T1
30 Front I/O module with integrated diagnostics panel	T1	76 7mm drive backplanes	T2
31 Integrated diagnostics panel	T1	77 Riser 3 cage	T1
32 Front I/O module with front operator panel	T1	78 Riser 1 or riser 2 cage	T1
33 3.5-inch drive	T1	79 1U riser cage	T1
34 2.5-inch drive	T1	60 PCIe adapter	T1
35 3.5-inch drive fillers (1-bay)	C	81 Serial port module	T1
36 3.5-inch drive fillers (4-bay)	C	82 1 FH riser	T2
37 Security bezel	C	83 Riser 1 or riser 2 card	T1
38 External diagnostics handset	T1	84 Riser 3 card	T2
39 2.5-inch drive fillers (1-bay, 4-bay, or 8-bay)	C	85 3.5-inch drive bay chassis	F
40 Fan board	F	86 2.5-inch drive bay chassis	F
41 Processor board	F	87 Front OCP interposer card	T1
42 System I/O board	F	88 Front adapter cage	T1
43 Firmware and RoT security module	F	89 Riser 5 card	T2
44 PIB	F	90 Rear OCP interposer card	T1
45 MicroSD card	T1	91 Management NIC adapter	T1
46 Processor	F		

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 4. Unboxing and setup

Information in this section assists you on unboxing and setting up the server. When unboxing the server, check if the items in the package are correct, and learn where to find information of server serial number and Lenovo XClarity Controller access. Make sure to follow the instructions in “Server setup checklist” on page 47 when setting up the server.

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:

- Server
- Rail installation kit*. Installation guide is provided in the package.
- Cable management arm*. Installation guide is provided in the package.
- Material box, including items such as power cords*, accessory kit, and printed documents.

Notes:

- Some of the items listed are available on select models only.
- Items marked with asterisk(*) are optional.

If any item is missing or damaged, contact your place of purchase. Ensure that you retain your proof of purchase and packing material. They might be required to receive warranty service.

Identify the server and access the Lenovo XClarity Controller

This section contains instruction on how to identify your server and where to find the Lenovo XClarity Controller access information.

Identifying your server

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

The illustration below shows the location of the ID label which contains the model number, machine type, and serial number of the server.

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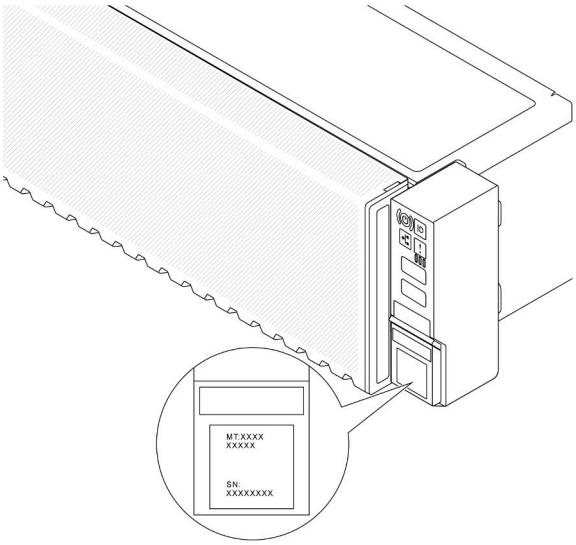


Figure 15. Location of the ID label

Lenovo XClarity Controller network access label

In addition, the Lenovo XClarity Controller (XCC) network access label is attached to the pull-out information tab located near the lower right corner in the front of the chassis, with MAC address accessible with a pull.

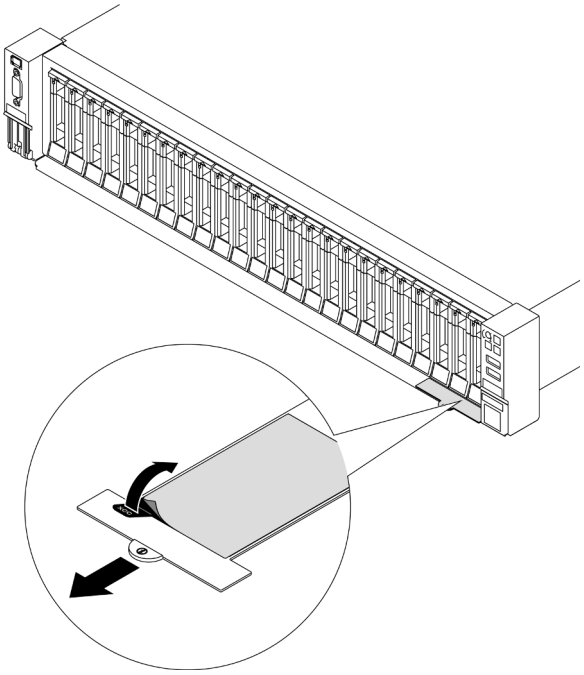


Figure 16. Lenovo XClarity Controller network access label on the pull-out information tab

Service information QR code

On the inside surface of the tray cover, there is a quick response (QR) code that provides mobile access to service information. You can scan the QR code with a mobile device using a QR code reader application and get quick access to the Service Information web page. The Service Information web page provides additional information for parts installation and replacement videos, and error codes for solution support.

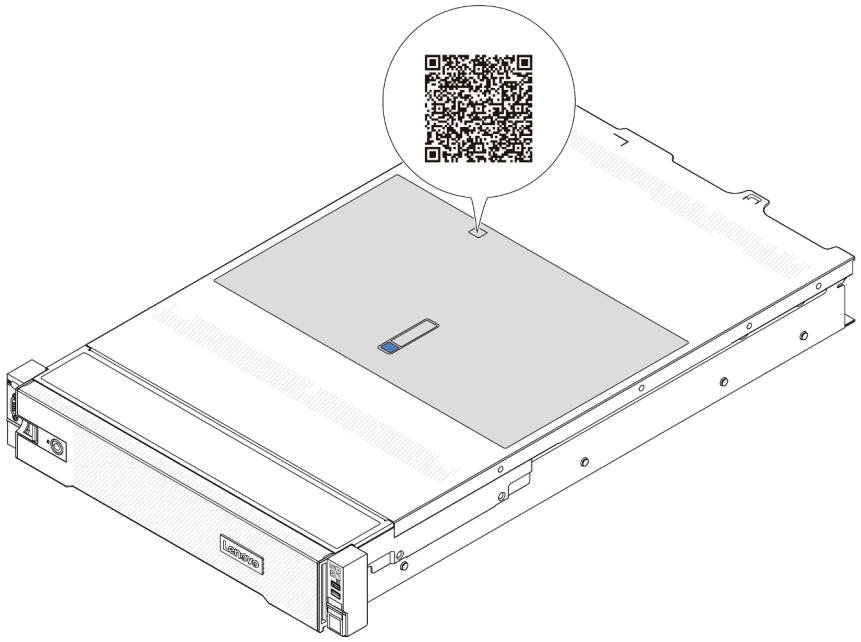


Figure 17. Service information QR code

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.

Setup the server hardware

Complete the following procedures to setup the server hardware.

1. Unpack the server package. See “Server package contents” on page 45.
2. Install any required hardware or server options. See the related topics in Chapter 5 “Hardware replacement procedures” on page 49.
3. If necessary, install the rail and CMA to a standard rack cabinet. Follow the instruction in *Rail Installation Guide* and *CMA Installation Guide* that comes with the rail installation kit.
4. If necessary, install the server into a standard rack cabinet. See “Install the server to rack” on page 71.
5. Connect all external cables to the server. See Chapter 2 “Server components” on page 17 for connectors locations.

   Typically, you will need to connect the following cables:

   - Connect server to the power source
   - Connect server to the data network

- Connect the server to the storage device
- Connect the server to the management network

6. Power on the server.

   Power button location and power LED are specified in:

   - Chapter 2 “Server components” on page 17
   - “Troubleshooting by system LEDs and diagnostics display” on page 504

   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.

   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 compatible with your server at https://pubs.lenovo.com/lxcc-overview/.

7. Validate the server. Make sure that the power LED, Ethernet connector LED, and network LED are lit with green light, which means the server hardware was set up successfully.

   See “Troubleshooting by system LEDs and diagnostics display” on page 504 for more information on the LED indications.

Configure the system

Complete the following procedures to configure the system. For detailed instructions. refer to Chapter 7 “System configuration” on page 493.

1. Set the network connection for the Lenovo XClarity Controller to the management network.
2. Update the firmware for the server, if necessary.
3. Configure the firmware for the server.

   The following information is available for RAID configuration:

   - https://lenovopress.lenovo.com/lp0578-lenovo-raid-introduction
   - https://lenovopress.lenovo.com/lp0579-lenovo-raid-management-tools-and-resources

4. Install the operating system.
5. Back up the server configuration.
6. Install the applications and programs for which the server is intended to be used.

Chapter 5. Hardware replacement procedures

This section provides installation and removal procedures for all serviceable system components. Each component replacement procedure references any tasks that need to be performed to gain access to the component being replaced.

Installation Guidelines

Before installing components in your server, read the installation guidelines.

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 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: "Working inside the server with the power on" on page 51 and "Handling static-sensitive devices" on page 52.
- 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.
  - For the option package contents, see https://serveroption.lenovo.com/.
- For more information about ordering parts:
  1. Go to **http://datacentersupport.lenovo.com** and navigate to the support page for your server.
  2. Click **Parts**.
  3. Enter the serial number to view a listing of parts for your server.
- 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 https://datacentersupport.lenovo.com/products/servers/thinksystem/sr655v3/7d9e/downloads/driver-list/ 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.
- If you replace a part, such as an adapter, that contains firmware, you might also need to update the firmware for that part. For more information about updating firmware, see "Update the firmware" on page 495.
- 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.

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  - 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, a T8 screwdriver and a T20 torx screwdriver available.
- To view the error LEDs on the system board (system board assembly) and internal components, leave the power on.
- You do not have to turn off the server to remove or install hot-swap power supplies, hot swap fans, 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.
- When replacing power supply units or fans, make sure to refer to redundancy rules for these components.
- 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.
- Orange on a component or a orange 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. (Orange 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.

Note: The product is not suitable for use at visual display workplaces according to §2 of the Workplace Regulations.

Note: 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.

Working inside the server with the power on

You might need to keep the power on with the server cover removed to look at system information on the display panel or to replace hot-swap components. Review these guidelines before doing so.

Attention: The server might stop and data loss might occur when internal server components are exposed to static electricity. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding systems when working inside the server with the power on.

- Avoid loose-fitting clothing, particularly around your forearms. Button or roll up long sleeves before working inside the server.
- Prevent your necktie, scarf, badge rope, or hair from dangling into the server.
- Remove jewelry, such as bracelets, necklaces, rings, cuff links, and wrist watches.
- Remove items from your shirt pocket, such as pens and pencils, in case they fall into the server as you lean over it.
- Avoid dropping any metallic objects, such as paper clips, hairpins, and screws, into the server.

Handling static-sensitive devices

Review these guidelines before you handle static-sensitive devices to reduce the possibility of damage from electrostatic discharge.

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.

Technical rules

This topic provides technical rules for the server.

- "Memory module installation rules and order" on page 53
- "PCIe slots and PCIe adapters" on page 55
- "Thermal rules" on page 60

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.

Supported memory types

For information on the types of memory module supported by this server, see “Memory” section in “Technical specifications” on page 3.

Your server has 12 memory slots with 12 channels. For a list of supported memory options, see:

https://serverproven.lenovo.com.

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

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

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

https://dcsc.lenovo.com/#/memory_configuration

Specific information about the required installation order of memory modules in your server based on the system configuration is shown below.

Memory modules and processors layout

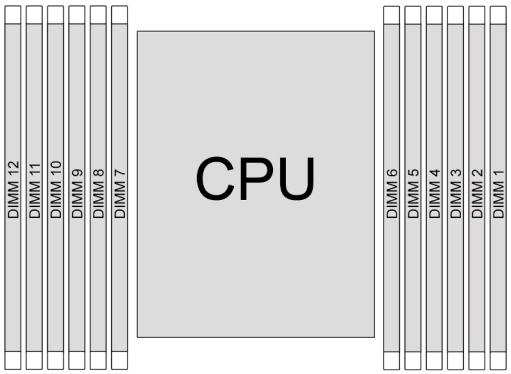


Figure 18. Memory modules and processors layout

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

Table 23. Memory slot and channel identification

Processor	CPU											
UMC No.	UMC2	UMC1	UMC5	UMC0	UMC4	UMC3	UMC9	UM-C10	UMC6	UM-C11	UM-C7	UM-C8
Channel No.	CH-F	CH-E	CH-D	CH-C	CH-B	CH-A	CH-G	CH-H	CH-I	CH-J	CH-K	CH-L
DIMM No.	12	11	10	9	8	7	6	5	4	3	2	1

Memory module installation guideline

- At least one DIMM is required. Install at least six DIMMs for good performance.
- Mixing DIMMs from different vendors is supported in a system.
- Mixing x4 and x8 DIMMs is not allowed in a system.
- Only one rank and two rank DIMM mixing is allowed in a system.
- When installing DIMMs with different capacity, install the DIMM with the highest capacity first.
- For best performance, the population recommends identical memory capacity and rank across all 12 channels.

General DIMM mixing rules

DIMMs	Coexist in a system
9x4 RDIMM and other RDIMM types	x
3DS RDIMM and other DIMM types	x
128 GB 3DS RDIMM and 256 GB 3DS RDIMM	x
x4 DIMM and x8 DIMM	x
Different DRAM density (16Gbit, 24Gbit, and 32Gbit)[1, 2, 5]	x (for 9004 series processors)
	√ (for 9005 series processors)
RDIMMs of different capacity[3, 4]	√
RDIMMs of different ranks (1R and 2R)[4, 5]	√
DIMMs manufactured by different vendors	√

Notes:

1. The 16Gbit DRAM is used in 16 GB, 32 GB, and 64 GB RDIMMs. The 24Gbit DRAM is used in 48 GB and 96 GB RDIMMs. The 32Gbit DRAM is used in 128 GB 2Rx4 RDIMMs.
2. Before installing 24 Gb DRAM RDIMMs, make sure to apply the UEFI firmware version KAE108C or later to the server first and remove all existing 16 Gb DRAM RDIMMs.
3. When installing DIMMs with different capacity, install the DIMM with the highest capacity first following the population sequence.
4. For optimal performance, it is recommended to install DIMMs with identical capacity and rank in the same channel of the two processors.
5. Mixing 1R and 2R RDIMMs or mixing RDIMMs based on different DRAM density in a system equipped with 9005 series processors may have an impact on performance.
6. Servers with 9004 series processors do not support 6400 MHz RDIMMs.

Memory module installation order

The following table shows the DIMM population sequence.

Table 24. DIMM population sequence

Total DIMMs	CPU											
	12	11	10	9	8	7	6	5	4	3	2	1
1 DIMM						7						
2 DIMMs						7	6					
4 DIMMs				9		7	6		4			

Table 24. DIMM population sequence (continued)

6 DIMMs				9	8	7	6	5	4			
8 DIMMs		11		9	8	7	6	5	4		2	
10 DIMMs		11	10	9	8	7	6	5	4	3	2	
12 DIMMs	12	11	10	9	8	7	6	5	4	3	2	1

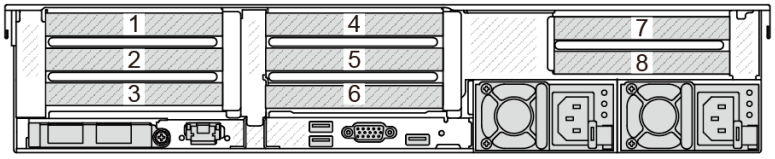
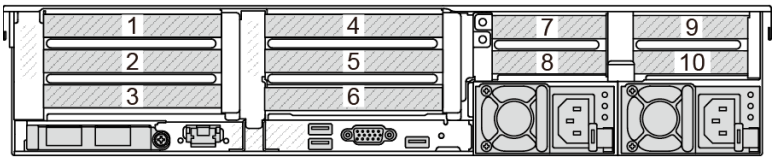
PCIe slots and PCIe adapters

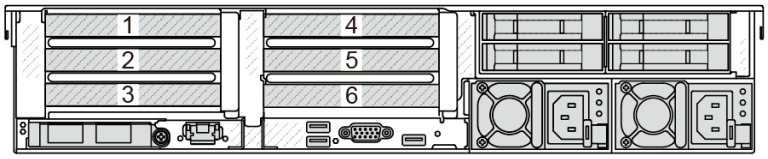
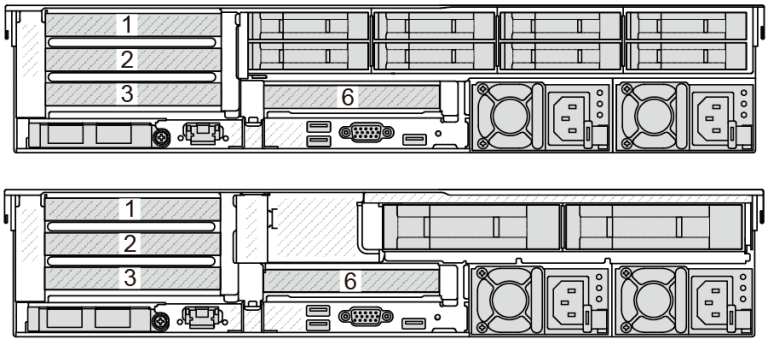
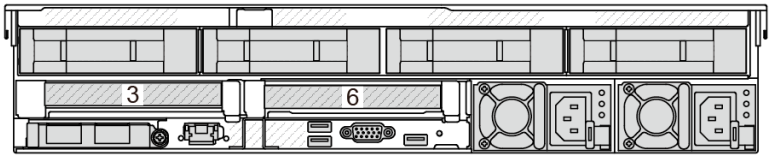
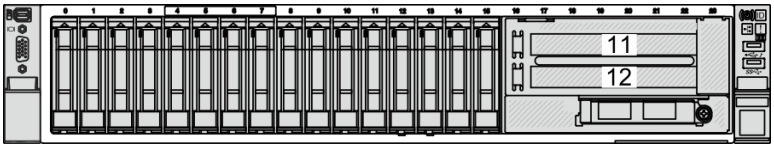
This topic provides installation rules for PCIe adapters.

Slot configurations

The following tables list the PCIe slot configurations for each server rear view.

Note: *E: empty

Server rear view	PCIe slots
	**Slots 1–3 on riser 1:** • x16/x8/x8 (Gen 4/5) • x16/x16/E (Gen 4/5) • E/x16 (Gen 4/5)/x16 (Gen 4) **Slots 4–6 on riser 2:** • x16/x8/x8 (Gen 4/5) • x16/x16/E (Gen 4/5) • E/x16 (Gen 4/5)/x16 (Gen 4) **Slots 7–8 on riser 3:** • x16 (Gen 4/5)/x16 (Gen 4) • x8 (Gen 4/5)/x8 (Gen 4)
	**Slots 1–3 on riser 1:** • x16/x8/x8 (Gen 4/5) • x16/x16/E (Gen 4/5) • E/x16 (Gen 4/5)/x16 (Gen 4) **Slots 4–6 on riser 2:** • x16/x8/x8 (Gen 4/5) • x16/x16/E (Gen 4/5) • E/x16 (Gen 4/5)/x16 (Gen 4) **Slots 7–8 on riser 3:** • x8 (Gen 4) **Slot 9–10 on riser 4:** • x8 (Gen 4)

Server rear view	PCIe slots
	**Slots 1–3 on riser 1:** • x16/x8/x8 (Gen 4/5) • x16/x16/E (Gen 4/5) • E/x16 (Gen 4/5)/x16 (Gen 4) **Slots 4–6 on riser 2:** • x16/x8/x8 (Gen 4/5) • x16/x16/E (Gen 4/5) • E/x16 (Gen 4/5)/x16 (Gen 4)
	**Slots 1–3 on riser 1:** • x16/x8/x8 (Gen 4/5) • x16/x16/E (Gen 4/5) • E/x16 (Gen 4/5)/x16 (Gen 4) **Slot 6 on riser 2:** • x16 (Gen 4)
	**Slot 3 on riser 1:** • x16 (Gen 4) **Slot 6 on riser 2:** • x16 (Gen 4)
	**Slot 11 on riser 5:** • x16 (Gen 4) **Slot 12 on riser 5:** • x16 (Gen 4)

Notes:

- The priority of x8 slots is higher than x16 slots for x8 adapters.
- **7mm drive cage installation rules**:
  - For server models with 8 PCIe slots or 10 PCIe slots, a 2FH+7mm SSD drive cage can be installed on slot 3 or slot 6, but not both at the same time.
  - For server models with an 8 x 2.5-inch/2 x 3.5-inch rear drive cage, one of the 7mm drive cages can be installed:
    - 2FH+7mm SSD drive cage: slot 3
    - 7mm SSD drive cage: slot 6
  - For server models with a 4 x 3.5-inch rear drive cage or a GPU installed, a low-profile 7mm drive cage can be installed only on slot 6.
  - For server models with a 4 x 2.5-inch rear drive cage, no 7mm drive cage is supported.
- **Serial port module installation rules:**

- For server models with 8 PCIe slots, 10 PCIe slots, or a 4 x 2.5-inch rear drive cage:
  - If both riser 1 and riser 2 use the x16/x16/E riser card and a 7mm drive cage is installed on slot 6, a serial port module can be installed on slot 3. If no 7mm drive cage is installed, a serial port module can be installed on slot 6.
  - If riser 1 uses the x16/x16/E riser card but riser 2 is not installed or not the x16/x16/E riser card, a serial port module can be installed on slot 3 when no 7mm drive cage is installed.
  - If riser 1 does not use the x16/x16/E riser card but riser 2 uses the x16/x16/E riser card, a serial port module can be installed on slot 6 when no 7mm drive cage is installed.
  - If both riser 1 and riser 2 do not use the x16/x16/E riser card, no serial port module is supported.
- For server models with an 8 x 2.5-inch/2 x 3.5-inch rear drive cage:
  - If riser 1 uses the x16/x16/E riser card, a serial port module can be installed on slot 3 and a 7mm SSD cage can be installed on slot 6.
  - If riser 1 does not use the x16/x16/E riser card, a 7mm drive cage and a serial port module cannot be installed at the same time. If no 7mm drive cage is installed, a serial port module can be installed on slot 6.
- For server models with a 4 x 3.5-inch rear drive cage, a 7mm drive cage and a serial port module cannot be installed at the same time. If no 7mm drive cage is installed, a serial port module can be installed on slot 6.
- For server models with a double-wide GPU, the serial port module can be installed only on slot 6 when no 7mm drive cage is installed.

Supported PCIe adapters and slot priorities

The following table lists the recommended slot installation priority for common PCIe adapters.

PCIe adapter	Maximum supported	Suggested slot priority
GPU adapternote1 on page 59		
Half-height half-length (HHHL) single-wide (SW) GPU: A2	8	• With FH riser 3 : 2, 3, 5, 6, 7, 8, 1, 4 • With LP riser 3 : 2, 3, 5, 6, 1, 4 • With riser 5: 2, 3, 5, 6, 11, 12, 1, 4
HHHL SW GPU: L4	8	• With FH riser 3 : 1, 4, 2, 5, 7, 3, 6 • With LP riser 3 : 1, 4, 2, 5, 3, 6 • With riser 5: 1, 4, 2, 5, 3, 6, 11, 12
HHHL double-wide (DW) GPU: RTX A2000	3	2, 5, 7
Full-height full-length (FHFL) double-wide GPU: A16, A30, A40, L40, L40S, A100, H100, H100 NVL, RTX A4500, RTX A6000, RTX 4500 Ada, RTX 6000 Ada, MI210	3	2, 5, 7
DPU adapter		
ThinkSystem NVIDIA BlueField-3 VPI QSFP112 2P 200G PCIe Gen5 x16	2	4, 5, 1, 2
PCIe Retimer card		
ThinkSystem x16 Gen 4.0 Re-timer adapter (for 4x NVMe)	3	1, 3, 2, 4, 5

PCIe adapter	Maximum supported	Suggested slot priority
ThinkSystem SR630/SR650 V3 x16 retimer (Gen5)	3	1, 2, 4
Internal custom form factor (CFF) RAID/HBA/Expander		
5350-8i, 9350-8i, 9350-16i	1	Not installed in PCIe slots. The CFF RAID/HBA/Expander adapter is supported only in the 2.5-inch drive bay chassis, which is installed between the front backplane and the system board assembly.
440-16i, 940-16i		
ThinkSystem 48 port 12Gb Internal Expander		
Internal standard form factor (SFF) RAID/HBA adapternote4 on page 60		
440-8i, 540-8i, 940-8i, 4350-8i, 5350-8i	4	2, 3, 5, 6, 1, 4
440-16i, 540-16i, 940-16i, 4350-16i	2	
940-32i	1	
9450-8i, 4450-16i, 5450-16i, 9450-16i, 9450-32i	1	
9350-8i	4	• With other SFF RAID adapters: 2, 3, 5, 6, 1, 4 • Without other SFF RAID adapters: 3, 2, 5, 6, 1, 4
9350-16i	2	
External RAID/HBA adapter		
440-8e, 440-16e	10	• With FH riser 3 : 2, 3, 5, 6, 7, 8, 1, 4 • With LP riser 3 : 2, 3, 5, 6, 7, 8, 9, 10, 1, 4 • With riser 5: 2, 3, 5, 6, 1, 4
940-8e	4	
450W-16e	5	• With FH riser 3 : 2, 3, 5, 6, 7, 1, 4 • With LP riser 3 : 2, 3, 5, 6, 1, 4 • With riser 5: 2, 3, 5, 6, 1, 4
FC HBA adapter		
All supported FC HBA adapters	10	• With FH riser 3 : 2, 3, 5, 6, 7, 8, 1, 4 • With LP riser 3 : 2, 3, 5, 6, 7, 8, 9, 10, 1, 4 • With riser 5: 2, 3, 5, 6, 1, 4, 11, 12
NIC adapter		
ThinkSystem Broadcom 57508 100GbE QSFP56 2-port PCIe 4 Ethernet Adapter V2 ThinkSystem Broadcom 57504 10/25GbE SFP28 4-port PCIe Ethernet Adapter ThinkSystem Intel E810-DA4 10/25GbE SFP28 4-port PCIe Ethernet Adapter ThinkSystem Mellanox ConnectX-6 Dx 100GbE QSFP56 2-port PCIe Ethernet Adapter	6	• With FH riser 3 : 1, 4, 7, 8, 2, 5 • With LP riser 3 : 1, 4, 2, 5 • With riser 5: 1, 4, 11, 12, 2, 5

PCIe adapter	Maximum supported	Suggested slot priority
ThinkSystem Broadcom 57416 10GBASE-T 2-Port PCIe Ethernet Adapter ThinkSystem Broadcom 57454 10GBASE-T 4-port PCIe Ethernet Adapter	10	• With FH riser 3 : 2, 3, 5, 6, 7, 8, 1, 4 • With LP riser 3 : 2, 3, 5, 6, 1, 4 • With riser 5: 2, 3, 5, 6, 1, 4, 11, 12
ThinkSystem AMD X3522 10/25GbE DSFP28 2-port PCIe Ethernet Adapter (Low Latency)	6	• With FH riser 3 : 2, 3, 5, 6, 7, 8, 1, 4 • With LP riser 3 : 2, 3, 5, 6, 1, 4 • With riser 5: 2, 3, 5, 6, 1, 4, 11, 12
All other supported NIC adapters	10	• With FH riser 3 : 2, 3, 5, 6, 7, 8, 1, 4 • With LP riser 3 : 2, 3, 5, 6, 7, 8, 9, 10, 1, 4 • With riser 5: 2, 3, 5, 6, 1, 4, 11, 12
InfiniBand adapter		
ThinkSystem NVIDIA ConnectX-7 NDR400 OSFP 1-port PCIe Gen5 Adapter ThinkSystem Nvidia ConnectX-7 NDR200/ HDR QSFP112 2-port PCIe Gen5 x16 InfiniBand Adapter	6	• With FH riser 3 : 1, 4, 7, 2, 5 • With LP riser 3 : 1, 4, 2, 5 • With riser 5: 1, 4, 11, 12, 2, 5
Mellanox ConnectX-6 HDR100 IB/100GbE VPI 1-port x16 PCIe 3.0 HCA w/ Tall Bracket Mellanox ConnectX-6 HDR100 IB/100GbE VPI 2-port x16 PCIe 3.0 HCA w/ Tall Bracket Mellanox ConnectX-6 HDR IB/200GbE Single Port x16 PCIe Adapter w/ Tall Bracket	6	• With FH riser 3 : 1, 4, 7, 8, 2, 5 • With LP riser 3 : 1, 4, 2, 5 • With riser 5: 1, 4, 11, 12, 2, 5

Notes:

1. Rules for GPU adapters:
   - All installed GPU adapters must be identical. For thermal requirement on GPUs, see “Thermal rules” on page 60.
   - The air baffles for GPU adapters vary according to the GPU type. For detailed information, see “GPU replacement” on page 131.
   - If GPU adapters are installed, no middle drive cage, rear drive cage, or PCIe SSD cards are supported.
   - GPU adapters are not supported on the rear 4LP riser.
   - If a double-wide GPU adapter is installed in slot 5, 2, or 7, the adjacent slot 4, 1, or 8 respectively is not available.
   - When three or more SFF RAID/HBA adapters are installed, a maximum of two DW GPUs are supported.
   - When two DW GPUs are installed, 7mm drives are not supported.
   - The GPU adapter L4 is supported only on a Gen 5 riser with re-timer slot.
   - Servers equipped with 400 W GPU adapters do not support ThinkSystem NVIDIA BlueField-3 VPI QSFP112 2P 200G PCIe Gen5 x16.
   - Each riser only support one ThinkSystem NVIDIA BlueField-3 VPI QSFP112 2P 200G PCIe Gen5 x16.

- GPU adapters L40 and L40S are supported only on a Gen5 riser when a server is equipped with 9005 series processors.

2. The installation priority of internal storage controllers is as follows: CFF RAID/HBA > 940 32i > Gen 4 HBA > Gen 4 RAID > Gen 3 HBA > Gen 3 RAID > RAID for tri-mode.
3. Windows OSs do not support 440 8i/16i HBAs in configurations including the 12 x 3.5-inch SAS/SATA expander backplane and a middle or rear backplane.
4. Rules for the internal SFF RAID/HBA adapters:
   - RAID 940 series or 9350 series adapters require a RAID flash power module.
   - Mixing of RAID/HBA 4350/5350/9350 adapters (Gen 3) and RAID/HBA 440/540/940 adapters (Gen 4) in the same system is not allowed.
   - RAID/HBA adapters belonged to the same generation (Gen 3 or Gen 4) are allowed to be mixed in the same system.
   - The RAID/HBA 4350/5350/9350 adapters cannot be mixed with RAID/HBA 440/940/540 adapters, except for external RAID/HBA 440-8e/440-16e/940-8e adapters in the same system.
   - The RAID/HBA 4450-16i/5450-16i/9450-8i/9450-16i adapters cannot be installed in slot 2 or slot 5 when a rear 7mm bay is installed in riser 1 or riser 2 cage.
   - The RAID 940-8i or RAID 940-16i adapter supports Tri-mode. When Tri-mode is enabled, the server supports SAS, SATA and U.3 NVMe drives at the same time. NVMe drives are connected via a PCIe x1 link to the controller.

     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 546.
   - Gen 5 riser cards do not support the following adapters on servers equipped with 9005 series processors:
     - ThinkSystem Broadcom 57414 10/25GbE SFP28 2-port PCIe Ethernet Adapter V2
     - ThinkSystem Broadcom 57416 10GBASE-T 2-port PCIe Ethernet Adapter
     - ThinkSystem QLogic QLE2772 32Gb 2-Port PCIe Fibre Channel Adapter
   - ThinkSystem Broadcom 57412 10GBASE-T 4-port PCIe Ethernet Adapter is supported only on Gen 4 riser cards.

Thermal rules

This topic provides thermal rules for the server.

- “Thermal rules for server with 9004 series processors” on page 60
- “Thermal rules for server with 9005 series processors” on page 63

Thermal rules for server with 9004 series processors

This topic provides thermal rules for the server with 9004 series processors.

- “Standard configurations” on page 61
- “Storage configurations” on page 61
- “GPU configuration” on page 63

Abbreviations used in tables below are defined as following:
- TDP: Thermal Design Power
- S/S: SAS/SATA
- Max.Temp.: Maximum ambient temperature at sea level

- Any: AnyBay
- S: standard
- P: performance
- A: advanced
- NA: none
- Y: yes
- N: no

Processor groups are defined as follows:
- Group B: 200 W ≤ TDP ≤ 240 W
- Group A: 260 W < TDP ≤ 300 W
- Group E: 320 W ≤ TDP ≤ 400 W

Standard configurations

This section provides thermal information for standard configurations.

Front bays	Support riser 3	Max. Temp.	Processor	Heat sink	Air baffle	Fan type	Support DIMMs >= 96 GB
• 8 x 2.5" • FIO • 16 x 2.5" • 8 x 2.5" + FIO • 8 x 3.5"	Y	45°C	Group B	2U P	S	P	N
	Y	35°C	Group B	2U S	S	S	N[note 1]
	Y	35°C	Group B, A	2U S	S	P	Y
	Y	35°C	Group E	2U A	S	P	Y
	Y	30°C	Group E	2U P	S	P	Y
• 8 x 2.5" • 16 x 2.5" • 8 x 3.5"	N	35°C	Group B	2U S	S	S x 4	N[note 1]
	N	30°C	Group B, A	2U S	S	P x 4	Y

Notes:

1. Apart from supported configurations listed above, ThinkSystem 128GB TruDDR5 5600MHz (2Rx4) RDIMM-A is also supported in this configuration.
2. When a part with active optical cable (AOC) is installed and the rate of the part is greater than 25 GB, the ambient temperature must be limited to 30°C or lower.
3. When the following parts are installed, the ambient temperature must be limited to 35°C or lower.
   - PCIe network interface cards (NICs) at a rate greater than or equal to 100 GB
   - Parts with AOC and at a rate of 25 GB

Storage configurations

This section provides thermal information for storage configurations.

Front bays	Middle bays	Rear bays	Max. Temp.	Processor	Heat sink	Air baffle	Fan type	Support DIMMs >= 96 GB[note 1,2]
• 24 x 2.5" • 16 x 2.5" + FIO	NA	NA	30°C	Group B	2U S	S	S	N
	NA	NA	30°C	Group A	2U P	S	S	N
	NA	NA	30°C	Group B	2U S	S	P	Y
	NA	NA	30°C	Group A, E[note 3]	2U P	S	P	Y
	NA	Y[note 4]	30°C	Group B, A	2U P	S	P	N
	Y[note 4]	NA	30°C	Group B, A	2U P	NA	P	N
	Y[note 4]	Y[note 4]	30°C	Group B	2U P	NA	P	N
	NA	Y	25°C	Group B, A	2U P	S	P	Y
	Y	NA	25°C	Group B, A	2U P	NA	P	Y
	Y	Y	25°C	Group B, A	2U P	NA	P	Y
12 x 3.5"	NA	NA	30°C	Group B	2U S	S	P	Y
	NA	NA	30°C	Group A	2U P	S	P	Y
	NA	NA	30°C	Group E[note 3]	2U A	S	P	Y
	NA	NA	25°C	Group E[note 3]	2U P	S	P	Y
	NA	Y[note 4]	30°C	Group B, A	2U P	S	P	N
	Y[note 4]	NA	30°C	Group B, A	2U P	NA	P	N
	Y[note 4]	Y[note 4]	30°C	Group B	2U P	NA	P	N
	NA	Y	25°C	Group B, A	2U P	S	P	Y
	Y	NA	25°C	Group B, A	2U P	NA	P	Y
	Y	Y	25°C	Group B, A	2U P	NA	P	Y

Notes:

1. ThinkSystem 128GB TruDDR5 4800MHz (2S2Rx4) 3DS RDIMM-A v2 is supported in all configurations listed above, except for when using standard fans.
2. ThinkSystem 128GB TruDDR5 5600MHz (2Rx4) RDIMM-A is supported in all configurations listed above.
3. For storage configurations, group E processors are limited to AMD EPYC 9754/9734/9654(P)/9554(P)/9174F processors.
4. The following NVMe drives are not supported:
   - Gen5 7.68 TB or larger capacity
   - P5336 15.36TB or larger capacity
5. When a part with active optical cable (AOC) is installed and the rate of the part is greater than 25 GB, the ambient temperature must be limited to 30°C or lower.

GPU configuration

This section provides thermal information for the GPU configuration.

- Half-height half-length (HHHL) single-wide (SW) GPU: A2, L4
- DW GPU: A16, A30, A40, L40, L40S, A100, RTX A2000, RTX A4500, RTX A6000, RTX 4500 Ada, RTX 6000 Ada, H100, H100 NVL, AMD MI210

Front bays	Max. Temp.	Pro-cessor	Heat sink	Air baf-fle	Fan type	Max. GPU Qty.				
						SW (A2/L4)	DW (A200-0)	DW (A40/ L40)	DW (Others) note 2, 3	DW (H100/ L40S)
8 x 2.5"	30°C	Group B	2U S	S	P	8	3	NA	NA	NA
		Group A	2U P	S	P	8	3	NA	NA	NA
		Group B, A	2U P	GPU	P	NA	NA	3	3	3
16 x 2.5"	30°C	Group B	2U S	S	P	8	3	NA	NA	NA
		Group A	2U P	S	P	8	3	NA	NA	NA
		Group B, A	2U P	GPU	P	NA	NA	2 (slot 2/5)	3	2 (slot 2/5)
8 x 3.5"	30°C	Group B	2U S	S	P	8	3	NA	NA	NA
		Group A	2U P	S	P	8	3	NA	NA	NA
		Group B, A	2U P	GPU	P	NA	NA	3	3	3
24 x 2.5"	25°C	Group B	2U S	S	P	6	3	NA	NA	NA
		Group A	2U P	S	P	6	3	NA	NA	NA
		Group B, A	2U P	GPU	P	NA	NA	NA	2 (slot 2/5)	2 (slot 2/5)
• 8 x 2.5" • 16 x 2.5" • 8 x 3.5"	25°C	Group B	2U S	S	P	6	3	NA	NA	NA
		Group A, E note 1	2U P	S	P	6	3	NA	NA	NA
		Group B, A, E note 1	2U P	GPU	P	6	3	2 (slot 2/5)	2 (slot 2/5)	2 (slot 2/5)

Notes:

1. For GPU configurations, group E processors are limited to AMD EPYC 9754/9734/9654(P)/9554(P)/ 9174F processors.
2. When RTX 4500 Ada or RTX 6000 Ada is installed, the maximum ambient temperature is limited to 30°C in 8 x 2.5", 16 x 2.5", 24 x 2.5" or 8 x 3.5" configuration.
3. When H100 NVL is installed, the maximum ambient temperature is limited to 25°C in 8 x 2.5", 16 x 2.5" or 8 x 3.5" configuration with group B, A processors installed.
4. When a part with active optical cable (AOC) is installed and the rate of the part is greater than 25 GB, the ambient temperature must be limited to 30°C or lower.

Thermal rules for server with 9005 series processors

This topic provides thermal rules for the server with 9005 series processors.

- “Standard configurations” on page 64
- “Storage configurations with DWCM” on page 65
- “Storage configurations without DWCM” on page 65
- “GPU configurations” on page 66

Abbreviations used in tables below are defined as follows:
- Max.Temp.: Maximum ambient temperature at sea level
- FIO = riser 5 + front OCP
- S/S: SAS/SATA
- Any: AnyBay
- S: standard
- P: performance
- A: advanced
- NA: not applicable
- Y: yes
- Y* in the Middle bays or Rear bays column: yes (when no Gen5 7.68 TB or larger capacity NVMe drive or no Gen4 P5336 15.36 TB/30.72 TB/61.44 TB NVMe drive is installed)
- N: no
- DWCM: Direct Water Cooling Module

Processor groups are defined as follows:
- Group D: 9015, 9115
- Group B: 9135, 9335, 9255
- Group A: 9355(P), 9535, 9365, 9455(P)
- Group E[1]: 9555(P), 9565, 9645, 9655(P), 9745, 9825, 9845
- Group E[2]: 9375F, 9475F, 9575F
- Group E[3]: 9175F, 9275F

Standard configurations

This section provides thermal information for standard configurations.

Front bays	Max. Temp.	Processor	Heat sink	Air baffle	Fan type	Support ≥ 64 GB DIMM
• 8 x 2.5" • 16 x 2.5" • 8 x 3.5" • FIO • 8 x2.5"+FIO	35°C	Group B, D	2U S	S	S	N
		Group B, A, D	2U S	S	P	Y
		Group E[1]	2U A	S	P	Y
		Group B, A, D, E	DWCM	S	S	Y[3]
	30°C	Group E[1]	2U P	S	P	Y
		Group E[2], E[3]	2U A	S	P	Y
	25°C	Group E[2]	2U P	S	P	Y

Notes:

1. When a part with active optical cable (AOC) is installed and the rate of the part is greater than 25 GB, the ambient temperature must be limited to 30°C or lower.
2. When the following parts are installed, the ambient temperature must be limited to 35°C or lower.
   - PCIe network interface cards (NICs) at a rate greater than or equal to 100 GB
   - Parts with AOC and at a rate of 25 GB

3. When standard fans are used, the max. supported ambient temperature is 30°C; when performance fans are used, the max. supported ambient temperature is 35°C.

Storage configurations with DWCM

This section provides thermal information for storage configurations with DWCM.

Front bays	Middle bays	Rear bays	Max. Temp.	Processor	Heat sink	Air baffle	Fan type	Support ≥ 64 GB DIMM
• 24 x 2.5" • 16 x 2.5" + FIO • 12 x 3.5"	N	N	35°C	Group B, A, D, E	DWCM	S	S	Y[1]
	N/Y [2]	N/Y [2]	35°C	Group B, A, D, E	DWCM	S	P	Y

Notes:

1. When standard fans are used, the max. supported ambient temperature is 30°C; when performance fans are used, the max. supported ambient temperature is 35°C.
2. The ambient temperature is limited to 30°C when the following NVMe drives are installed in middle or rear drive bays:
   - Gen5 7.68 TB or larger capacity
   - Gen4 P5336 15.36T/30.72T/61.44T NVMe

Storage configurations without DWCM

This section provides thermal information for storage configurations without DWCM.

Front bays	Middle bays	Rear bays	Max. Temp.	Processor	Heat sink	Air baffle	Fan type	Support ≥ 64 GB DIMM
• 24 x 2.5" • 16 x 2.5" + FIO	N	N	30°C	Group B, D	2U S	S	S	N
	N	N	30°C	Group A	2U P	S	S	N
	N	N	30°C	Group B, D	2U S	S	P	Y
	N	N	30°C	Group A	2U P	S	P	Y
	N	N	30°C	Group E[1], E[2]	2U A	S	P	Y
	N	Y*	30°C	Group D	2U S	S	P	N
	N	Y*	30°C	Group B, A	2U P	S	P	N
	Y*	N	30°C	Group B, A, D	2U P	N/A	P	N
	Y*	Y*	30°C	Group B, D	2U P	N/A	P	N
	N	N	25°C	Group E[1]	2U P	S	P	Y
	N	N	25°C	Group E[2], E[3]	2U A	S	P	Y
	N	Y	25°C	Group D	2U S	S	P	Y

Front bays	Middle bays	Rear bays	Max. Temp.	Processor	Heat sink	Air baffle	Fan type	Support ≥ 64 GB DIMM
	N	Y	25°C	Group B, A	2U P	S	P	Y
	N	Y	25°C	Group E[3]	2U A	S	P	Y
	Y	N/Y	25°C	Group B, A, D	2U P	NA	P	Y
• 12 x 3.5"	N	N	30°C	Group B, D	2U S	S	P	Y
	N	N	30°C	Group A	2U P	S	P	Y
	N	N	30°C	Group E[1], E[2]	2U A	S	P	Y
	N	Y*	30°C	Group D	2U S	S	P	N
	N	Y*	30°C	Group B, A	2U P	S	P	N
	Y*	N	30°C	Group B, A, D	2U P	N/A	P	N
	Y*	Y*	30°C	Group B, D	2U P	N/A	P	N
	N	N	25°C	Group E[1]	2U P	S	P	Y
	N	N	25°C	Group E[3]	2U A	S	P	Y
	N	Y	25°C	Group D	2U S	S	P	N
	N	Y	25°C	Group B, A	2U P	S	P	N
	N	Y	25°C	Group E[3]	2U A	S	P	N
	Y	N/Y	25°C	Group B, A, D	2U P	NA	P	N

Notes:

1. The ambient temperature is limited to 30°C when the following NVMe drives are installed in middle or rear drive bays:
   - Gen5 7.68 TB or larger capacity
   - P5336 15.36TB or larger capacity
2. When a part with active optical cable (AOC) is installed and the rate of the part is greater than 25 GB, the ambient temperature must be limited to 30°C or lower.
3. When the following parts are installed, the ambient temperature must be limited to 35°C or lower.
   - PCIe network interface cards (NICs) at a rate greater than or equal to 100 GB
   - Parts with AOC and at a rate of 25 GB

GPU configurations

This section provides thermal information for GPU configurations.

Notes:

- For GPU configurations, group E[1] processors are defined as follows: 9555(P), 9565, 9645, 9655(P), 9745, 9825, 9845, 9475F, 9575F.
- Performance fans are required for servers with GPU adapters.
- Half-height half-length (HHHL) single-wide (SW) GPU: A2, L4

- DW GPU: A16, A30, A40, L40, L40S, A100, RTX A2000, RTX A4500, RTX A6000, RTX 4500 Ada, RTX 6000 Ada, H100, H100 NVL, AMD MI210

Front bays	Max. Temp.	Processor	Heat sink	Air baffle	Max. GPU Qty.				
					SW	DW (A2000)	DW (A40/ L40)	350W DW	Other DW
• 8 x 2.5" • 8 x 3.5" • FIO	30°C	Group B, D	2U S	S	8	3	NA	NA	NA
		Group A	2U P	S	8	3	NA	NA	NA
		Group B, A, D	2U P	GPU	NA	NA	3	3	3
	25°C	Group E[1]	2U P	S	6	3	NA	NA	NA
		Group E[1]	2U P	GPU	NA	NA	2 (slot 2/5)	2 (slot 2/5)	2 (slot 2/5)
• 16 x 2.5" • 8 x 2.5" + FIO	30°C	Group B, D	2U S	S	8	3	NA	NA	NA
		Group A	2U P	S	8	3	NA	NA	NA
		Group B, A, D	2U P	GPU	NA	NA	2 (slot 2/5)	2 (slot 2/5)	3
	25°C	Group E[1]	2U P	S	6	3	NA	NA	NA
		Group E[1]	2U P	GPU	NA	NA	2 (slot 2/5)	2 (slot 2/5)	2 (slot 2/5)
• 24 x 2.5" • 16 x 2.5" + FIO	25°C	Group B, D	2U S	S	6	3	NA	NA	NA
		Group A	2U P	S	6	3	NA	NA	NA
		Group B, A, D	2U P	GPU	NA	NA	2 (slot 2/5)	2 (slot 2/5)	2 (slot 2/5)

Power on and power off the server

Follow the instructions in this section to power on and power off the server.

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).

Power button location and power LED are specified in:

- Chapter 2 “Server components” on page 17
- “Troubleshooting by system LEDs and diagnostics display” on page 504

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 “Power off the server” on page 68.

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.

Power button location and power LED are specified in:

- Chapter 2 “Server components” on page 17
- “Troubleshooting by system LEDs and diagnostics display” on page 504

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 “Power on the server” on page 67.

Server replacement

Follow instructions in this section to remove and install the server.

- “Remove the server from rack” on page 68
- “Install the server to rack” on page 71

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)

CAUTION:
Use safe practices when lifting.

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 49 and “Safety inspection checklist” on page 50 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 68.

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

Watch the procedure

A video of this procedure is available at YouTube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-BashWCNZQEDP7o3EohXPEV.

Procedure

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

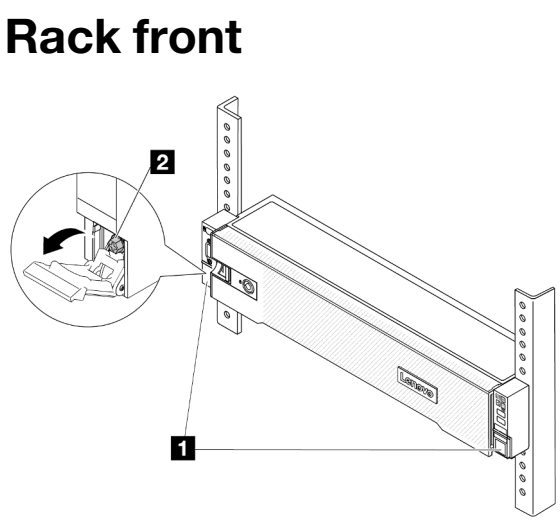


Figure 19. Disengaging server from the rack

1	Rack latch
2	Thumbscrew

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

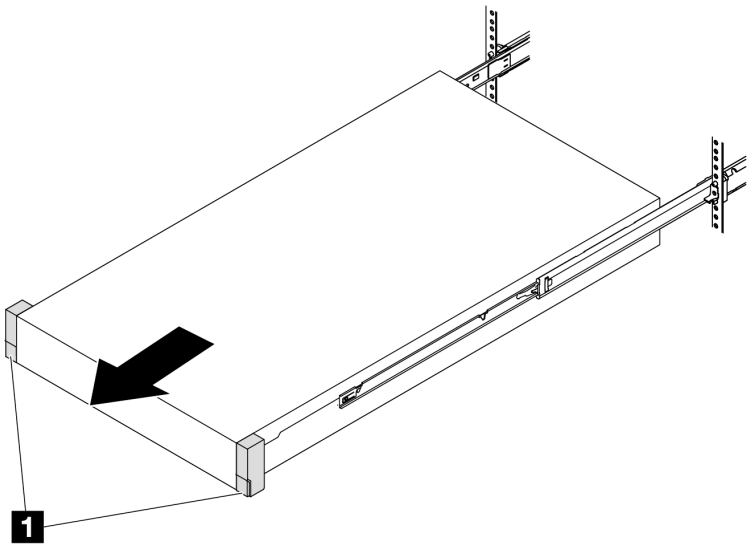


Figure 20. Pulling out the server

1	Rack latch (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



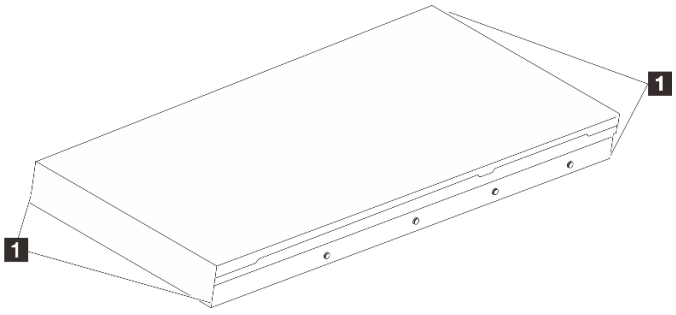


Figure 21. Lifting up the server

1	Lift point

Rack Front

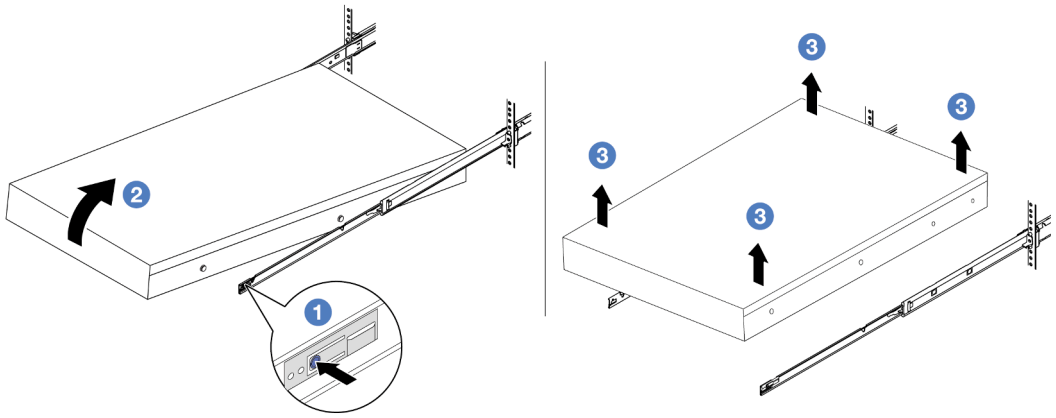


Figure 22. Removing the server from the rack.

1	Release tab

a. ❶ Press the release tabs to disengage the rails from the server.

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

c. ❸ Lift up the server to remove it from the rails completely. Place the server on a flat and sturdy surface.

After you finish

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

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)

CAUTION:
Use safe practices when lifting.

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 49 and "Safety inspection checklist" on page 50 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 68.

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

Firmware and driver download: You might need to update the firmware or driver after replacing a component.

- Go to https://datacentersupport.lenovo.com/products/servers/thinksystem/sr655v3/7d9e/downloads/driver-list/ to see the latest firmware and driver updates for your server.
- Go to "Update the firmware" on page 495 for more information on firmware updating tools.

Watch the procedure

A video of this procedure is available at YouTube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-BashWCNZQEDP7o3EohXPEV.

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

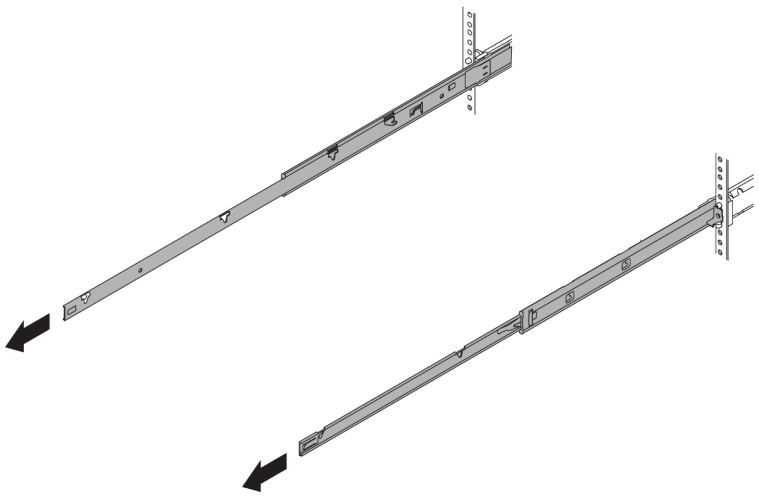


Figure 23. Pulling out the rails

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

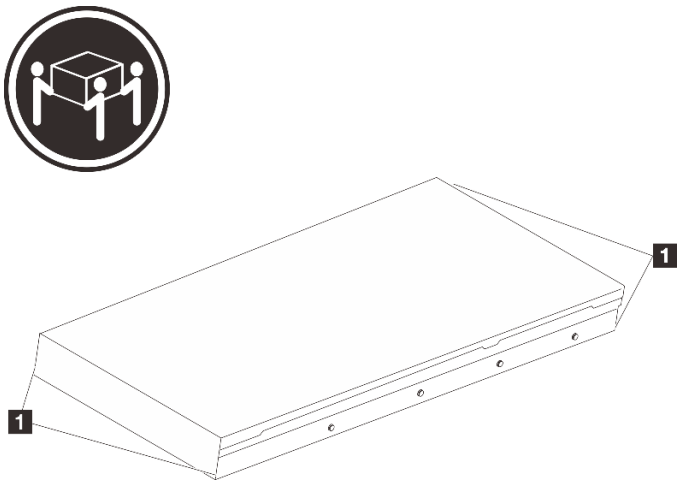


Figure 24. Lifting up the server

1	Lift point

Step 3. From the front of the rack, install the server into the rails.

Rack front

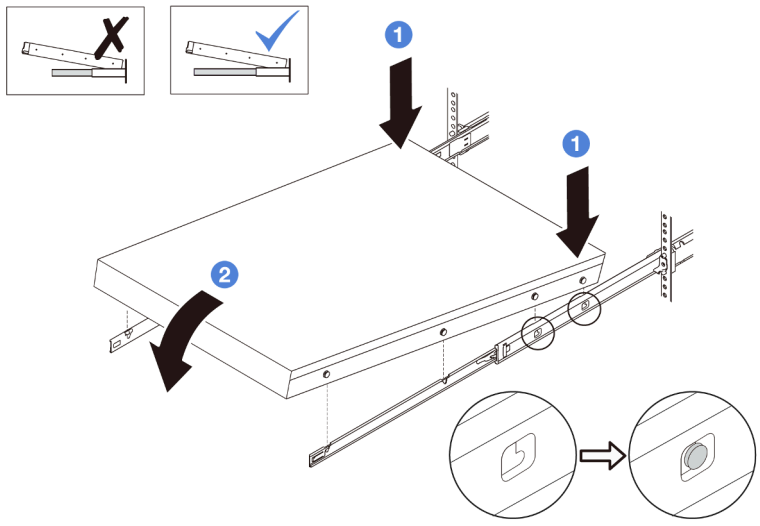


Figure 25. Installing the server into the rails

a. 1 Tilt the server and slowly lower its 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. 2 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.

Step 4. Slide the server into rack.

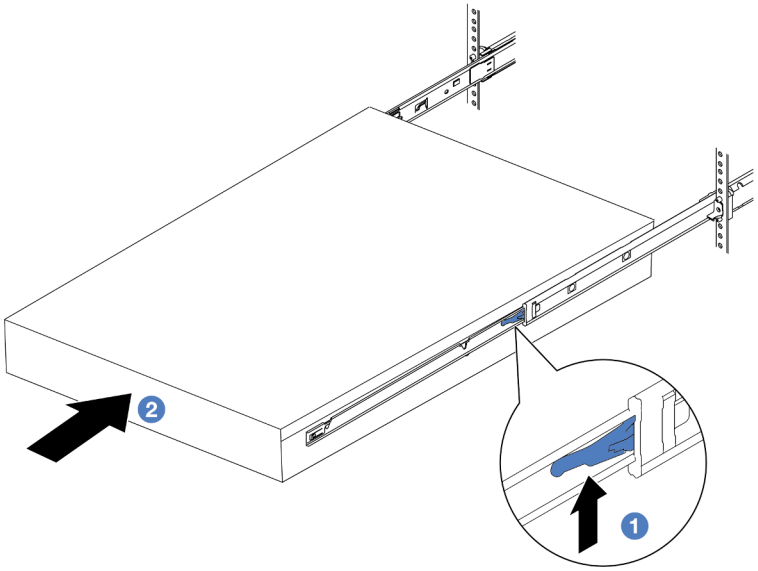


Figure 26. Installing the server into the rack

1	Latch

a. 1 Push up the latches on the rails.

b. 2 Push the server all the way into the rack until both latches lock into position with a click.

Step 5. (Optional) Secure the server to the rack.

a. Install one M6 screw to each of the rails to secure the server to the rear of the rack.

Rack rear

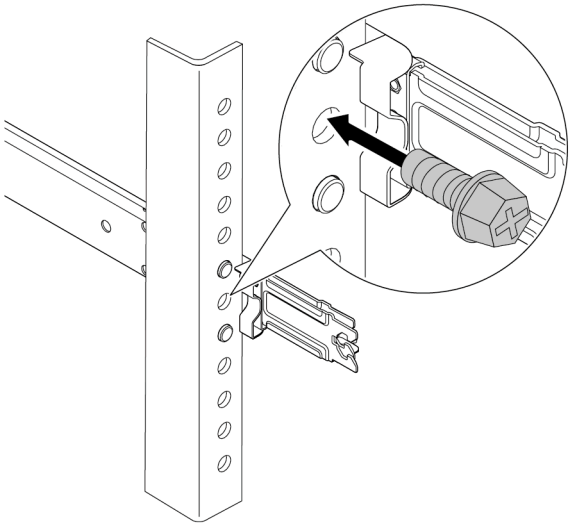


Figure 27. Securing the server to the rear of the rack

b. Fasten the two thumbscrews located on the front of the server.

Rack front

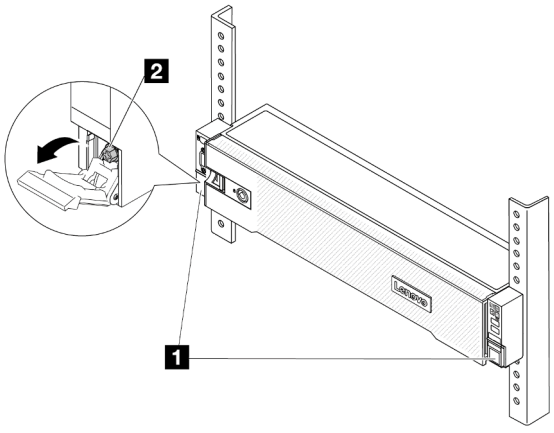


Figure 28. Securing the server to the front of the rack

1	Rack latch
2	Thumbscrew

After you finish

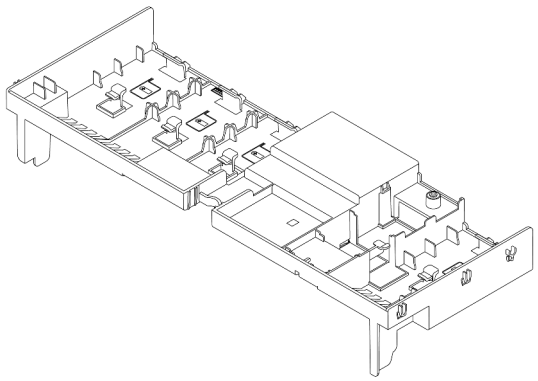
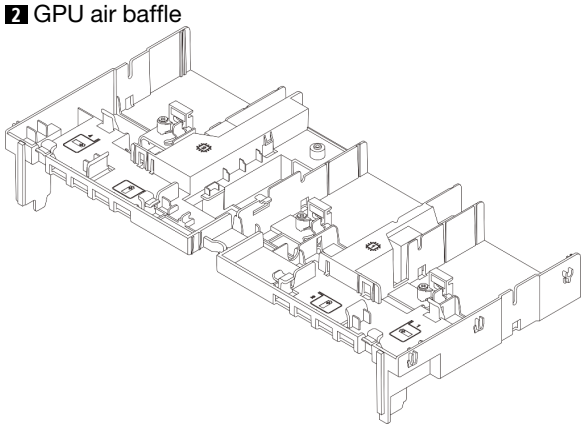
1. Reconnect the power cords and any cables that you removed.
2. Power on the server and any peripheral devices. See “Power on the server” on page 67.
3. Update the server configuration. See “Complete the parts replacement” on page 345.

Air baffle replacement

Follow instructions in this section to remove and install the air baffle.

The air baffle varies by the server hardware configuration. Refer to “Thermal rules” on page 60 to select the appropriate air baffle for your server. The replacement procedures for the air baffles are the same.

- “Remove the air baffle” on page 76
- “Install the air baffle” on page 78

1 Standard air baffle	2 GPU air baffle
	

Remove the air baffle

Follow instructions in this section to remove the air baffle.

About this task

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.

S017



CAUTION:
Hazardous moving fan blades nearby. Keep fingers and other body parts away.

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.

Procedure

Note: The illustrated air baffle is the standard air baffle. The removal procedure is the same for the GPU air baffle.

Step 1. Make preparation for the task.

a. 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 68.

b. Remove the top cover. See “Remove the top cover” on page 342.

c. If there is a RAID flash power module installed on the air baffle, disconnect the cable of the RAID flash power module.

d. If there is an M.2 drive installed on the air baffle, disconnect M.2 backplane cables from the M.2 backplane.

e. If there is a GPU installed on the air baffle, remove the GPU. See “Remove a GPU adapter” on page 132.

Step 2. 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.

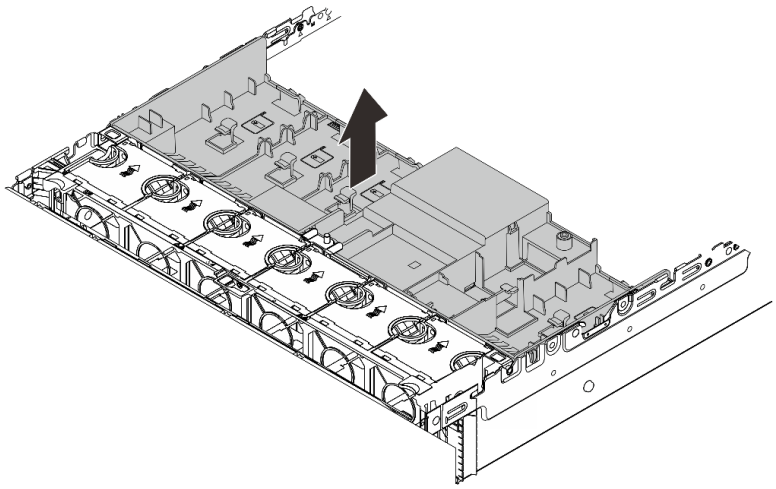


Figure 29. Removing the air baffle

Step 3. (Optional) Remove the fillers from the air baffle if you are using performance heat sinks and need to change to 2U standard heat sinks.

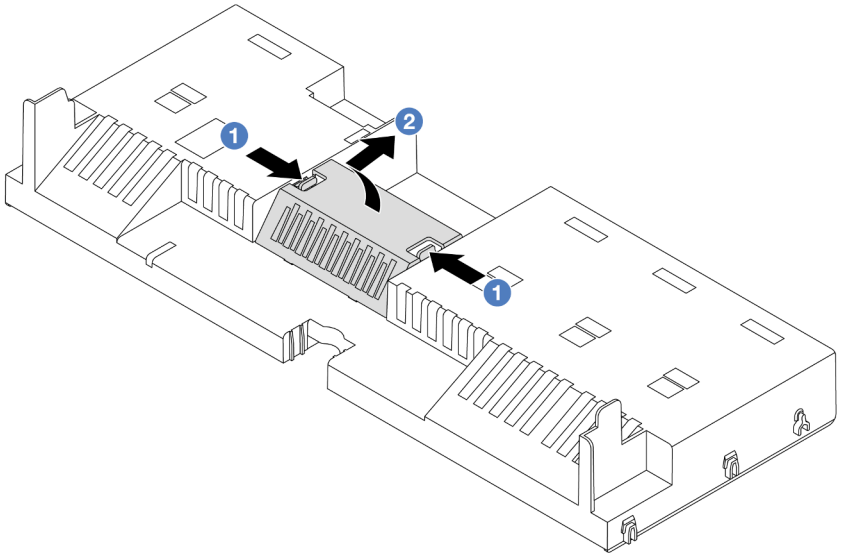


Figure 30. Removing the air baffle filler

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 air baffle

Follow instructions in this section to install the air baffle.

About this task

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.

S017



CAUTION:

Hazardous moving fan blades nearby. Keep fingers and other body parts away.

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 to ensure that you work safely.
- 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: The illustrated air baffle is a standard air baffle. The installation method is the same for the GPU air baffle.

Step 1. Refer to “Thermal rules” on page 60 to select the appropriate air baffle for your server.

Step 2. (Optional) If performance heat sinks are installed, install the air baffle fillers to fill the gaps between the heat sinks and the air baffle.

Note: The following illustration shows the air baffle upside down.

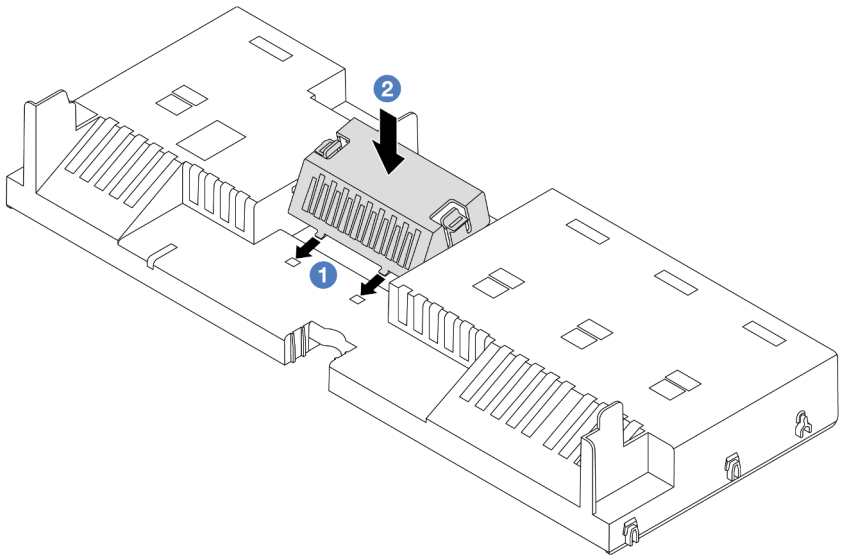


Figure 31. Installing the air baffle filler

Step 3. Align the tabs on both sides of the air baffle with the corresponding slots on both sides of the chassis. Then, lower the air baffle into the chassis and press the air baffle down until it is securely seated.

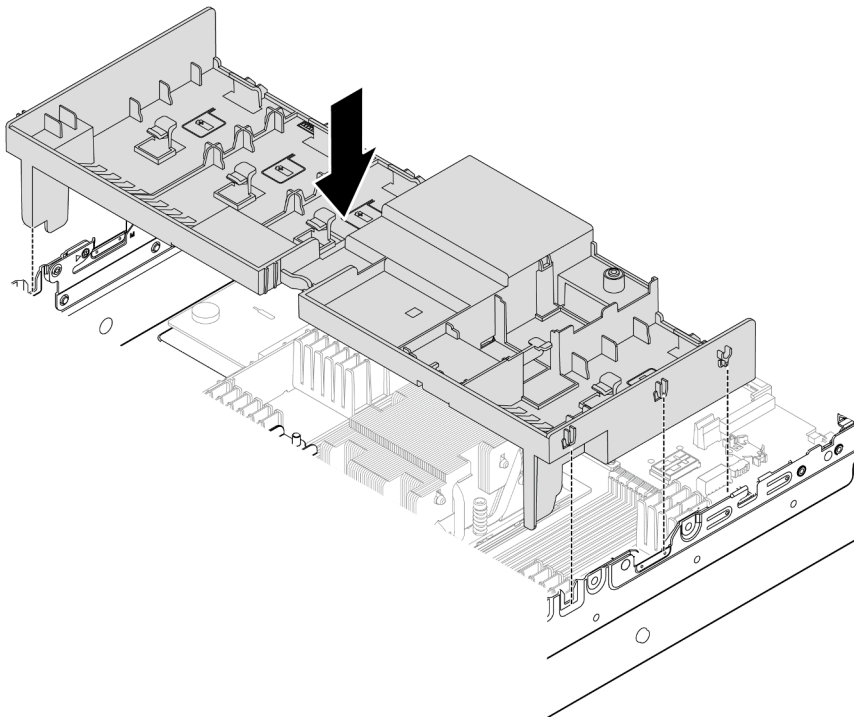


Figure 32. Installing the air baffle

After you finish

1. Reconnect the cable of the RAID flash power module if you have disconnected it. See Chapter 6 “Internal cable routing” on page 347.
2. Reconnect the cables of the M.2 backplane if you have disconnected them. See Chapter 6 “Internal cable routing” on page 347.
3. Reinstall the GPU adapter if you have removed it. See “Install a GPU adapter” on page 135.
4. Complete the parts replacement. See “Complete the parts replacement” on page 345.

Demo video

Watch the procedure on YouTube

CMOS battery (CR2032) replacement

Follow instructions in this section to remove and install the CMOS battery.

- “Remove the CMOS battery” on page 80
- “Install the CMOS battery” on page 82

Remove the CMOS battery

Follow instructions in this section to remove the CMOS battery.

About this task

The following tips describe information that you must consider when removing the CMOS battery.

- Lenovo has designed this product with your safety in mind. The lithium CMOS battery must be handled correctly to avoid possible danger. If you replace the CMOS battery, you must adhere to local ordinances or regulations for battery disposal.
- If you replace the original lithium battery with a heavy-metal battery or a battery with heavy-metal components, be aware of the following environmental consideration. Batteries and accumulators that contain heavy metals must not be disposed of with normal domestic waste. They will be taken back free of charge by the manufacturer, distributor, or representative, to be recycled or disposed of in a proper manner.
- To order replacement batteries, call your support center or business partner. For Lenovo support telephone numbers, see https://datacentersupport.lenovo.com/supportphonelist for your region support details.

Note: After you replace the CMOS battery, you must reconfigure the server and reset the system date and time.

S004



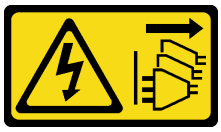
CAUTION:
When replacing the lithium battery, use only Lenovo specified part number or an equivalent type of battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:

- **Throw or immerse into water**
- **Heat to more than 100°C (212°F)**
- **Repair or disassemble**

Dispose of the battery as required by local ordinances or regulations.

S002



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.

Procedure

Step 1. Make preparation for the task.

a. 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 68.

b. Remove the top cover. See “Remove the top cover” on page 342.

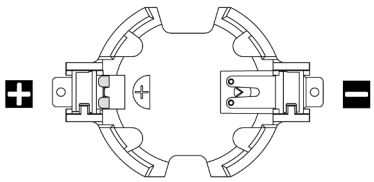
c. Remove any parts and disconnect any cables that might impede your access to the CMOS battery.

Step 2. Locate the CMOS battery. See “System-board-assembly connectors” on page 33.

Step 3. Remove the CMOS battery.

Attention:

- Differentiate between the positive and negative ends of the battery socket as shown below.



- Failing to remove the CMOS battery properly might damage the socket on the processor board. Any damage to the socket might require replacing the processor board.
- Do not tilt or push the CMOS battery by using excessive force.

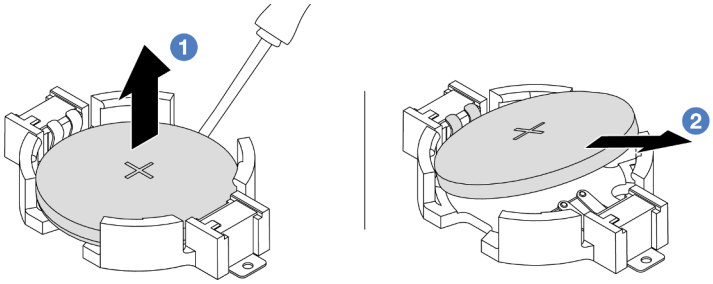


Figure 33. Removing the CMOS battery

a. 1 Pry the CMOS battery from the socket with a flat blade screwdriver.

b. 2 Remove the CMOS battery.

After you finish

1. Install a new one. See “Install the CMOS battery” on page 82.
2. Dispose of the CMOS battery as required by local ordinances or regulations.

Demo video

Watch the procedure on YouTube

Install the CMOS battery

Follow instructions in this section to install the CMOS battery.

About this task

The following tips describe information that you must consider when installing the CMOS battery.

- Lenovo has designed this product with your safety in mind. The lithium CMOS battery must be handled correctly to avoid possible danger. If you replace the CMOS battery, you must adhere to local ordinances or regulations for battery disposal.
- If you replace the original lithium battery with a heavy-metal battery or a battery with heavy-metal components, be aware of the following environmental consideration. Batteries and accumulators that contain heavy metals must not be disposed of with normal domestic waste. They will be taken back free of charge by the manufacturer, distributor, or representative, to be recycled or disposed of in a proper manner.
- To order replacement batteries, call your support center or business partner. For Lenovo support telephone numbers, see https://datacentersupport.lenovo.com/supportphonelist for your region support details.

Note: After you install the CMOS battery, you must reconfigure the server and reset the system date and time.

S004



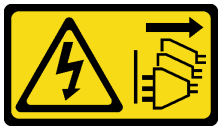
CAUTION:
When replacing the lithium battery, use only Lenovo specified part number or an equivalent type of battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:

- **Throw or immerse into water**
- **Heat to more than 100°C (212°F)**
- **Repair or disassemble**

Dispose of the battery as required by local ordinances or regulations.

S002



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Install the CMOS battery.

Note: Before you install the battery into the socket, make sure that the positive side faces upward.

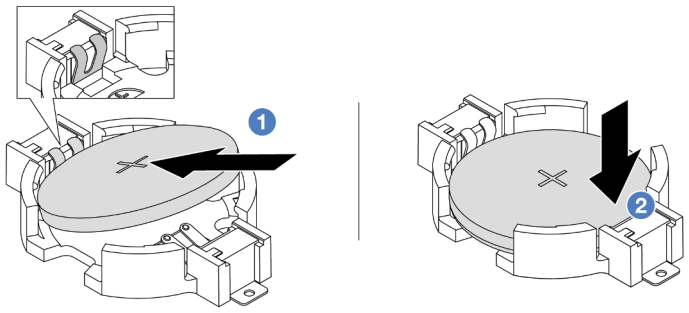


Figure 34. Installing the CMOS battery

a. 1 Tilt the battery and insert it to the positive end on the socket. Make sure that the battery goes tight to the metal clip.

b. 2 Press the battery down until it clicks into the socket.

After you finish

1. Complete the parts replacement. See “Complete the parts replacement” on page 345.
2. Use the Setup Utility to set the date, time, and any passwords.

Demo video

Watch the procedure on YouTube

Front adapter cage replacement

Follow instructions in this section to remove and install the front adapter cage, including the riser 5 cage at the top and the front OCP cage at the bottom.

- “Remove the front adapter cage” on page 84
- “Install the front adapter cage” on page 89

Remove the front adapter cage

Follow instructions in this section to remove the front adapter cage, including the riser 5 cage at the top and the front OCP cage at the bottom.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.

Procedure

Step 1. Make preparation for the task.

a. 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 68.

b. Remove the top cover. See “Remove the top cover” on page 342.

c. If your server comes with a riser 1 assembly, remove it first. See “Remove a rear riser assembly” on page 230. Then disconnect the cables from the rear OCP interposer card.

d. Remove the air baffle. See Remove the air baffle.

e. Remove the system fan cage. See “Remove the system fan cage” on page 335.

f. Record the cable connections, and disconnect all cables from the system board assembly.

Attention: To avoid damaging the system board assembly, make sure to follow the instructions in Chapter 6 “Internal cable routing” on page 347 when disconnecting cables from the system board assembly.

Step 2. Remove the front adapter assembly.

Note: The number of cables varies according to the configuration.

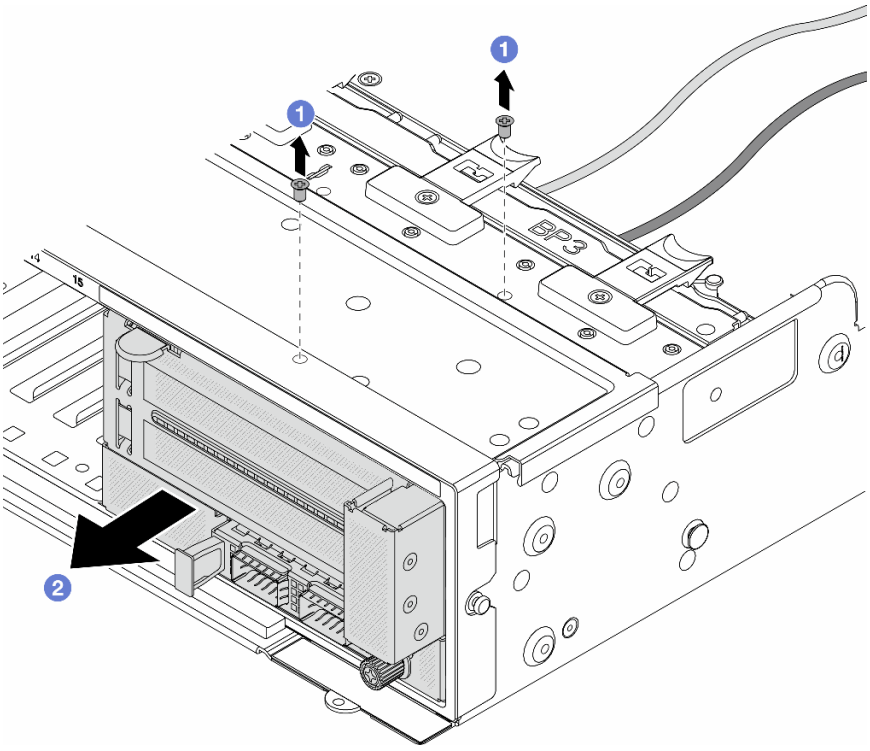


Figure 35. Removing the front adapter assembly

a. 1 Remove the screws that secure the assembly.

b. 2 Slide the assembly out of the front chassis.

Step 3. Lift the riser 5 assembly up off the front OCP assembly, and disconnect cables from the front OCP interposer card.

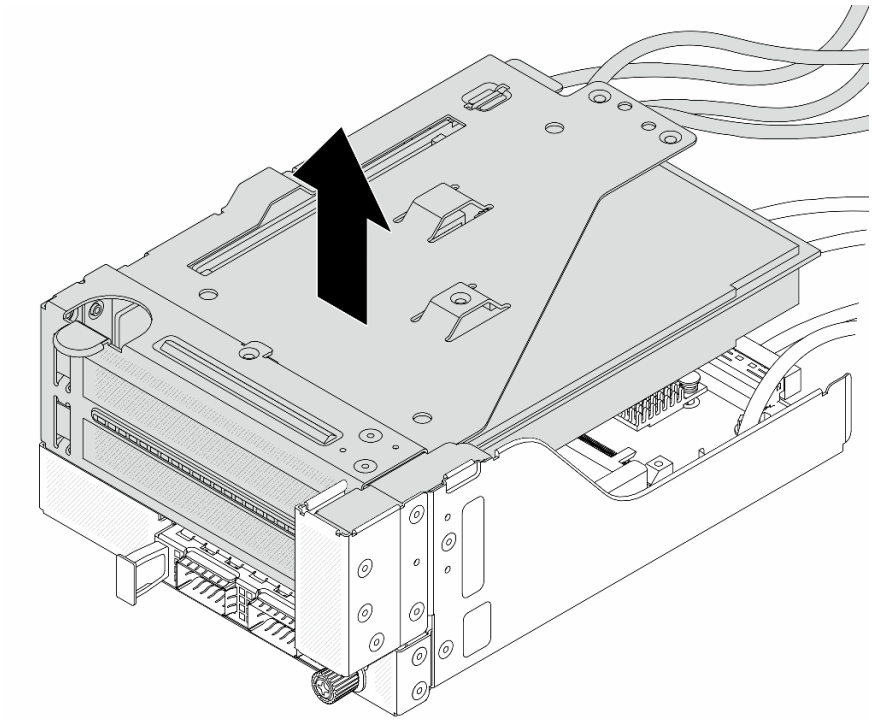


Figure 36. Lifting the riser 5 assembly

Step 4. Remove the PCIe adapter from the riser 5 cage.

Note: For ThinkSystem AMD X3522 10/25GbE DSFP28 2-port PCIe Ethernet Adapter, remove the screw that secures the adapter first.

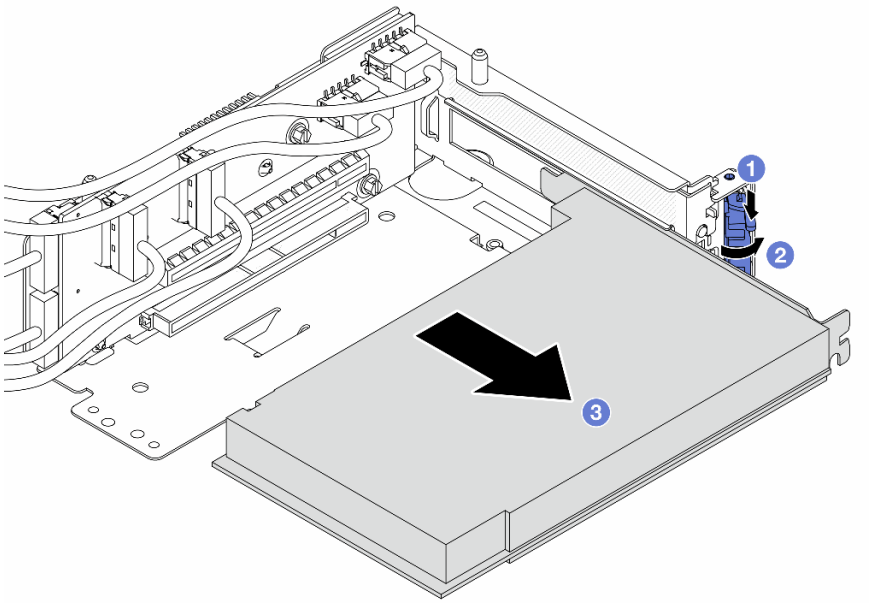


Figure 37. Removing the PCIe adapter from the riser 5 cage

a. 1 Press the retainer clip downward.

b. 2 Rotate the retention latch to the open position.

c. 3 Grasp the PCIe adapter by its edges and carefully pull it out of the PCIe slot.

Step 5. Disconnect the cables from the riser card, and remove the riser card from the riser 5 cage.

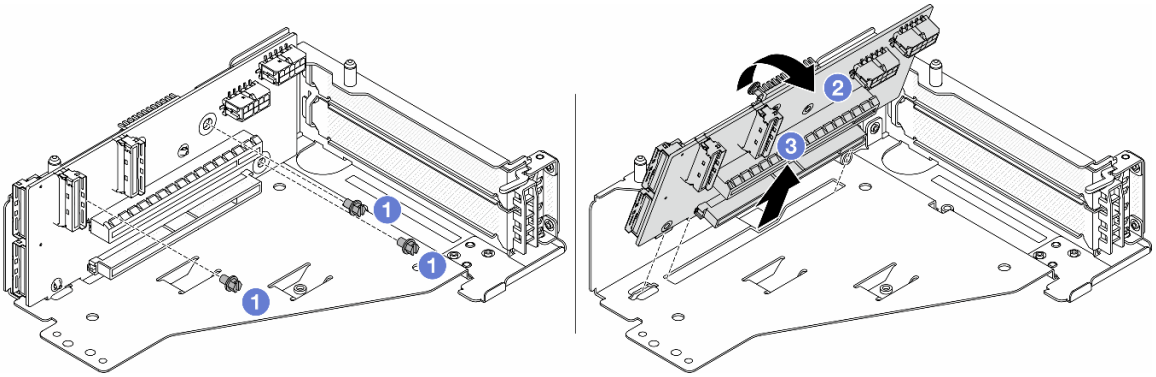


Figure 38. Removing the riser card from the riser 5 cage

a. 1 Remove the screws that secure the riser card.
b. 2 Rotate the riser card from the top to disengage it from the screw holes on the riser cage.
c. 3 Lift the riser card out of the riser cage.

Step 6. Remove the OCP module from the front OCP cage.

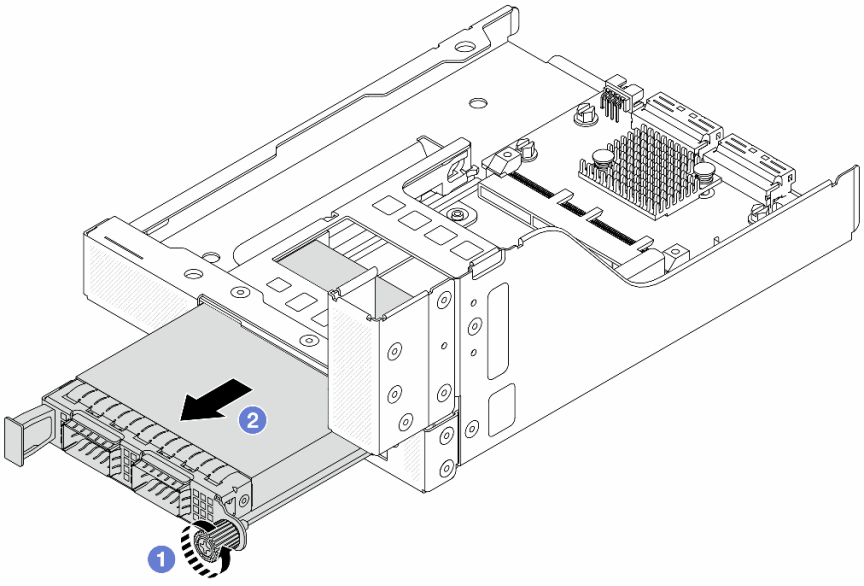


Figure 39. Removing the OCP module

a. 1 Loosen the thumbscrew that secures the OCP module.
b. 2 Pull out the OCP module.

Step 7. Remove the front OCP interposer card.

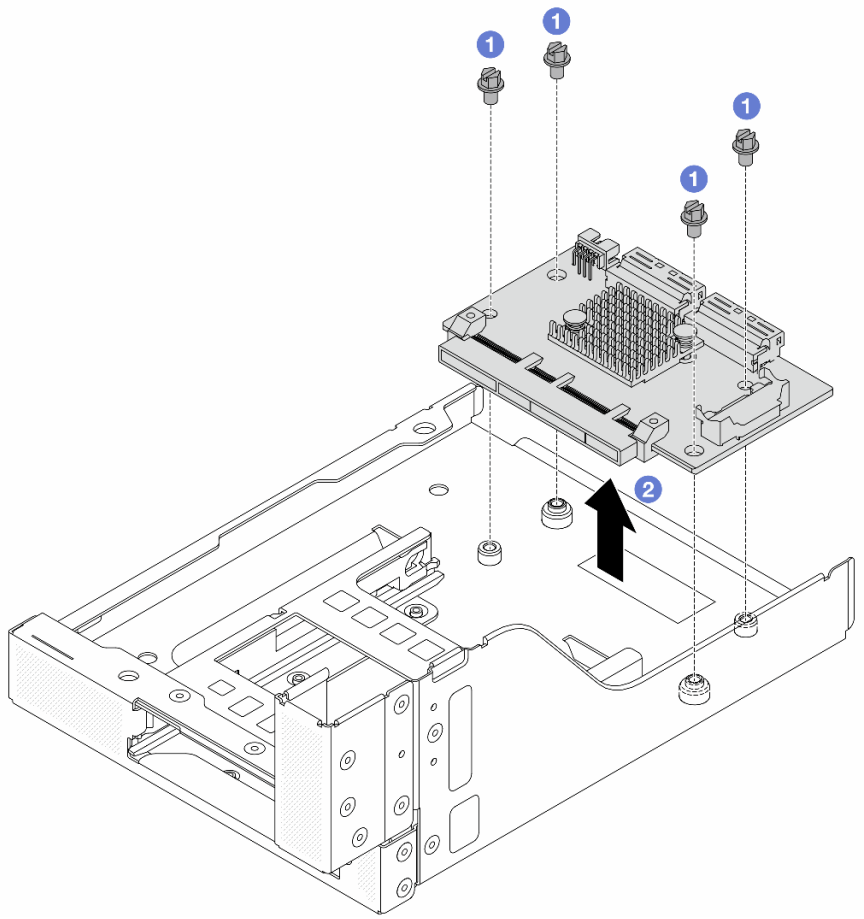


Figure 40. Removing the front OCP interposer card

a. 1 Loosen the screws that secure the front OCP interposer card.

b. 2 Lift the front OCP interposer card up off the front OCP cage.

After you finish

1. Install the new front adapter cage. See "Install the front adapter cage" on page 89.
2. 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 front adapter cage

Follow instructions in this section to install the front adapter cage, including the riser 5 cage at the top and the front OCP cage at the bottom.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Install the front OCP interposer card on the front OCP cage, and connect cables to the card. See Chapter 6 “Internal cable routing” on page 347.

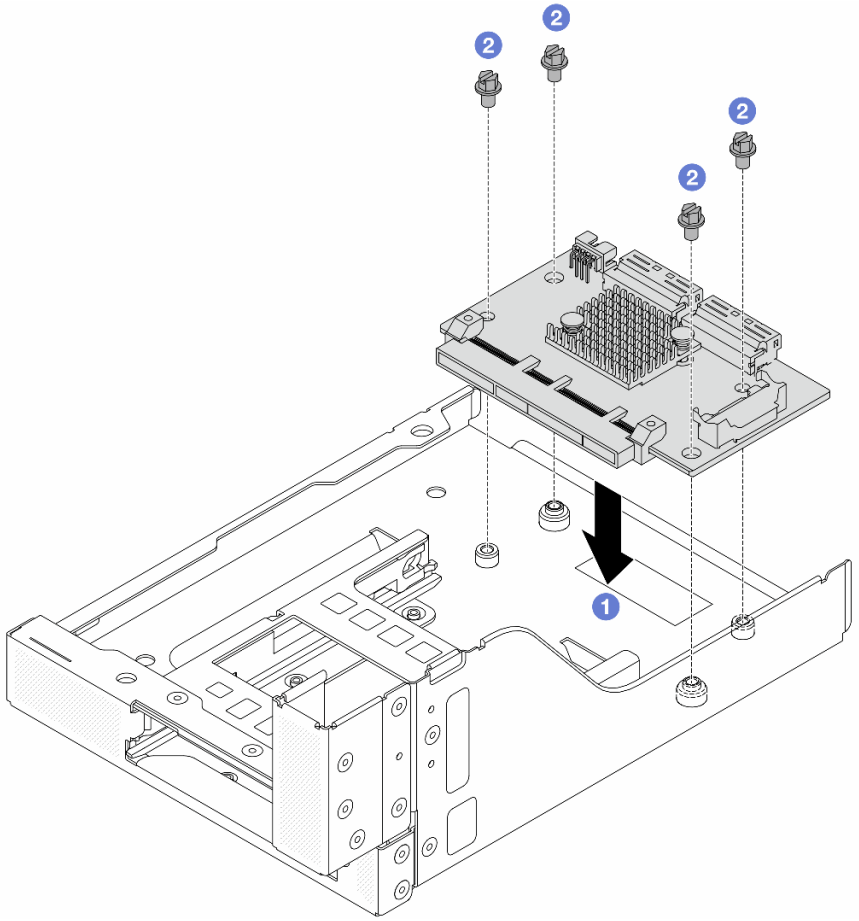


Figure 41. Installing the front OCP interposer card

a. 1 Lower the front OCP interposer card onto the front OCP cage.

b. 2 Tighten the screws to secure the front OCP interposer card.

Step 3. Install the OCP module.

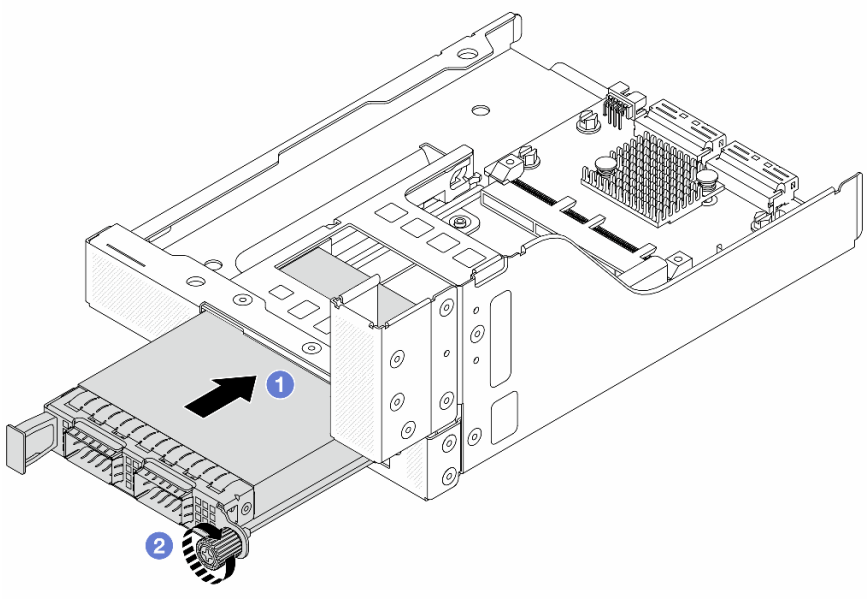


Figure 42. Installing the OCP module

a. 1 Push the OCP module into the slot until it is fully seated.

b. 2 Tighten the thumbscrew to secure the OCP module.

Step 4. Install the riser card and connect the cables to the riser card. See Chapter 6 “Internal cable routing” on page 347.

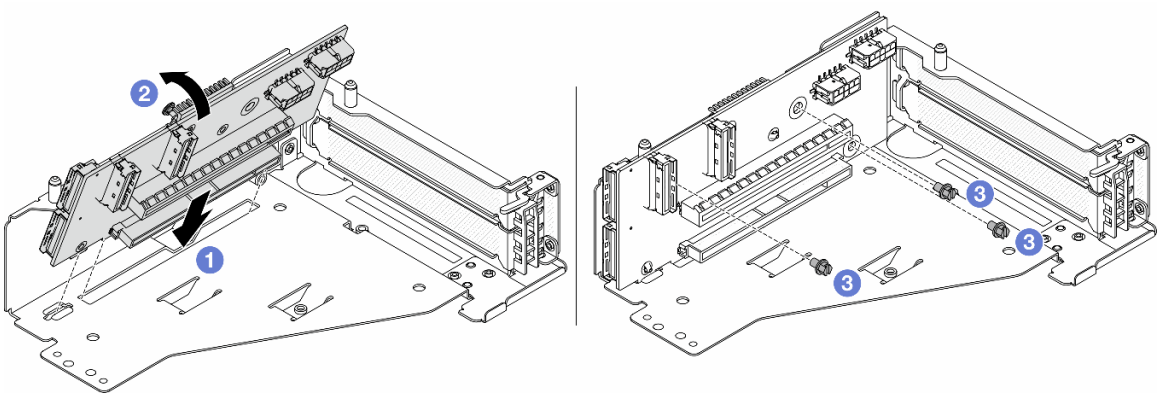


Figure 43. Installing the riser card

a. 1 Insert the riser card into the slots in the riser cage.

b. 1 Push the top of the riser card towards the riser cage so that the holes in the riser card engage with the holes on the riser cage.

c. 2 Install the screws to secure the riser card into place.

Step 5. Install the PCIe adapter to the riser 5 cage.

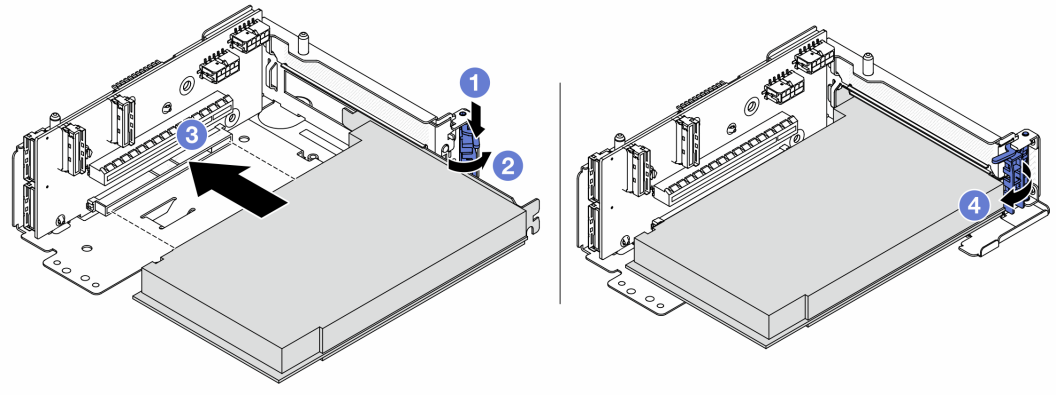


Figure 44. Installing the PCIe adapter to the riser 5 cage

a. 1 Press the retainer clip downward.

b. 2 Rotate the PCIe adapter retention latch to the open position.

c. 3 Align the PCIe adapter with the PCIe slot on the riser card. Carefully press the PCIe adapter straight into the slot until it is securely seated and its bracket also is secured.

d. 4 Close the retention latch.

Note: For ThinkSystem AMD X3522 10/25GbE DSFP28 2-port PCIe Ethernet Adapter, install the screw to secure the adapter before closing the retention latch if the server needs to be shipped.

Step 6. Install the riser 5 assembly on the front OCP assembly.

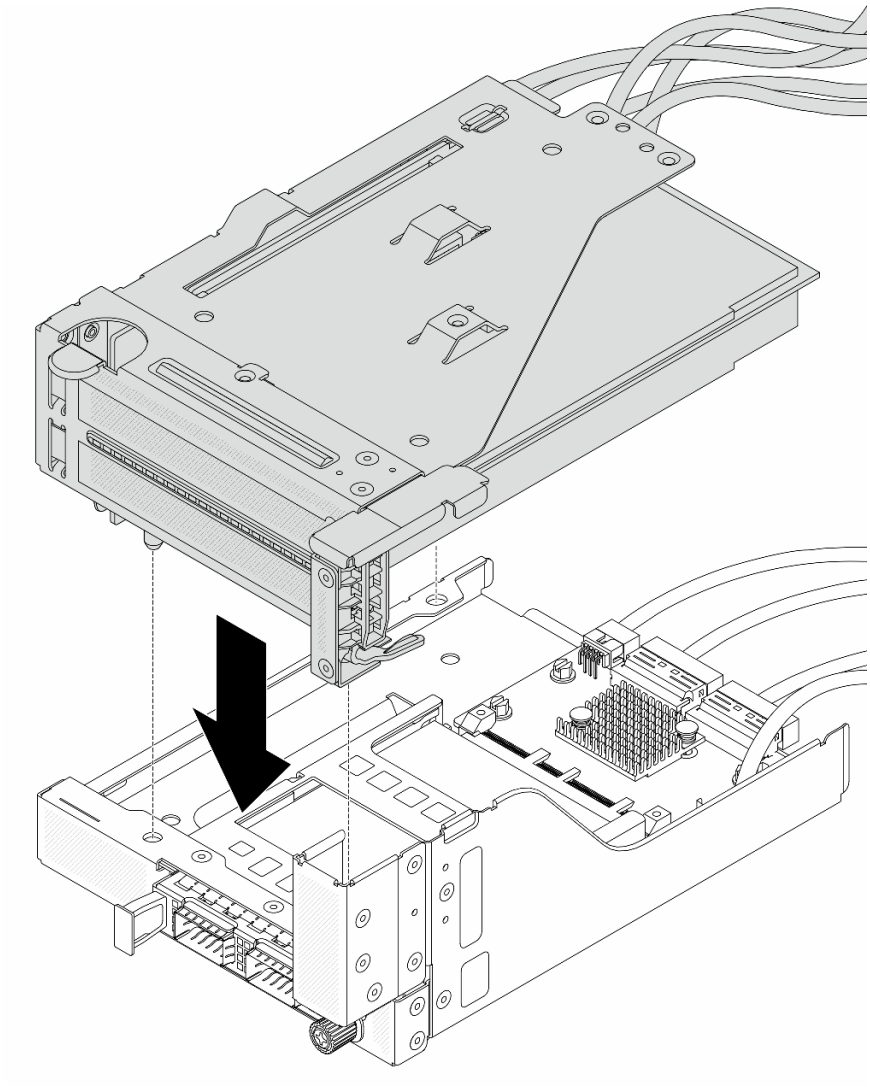


Figure 45. Installing the riser 5 assembly on the front OCP assembly

Step 7. Install the front adapter assembly.

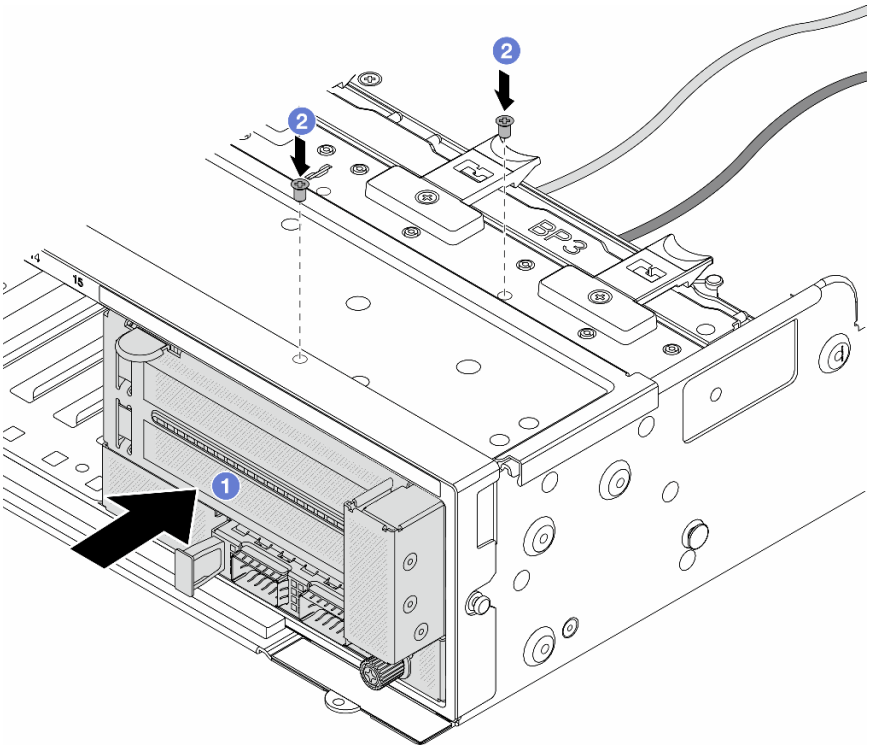


Figure 46. Installing the front adapter assembly

a. 1 Insert the front adapter assembly into the front chassis.

b. 2 Install the screws to secure the front adapter assembly in place.

Step 8. Connect the cables to the system board assembly and the rear OCP interposer card. See Chapter 6 “Internal cable routing” on page 347.

Step 9. Install the system fan cage. See “Install the system fan cage” on page 336.

Step 10. Install the air baffle. See “Install the air baffle” on page 78.

Step 11. Install the riser 1 assembly if you have removed it. See “Install a rear riser assembly” on page 239.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 345.

Demo video

Watch the procedure on YouTube

Front OCP module and OCP interposer card replacement

Some server models support the front OCP module. The front OCP module and the front and rear OCP interposer cards are codependent. Follow instructions in this section to remove and install the front OCP module and the front and rear OCP interposer cards.

- “Front OCP module replacement” on page 95
- “OCP interposer card replacement” on page 97

Front OCP module replacement

Follow instructions in this section to remove and install the front OCP module.

- “Remove the front OCP module” on page 95
- “Install the front OCP module” on page 96

Remove the front OCP module

Follow instructions in this section to remove the front OCP module.

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.

Procedure

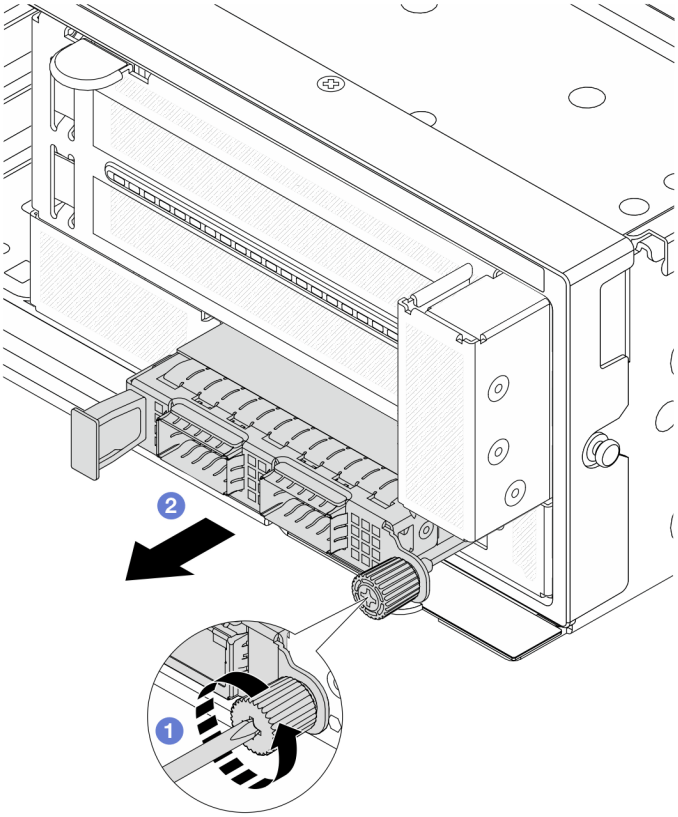


Figure 47. Removing the front OCP module

Step 1. 1 Loosen the thumbscrew that secures the OCP module. Use a screwdriver if needed.

Step 2. 2 Pull out the OCP module.

After you finish

1. Install a new front OCP module or an OCP module filler. See “Install the front OCP module” on page 96.
2. 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 front OCP module

Follow instructions in this section to install the front OCP module.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Remove the OCP module filler if there is.

Step 3. Install the front OCP module.

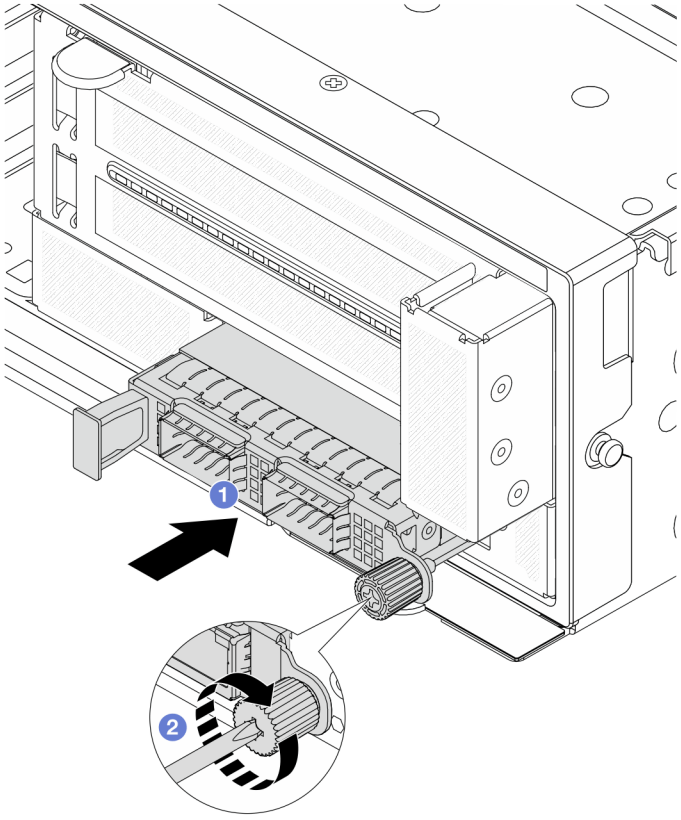


Figure 48. Installing the front OCP module

a. 1 Push the OCP module into the slot until it is fully seated.

b. 2 Tighten the thumbscrew to secure the OCP module. Use a screwdriver if needed.

Note: Ensure that the OCP module is fully seated and the thumbscrew is securely tightened. Otherwise, the OCP module will not get full connection and may not function.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 345.

Demo video

Watch the procedure on YouTube

OCP interposer card replacement

Follow instructions in this section to remove and install the front and rear OCP interposer cards.

- “Remove the front OCP interposer card” on page 97
- “Install the front OCP interposer card” on page 101
- “Remove the rear OCP interposer card” on page 105
- “Install the rear OCP interposer card” on page 106

Remove the front OCP interposer card

Follow instructions in this section to remove the front OCP interposer card.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.

Procedure

Step 1. Make preparation for the task.

a. 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 68.

b. Remove the top cover. See “Remove the top cover” on page 342.

c. If your server comes with a riser 1 assembly, remove it first. See “Remove a rear riser assembly” on page 230. Then disconnect the cables from the rear OCP interposer card.

d. Remove the air baffle. See Remove the air baffle.

e. Remove the system fan cage. See “Remove the system fan cage” on page 335.

f. Record the cable connections, and disconnect all cables from the system board assembly.

Attention: To avoid damaging the system board assembly, make sure to follow the instructions in Chapter 6 “Internal cable routing” on page 347 when disconnecting cables from the system board assembly.

Step 2. Remove the front adapter assembly.

Note: The number of cables varies according to the configuration.

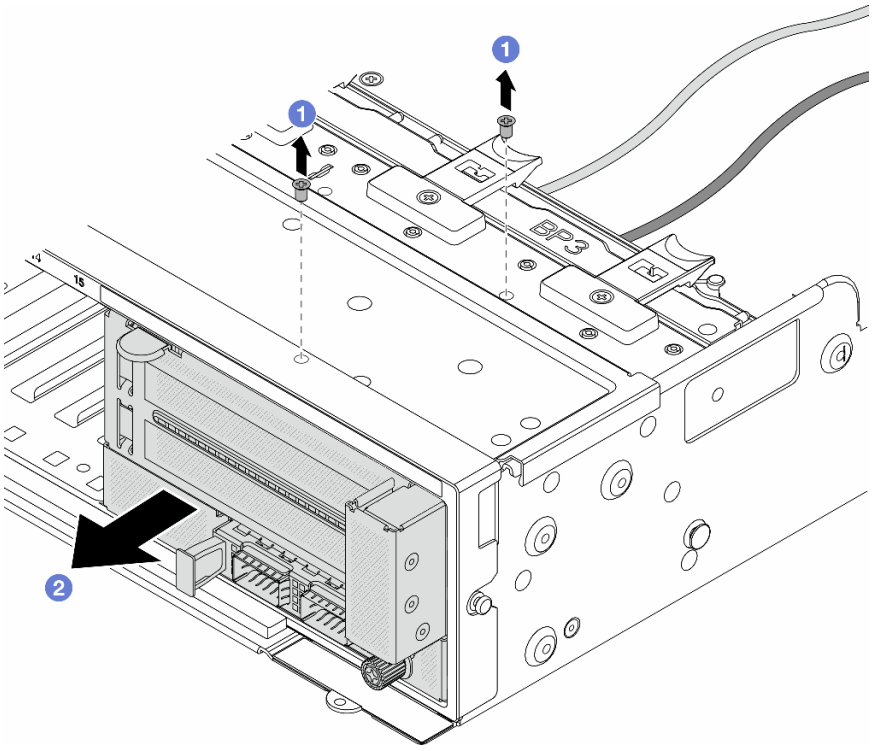


Figure 49. Removing the front adapter assembly

a. 1 Remove the screws that secure the assembly.

b. 2 Slide the assembly out of the front chassis.

Step 3. Lift the riser 5 assembly up off the front OCP assembly, and disconnect cables from the front OCP interposer card.

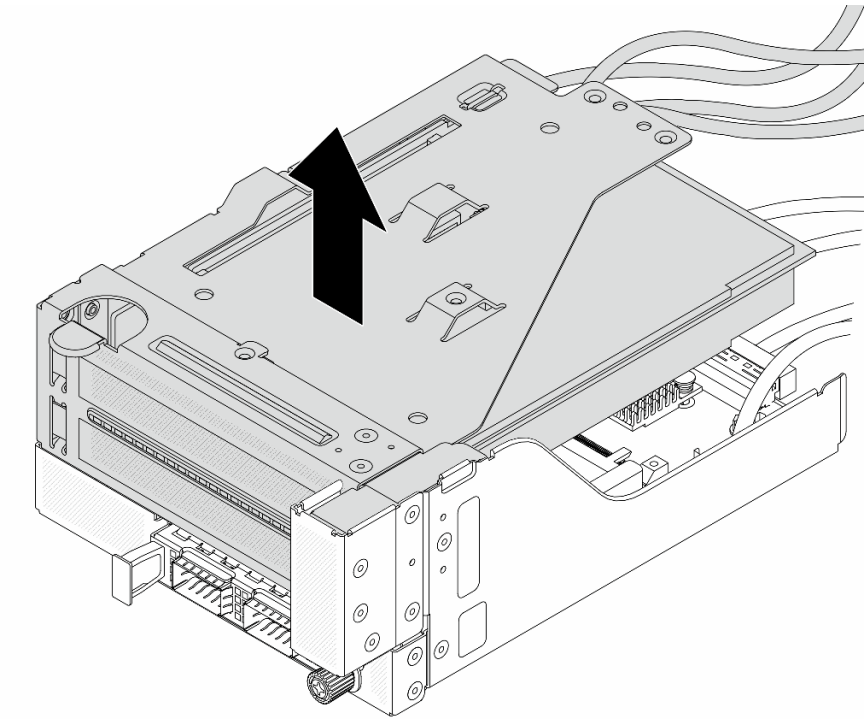


Figure 50. Lifting the riser 5 assembly

Step 4. Remove the OCP module from the front OCP cage.

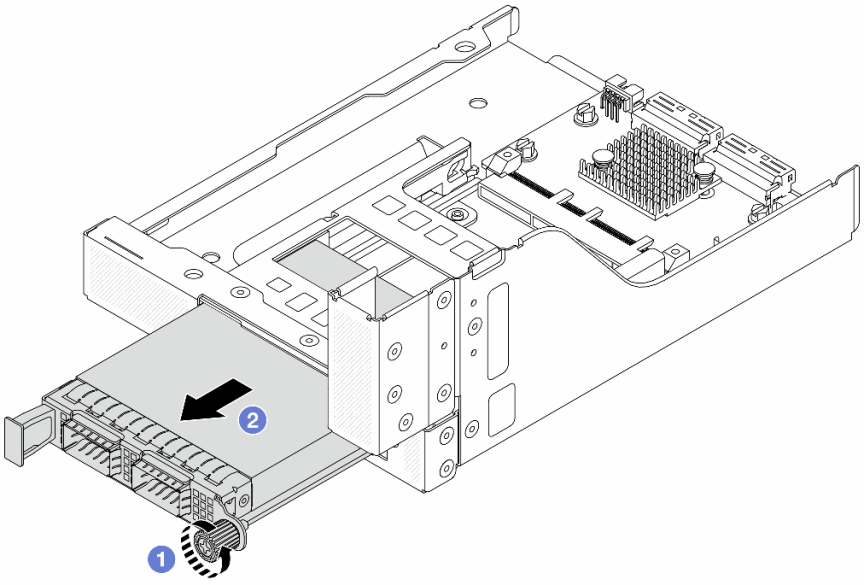


Figure 51. Removing the OCP module

a. 1 Loosen the thumbscrew that secures the OCP module.
b. 2 Pull out the OCP module.

Step 5. Remove the front OCP interposer card.

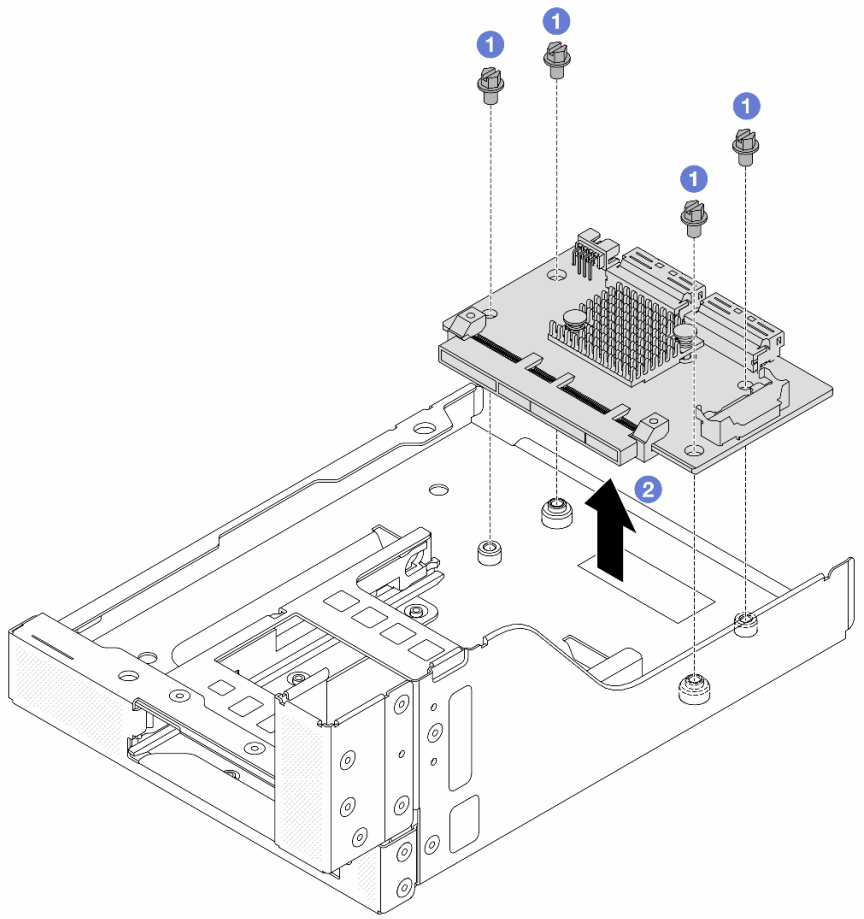


Figure 52. Removing the front OCP interposer card

a. 1 Loosen the screws that secure the front OCP interposer card.

b. 2 Lift the front OCP interposer card up off the front OCP cage.

After you finish

1. Install a new front OCP interposer card. See “Install the front OCP interposer card” on page 101.
2. 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 front OCP interposer card

Follow instructions in this section to install the front OCP interposer card.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Install the front OCP interposer card on the front OCP cage, and connect cables to the card. See Chapter 6 "Internal cable routing" on page 347.

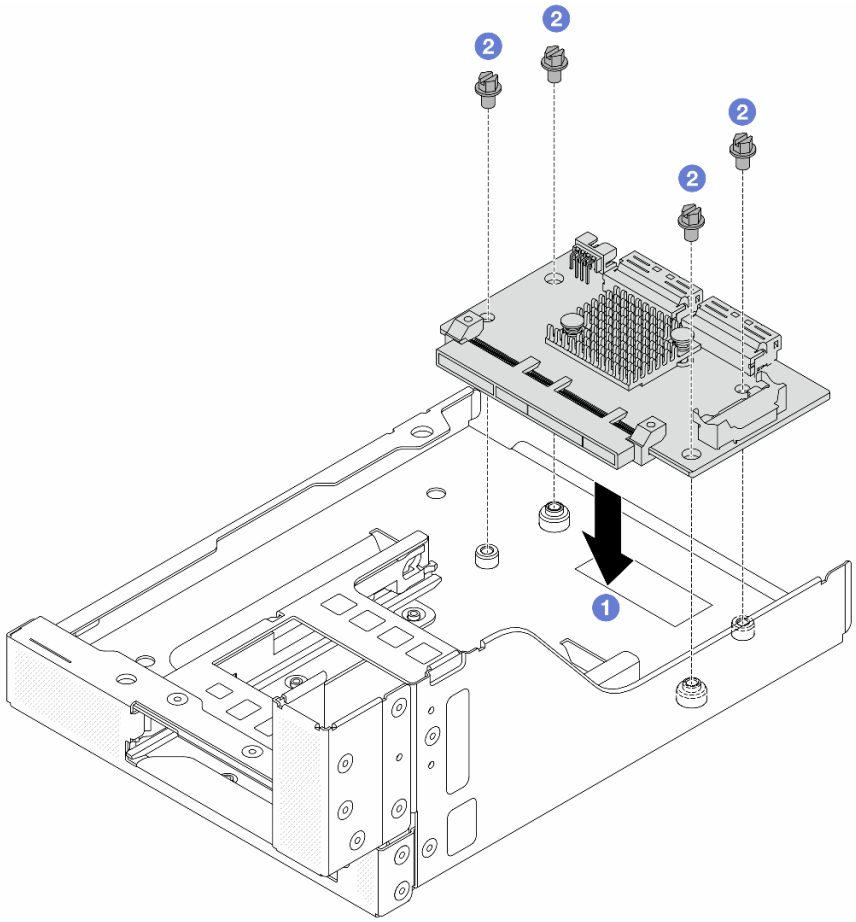


Figure 53. Installing the front OCP interposer card

a. 1 Lower the front OCP interposer card onto the front OCP cage.

b. 2 Tighten the screws to secure the front OCP interposer card.

Step 3. Install the OCP module.

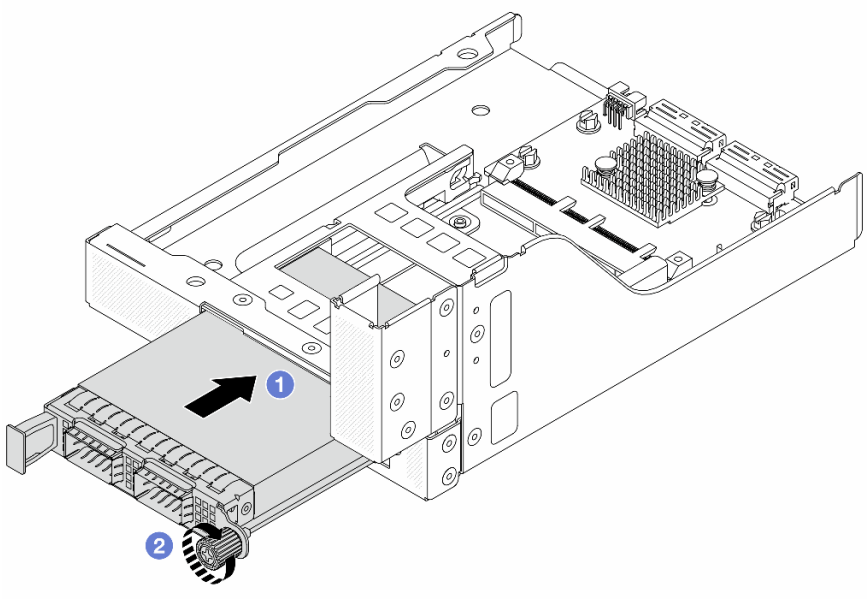


Figure 54. Installing the OCP module

a. 1 Push the OCP module into the slot until it is fully seated.

b. 2 Tighten the thumbscrew to secure the OCP module.

Step 4. Install the riser 5 assembly on the front OCP assembly.

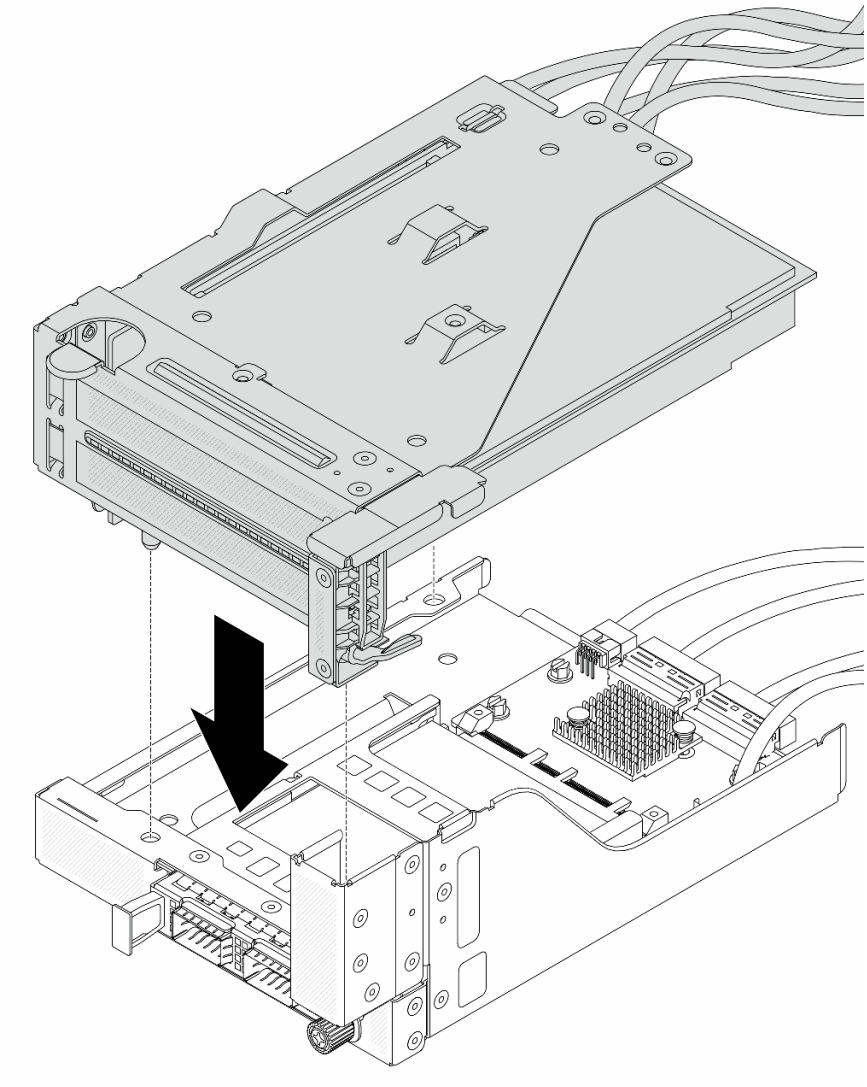


Figure 55. Installing the riser 5 assembly on the front OCP assembly

Step 5. Install the front adapter assembly.

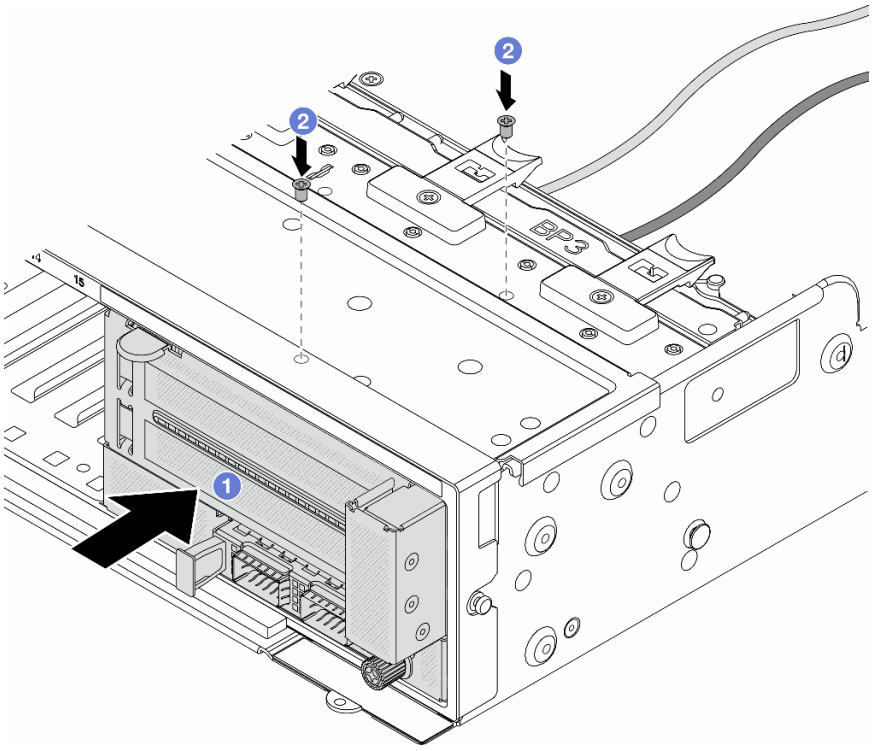


Figure 56. Installing the front adapter assembly

a. 1 Insert the front adapter assembly into the front chassis.

b. 2 Install the screws to secure the front adapter assembly in place.

Step 6. Connect the cables to the system board assembly and the rear OCP interposer card. See Chapter 6 “Internal cable routing” on page 347.

Step 7. Install the system fan cage. See “Install the system fan cage” on page 336.

Step 8. Install the air baffle. See “Install the air baffle” on page 78.

Step 9. Install the riser 1 assembly if you have removed it. See “Install a rear riser assembly” on page 239.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 345.

Demo video

Watch the procedure on YouTube

Remove the rear OCP interposer card

Follow instructions in this section to remove the rear OCP interposer card.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.

Procedure

Step 1. Make preparation for the task.

a. 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 68.

b. Remove the top cover. See “Remove the top cover” on page 342.

c. If your server comes with a riser 1 assembly, remove it first. See “Remove a rear riser assembly” on page 230. Then disconnect the cables from the rear OCP interposer card.

Step 2. Remove the rear OCP interposer card.

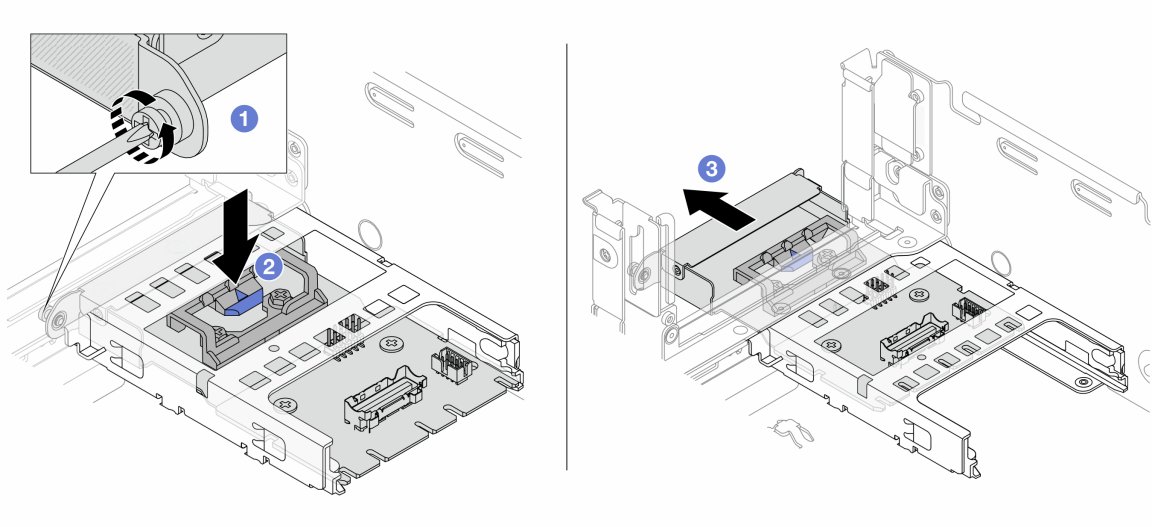


Figure 57. Removing the rear OCP interposer card

a. 1 Loosen the thumbscrew that secures the rear OCP interposer card.

b. 2 Press and hold the blue latch.

c. 3 Pull out the rear OCP interposer card.

After you finish

1. Install a new rear OCP interposer card. See “Install the rear OCP interposer card” on page 106.
2. 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 rear OCP interposer card

Follow instructions in this section to install the rear OCP interposer card.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Install the rear OCP interposer card.

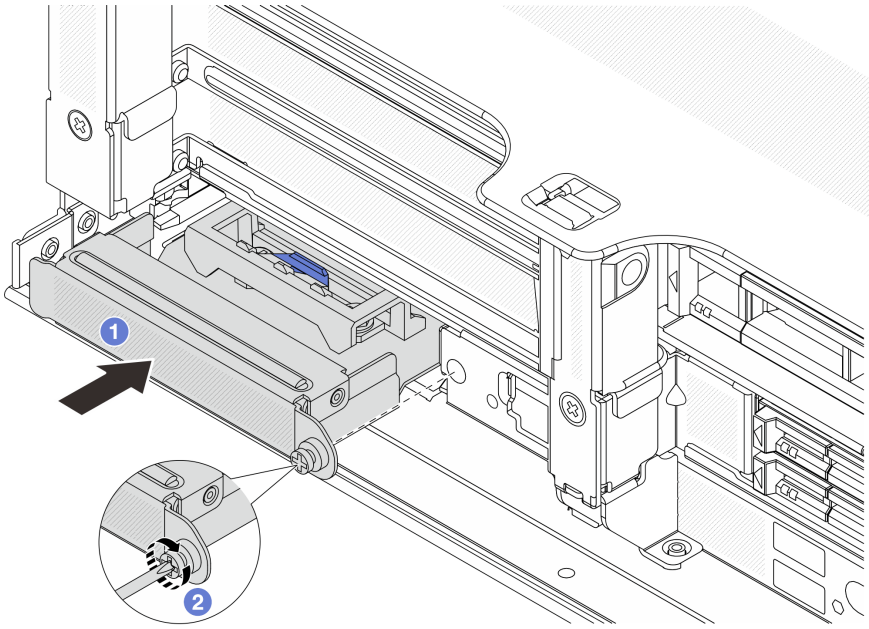


Figure 58. Installing the rear OCP interposer card

a. 1 Push the rear OCP interposer card into the slot until it is fully seated.

b. 2 Tighten the thumbscrew to secure the card.

Note: Ensure that the card is fully seated and the thumbscrew is securely tightened. Otherwise, the card will not get full connection and may not function.

Step 3. Connect the cables to the rear OCP interposer card. See Chapter 6 “Internal cable routing” on page 347.

Step 4. Install the riser 1 assembly if you have removed it. See “Install a rear riser assembly” on page 239.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 345.

Demo video

Watch the procedure on YouTube

Front PCIe adapter and riser card replacement

Follow instructions in this section to remove and install the front PCIe adapter and riser 5 card.

- "Remove the front PCIe adapter and riser card" on page 108
- "Install the front PCIe adapter and riser card" on page 111

Remove the front PCIe adapter and riser card

Follow instructions in this section to remove the front PCIe adapter and riser 5 card.

About this task

Attention:

- Read "Installation Guidelines" on page 49 and "Safety inspection checklist" on page 50 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 68.
- 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.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.

Procedure

Step 1. Make preparation for the task.

a. 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 68.

b. Remove the top cover. See "Remove the top cover" on page 342.

c. If your server comes with a riser 1 assembly, remove it first. See "Remove a rear riser assembly" on page 230. Then disconnect the cables from the rear OCP interposer card.

d. Remove the air baffle. See Remove the air baffle.

e. Remove the system fan cage. See "Remove the system fan cage" on page 335.

f. Record the cable connections, and disconnect all cables from the system board assembly.

Attention: To avoid damaging the system board assembly, make sure to follow the instructions in Chapter 6 "Internal cable routing" on page 347 when disconnecting cables from the system board assembly.

Step 2. Remove the front adapter assembly.

Note: The number of cables varies according to the configuration.

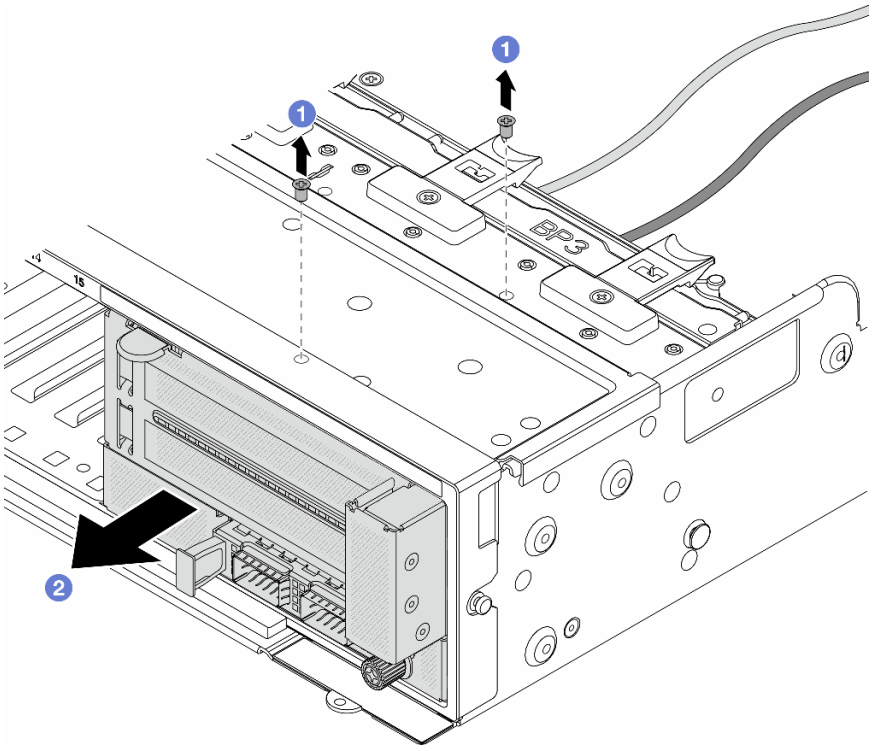


Figure 59. Removing the front adapter assembly

a. 1 Remove the screws that secure the assembly.

b. 2 Slide the assembly out of the front chassis.

Step 3. Lift the riser 5 assembly up off the front OCP assembly, and disconnect cables from the front OCP interposer card.

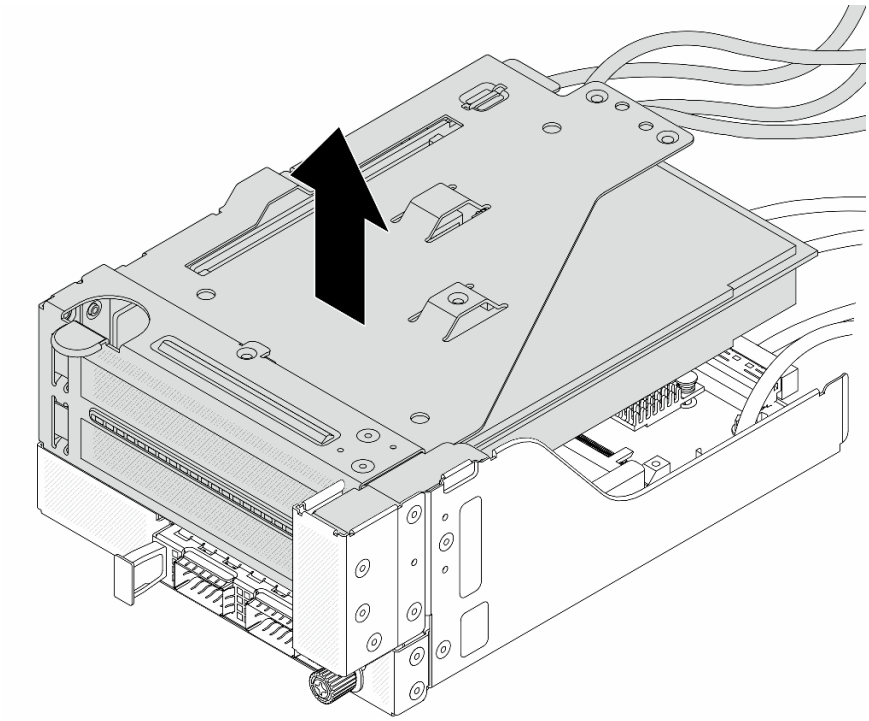


Figure 60. Lifting the riser 5 assembly

Step 4. Remove the PCIe adapter from the riser 5 cage.

Note: For ThinkSystem AMD X3522 10/25GbE DSFP28 2-port PCIe Ethernet Adapter, remove the screw that secures the adapter first.

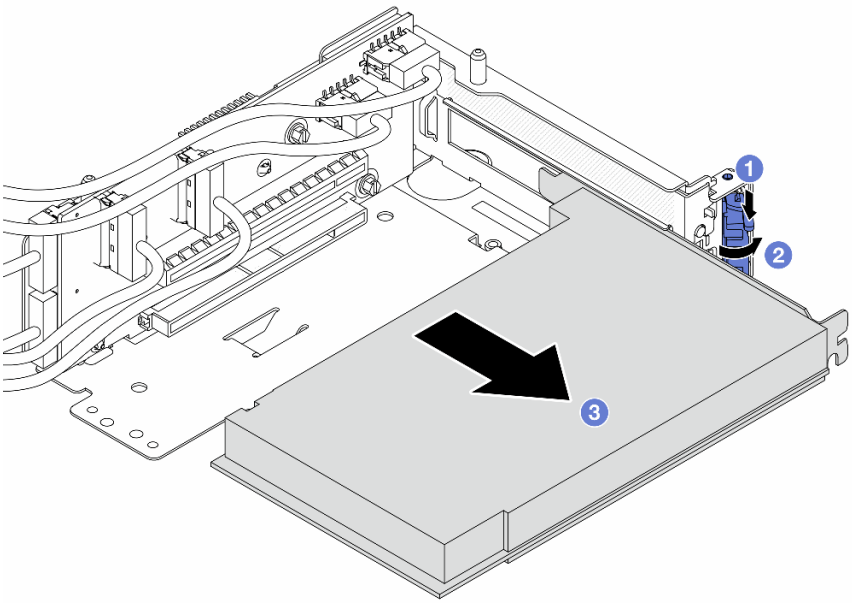


Figure 61. Removing the PCIe adapter from the riser 5 cage

a. 1 Press the retainer clip downward.

b. 2 Rotate the retention latch to the open position.

c. 3 Grasp the PCIe adapter by its edges and carefully pull it out of the PCIe slot.

Step 5. Disconnect the cables from the riser card, and remove the riser card from the riser 5 cage.

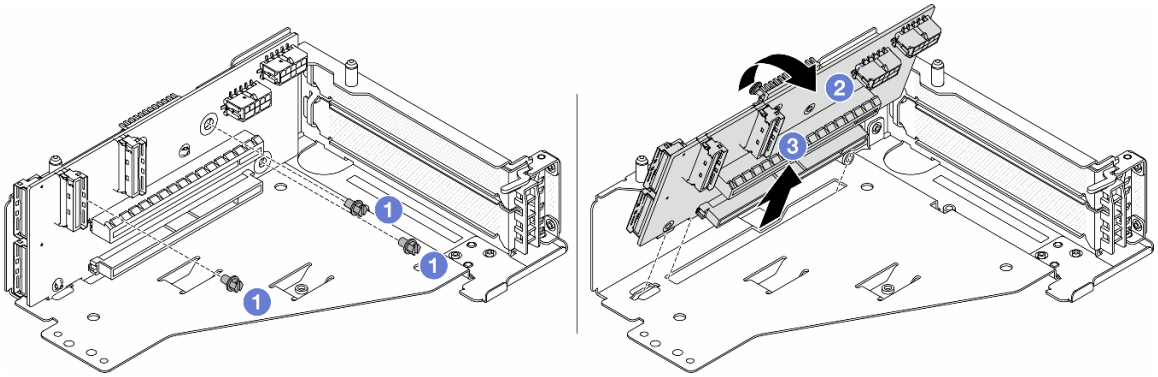


Figure 62. Removing the riser card from the riser 5 cage

a. 1 Remove the screws that secure the riser card.
b. 2 Rotate the riser card from the top to disengage it from the screw holes on the riser cage.
c. 3 Lift the riser card out of the riser 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

Install the front PCIe adapter and riser card

Follow instructions in this section to install the front PCIe adapter and riser 5 card.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.
- For PCIe adapter installation rules, see “PCIe slots and PCIe adapters” on page 55.
- For ThinkSystem AMD X3522 10/25GbE DSFP28 2-port PCIe Ethernet Adapter installed on the front riser card, make sure that the XCC firmware version is KAX334O or later.

Firmware and driver download: You might need to update the firmware or driver after replacing a component.

- Go to https://datacentersupport.lenovo.com/products/servers/thinksystem/sr655v3/7d9e/downloads/driver-list/ to see the latest firmware and driver updates for your server.
- Go to “Update the firmware” on page 495 for more information on firmware updating tools.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Install the riser card and connect the cables to the riser card. See Chapter 6 “Internal cable routing” on page 347.

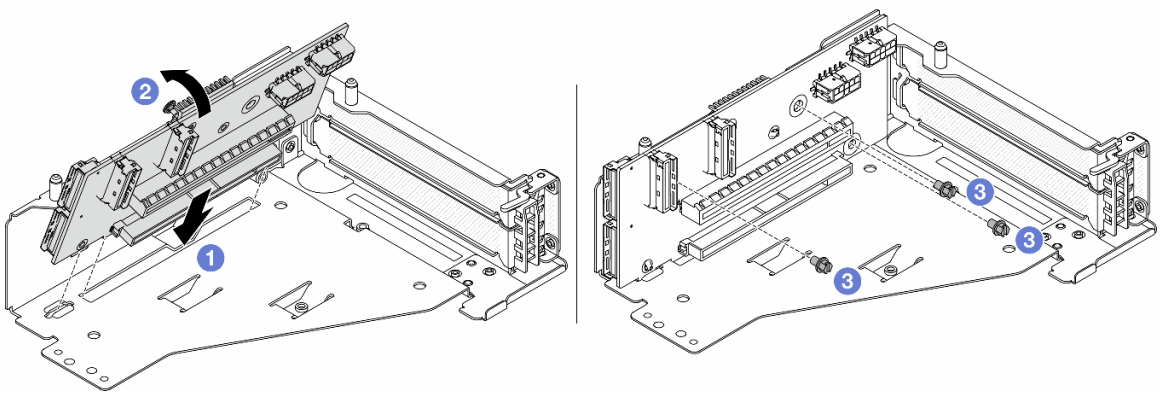


Figure 63. Installing the riser card

a. 1 Insert the riser card into the slots in the riser cage.

b. 1 Push the top of the riser card towards the riser cage so that the holes in the riser card engage with the holes on the riser cage.

c. 2 Install the screws to secure the riser card into place.

Step 3. Install the PCIe adapter to the riser 5 cage.

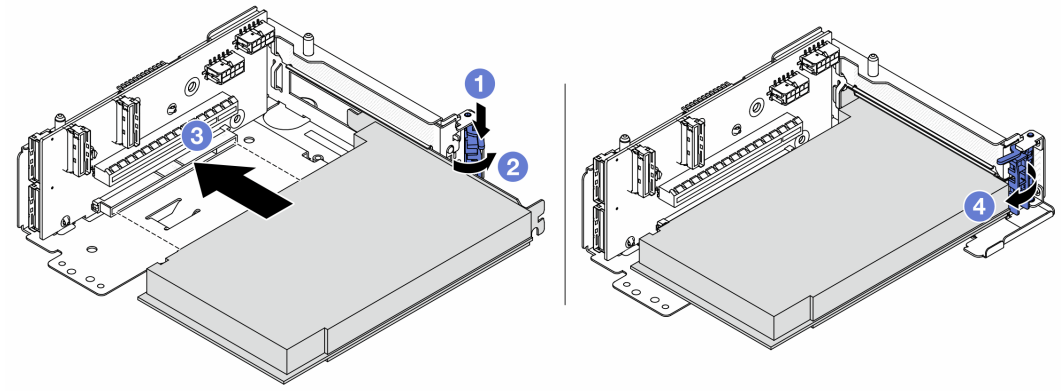


Figure 64. Installing the PCIe adapter to the riser 5 cage

a. 1 Press the retainer clip downward.

b. 2 Rotate the PCIe adapter retention latch to the open position.

c. 3 Align the PCIe adapter with the PCIe slot on the riser card. Carefully press the PCIe adapter straight into the slot until it is securely seated and its bracket also is secured.

d. 4 Close the retention latch.

Note: For ThinkSystem AMD X3522 10/25GbE DSFP28 2-port PCIe Ethernet Adapter, install the screw to secure the adapter before closing the retention latch if the server needs to be shipped.

Step 4. Install the riser 5 assembly on the front OCP assembly.

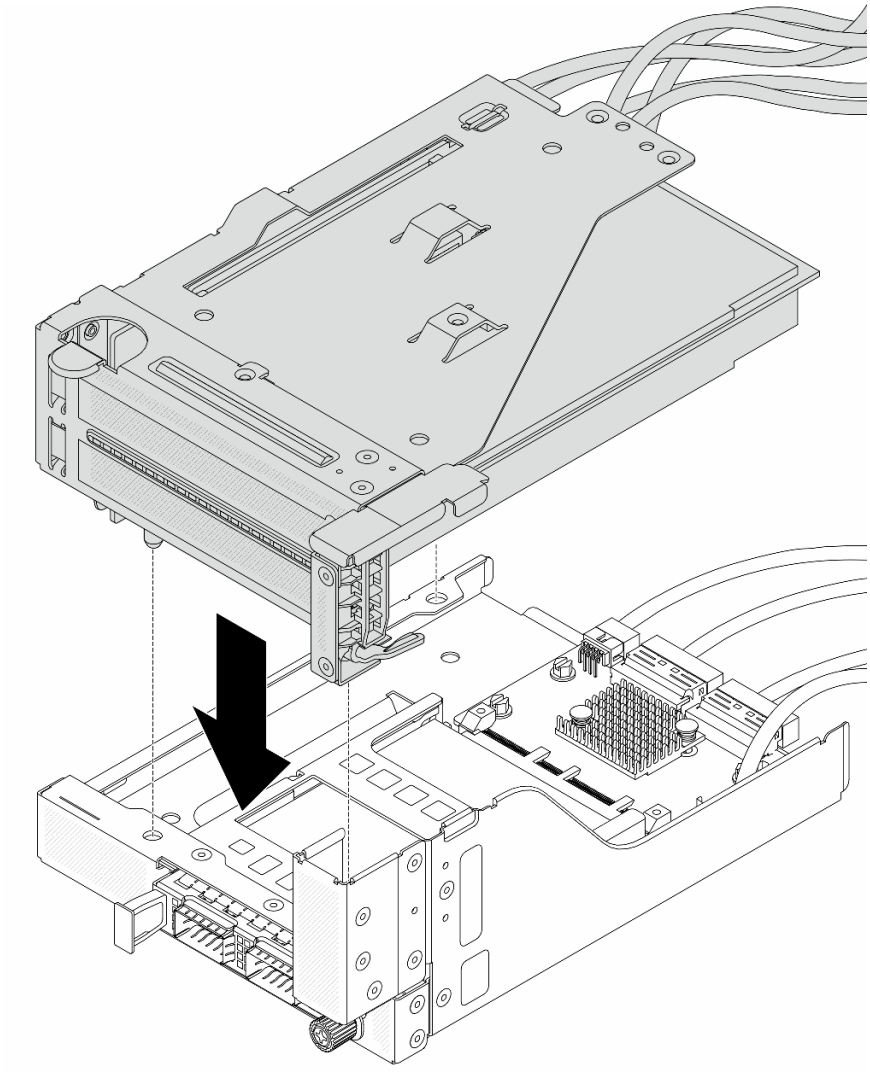


Figure 65. Installing the riser 5 assembly on the front OCP assembly

Step 5. Install the front adapter assembly.

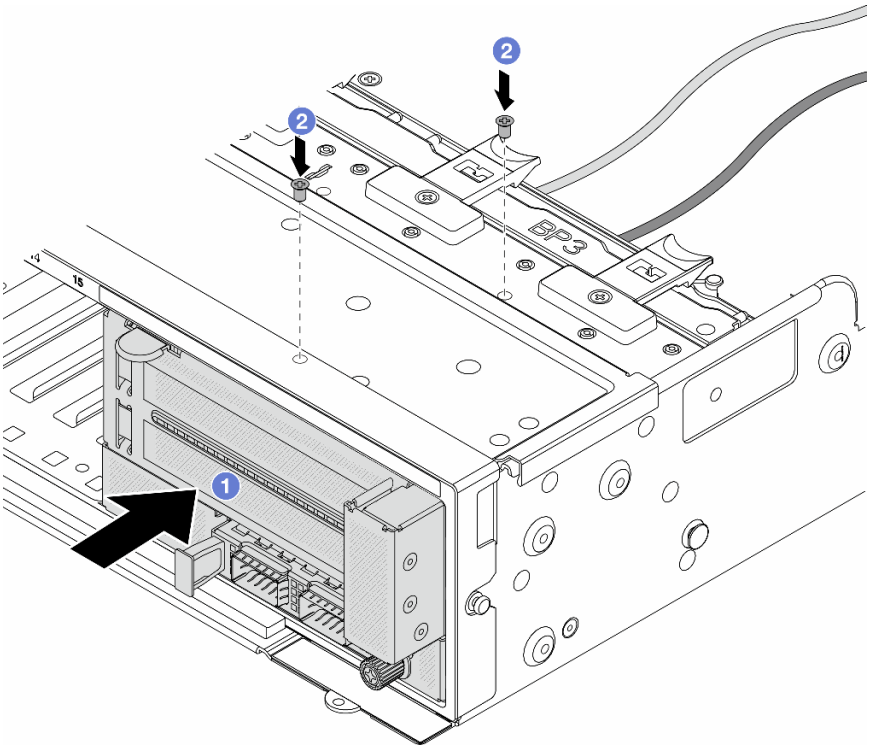


Figure 66. Installing the front adapter assembly

a. 1 Insert the front adapter assembly into the front chassis.

b. 2 Install the screws to secure the front adapter assembly in place.

Step 6. Connect the cables to the system board assembly and the rear OCP interposer card. See Chapter 6 “Internal cable routing” on page 347.

Step 7. Install the system fan cage. See “Install the system fan cage” on page 336.

Step 8. Install the air baffle. See “Install the air baffle” on page 78.

Step 9. Install the riser 1 assembly if you have removed it. See “Install a rear riser assembly” on page 239.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 345.

Demo video

Watch the procedure on YouTube

Fan board replacement

Follow instructions in this section to remove and install the fan board.

Remove the fan board

Follow instructions in this section to remove the fan board.

About this task

Important: This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install the part without proper training and qualification.

S002



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Attention:

- Read "Installation Guidelines" on page 49 and "Safety inspection checklist" on page 50 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 68.
- 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.

Procedure

Step 1. Make preparation for the task.

a. Remove the top cover. See "Remove the top cover" on page 342.

b. If your server comes with an air baffle, remove it first. See "Remove the air baffle" on page 76.

c. If your server comes with a middle drive cage, remove it first. See "Middle drive cage and drive backplane replacement" on page 222.

d. Remove system fans. See "Remove a system fan" on page 331.

e. Remove the system fan cage. See "Remove the system fan cage" on page 335.

f. (Optional) If your server comes with a T-shape heat sink, remove it first. See "Remove a heat sink" on page 256.

g. Remove the system board assembly out of chassis. See "Remove the processor board" on page 324.

h. Disconnect fan power and fan sideband cables from the fan board. See "Connections between the processor board and fan board" on page 387.

i. Move or disconnect other cables that go right over the fan board.

Step 2. Remove the fan board.

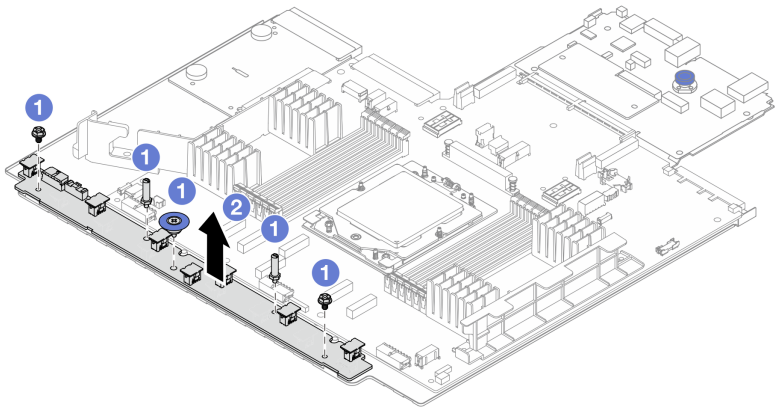


Figure 67. Fan board removal

a. 1 Remove the screws from the fan board.
b. 2 Gently hold and lift the fan board from the system board tray.

After you finish

- If you are replacing the fan board, install a new fan board. See “Install the fan board” on page 116.
- 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 fan board

Follow instructions in this section to install the fan board.

About this task

Important: This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install the part without proper training and qualification.

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.

Procedure

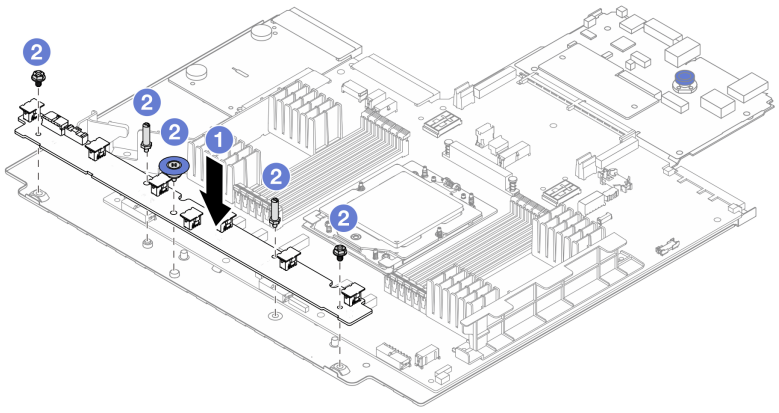


Figure 68. Fan board installation

Step 1. 1 Gently hold and lower the fan board into the system board tray.

Step 2. 2 Install the screws to secure the fan board.

Step 3. Connect the fan power and fan sideband cables. See “Connections between the processor board and fan board” on page 387.

After you finish

1. Install the system board assembly into the chassis. See “Install the processor board” on page 328.
2. Install the fan cage. See “Install the system fan cage” on page 336.
3. Install the system fans. See “Install a system fan” on page 333.
4. Install the T-shape heat sink if have removed it. See “Install a heat sink” on page 261.
5. Install the middle drive cage if you have removed it. See “Middle drive cage and drive backplane replacement” on page 222.
6. Install the air baffle if you have removed it. See “Install the air baffle” on page 78.
7. Complete the parts replacement. See “Complete the parts replacement” on page 345.

Demo video

Watch the procedure on YouTube

Front drive backplane replacement

Follow instructions in this section to remove and install a front drive backplane.

- “Remove the front 2.5-inch drive backplane” on page 117
- “Install the front 2.5-inch drive backplane” on page 120
- “Remove the front 3.5-inch drive backplane” on page 123
- “Install the front 3.5-inch drive backplane” on page 124

Remove the front 2.5-inch drive backplane

Follow instructions in this section to remove the front 2.5-inch drive backplane.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), 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.
- If one or more NVMe solid-state drives are to be removed, it is recommended to disable them beforehand via the operating system.
- To ensure that there is adequate system cooling, do not operate the server for more than two minutes without either a drive or a drive filler installed in each bay.

Procedure

Note: If the cables connected to the backplane are easy to disconnect, you can perform step 3 before step 2.

Step 1. Make preparation for the task.

a. Remove all the installed drives and fillers (if any) from the drive bays. See “Remove a hot-swap drive” on page 140.

b. 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 68.

c. Remove the top cover. See “Remove the top cover” on page 342.

d. Remove the system fan cage for easier operation. See “Remove the system fan cage” on page 335.

e. Remove the air baffle if needed. See “Remove the air baffle” on page 76.

Step 2. Remove the 2.5-inch drive backplane.

Note: Depending on the specific type, your backplane might look different from the illustration.

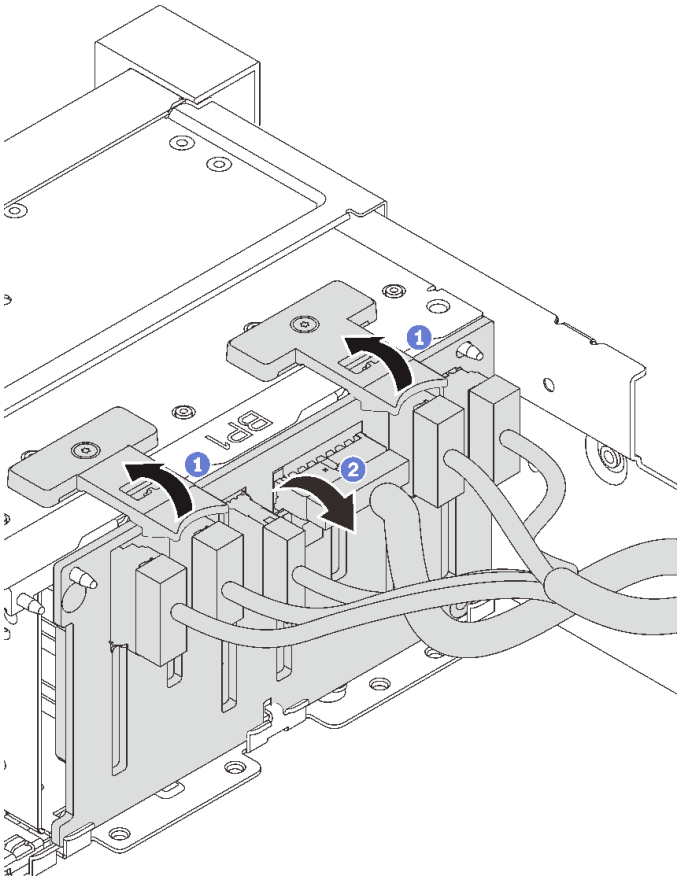


Figure 69. Removing the 2.5-inch drive backplane

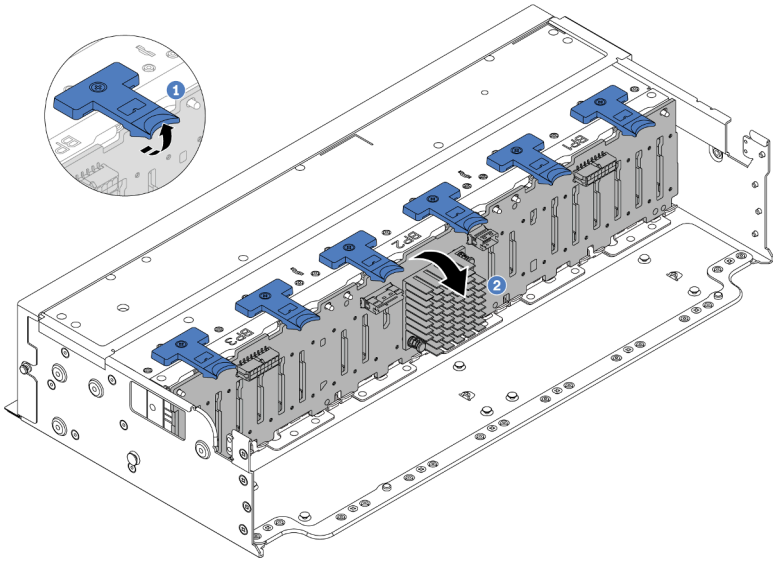


Figure 70. Removing the 24-bay drive backplane

a. 1 Lift the release tabs.

b. 2 Rotate the backplane from the top to disengage it from the two pins on the chassis.

Step 3. Record the cable connections on the backplane and then disconnect all cables from the 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 front 2.5-inch drive backplane

Follow instructions in this section to install the front 2.5-inch drive backplane.

About this task

The server supports up to three 2.5-inch drive backplanes of below types. Depending on the backplane type and quantity, the installation location of the backplanes varies.

- 2.5-inch SAS/SATA 8-bay backplane
- 2.5-inch AnyBay 8-bay backplane
- 2.5-inch SAS/SATA 24-bay expander backplane

The following table lists the supported backplane combinations. Install the backplane according to your server configuration.

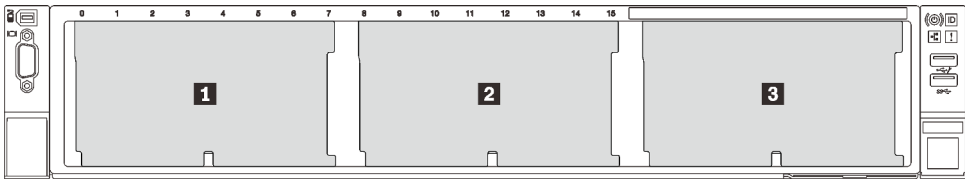


Figure 71. Drive backplane numbering

Back-plane quantity	Backplane 1	Backplane 2	Backplane 3
1	• SAS/SATA 8-bay • AnyBay 8-bay		
1	24-bay expander backplane		
2	SAS/SATA 8-bay	• SAS/SATA 8-bay • AnyBay 8-bay	
	AnyBay 8-bay	AnyBay 8-bay	
3	SAS/SATA 8-bay	SAS/SATA 8-bay	• SAS/SATA 8-bay • AnyBay 8-bay
	AnyBay 8-bay	AnyBay 8-bay	AnyBay 8-bay

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 to ensure that you work safely.
- 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 assembly), drive backplanes, or drive cables, back up all important data that is stored on drives.

Firmware and driver download: You might need to update the firmware or driver after replacing a component.

- Go to https://datacentersupport.lenovo.com/products/servers/thinksystem/sr655v3/7d9e/downloads/driver-list/ to see the latest firmware and driver updates for your server.
- Go to “Update the firmware” on page 495 for more information on firmware updating tools.

Procedure

Note: If the cables are easy to connect to the backplane, you can perform step 3 before step 2.

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Connect the cables to the backplane. See Chapter 6 “Internal cable routing” on page 347.

Step 3. Install the 2.5-inch drive front backplane.

Note: Depending on the specific type, your backplane might look different from the illustration.

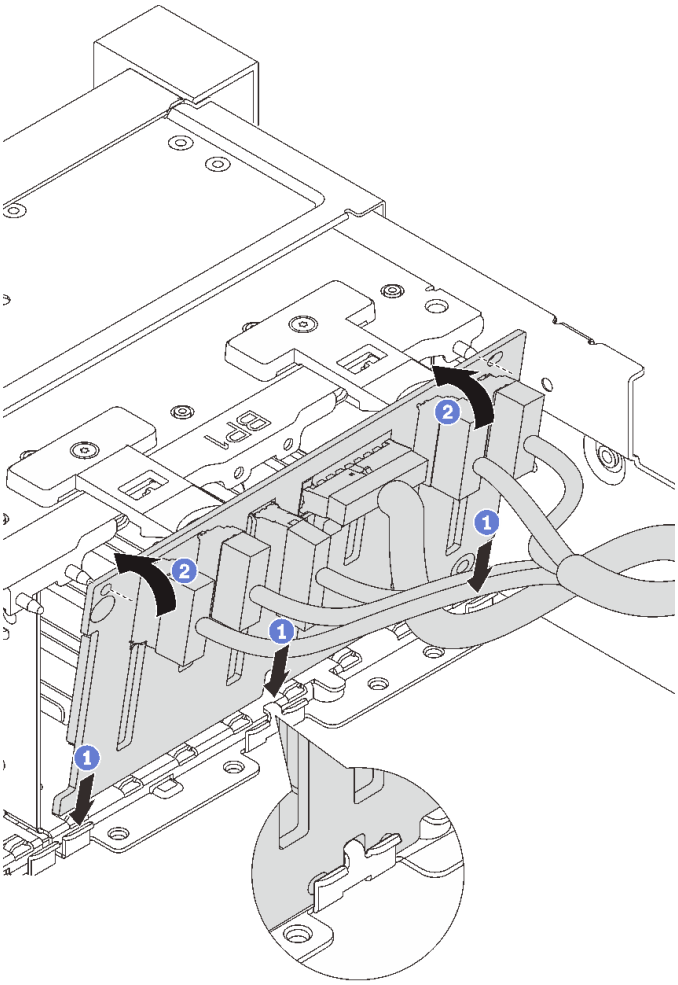


Figure 72. Installing the 2.5-inch drive backplane

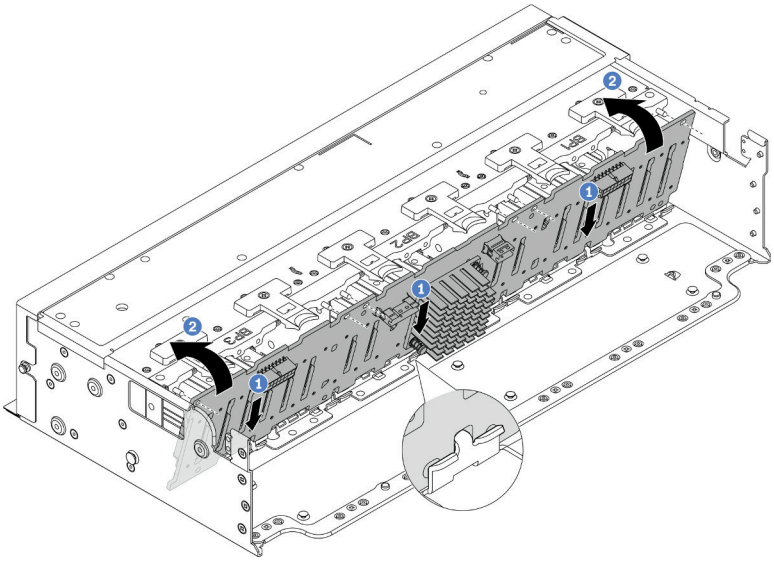


Figure 73. Installing the 24-bay expander backplane

a. ❶ Align the bottom of the backplane with the slots on of the chassis, and lower the backplane into the chassis.

b. ❷ Rotate the backplane to the vertical position. Align the holes in the backplane with the pins on the chassis, and press the backplane into position. The release tabs will secure the backplane in place.

After you finish

1. Reinstall all the drives and fillers (if any) into the drive bays. See “Install a hot-swap drive” on page 141.
2. Reinstall the fan cage. See “Install the system fan cage” on page 336.
3. Reinstall the air baffle if you have removed it. See “Install the air baffle” on page 78.
4. Complete the parts replacement. See “Complete the parts replacement” on page 345.

Demo video

Watch the procedure on YouTube

Remove the front 3.5-inch drive backplane

Follow instructions in this section to remove the front 3.5-inch drive backplane.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), 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.
- If one or more NVMe solid-state drives are to be removed, it is recommended to disable them beforehand via the operating system.
- To ensure that there is adequate system cooling, do not operate the server for more than two minutes without either a drive or a drive filler installed in each bay.

Procedure

Note: If the cables connected to the backplane are easy to disconnect, you can perform step 3 before step 2.

Step 1. Make preparation for the task.

a. Remove all the installed drives and fillers (if any) from the drive bays. See “Remove a hot-swap drive” on page 140.

b. 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 68.

c. Remove the top cover. See “Remove the top cover” on page 342.

d. Remove the system fan cage for easier operation. See “Remove the system fan cage” on page 335.

e. Remove the air baffle if needed. See “Remove the air baffle” on page 76.

Step 2. Remove the 3.5-inch drive backplane.

Note: Depending on the specific type, your backplane might look different from the illustration.

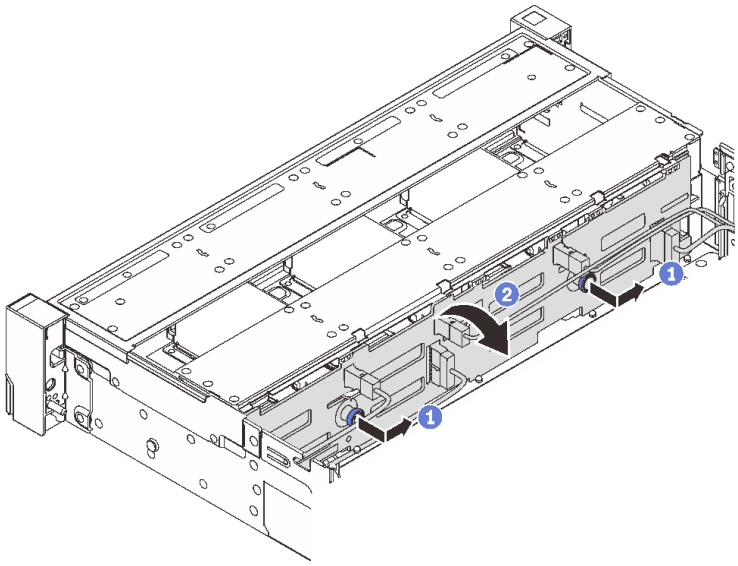


Figure 74. Removing the 3.5-inch drive backplane

a. 1 Pull out the plungers and slightly slide the backplane to the side as shown.

b. 2 Rotate the backplane down to release it from the four hooks on the chassis. Then, carefully lift the backplane out of the chassis.

Step 3. Record the cable connections on the backplane and then disconnect all cables from the 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 front 3.5-inch drive backplane

Follow instructions in this section to install the front 3.5-inch drive backplane.

About this task

The server supports one of the following backplanes. The installation procedure for the backplanes is the same.

- 8 x 3.5-inch SAS/SATA backplane

- 12 x 3.5-inch SAS/SATA backplane
- 12 x 3.5-inch AnyBay backplane
- 12 x 3.5-inch SAS/SATA expander backplane

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 to ensure that you work safely.
- 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 assembly), drive backplanes, or drive cables, back up all important data that is stored on drives.

Firmware and driver download: You might need to update the firmware or driver after replacing a component.

- Go to https://datacentersupport.lenovo.com/products/servers/thinksystem/sr655v3/7d9e/downloads/driver-list/ to see the latest firmware and driver updates for your server.
- Go to “Update the firmware” on page 495 for more information on firmware updating tools.

Procedure

Note: If the cables are easy to connect to the backplane, you can perform step 3 before step 2.

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Connect the cables to the backplane. See Chapter 6 “Internal cable routing” on page 347.

Step 3. Install the 3.5-inch drive backplane.

Note: Depending on the specific type, your backplane might look different from the illustration.

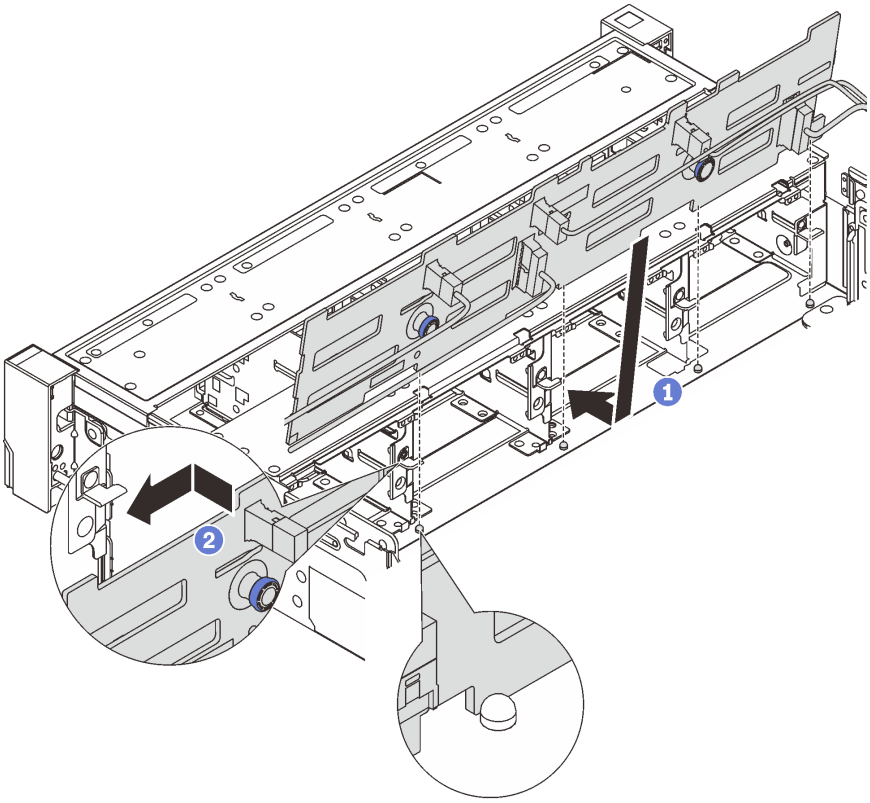


Figure 75. Installing the 3.5-inch drive backplane

a. 1 Align the backplane with the chassis and lower it into the chassis. Then, put the backplane into place with it leaning backward slightly.

b. 2 Rotate the backplane to vertical position to ensure that the four hooks on the chassis pass through the corresponding holes in the backplane. Then, slide the new backplane as shown until it is secured into place.

After you finish

1. Reinstall all the drives and fillers (if any) into the drive bays. See “Install a hot-swap drive” on page 141.
2. Reinstall the fan cage. See “Install the system fan cage” on page 336.
3. Reinstall the air baffle if you have removed it. See “Install the air baffle” on page 78.
4. Complete the parts replacement. See “Complete the parts replacement” on page 345.

Demo video

Watch the procedure on YouTube

Front I/O module replacement

Follow instructions in this section to remove and install the front I/O module.

The front I/O module varies by model. The front I/O module for most models is on the right rack latch. The front I/O module on media bay is supported only in the following server models:

- Server models with eight 2.5-inch front drive bays
- Server models with sixteen 2.5-inch front drive bays

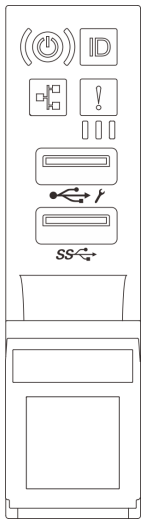


Figure 76. Front I/O module (on rack latch)

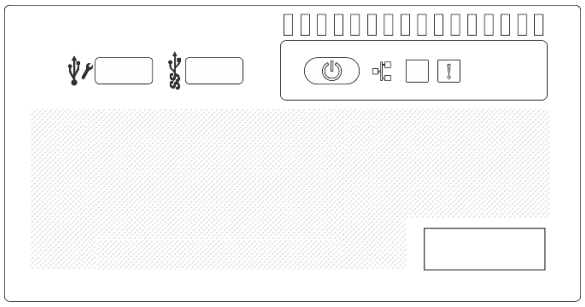
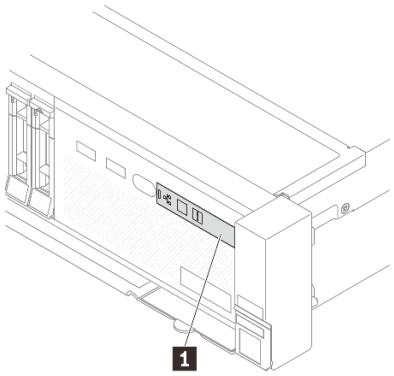
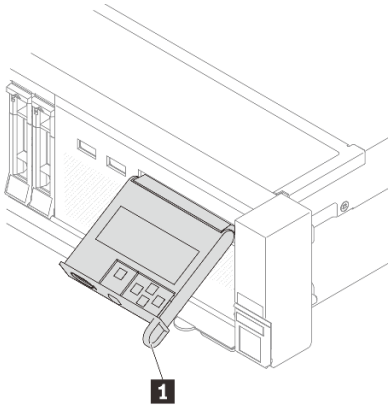


Figure 77. Front I/O module (on media bay)

There are two types of front I/O modules on the media bay. This section uses the front I/O module with the front operator panel as an example for illustration. The procedure is the same for the other front I/O module.



1 Front operator panel without LCD display



1 Integrated Diagnostics Panel with LCD display

To replace the front I/O module on the rack latch, see “Rack latches replacement” on page 264.

To replace the front I/O module on the media bay:

- “Remove the front I/O module” on page 127
- “Install the front I/O module” on page 130

Remove the front I/O module

Follow instructions in this section to remove the front I/O module.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.

Procedure

Step 1. Make preparation for the task.

a. If the security bezel is installed, remove it. See “Remove the security bezel” on page 307.

b. 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 68.

c. Remove the top cover. See “Remove the top cover” on page 342.

d. Remove the air baffle. See “Remove the air baffle” on page 76.

Step 2. Disconnect the cables of the front I/O module from the processor board.

Notes:

- If you need to disconnect cables from the system board assembly, disengage all latches or release tabs on cable connectors first. Failing to release the tab before removing the cables will damage the cable sockets on the system board assembly. Any damage to the cable sockets might require replacing the processor board or system I/O board.
- The connectors on your system board assembly might look different from those in the illustration, but the removal procedure is the same.
  1. Press the release tab to release the connector.
  2. Disengage the connector from the cable socket.

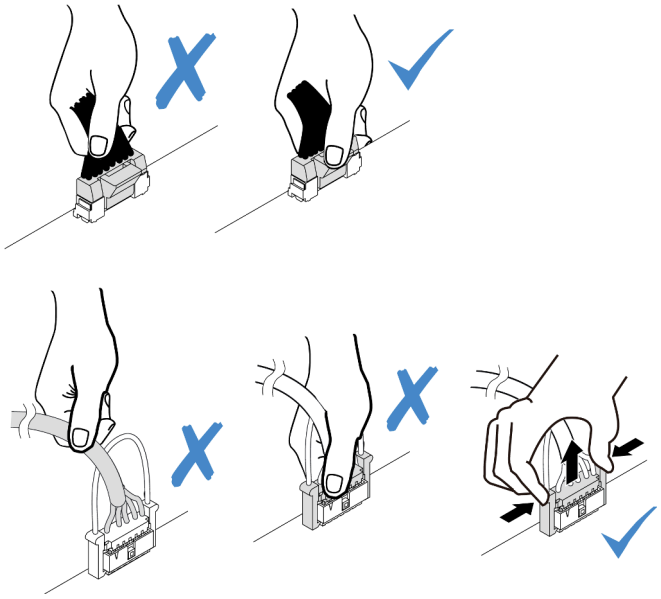


Figure 78. Disconnecting cables from the system board assembly

Step 3. Remove the front I/O module from the front chassis.

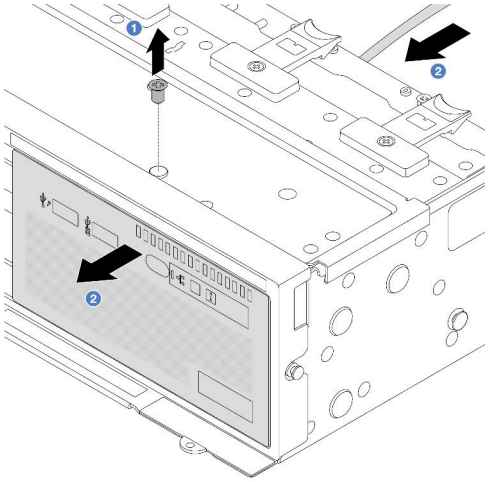


Figure 79. Front I/O module with the front operator panel

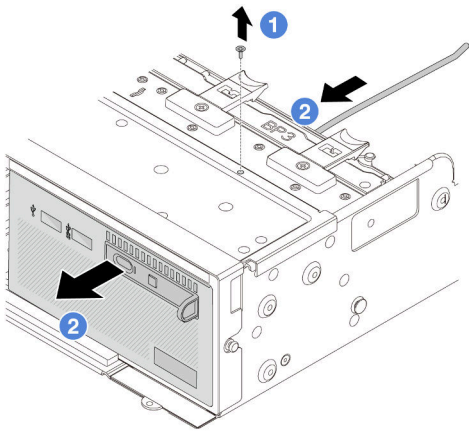


Figure 80. Front I/O module with the integrated diagnostics panel

a. 1 Remove the screw that secure the front I/O module.

b. 2 Slide the media bay out of the front chassis.

Step 4. (Optional) If you are replacing the Integrated Diagnostics Panel, remove the diagnostics panel from the front I/O module.

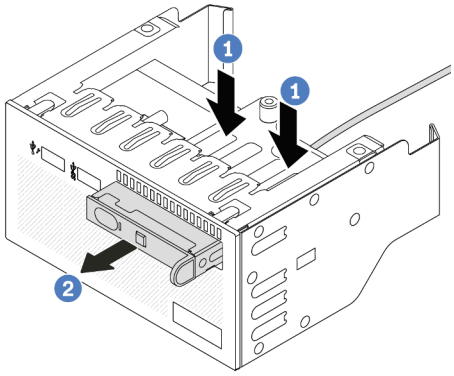


Figure 81. Removing the Integrated Diagnostics Panel

a. 1 Press down the clips as shown.

b. 2 Pull the diagnostics panel by its handle to get it out of its 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

Install the front I/O module

Follow instructions in this section to install the front I/O module.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. (Optional) If you are replacing the integrated diagnostics panel, insert the diagnostics panel into the front I/O module. Ensure that the panel is fully seated into the assembly.

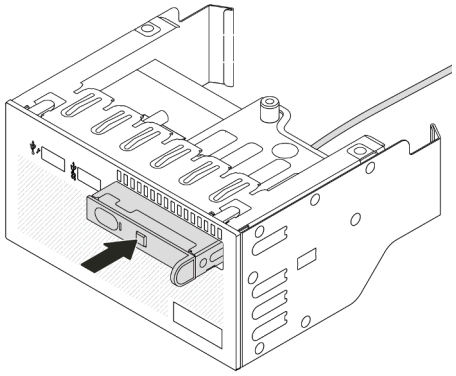


Figure 82. Installing the Integrated Diagnostics Panel

Step 3. Install the front I/O module.

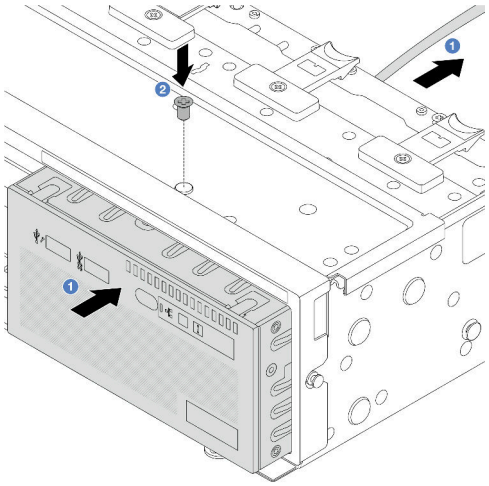


Figure 83. Front I/O module with the front operator panel

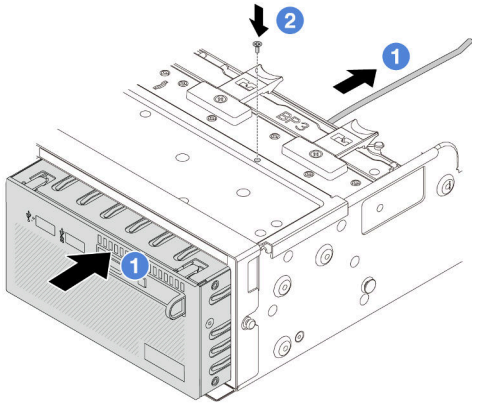


Figure 84. Front I/O module with the integrated diagnostics panel

a. (1) Insert the front I/O module into the front chassis.

b. (2) Install the screw to secure the front I/O module in place.

After you finish

1. Connect the cables of the front I/O module to the processor board. See Chapter 6 “Internal cable routing” on page 347.
2. Complete the parts replacement. See “Complete the parts replacement” on page 345.

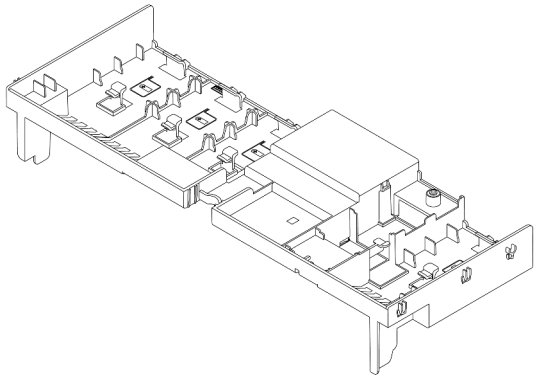
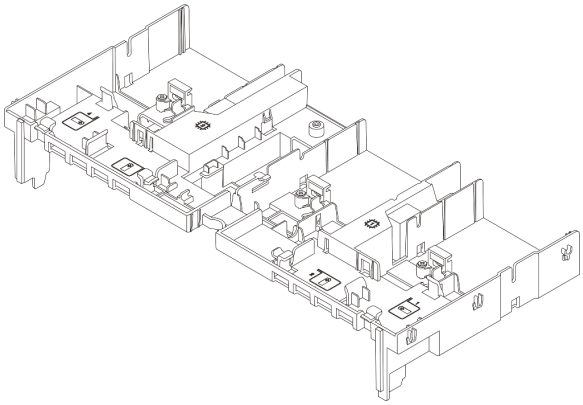
Demo video

Watch the procedure on YouTube

GPU replacement

Follow instructions in this section to remove and install a GPU adapter.

- “Remove a GPU adapter” on page 132
- “Install a GPU adapter” on page 135

Air baffle	Supported GPU adapter
 *Figure 85. Standard air baffle*	Half length, low profile, single-wide
 *Figure 86. GPU Air baffle*	Full length, full height, double-wide

Remove a GPU adapter

Follow instructions in this section to remove a GPU adapter.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.
- Depending on the specific type, your GPU adapter might look different from the illustration in this topic.

Procedure

Step 1. Make preparation for the task.

a. 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 68.

b. Remove the top cover. See “Remove the top cover” on page 342.

Step 2. Remove the riser assembly that has the GPU adapter installed.

GPU adapter on riser 1 or 2 assembly

Note: The following uses riser 1 assembly as an example for illustration. The replacement procedure is the same for riser 2 assembly.

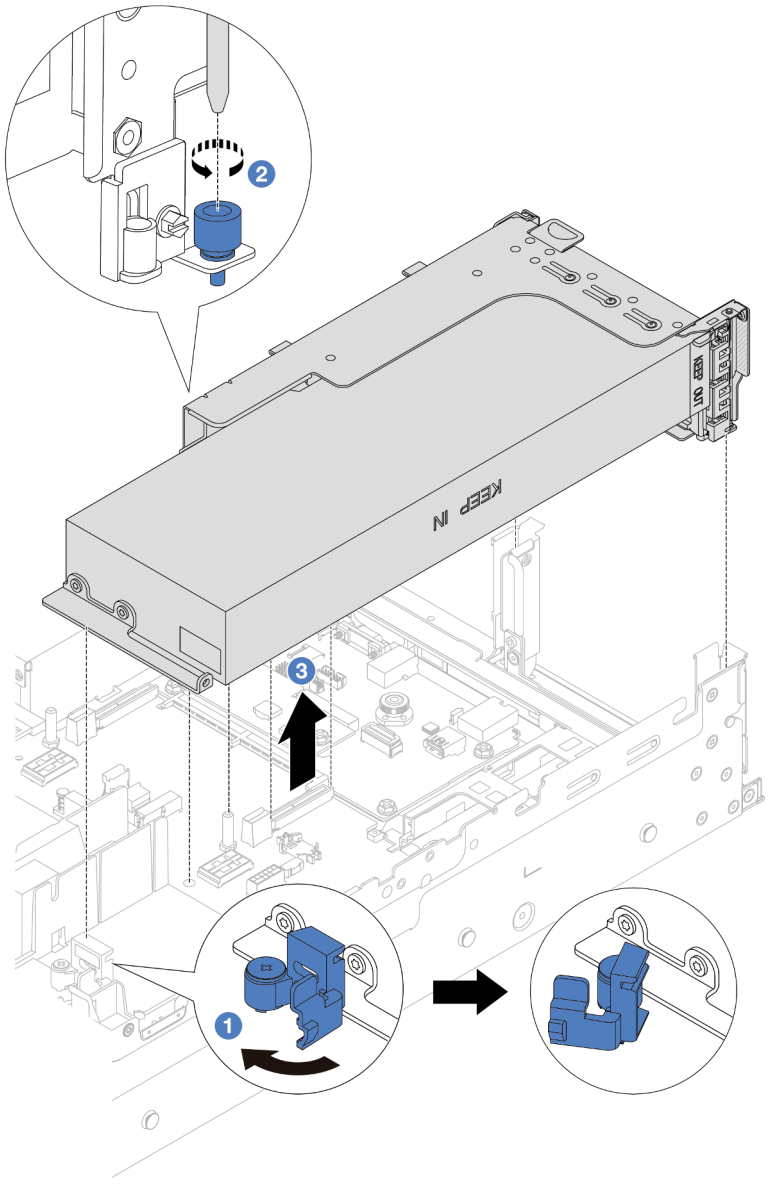


Figure 87. Removing the riser 1 assembly with GPU adapter

a. (1) Open the blue latch on the GPU air baffle.

b. (2) Loosen the screw that secures the riser assembly.

c. (3) Grasp the riser assembly by its edges and carefully lift it straight up and off the chassis.

GPU adapter on riser 3 assembly

a. Open the blue latch on the GPU air baffle.

b. Slightly lift the riser 3 assembly up, and remove the air baffle. See "Remove the air baffle" on page 76.

c. Disconnect riser 3 and GPU adapter cables from the processor board.

Notes:

- If you need to disconnect cables from the system board assembly, disengage all latches or release tabs on cable connectors first. Failing to release the tab before removing the cables will damage the cable sockets on the system board assembly. Any damage to the cable sockets might require replacing the processor board or system I/O board.
- The connectors on your system board assembly might look different from those in the illustration, but the removal procedure is the same.
  1. Press the release tab to release the connector.
  2. Disengage the connector from the cable socket.

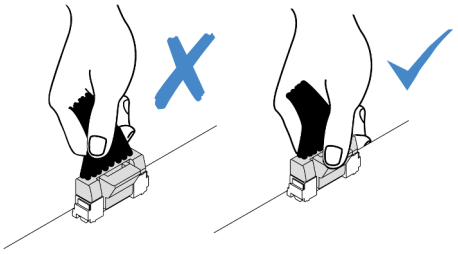


Figure 88. Disconnecting cables from the system board assembly

d. Remove the riser 3 assembly. See "Remove a rear riser assembly" on page 230.

Step 3. Disconnect the power cable from the GPU adapter.

Step 4. Remove the GPU adapter from the riser bracket.

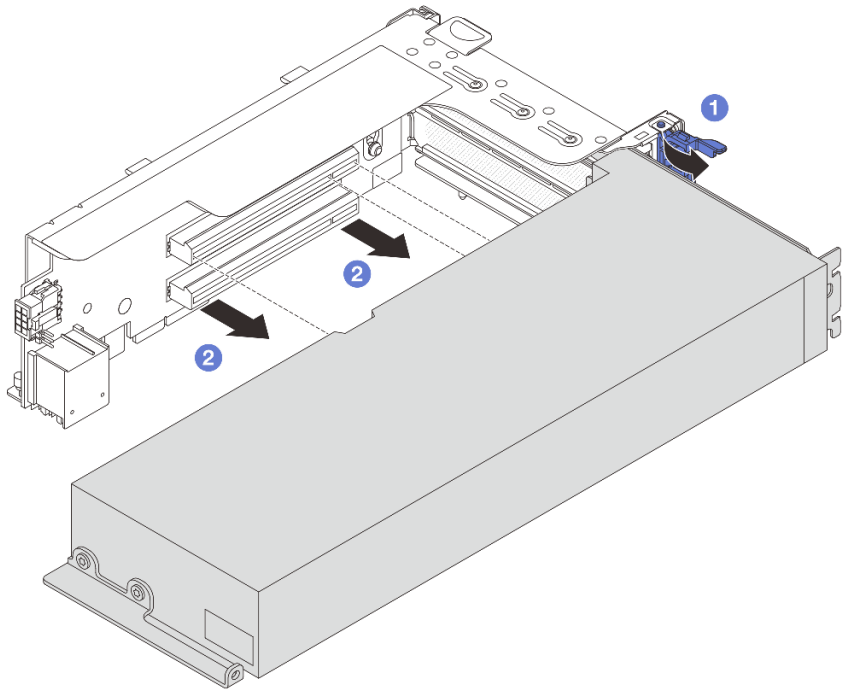


Figure 89. Removing the GPU adapter

a. 1 Rotate the GPU adapter retention latch to the open position.

b. 2 Grasp the GPU adapter by its edges and carefully pull it out of the PCIe slot.

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 a GPU adapter

Follow instructions in this section to install a GPU adapter.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.
- GPU adapters are supported on some server models with requirements. See “Thermal rules” on page 60.

- All installed GPU adapters must be identical.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Locate the appropriate PCIe slot for the new GPU adapter. See “PCIe slots and PCIe adapters” on page 55.

Step 3. Install the GPU adapter into the PCIe slot on the riser card.

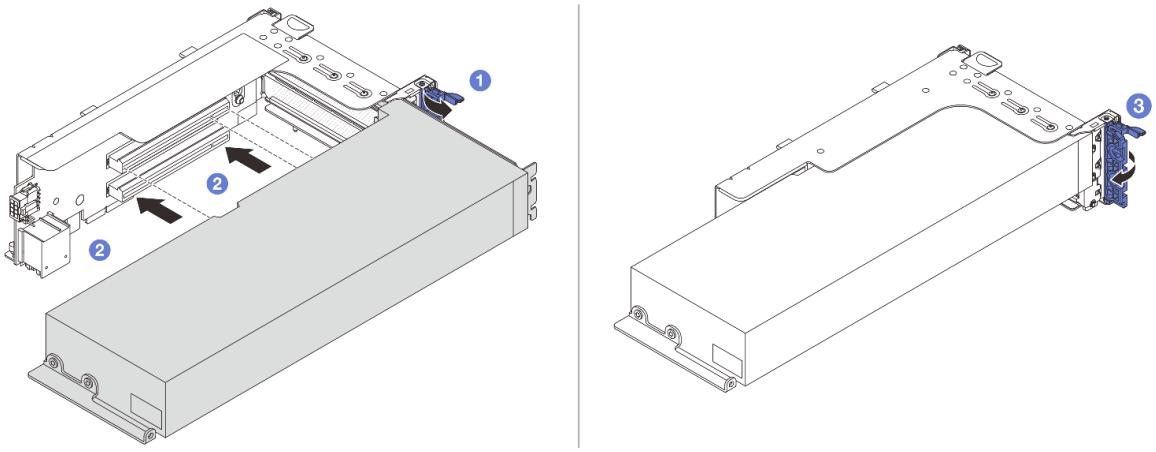


Figure 90. Installing the GPU adapter

a. 1 Open the blue latch on the riser cage.

b. 2 Align the GPU adapter with the PCIe slot on the riser card. Then, carefully press the GPU adapter straight into the slot until it is securely seated.

c. 3 Close the blue latch.

Step 4. Connect the GPU power cable to the GPU adapter. See Chapter 6 “Internal cable routing” on page 347.

Step 5. (Optional) Install an add-on air baffle on the GPU air baffle.

Note: If a single-wide FHFL GPU adapter is to be installed but the adjacent slot will be left empty or installed with a half-length adapter, you need to install an add-on air baffle on the GPU air baffle.

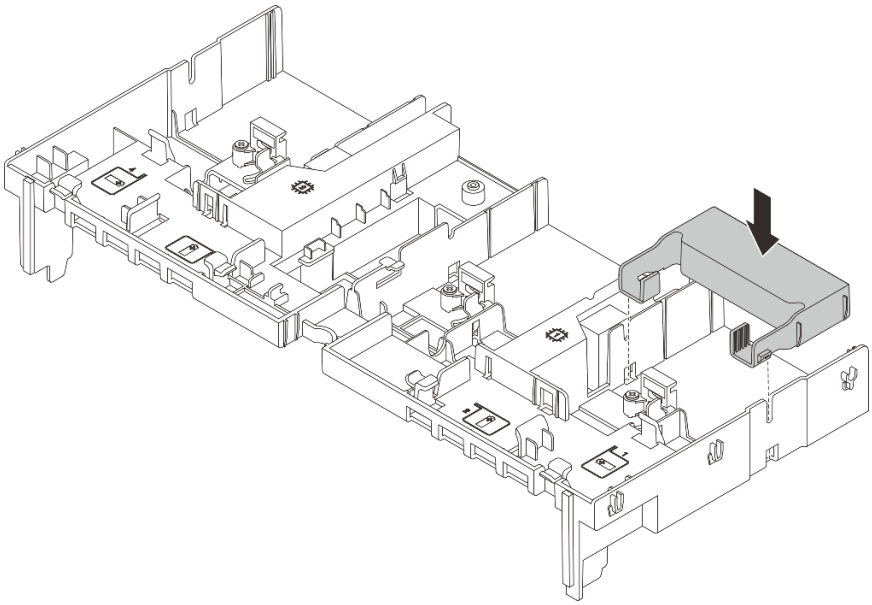


Figure 91. Installing an add-on air baffle

Step 6. Install the riser assembly with the GPU adapter.

GPU adapter on riser 1 or 2 assembly

Note: The following uses riser 1 assembly as an example for illustration. The replacement procedure is the same for riser 2 assembly.

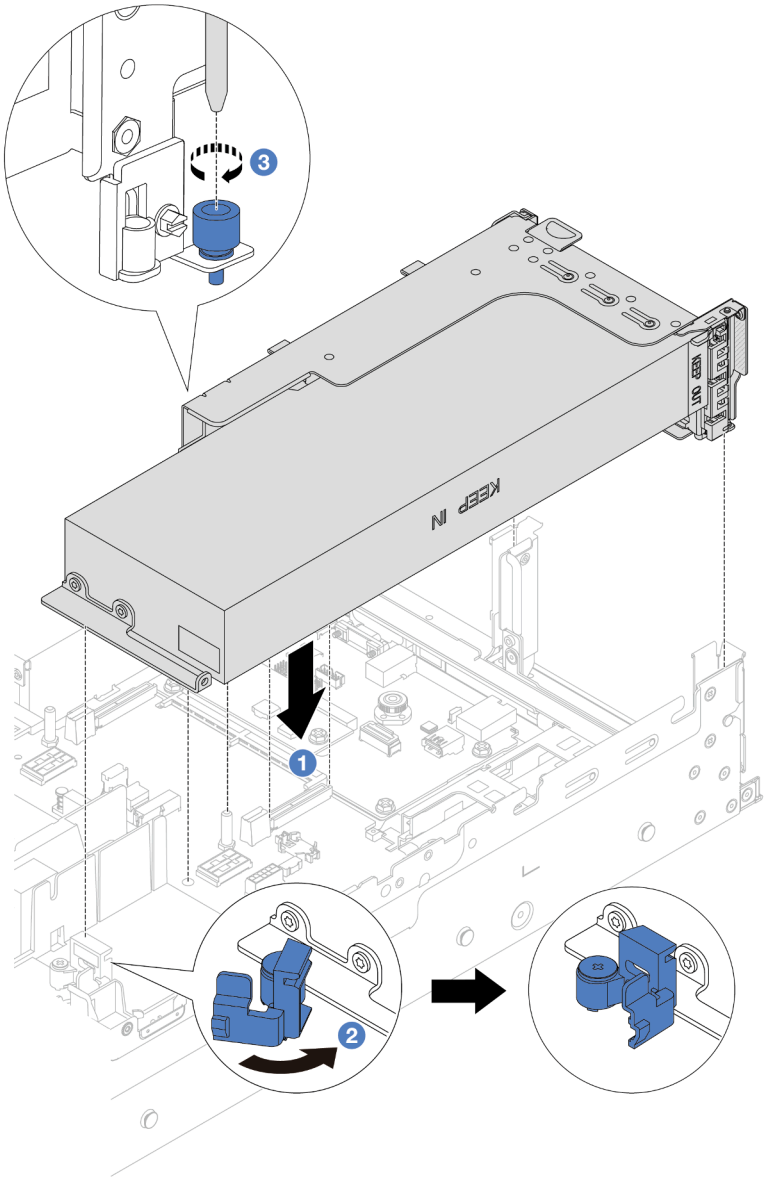


Figure 92. Installing the riser 1 assembly with GPU adapter

a. 1 Align the riser card with the PCIe slot on the processor board. Carefully press the riser card straight into the slot until it is securely seated.

b. 2 Open the blue latch on the GPU air baffle and fix the end of the GPU adapter. Then, close the blue latch.

c. 3 Tighten the screw to fix the riser cage.

GPU adapter on riser 3 assembly

a. Connect cables from the riser 3 and GPU adapter to the processor board. See Chapter 6 “Internal cable routing” on page 347.

b. Install the GPU air baffle. See “Install the air baffle” on page 78.

c. Install the riser 3 assembly. See “Install a rear riser assembly” on page 239.

d. Open the blue latch on the GPU air baffle and fix the end of the GPU adapter. Then, close the blue latch.

Step 7. (Optional) If a certain slot is not installed with a GPU adapter, install a filler on the GPU air baffle.

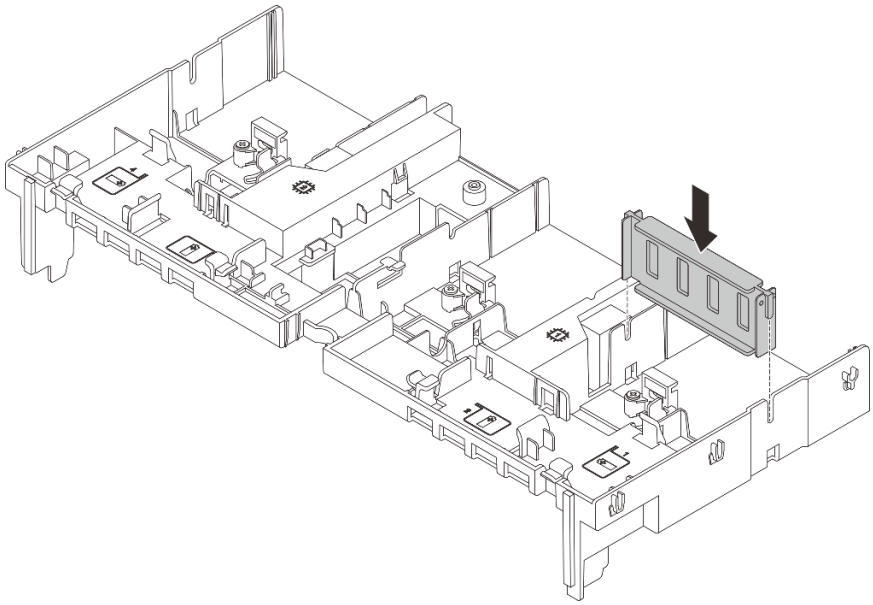


Figure 93. Installing the GPU air baffle filler

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 345.

Demo video

Watch the procedure on YouTube

Hot-swap drive replacement

Follow instructions in this section to remove and install a hot-swap drive. You can remove or install a hot-swap drive without turning off the server, which helps you avoid significant interruption to the operation of the system.

- “Remove a hot-swap drive” on page 140
- “Install a hot-swap drive” on page 141

Notes:

- The term “hot-swap drive” refers to all the supported types of hot-swap hard disk drives, hot-swap solid-state drives, and hot-swap NVMe drives.
- Use any documentation that comes with the drive and follow those instructions in addition to the instructions in this topic. Ensure that you have all the cables and other equipment that are specified in the documentation that comes with the drive.
- The electromagnetic interference (EMI) integrity and cooling of the server are protected by having all drive bays covered or occupied. The vacant bays are either covered by an EMI-protective panel or occupied by drive fillers. When installing a drive, save the removed drive filler in case that you later remove the drive and need the drive filler to cover the place.

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

Remove a hot-swap drive

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

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 to ensure that you work safely.
- 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.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), 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.
- If one or more NVMe solid-state drives are to be removed, it is recommended to disable them beforehand via the operating system.
- To ensure that there is adequate system cooling, do not operate the server for more than two minutes without either a drive or a drive filler installed in each bay.

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

Procedure

Step 1. If the security bezel is installed, remove it first. See “Remove the security bezel” on page 307.

Step 2. Slide the release latch to unlock the drive handle.

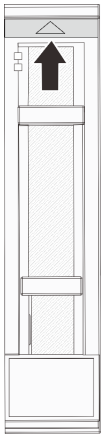


Figure 94. 2.5-inch hot-swap drive

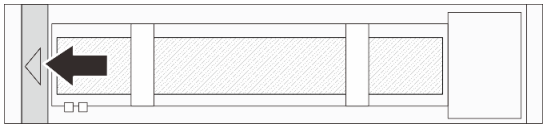


Figure 95. 3.5-inch hot-swap drive

Step 3. Grasp the handle and slide the drive out of the drive bay.

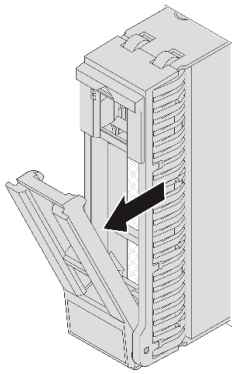


Figure 96. 2.5-inch hot-swap drive

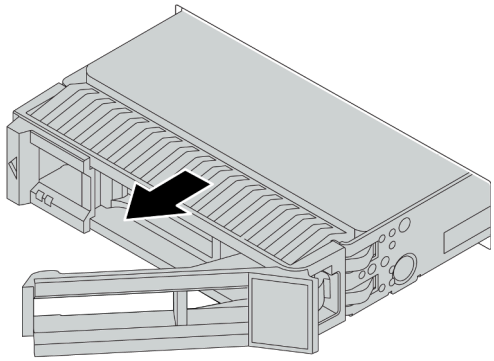


Figure 97. 3.5-inch hot-swap drive

After you finish

1. Install a new drive or drive filler to cover the drive bay. See “Install a hot-swap drive” on page 141.
2. 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 a hot-swap drive

Follow instructions in this section to install a hot-swap drive.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 to ensure that you work safely.
- 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.

For a list of supported drives, see https://serverproven.lenovo.com.

Firmware and driver download: You might need to update the firmware or driver after replacing a component.

- Go to https://datacentersupport.lenovo.com/products/servers/thinksystem/sr655v3/7d9e/downloads/driver-list/ to see the latest firmware and driver updates for your server.
- Go to “Update the firmware” on page 495 for more information on firmware updating tools.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Install the drive in the drive bay.

a. ❶ Ensure that the drive tray handle is in the open position. Slide the drive into the drive bay until it snaps into position.

b. ❷ Close the drive tray handle to lock the drive in place.

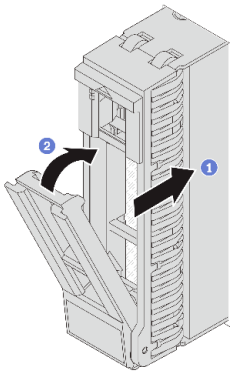


Figure 98. 2.5-inch hot-swap drive

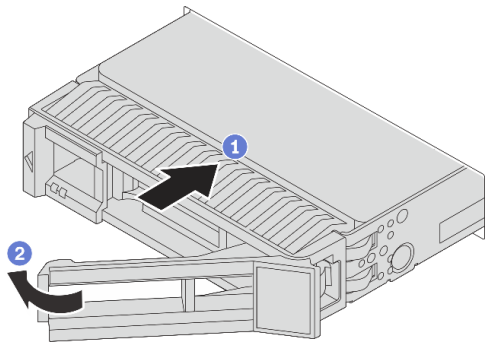


Figure 99. 3.5-inch hot-swap drive

Step 3. Check the drive status LED to verify that the drive is operating correctly.

- If the yellow drive status LED is lit continuously, that drive is faulty and must be replaced.
- If the green drive activity LED is flashing, the drive is being accessed

Step 4. Continue to install additional hot-swap drives if necessary.

After you finish

1. Reinstall the security bezel if you have removed it. See “Install the security bezel” on page 308.
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

Internal RAID/HBA/expander adapter replacement

Follow instructions in this section to remove and install an internal customer form factor (CFF) RAID adapter, internal CFF HBA adapter, or internal CFF RAID expander adapter.

The server supports RAID/HBA adapters in two form factors:

- Customer form factor (CFF): CFF RAID/HBA adapters are installed between the front backplane and fan cage.
- Standard form factor (SFF): RAID/HBA adapters in this form factor are installed in the PCIe expansion slots, see “Rear PCIe adapter and riser assembly replacement” on page 229.

Remove an internal RAID/HBA/expander adapter

Follow instructions in this section to remove an internal CFF RAID adapter, internal CFF HBA adapter, or internal CFF RAID expander adapter.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), 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. Make preparation for the task.

a. 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 68.

b. Remove the top cover. See “Remove the top cover” on page 342.

c. Remove the system fan cage. See “Remove the system fan cage” on page 335.

d. Record the cable connections for cables from or crossing over the adapter; then, disconnect all the cables.

Notes:

- If you need to disconnect cables from the system board assembly, disengage all latches or release tabs on cable connectors first. Failing to release the tab before removing the cables will damage the cable sockets on the system board assembly. Any damage to the cable sockets might require replacing the processor board or system I/O board.
- The connectors on your system board assembly might look different from those in the illustration, but the removal procedure is the same.
  1. Press the release tab to release the connector.
  2. Disengage the connector from the cable socket.

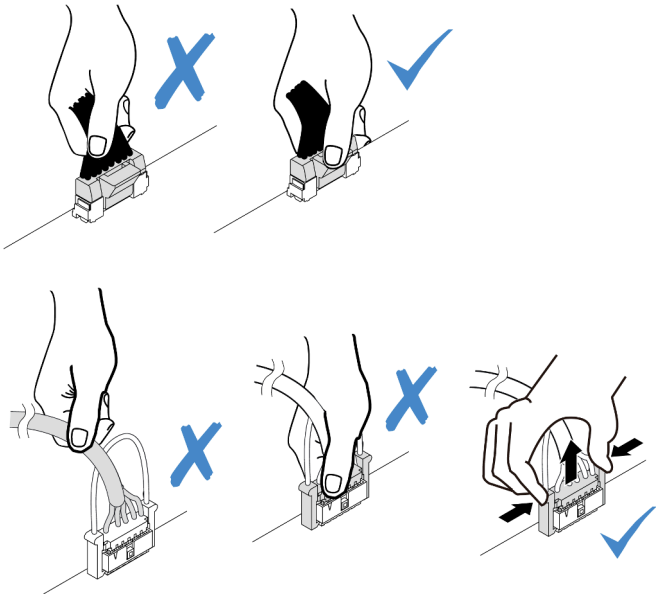


Figure 100. Disconnecting cables from the system board assembly

Step 2. Lift the blue touch point, slightly slide the adapter as shown, and carefully lift it out of the chassis.

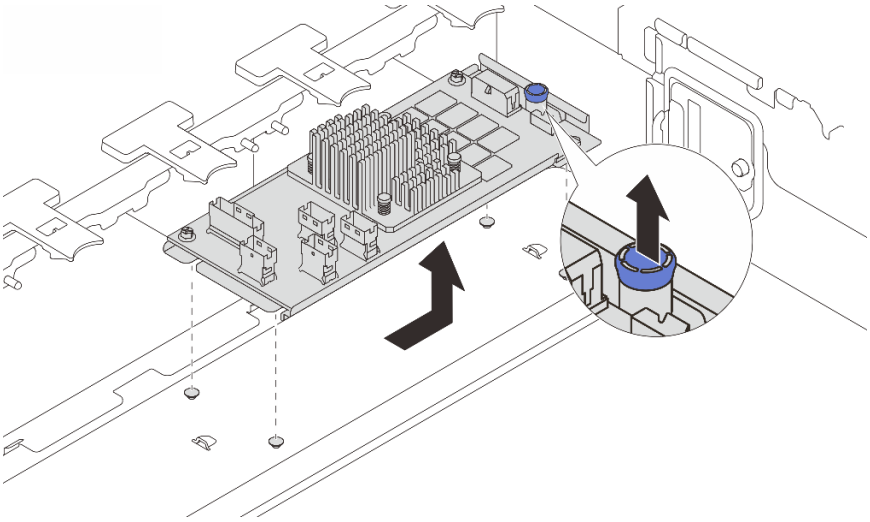


Figure 101. Removing the internal CFF adapter

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 an internal RAID/HBA/expander adapter

Follow instructions in this section to install an internal CFF RAID adapter, internal CFF HBA adapter, or internal CFF RAID expander adapter.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), drive backplanes or drive cables, back up all important data that is stored on drives.
- The CFF adapter is supported only in the 2.5-inch drive bay chassis when two processors are installed.

Firmware and driver download: You might need to update the firmware or driver after replacing a component.

- Go to https://datacentersupport.lenovo.com/products/servers/thinksystem/sr655v3/7d9e/downloads/driver-list/ to see the latest firmware and driver updates for your server.
- Go to “Update the firmware” on page 495 for more information on firmware updating tools.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Note: The adapter is shipped with and preinstalled on a mounting bracket, check and ensure that the adapter is fixed in place. If there are any loosen screws, tighten the screws using a No.1 Phillips torque screwdriver. The maximum torque value is 4.8 ± 0.5 inch-pounds.

Step 2. Align the notches on the mounting bracket with the pins on the chassis, place down the adapter, and slightly slide it as shown to secure it on the chassis.

Note: The illustration shows installing the CFF adapter on the left side (viewed from the front of the server). When the 24 x 2.5-inch expander backplane is installed, the CFF adapter can be installed only on the other side (right side viewed from the front of the server).

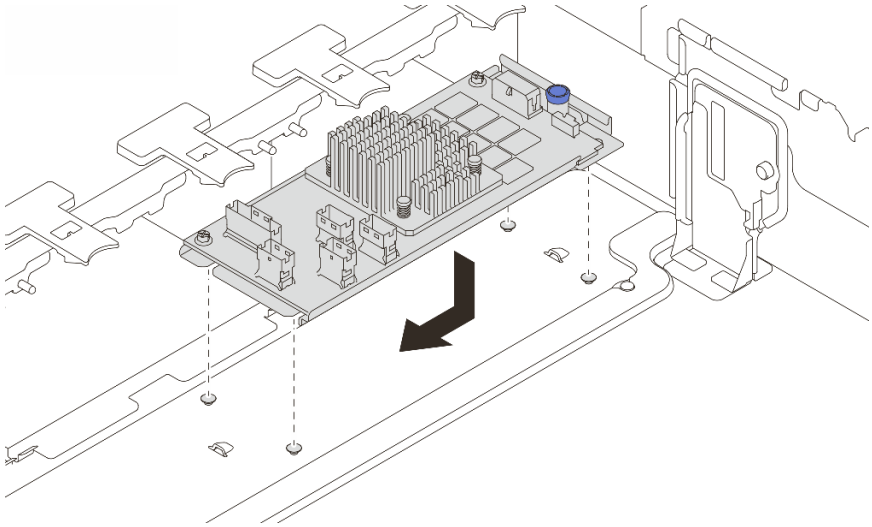


Figure 102. Installing the internal CFF adapter

Step 3. Connect cables to the adapter. See Chapter 6 “Internal cable routing” on page 347.

After you finish

1. Install the system fan cage. See “Install the system fan cage” on page 336.
2. Complete the parts replacement. See “Complete the parts replacement” on page 345.

Demo video

Watch the procedure on YouTube

Intrusion switch replacement

Follow instructions in this section to remove and install the intrusion switch. The intrusion switch informs you that the server cover is not properly installed or closed by creating an event in the system event log (SEL).

- “Remove the intrusion switch” on page 146
- “Install the intrusion switch” on page 148

Remove the intrusion switch

Follow instructions in this section to remove the intrusion switch.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.

Procedure

Step 1. Make preparation for the task.

a. 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 68.

b. Remove the top cover. See “Remove the top cover” on page 342.

c. Remove the system fans from the fan cage. See “Remove a system fan” on page 331.

d. Remove the fan cage from the system board assembly. See “Remove the system fan cage” on page 335.

Step 2. Rotate the fan cage by 90 degrees in the direction shown in the picture.

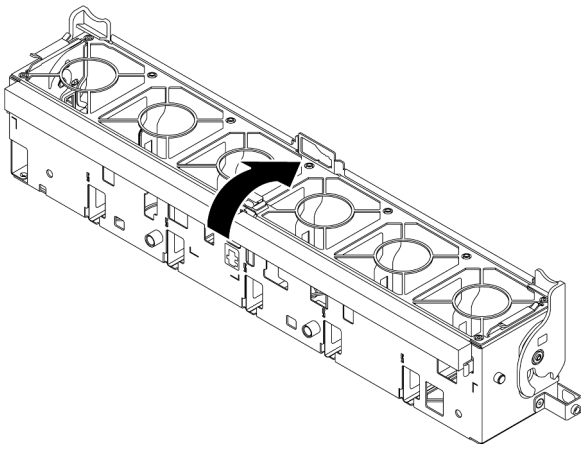


Figure 103. Rotating the fan cage

Step 3. Remove the intrusion switch assembly from the fan cage.

Note: The blowup in the illustration shows the fan cage upside down.

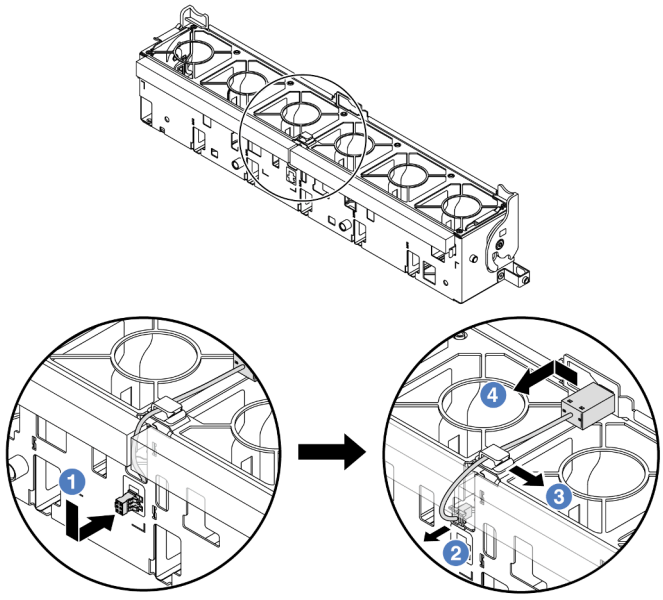


Figure 104. Removing the intrusion switch

a. (1) Move the intrusion switch connector in the shown direction to disengage it from the keyhole.

b. (2) Release the intrusion switch cable from the pre-cut slots on the foam and fan cage bottom.

c. (3) Release the intrusion switch cable from the cable clip.

d. (4) Slide and pull the intrusion switch to remove it from the holder.

After you finish

1. Install a new intrusion switch. See “Install the intrusion switch” on page 148.
2. 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 intrusion switch

Follow instructions in this section to install the intrusion switch.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Install the intrusion switch onto the fan cage.

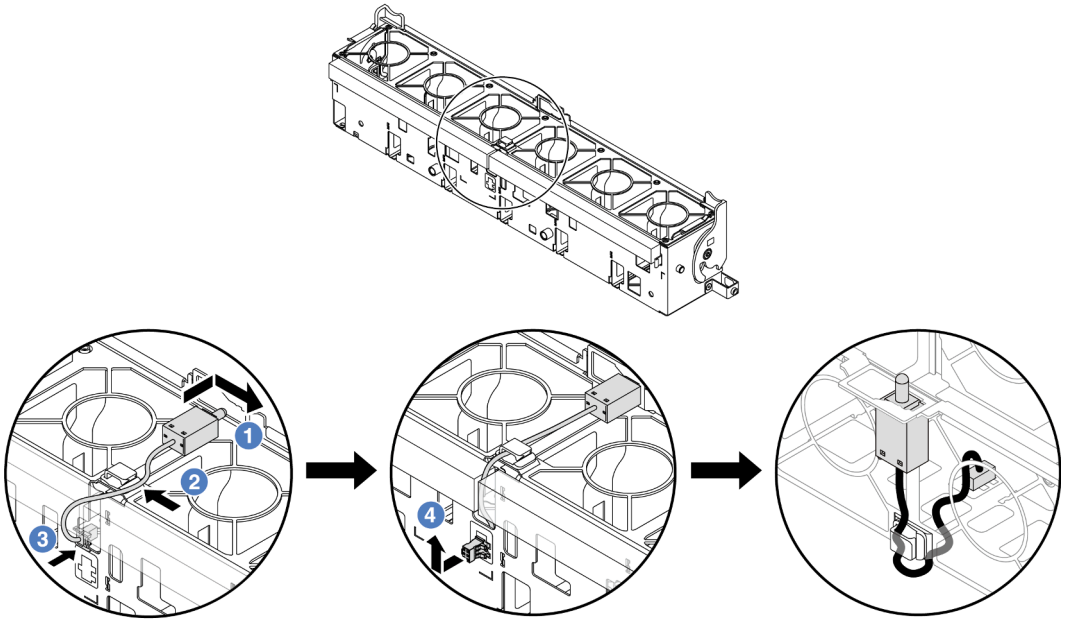
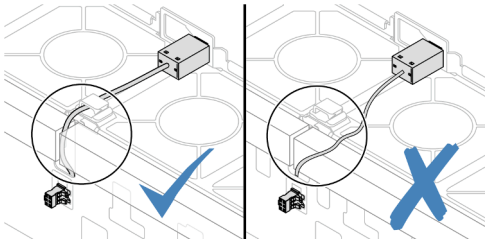


Figure 105. Installing the intrusion switch

Note: Ensure that the intrusion switch cable is routed through the cable clip and the pre-cut slots on the foam and fan cage bottom. Otherwise, the cable may slide under the fan cage, the contact surface between the fan cage and the system board assembly may get uneven, and the fan connection may get loose.



a. (1) Insert the intrusion switch onto the holder on the fan cage and push it in the direction as shown until it is fully seated.

b. (2) Fix the intrusion switch cable into the cable clip.

c. (3) Route the cable into the fan cage through the pre-cut slots on the foam and fan cage bottom.

d. (4) Insert the intrusion switch connector into the connector keyhole, and move it in the shown direction until it is fully seated.

Step 3. Install the fan cage back into the chassis. See “Install the system fan cage” on page 336.

Step 4. Install system fans into the fan cage. “Install a system fan” on page 333.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 345.

Demo video

Watch the procedure on YouTube

Lenovo Neptune Processor Direct Water Cooling Module replacement (trained technicians only)

Follow the instructions in this section to remove and install the Lenovo Neptune® Direct Water Cooling Module (DWCM).

Important:

- This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install the part without proper training and qualification.
- Configurations with DWCM do not support rail kits with cable management arm (CMA).
- "Remove the Lenovo Neptune Processor Direct Water Cooling Module" on page 150
- "Install the Lenovo Neptune Processor Direct Water Cooling Module" on page 154

Remove the Lenovo Neptune Processor Direct Water Cooling Module

Follow the instructions in this section to remove the Direct Water Cooling Module (DWCM).

Important: This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install the part without proper training and qualification.

About this task

Safety information for liquid detection sensor module cable

S011



CAUTION:
Sharp edges, corners, or joints nearby.

Attention:

- Read "Installation Guidelines" on page 49 and "Safety inspection checklist" on page 50 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 68.
- 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.

Prepare the following screwdrivers to ensure you can install and remove the corresponding screws properly.

Torque screwdriver type list	Screw Type
Torx T20 head screwdriver	Torx T20 screw

Procedure

Step 1. Make preparations for this task.

a. Remove the quick connect plugs from the manifolds. See “Remove the manifold (in-rack system)” on page 175 or “Remove the manifold (in-row system)” on page 194.

b. Remove the server from the rack. See “Remove the server from rack” on page 68.

c. Remove the top cover. See “Remove the top cover” on page 342.

d. Remove the air baffle or middle drive cage. See “Remove the air baffle” on page 76 or “Remove the middle drive cage and drive backplanes” on page 223.

e. Disconnect the liquid detection sensor module cable of the DWCM from the connector on the system board assembly. See “Direct water cooling module” on page 360.

Step 2. Remove the riser cage.

- **1FH riser cage**

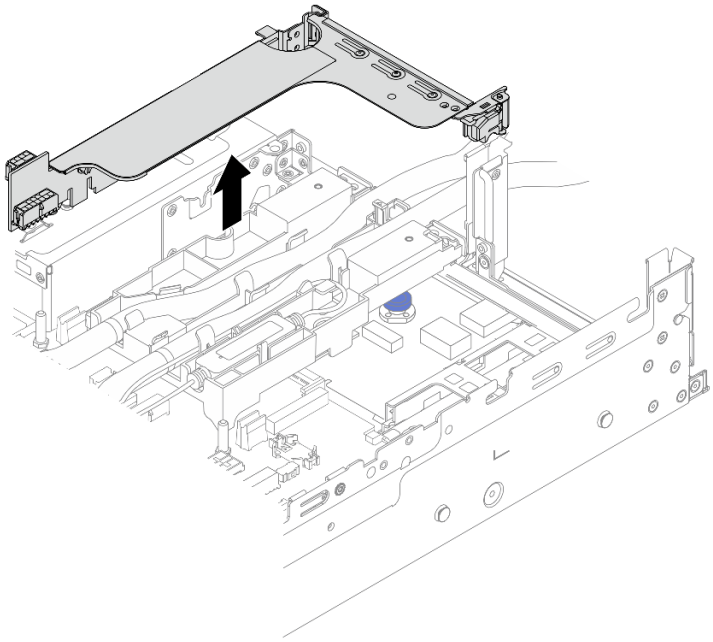


Figure 106. Removing the 1FH riser cage

- **3FH riser cage**

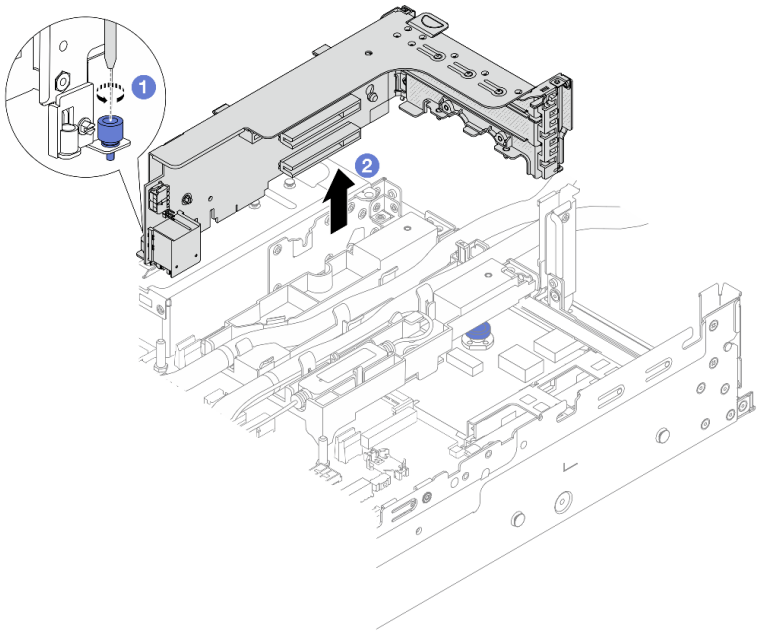


Figure 107. Removing the 3FH riser cage

a. Loosen the screw that secures the riser cage.

b. Grasp the riser cage by its edges and carefully lift it straight up and off the chassis.

Step 3. Disengage the hoses and liquid detection sensor module.

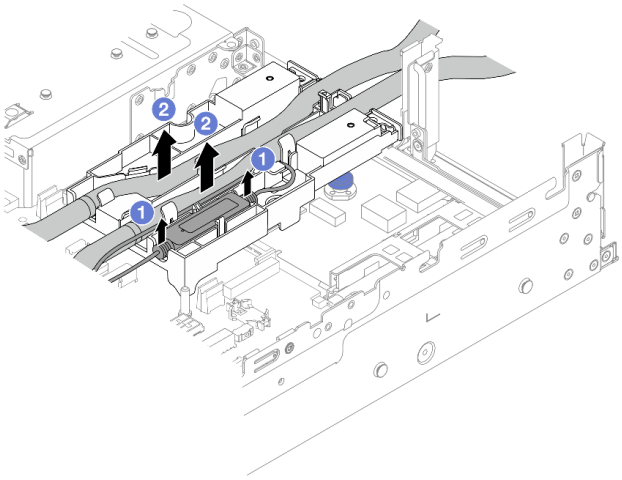


Figure 108. Disengaging the hoses and module

a. Lift the liquid detection sensor module up from the hose holder.

b. Disengage the hoses from the hose holder.

Step 4. Remove the DWCM from the processor board.

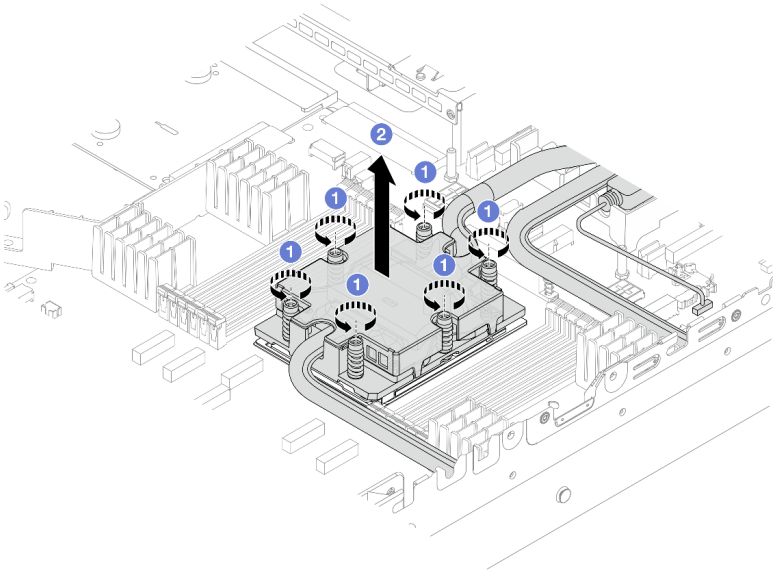


Figure 109. Removing the DWCM

a. 1 Fully loosen all the screws *in the removal sequence shown* on the cold plate assembly.

b. 2 Carefully lift the DWCM from the processor socket.

Step 5. If you are replacing a processor, remove the processor. See "Remove a processor" on page 259.

Step 6. Remove the hose holder.

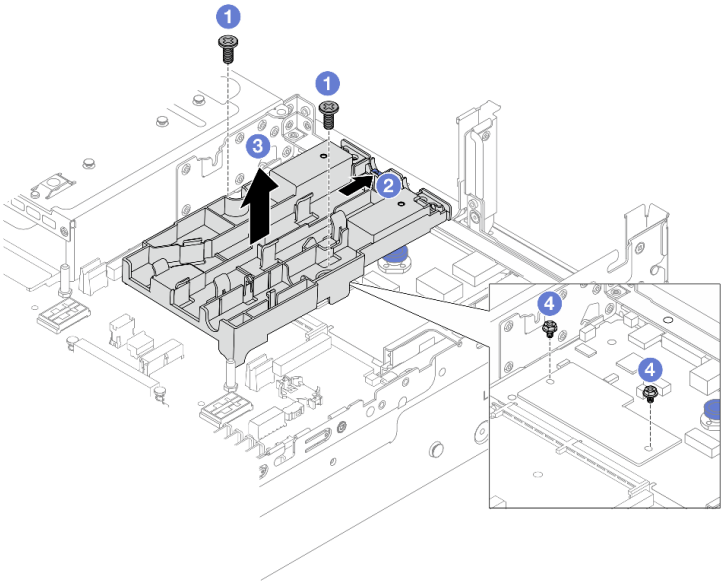


Figure 110. Removing the hose holder

a. 1 Loosen the screws that locks the holder to the system I/O board.

b. 2 Move the blue latch towards the rear of the server.

c. 3 Lift the hose holder out of the chassis.

d. 4 Install the screws to secure the firmware and RoT security module if needed.

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 Lenovo Neptune Processor Direct Water Cooling Module

Follow the instructions in this section to install the Direct Water Cooling Module (DWCM).

Important: This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install the part without proper training and qualification.

About this task

S011



CAUTION:
Sharp edges, corners, or joints nearby.

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.

CAUTION:
When removing a new DWCM from the shipping box, lift out the cold plate assembly with the shipping tray attached to prevent thermal grease on the cold plate assembly from damage.

Prepare the following screwdrivers to ensure you can install and remove the corresponding screws properly.

Torque screwdriver type list	Screw Type
Torx T20 head screwdriver	Torx T20 screw

Procedure

Step 1. Install the hose holder to the chassis.

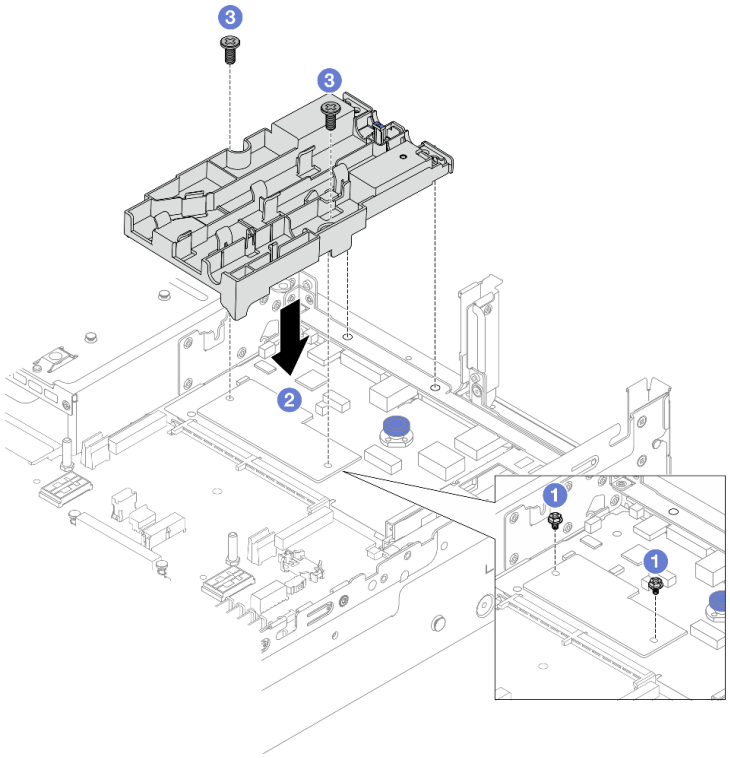


Figure 111. Installing the hose holder

a. 1 Remove the screws that secure the firmware and RoT security module if needed.

b. 2 Align the screw holes on the hose holder with the screw holes on the firmware and RoT security module, and the guiding pins of the holder with the holes on the rear wall.

c. 3 Tighten the screws to secure the hose holder to the system I/O board.

Step 2. Install the processor. See “Install a processor” on page 260.

Step 3. Install the DWCM to the system board assembly.

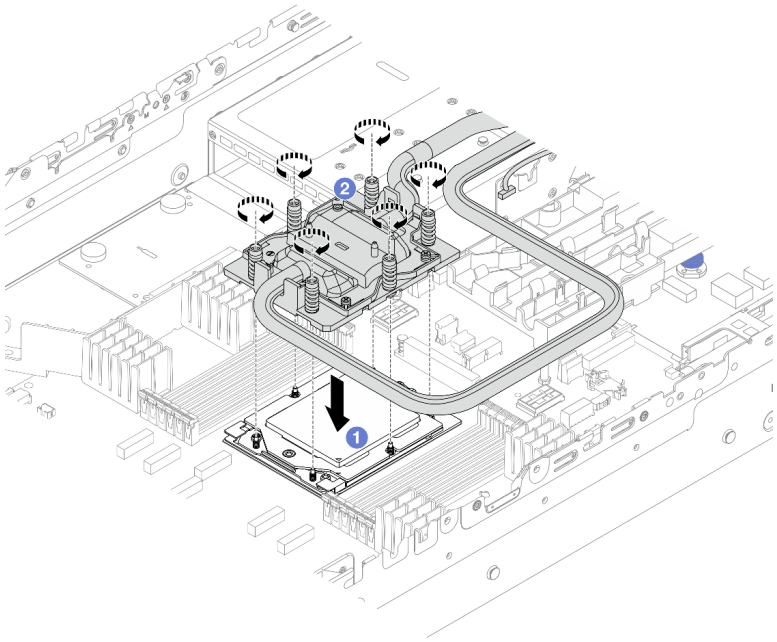


Figure 112. Installing the DWCM

1. 1 Align the triangular mark and screws on the cold plate assembly with the triangular mark and threaded posts on the processor socket; then install the cold plate assembly on the processor socket.
2. 2 Fully tighten all the screws *in the installation sequence shown* on the cold plate assembly.

   Note: For reference, the torque required for the fasteners to fully tighten is 1.25-1.45 newton-meters (11.0-13.0 inch-pounds).

Step 4. Install the cold plate covers. Press the cover down as illustrated below.

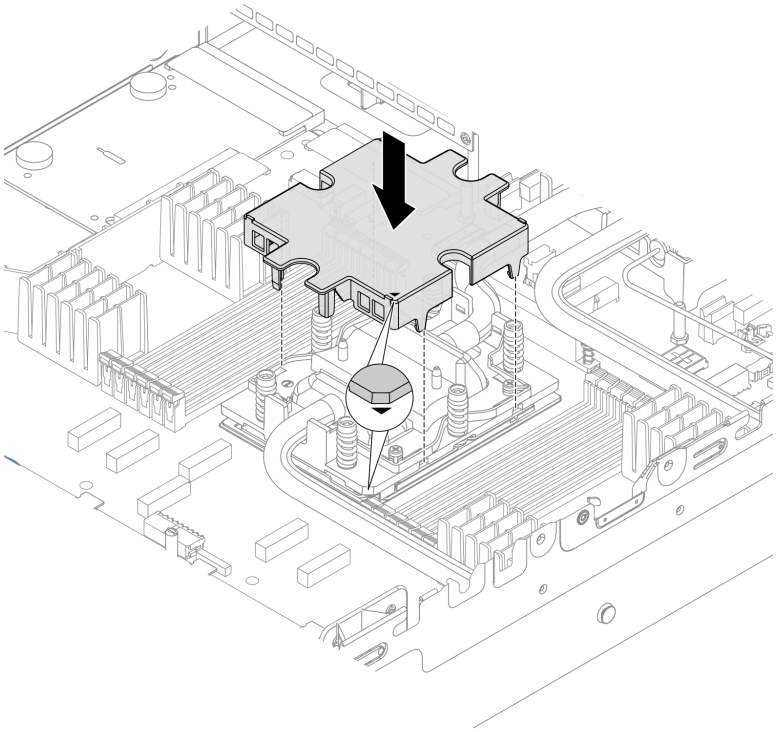


Figure 113. Installing cold plate cover

Step 5. Place the hoses and the liquid detection sensor module on the hose holder.

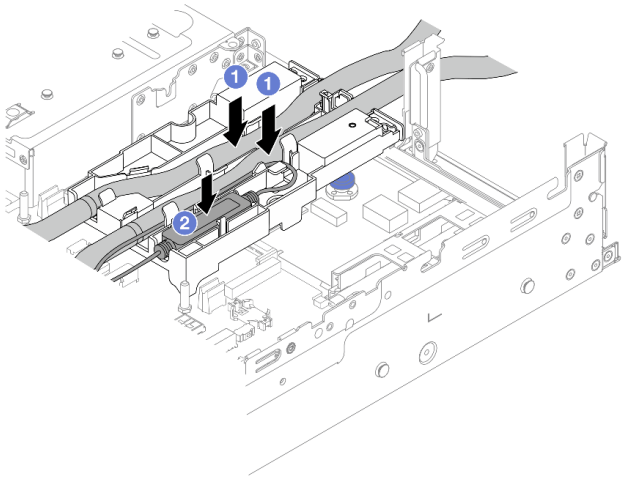


Figure 114. Placing the hoses and module

a. 1 Place the hoses on the hose holder.

b. 2 Place the liquid detection sensor module on the hose holder.

Notes:

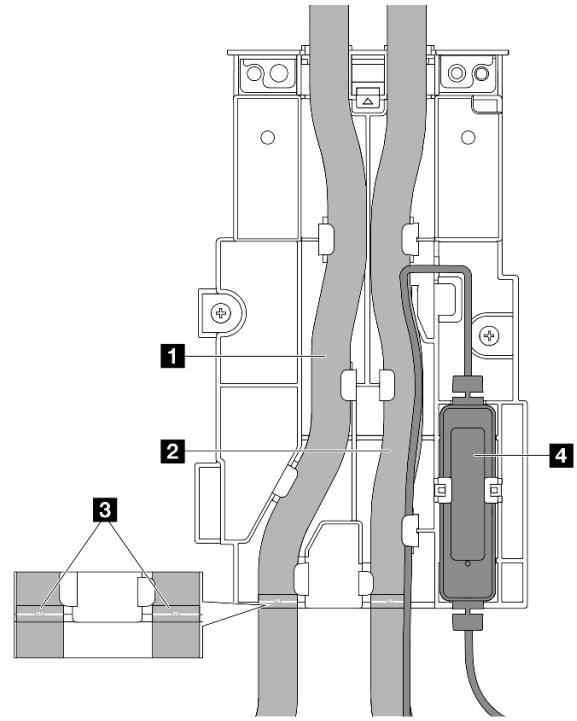


Figure 115. Installation details

- Place the middle part of the hose against the blue latch, and insert the outlet hose 1 and the inlet hose 2 into the holder.
- Check the guiding labels 3 on the hoses before installation, and align the labels with the front edge of the hose holder. Otherwise, the hoses might obstruct open connectors on the system board assembly.
- Insert the liquid detection sensor module 4 to the holder beside the hoses. Make sure that the side with a status LED is up and route the cable as illustrated above.
- For liquid detection sensor module working status, see “LED on the liquid detection sensor module” on page 524.

Step 6. Install the riser cage.

- **1FH riser cage**

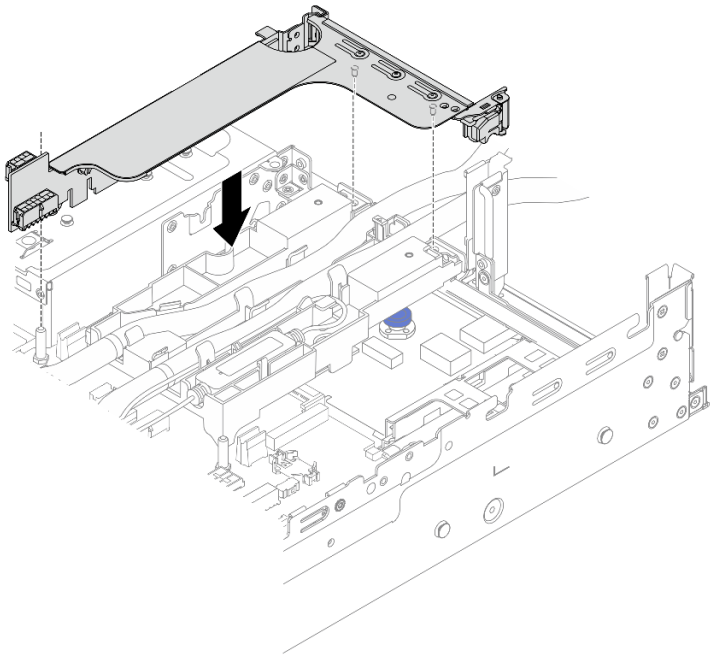


Figure 116. Installing the 1FH riser cage

- **3FH riser cage**

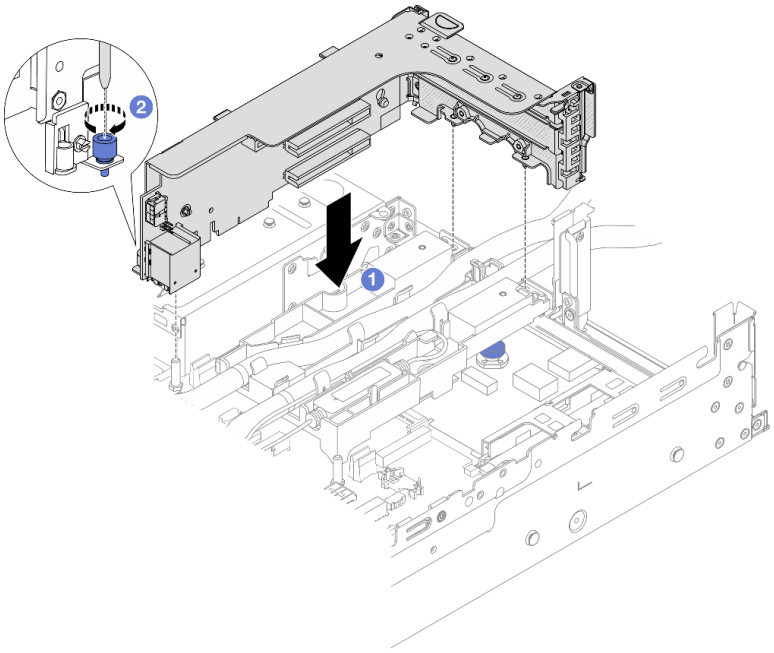


Figure 117. Installing the 3FH riser cage

a. 1 Align the riser card with the riser slot on the system board assembly. Carefully press the riser card straight into the slot until it is securely seated.

b. 2 Tighten the screw to secure the riser cage.

Step 7. Connect the cable of the liquid detection sensor module to the connector on the system board assembly. See “Direct water cooling module” on page 360.

After you finish

1. Install the air baffle or middle drive cage. See “Install the air baffle” on page 78 or “Install the middle drive backplanes and drive cage” on page 226.
2. Install the top cover. See “Install the top cover” on page 344.
3. Install the server into the rack. See “Install the server to rack” on page 71.
4. Install the quick connect plugs to the manifolds. See Install the manifold (in-rack system) or Install the manifold (in-row system).
5. Complete the parts replacement. See “Complete the parts replacement” on page 345.

Demo video

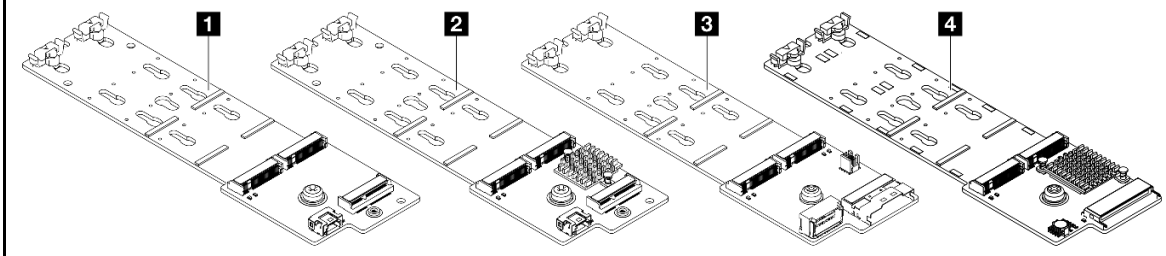
Watch the procedure on YouTube

M.2 drive and M.2 backplane replacement

Follow instructions in this section to remove and install the M.2 drive and M.2 backplane (an assembled M.2 backplane and M.2 drive is also known as M.2 module).

The server supports the following M.2 backplanes. The removal and installation methods are similar.

Note: The M.2 adapters and modules are also referred to as enablement kits.



1	ThinkSystem M.2 SATA/NVMe 2-Bay Enablement Kit
2	ThinkSystem M.2 NVMe 2-Bay RAID Enablement Kit
3	ThinkSystem M.2 SATA/x4 NVMe 2-Bay Enablement Kit
4	ThinkSystem M.2 RAID B540i-2i SATA/NVMe Enablement Kit

- “Remove an M.2 drive” on page 160
- “Install an M.2 drive” on page 162
- “Remove the M.2 backplane” on page 164
- “Install the M.2 backplane” on page 167

Remove an M.2 drive

Follow instructions in this section to remove an M.2 drive.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), 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. 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 68.

Step 2. Remove the top cover. See “Remove the top cover” on page 342.

Step 3. Remove the M.2 drive.

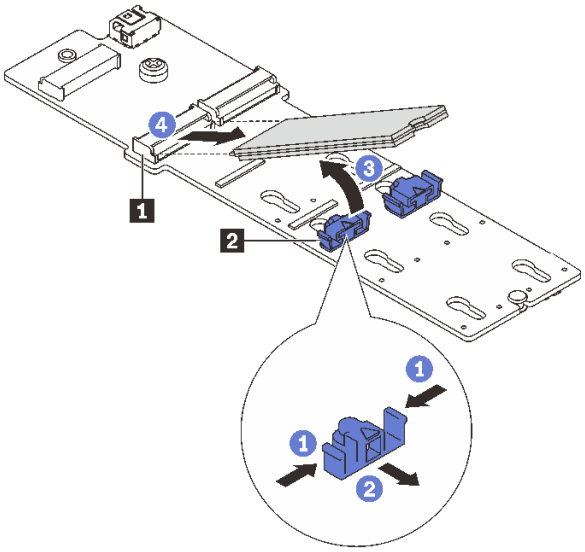


Figure 118. Removing the M.2 drive

a. (1) Press both sides of the retainer (2).
b. (2) Slide the retainer away from the M.2 drive.
c. (3) Rotate the rear end of M.2 drive to an angle of approximately 30 degrees.
d. (4) Pull the M.2 drive away from the connector (1).

After you finish

1. Install a new M.2 drive. See “Install an M.2 drive” on page 162.
2. 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 an M.2 drive

Follow instructions in this section to install an M.2 drive.

Attention:

- Read "Installation Guidelines" on page 49 and "Safety inspection checklist" on page 50 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 68.
- 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.

Firmware and driver download: You might need to update the firmware or driver after replacing a component.

- Go to https://datacentersupport.lenovo.com/products/servers/thinksystem/sr655v3/7d9e/downloads/driver-list/ to see the latest firmware and driver updates for your server.
- Go to "Update the firmware" on page 495 for more information on firmware updating tools.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. (Optional) Adjust the retainer on the M.2 backplane to accommodate the particular size of the M.2 drive you want to install.

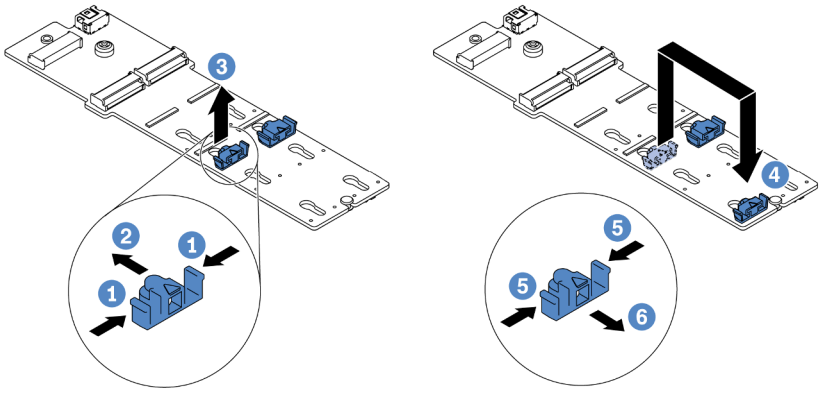


Figure 119. Adjusting the M.2 retainer

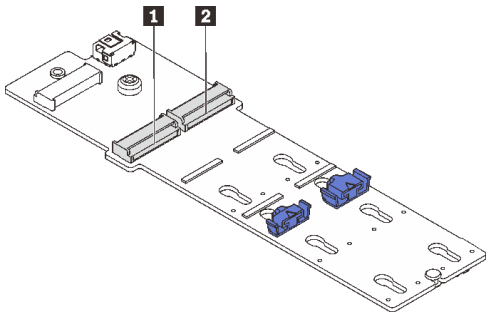
a. 1 Press both sides of the retainer.
b. 2 Move the retainer forward until it is in the large opening of the keyhole.
c. 3 Take the retainer out of the keyhole.
d. 4 Insert the retainer into the correct keyhole.
e. 5 Press both sides of the retainer.

f. 6 Slide the retainer backwards (toward the small opening of the keyhole) until it is seated in place.

Step 3. Locate the connector on the M.2 backplane.

Notes:

- Your M.2 backplane might look different from the following illustrations, but the installation method is the same.
- Some M.2 backplanes support two identical M.2 drives. Install the M.2 drive in slot 0 first.



1 Slot 0
2 Slot 1

Figure 120. M.2 drive slot

Step 4. Install the M.2 drive on the M.2 backplane.

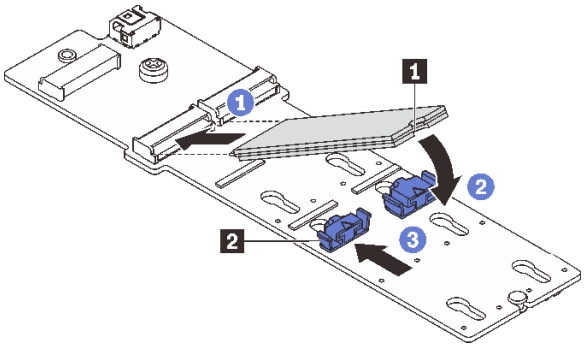


Figure 121. Installing the M.2 drive

a. 1 Hold the M.2 drive at an angle, and insert it into the M.2 slot.

b. 2 Rotate the M.2 drive down until the notch 1 catches on the lip of the retainer 2.

c. 3 Slide the retainer toward the M.2 drive to secure it in place.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 345.

Demo video

Watch the procedure on YouTube

Remove the M.2 backplane

Follow instructions in this section to remove the M.2 backplane.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), 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. 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 68.

Step 2. Remove the top cover. See “Remove the top cover” on page 342.

Step 3. Remove the M.2 drive from the M.2 backplane. See “Remove an M.2 drive” on page 160.

Step 4. Disconnect the M.2 cables from the M.2 backplane.

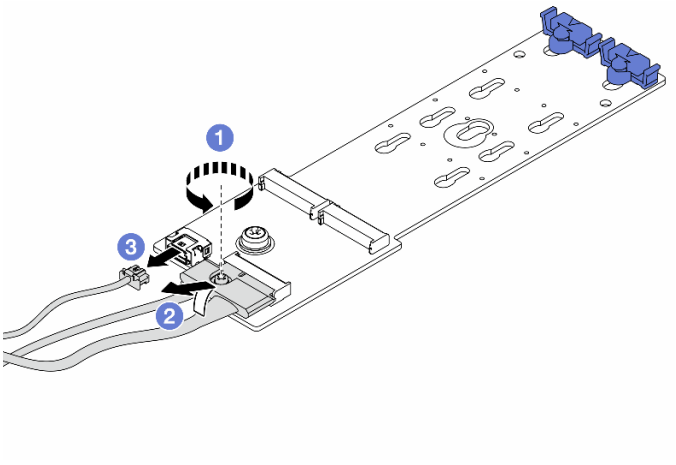


Figure 122. Disconnecting M.2 cables from ThinkSystem M.2 SATA/NVMe 2-Bay Enablement Kit *or* ThinkSystem M.2 NVMe 2-Bay RAID Enablement Kit

a. 1 Loosen the screw on the signal cable.

b. 2 Tilt the connector and remove it.

c. 3 Remove the power cable.

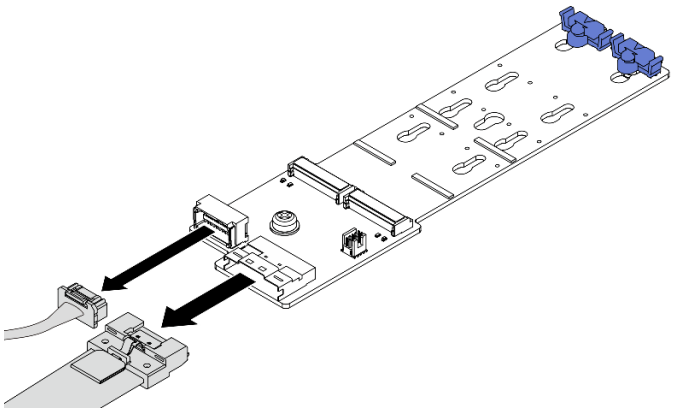


Figure 123. Disconnecting M.2 cables from ThinkSystem M.2 SATA/x4 NVMe 2-Bay Enablement Kit

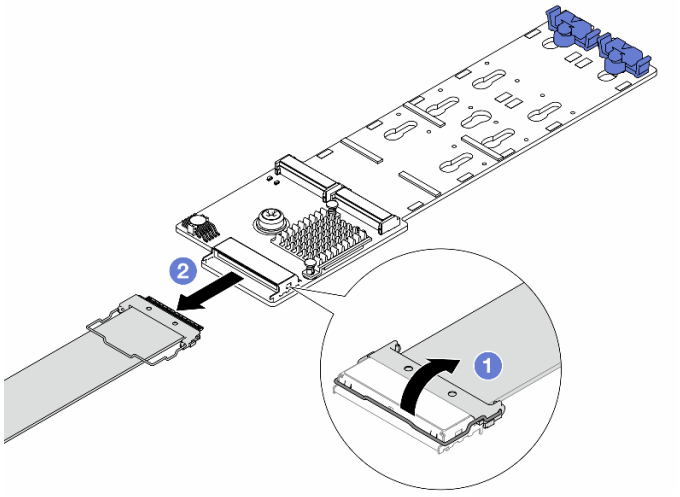


Figure 124. Disconnecting M.2 cables from ThinkSystem M.2 RAID B540i-2i SATA/NVMe Enablement Kit

a. 1 Pull up the latch on the M.2 cable.

b. 2 Disconnect the M.2 cable from the M.2 backplane.

Step 5. Remove the M.2 backplane.

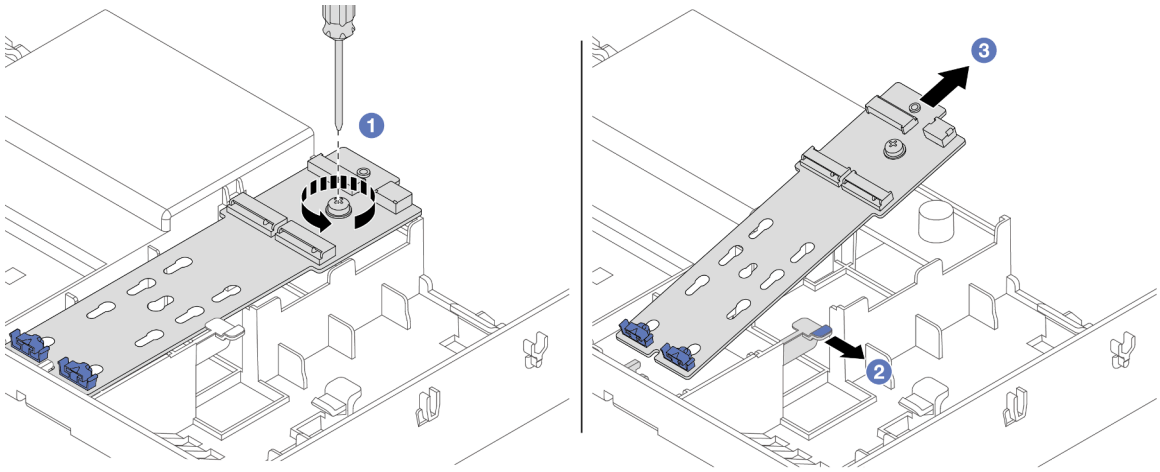


Figure 125. Removing the M.2 backplane from the air baffle

a. Unfasten the screw that secures the M.2 backplane to the air baffle.
b. Slide and hold the retention clip on the air baffle.
c. Remove the M.2 backplane from the air baffle, and release the retention clip.

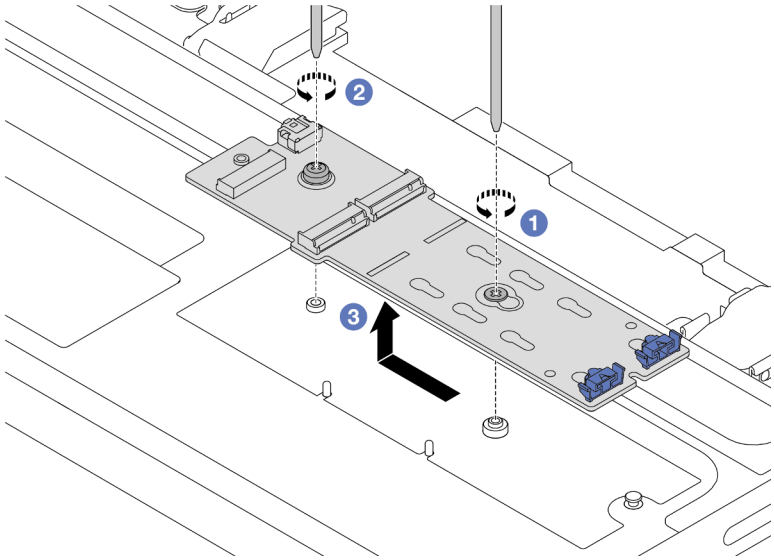


Figure 126. Removing the M.2 backplane from the middle drive cage

a. Unfasten the screw on the middle of M.2 backplane.
b. Unfasten the screw on the end of the M.2 backplane.
c. Remove the M.2 backplane from the middle drive cage.

After you finish

1. Install a new M.2 backplane. See “Install the M.2 backplane” on page 167.
2. 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 M.2 backplane

Follow instructions in this section to install the M.2 backplane.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.

Firmware and driver download: You might need to update the firmware or driver after replacing a component.

- Go to https://datacentersupport.lenovo.com/products/servers/thinksystem/sr655v3/7d9e/downloads/driver-list/ to see the latest firmware and driver updates for your server.
- Go to “Update the firmware” on page 495 for more information on firmware updating tools.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Install the M.2 backplane.

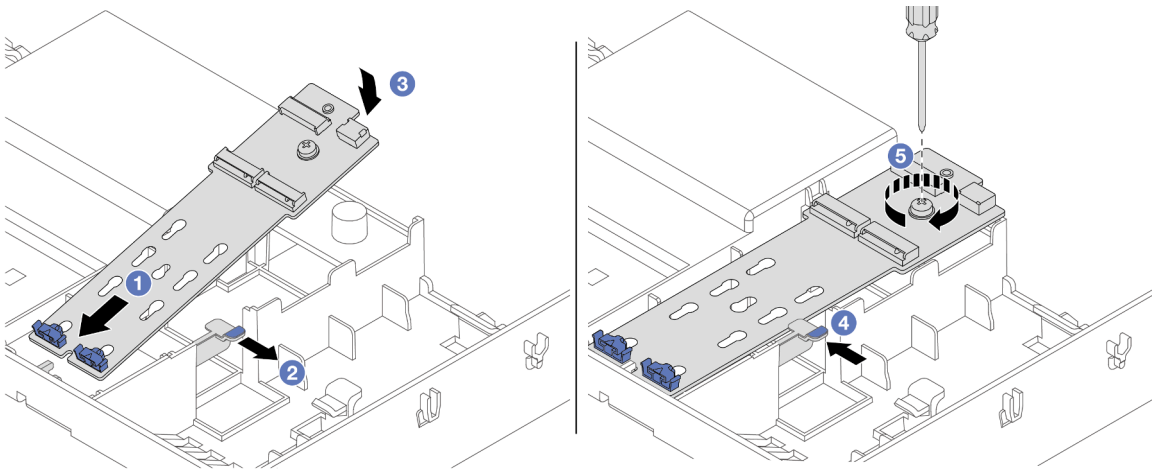


Figure 127. Installing the M.2 backplane on the air baffle

a. 1 Align the guide holes on the M.2 backplane with the guide pins on the air baffle, and insert the backplane into the air baffle.

b. 2 Slide and hold the retention clip on the air baffle.

c. 3 Rotate the M.2 backplane downward into place.

d. 4 Release the retention clip. The retention clip will engage automatically.

e. 5 Tighten the screw to secure the M.2 backplane.

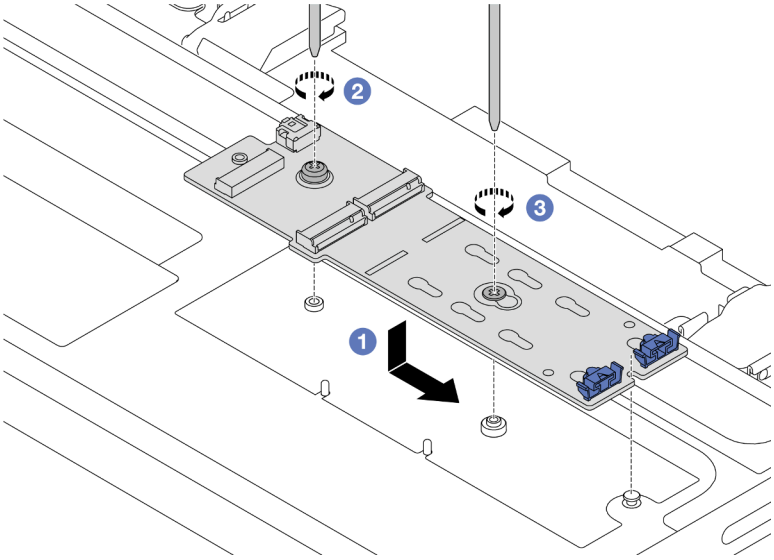


Figure 128. Installing the M.2 backplane on the middle drive cage

a. 1 Align the notch of the M.2 backplane with the pin on the middle drive cage, and then lower the M.2 backplane onto the middle drive cage.

b. 2 Tighten the screw on the end of the M.2 backplane.

c. 3 Tighten the screw on the middle of the M.2 backplane.

Step 3. Connect the M.2 cables.

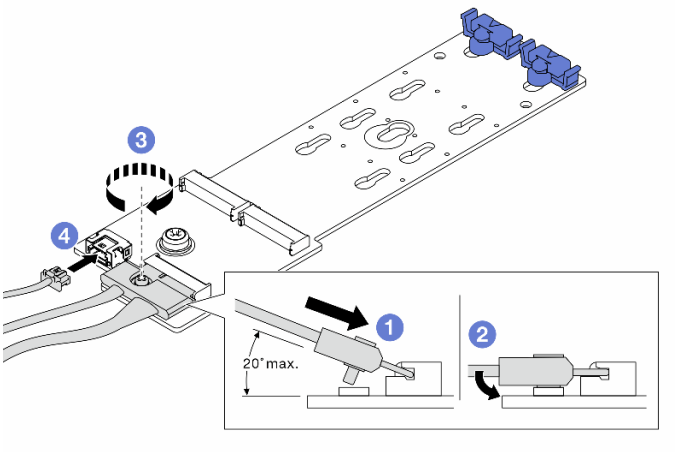


Figure 129. Connecting M.2 cables to ThinkSystem M.2 SATA/NVMe 2-Bay Enablement Kit *or* ThinkSystem M.2 NVMe 2-Bay RAID Enablement Kit

a. 1 Tilt the connector at an angle of 20 degrees or lower, and insert it until its bottom surface reaches the ramp.

b. 2 Press the connector down flat.

c. 3 Tighten the screw on the signal cable.

d. 4 Connect the power cable.

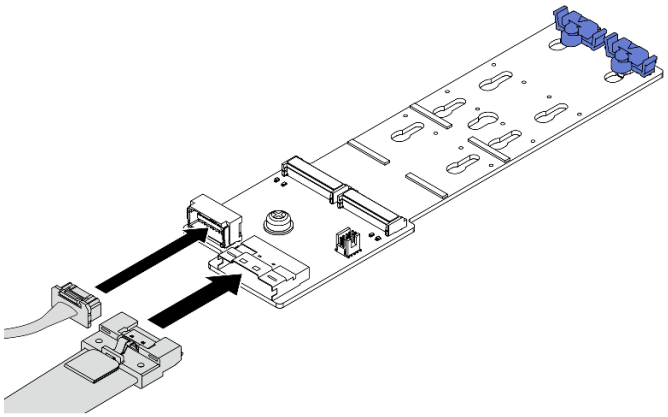


Figure 130. Connecting M.2 cables to ThinkSystem M.2 SATA/x4 NVMe 2-Bay Enablement Kit

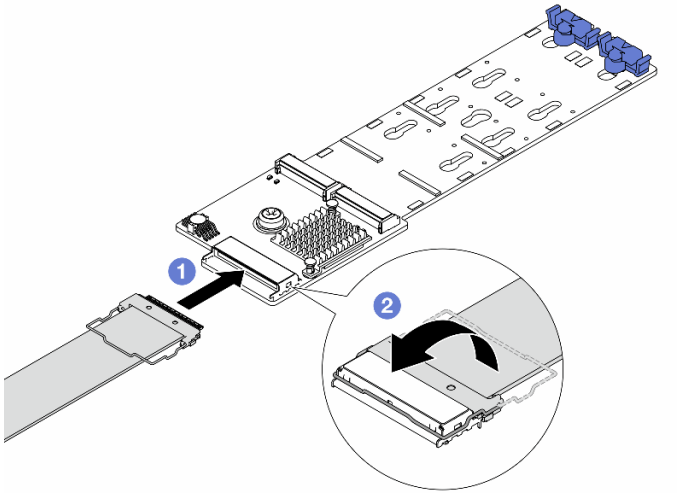


Figure 131. Connecting M.2 cables to ThinkSystem M.2 RAID B540i-2i SATA/NVMe Enablement Kit

a. 1 Connect the M.2 cable to the M.2 backplane.

b. 2 Rotate the latch on the cable as illustrated, and press the latch down until it clicks into place.

Step 4. Install the M.2 drive on the M.2 backplane. See “Install an M.2 drive” on page 162.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 345.

Demo video

Watch the procedure on YouTube

Management NIC adapter replacement

Follow instructions in this section to remove and install the ThinkSystem V3 Management NIC Adapter Kit (management NIC adapter).

Note: If the ThinkSystem V3 Management NIC Adapter Kit (management NIC adapter) is installed on the server, it will not be displayed on the PCIe card list of system management software, such as XCC, LXPM, and so on.

- "Remove the management NIC adapter" on page 170
- "Install the management NIC adapter" on page 171

Remove the management NIC adapter

Follow instructions in this section to remove the management NIC adapter.

About this task

Attention:

- Read "Installation Guidelines" on page 49 and "Safety inspection checklist" on page 50 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 68.
- 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.

Procedure

Step 1. Make preparation for the task.

a. Access the Lenovo XClarity Controller; then, select **Network** in **BMC Configuration** and disable **Ethernet Port 2**.

b. 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 68.

c. Remove the top cover. See "Remove the top cover" on page 342.

d. If your server comes with a riser 1 assembly, remove it first. See "Remove a rear riser assembly" on page 230.

Step 2. Disconnect the cable on the management NIC adapter.

Step 3. Remove the management NIC adapter.

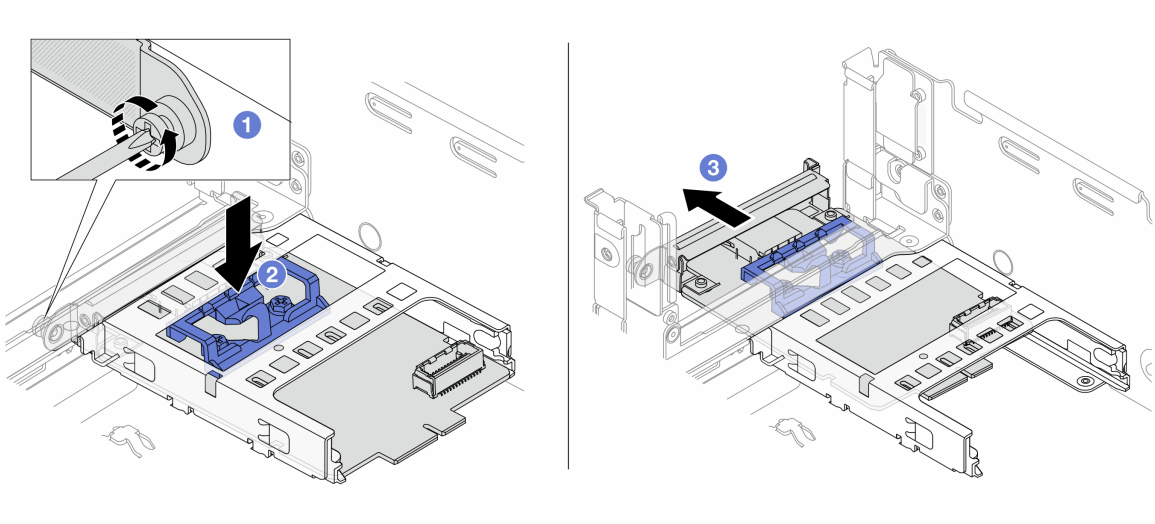


Figure 132. Removing the management NIC adapter

a. 1 Loosen the screw that secures the management NIC adapter.
b. 2 Press and hold the blue latch.
c. 3 Push the management NIC adapter by the latch out from the chassis.

After you finish

1. Install a replacement unit or a filler. See "Install the management NIC adapter" on page 171.
2. 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 management NIC adapter

Follow instructions in this section to install the management NIC adapter.

About this task

- Read "Installation Guidelines" on page 49 and "Safety inspection checklist" on page 50 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 68.
- 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.

Firmware and driver download: You might need to update the firmware or driver after replacing a component.

- Go to https://datacentersupport.lenovo.com/products/servers/thinksystem/sr655v3/7d9e/downloads/driver-list/ to see the latest firmware and driver updates for your server.

- Go to “Update the firmware” on page 495 for more information on firmware updating tools.

Procedure

Step 1. If a filler is installed, remove it.

Step 2. Install the management NIC adapter.

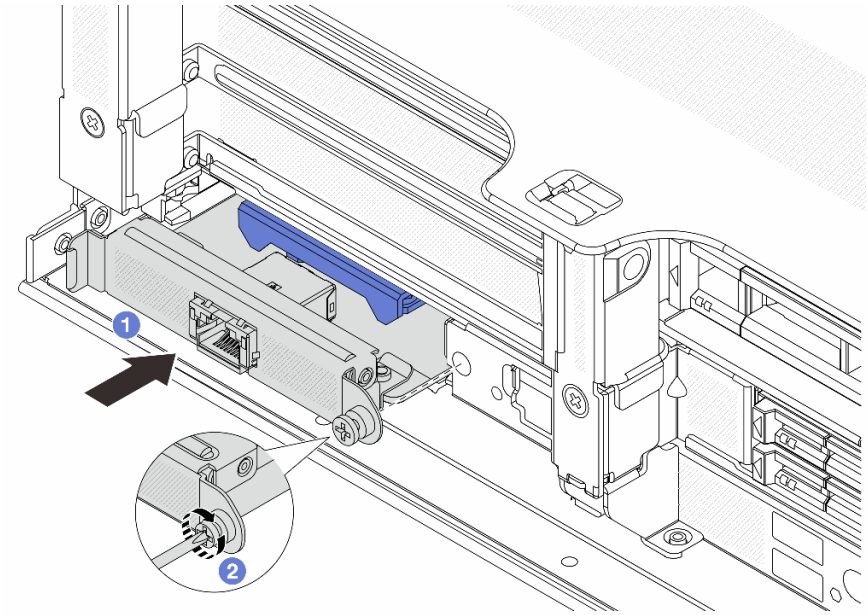


Figure 133. Installing the management NIC adapter

a. 1 Slide the management NIC adapter into the slot until it is fully seated.

b. 2 Tighten the screw to secure the management NIC adapter.

Step 3. Connect the cable to the management NIC adapter. See Chapter 6 “Internal cable routing” on page 347.

Step 4. Install the riser 1 assembly if you have removed it. See “Install a rear riser assembly” on page 239.

After you finish

1. Complete the parts replacement. See “Complete the parts replacement” on page 345.
2. Access the Lenovo XClarity Controller; then, select **Network** in **BMC Configuration** and enable **Ethernet Port 2**.

Demo video

Watch the procedure on YouTube

Manifold replacement (trained technicians only)

Use the following procedures to remove and install the manifolds.

Important:

- This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install the part without proper training and qualification.

- The coolant runs through the cooling system is de-ionized water. For more information about the coolant, see “Water requirements” on page 11.
- The server can be installed in the ThinkSystem Heavy Duty Full Depth Rack Cabinets. For ThinkSystem Heavy Duty Full Depth Rack Cabinets User Guide, see ThinkSystem Heavy Duty Full Depth Rack Cabinets User Guide.
- For more operation and maintenance guidelines on Coolant Distribution Unit (CDU), see Lenovo Neptune DWC RM100 in-rack Coolant Distribution Unit (CDU) Operation & Maintenance Guide.

The illustrations below present the rear views of a rack cabinet; three sets of manifolds and three sets of connection hoses. There are two labels attached to the front of the manifolds, and one label on one end of each hose.

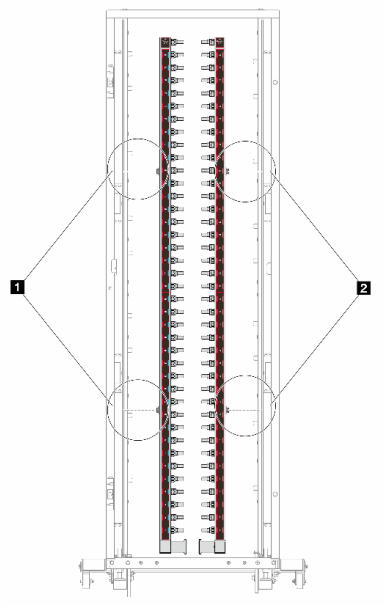


Figure 134. Manifolds in a 42U in-row system

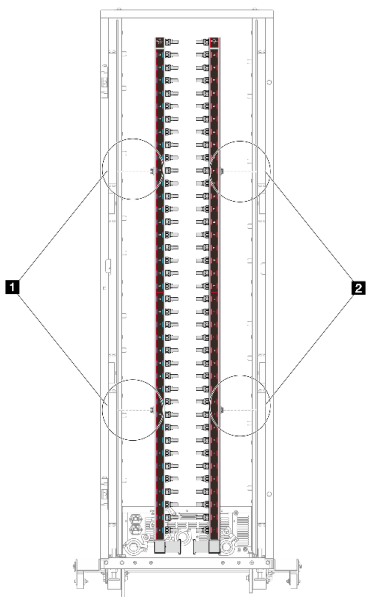


Figure 135. Manifolds in a 42U in-rack system

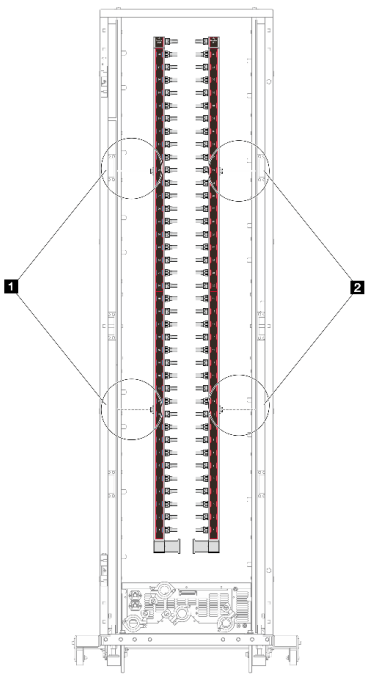


Figure 136. Manifolds in a 48U in-rack system

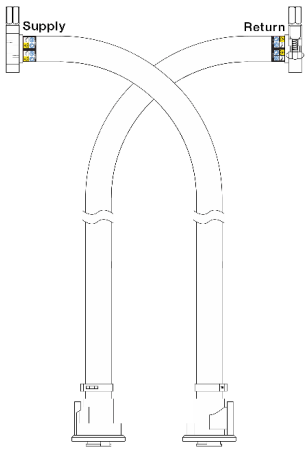


Figure 137. 42U in-row hose kit

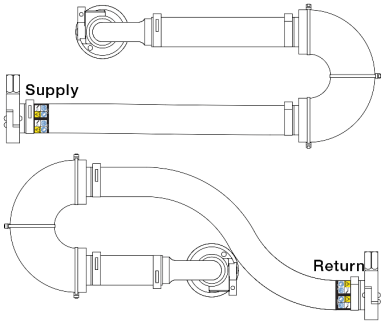


Figure 138. 42U in-rack connection set

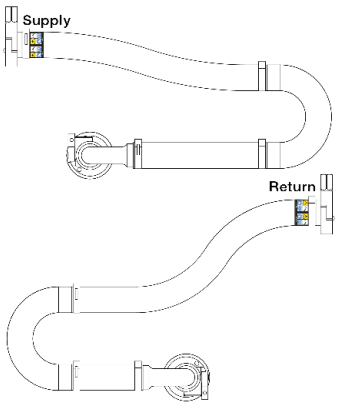


Figure 139. 48U in-rack connection set

- 1 Two left spools on supply manifold
- 2 Two right spools on return manifold
- “Remove the manifold (in-rack system)” on page 175
- “Install the manifold (in-rack system)” on page 182
- “Remove the manifold (in-row system)” on page 194
- “Install the manifold (in-row system)” on page 203

Remove the manifold (in-rack system)

Use this information to remove the manifold in an in-rack direct water cooling system.

About this task

Important: This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install the part without proper training and qualification.

CAUTION:
The coolant might cause irritation to the skin and eyes. Avoid direct contact with the coolant.

S002



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

S011



CAUTION:
Sharp edges, corners, or joints nearby.

S038



CAUTION:
Eye protection should be worn for this procedure.

S040



CAUTION:
Protective gloves should be worn for this procedure.

S042



DANGER

Risk of electric shock due to water or a water solution which is present in this product. Avoid working on or near energized equipment with wet hands or when spilled water is present.

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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 systems.
- Ensure proper handling procedures are followed when working with any chemically treated coolant used in the rack cooling system. Ensure that material safety data sheets (MSDS) and safety information are provided by the coolant chemical treatment supplier and that proper personal protective equipment (PPE) is available as recommended by the coolant chemical treatment supplier. Protective gloves and eyewear may be recommended as a precaution.
- This task requires two or more people.

Procedure

Step 1. Power off the in-rack CDU and disconnect all power cords.

Step 2. Close both ball valves.

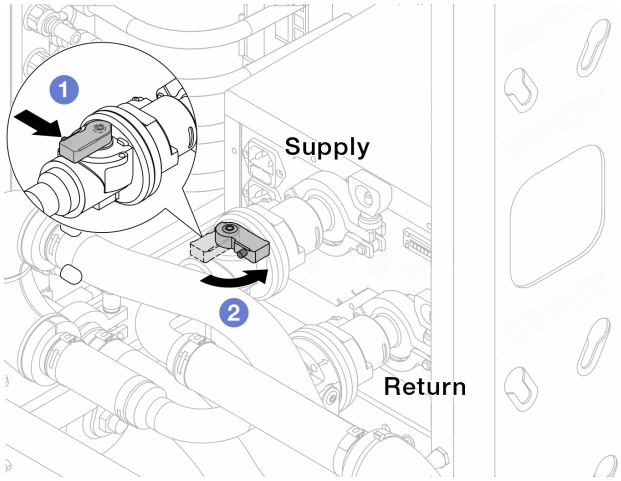


Figure 140. Closing ball valves

a. 1 Press the button on the ball valve switch.

b. 2 Rotate the switch to close the valves as illustrated above.

Step 3. Remove the quick connect plugs to separate the DWCM hoses from the manifold.

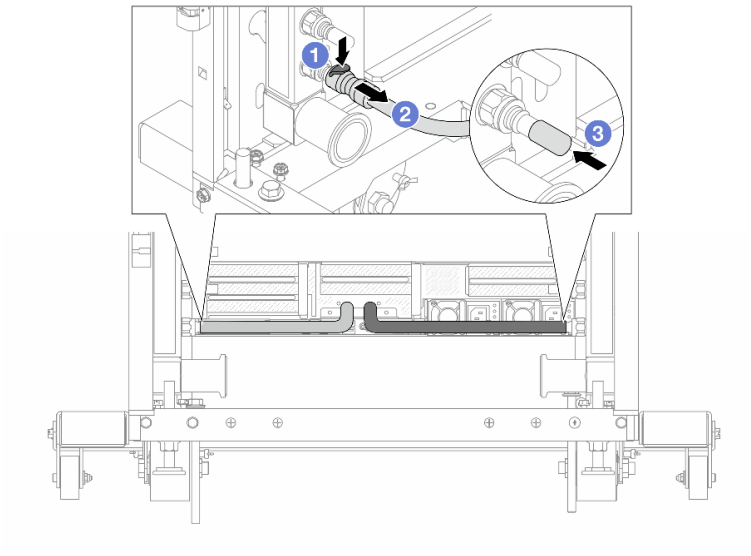


Figure 141. Quick connect plug removal

a. 1 Press the latch down to unlock the hose.
b. 2 Pull the hose off.
c. 3 Re-install the rubber quick connect plug covers to the ports on the manifold.

Step 4. Repeat Step 3 on page 177 to the other manifold.

Step 5. Disengage the connection set from ball valves.

Note: Disengage the return side first, then disengage the supply side.

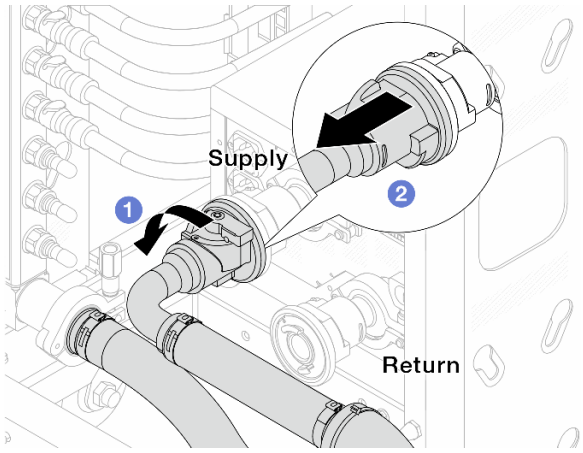


Figure 142. Removing the connection set

a. 1 Rotate the ball valve to the left.
b. 2 Pull the connection set off from ball valve.

Step 6. Remove the return manifold with the connection set attached.

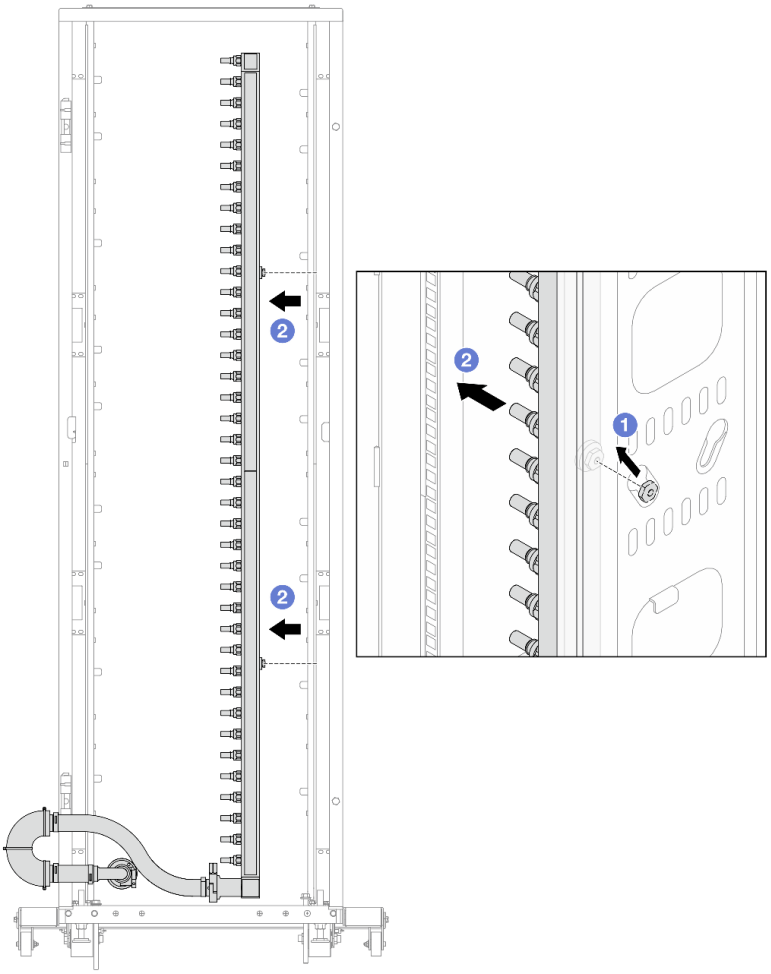


Figure 143. Removing the manifold

a. 1 Hold the manifold with both hands, and lift it upward to relocate the spools from the small openings to large ones on the rack cabinet.

b. 2 Remove the manifold with the connection set attached.

Step 7. Repeat Step 6 on page 177 to the supply manifold.

Notes:

- There is remaining coolant inside the manifold and the connection set. Remove both together and leave the further draining to the next step.
- For more information about the rack cabinet, see ThinkSystem Heavy Duty Full Depth Rack Cabinets User Guide.

Step 8. Install the bleeder kit to the manifold supply side.

Note: This step drains the coolant with the help of a pressure difference inside and outside the supply manifold.

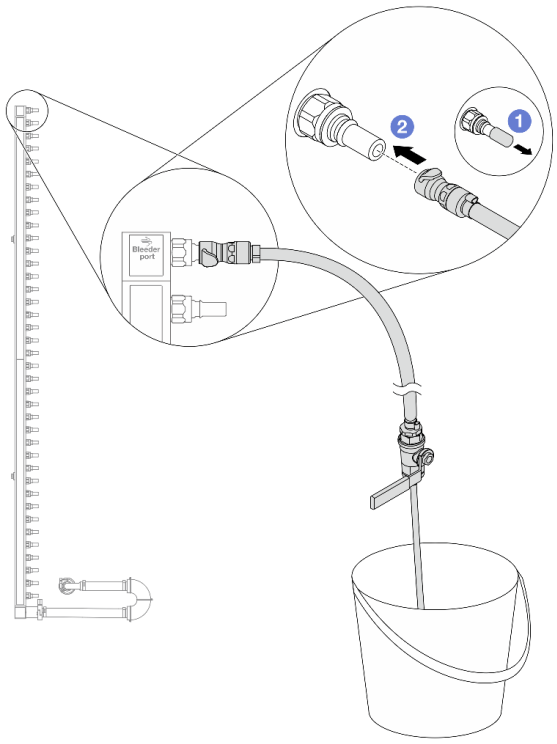


Figure 144. Installing the bleeder kit to the supply side

a. 1 Remove the rubber quick connect plug covers from the ports on the manifold.

b. 2 Plug the bleeder kit to the manifold.

Step 9. Slowly open the bleeder valve to allow a steady stream of coolant to drain. Close the bleeder valve once coolant stops flowing.

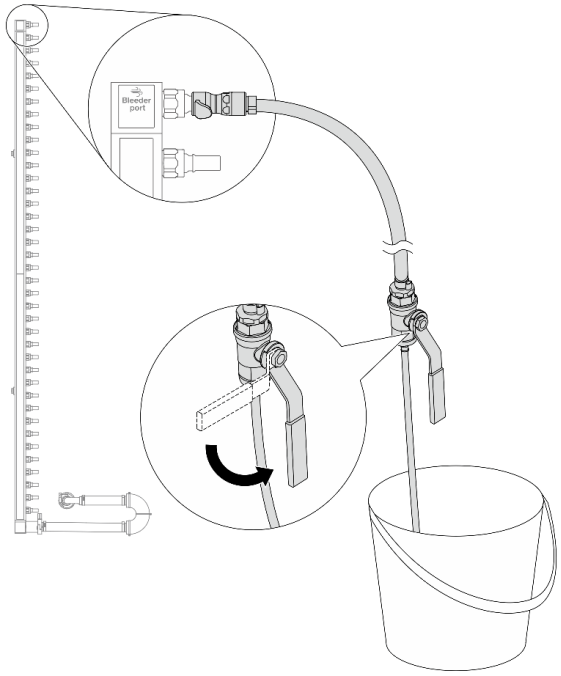


Figure 145. Opening the bleeder valve

Step 10. Install the bleeder kit to the manifold return side.

Note: This step drains the coolant with the help of a pressure difference inside and outside the return manifold.

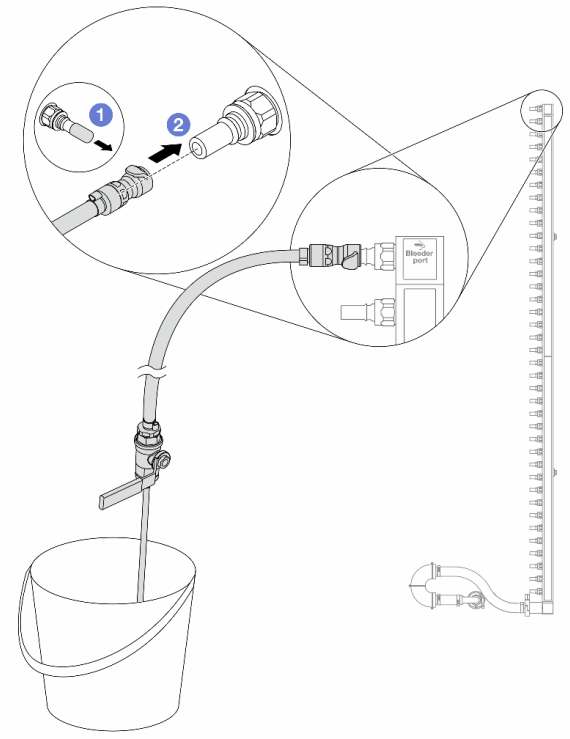


Figure 146. Installing the bleeder kit to the return side

a. 1 Remove the rubber quick connect plug covers from the ports on the manifold.

b. 2 Plug the bleeder kit to the manifold.

Step 11. Slowly open the bleeder valve to allow a steady stream of coolant to drain. Close the bleeder valve once coolant stops flowing.

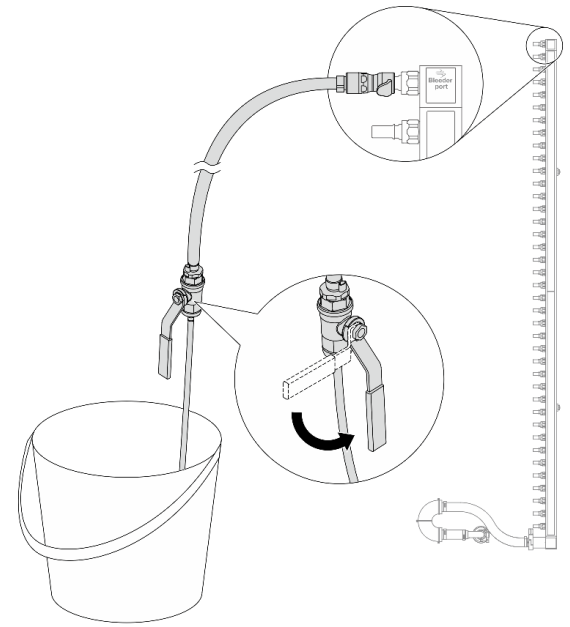


Figure 147. Opening the bleeder valve

Step 12. Separate the return manifold from the connection set in a dry and clean work area, and keep a bucket and absorbent cloths around to collect any coolant that may drain out.

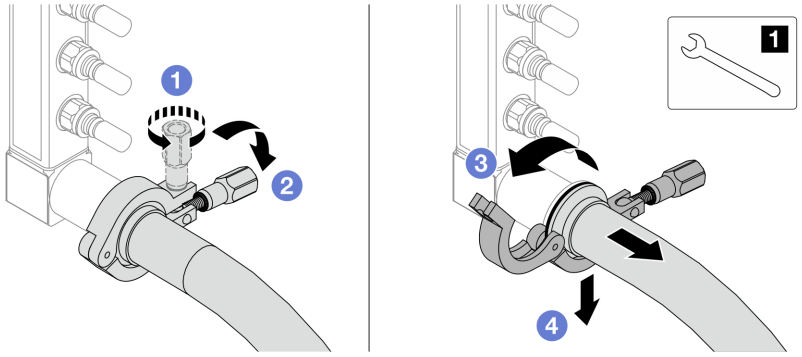


Figure 148. Separating the manifold from the connection set

1 17 mm wrench

a. 1 Loosen the screw that locks the ferrule.
b. 2 Put the screw down.
c. 3 Open the clamp.
d. 4 Remove the ferrule and connection set from the manifold.

Step 13. Repeat Step 12 on page 182 to the supply manifold.

Step 14. For better sanitation, keep the manifold ports and connection sets dry and clean. Re-install quick connect plug covers or any covers that protect connection sets and manifold ports.

Step 15. To remove the server from the rack, see “Remove the server from rack” on page 68.

Step 16. To remove the Direct Water Cooling Module (DWCM), see “Remove the Lenovo Neptune Processor Direct Water Cooling Module” on page 150.

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 manifold (in-rack system)

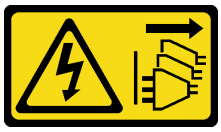
Use this information to install the manifold in an in-rack direct water cooling system.

About this task

Important: This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install the part without proper training and qualification.

CAUTION:
The coolant might cause irritation to the skin and eyes. Avoid direct contact with the coolant.

S002



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

S011



CAUTION:
Sharp edges, corners, or joints nearby.

S038



CAUTION:
Eye protection should be worn for this procedure.

S040



CAUTION:
Protective gloves should be worn for this procedure.

S042



DANGER

Risk of electric shock due to water or a water solution which is present in this product. Avoid working on or near energized equipment with wet hands or when spilled water is present.

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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 systems.
- Ensure proper handling procedures are followed when working with any chemically treated coolant used in the rack cooling system. Ensure that material safety data sheets (MSDS) and safety information are provided by the coolant chemical treatment supplier and that proper personal protective equipment (PPE) is available as recommended by the coolant chemical treatment supplier. Protective gloves and eyewear may be recommended as a precaution.
- This task requires two or more people.

Procedure

Step 1. Make sure that the in-rack CDU and other devices are not powered on, and that all external cables are disconnected.

Step 2. To install the Direct Water Cooling Module (DWCM), see “Install the Lenovo Neptune Processor Direct Water Cooling Module” on page 154.

Step 3. To install the server into the rack, see “Install the server to rack” on page 71.

Step 4. Install the manifold.

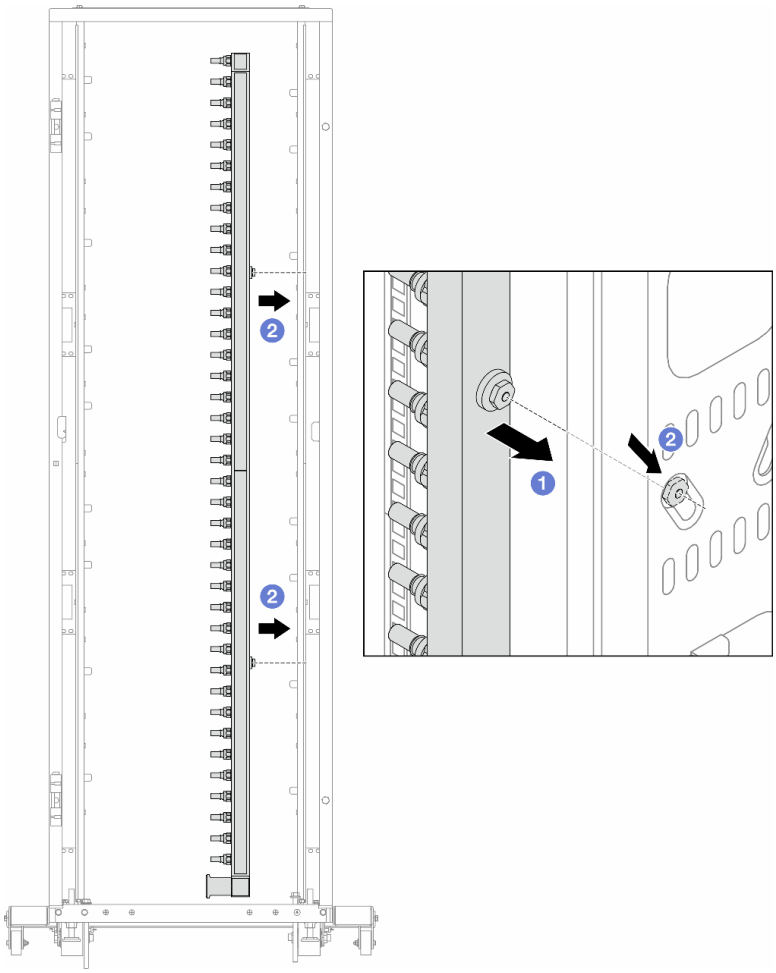


Figure 149. Installing the manifold

a. (1) Hold the manifold with both hands, and mount it onto the rack cabinet.

b. (2) Align the spools with holes, and clutch the cabinet.

Note: For more information about the rack cabinet, see ThinkSystem Heavy Duty Full Depth Rack Cabinets User Guide.

Step 5. Repeat Step 4 on page 184 to the other manifold.

Step 6. Separate ball valves from connection sets.

Note: One end of a connection set comes with a detachable ball valve, and the two parts are connected by a ferrule. Remove the ferrule to separate the ball valve that is bound for CDU in Step 7 on page 186.

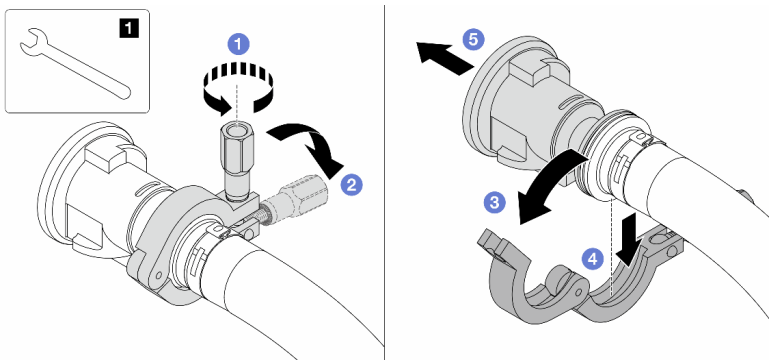


Figure 150. Separating ball valves

1 17 mm wrench

a. 1 Loosen the screw that locks the ferrule.
b. 2 Put the screw down.
c. 3 Open the clamp.
d. 4 Remove the ferrule.
e. 5 Remove the ball valve from connection set.

Step 7. Install ball valves to CDU.

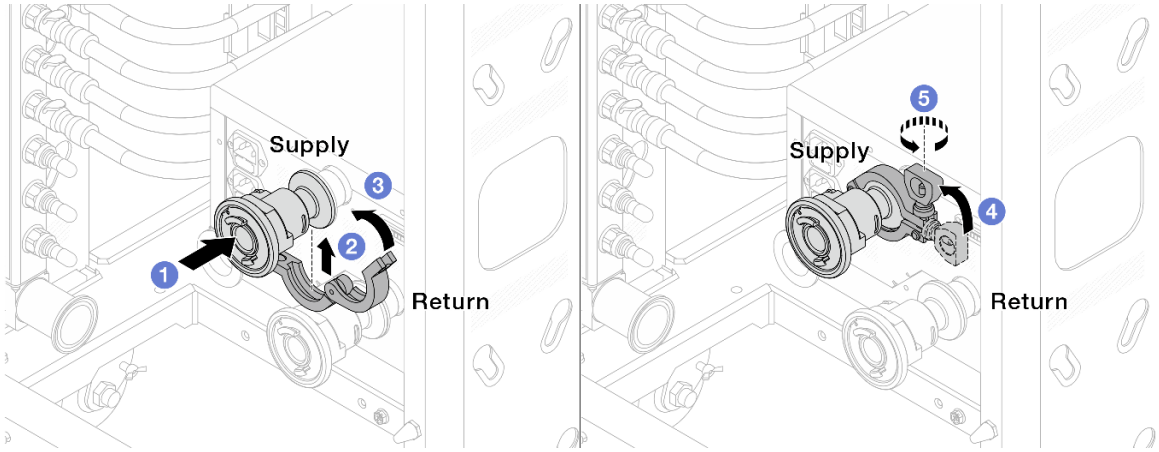


Figure 151. Installing ball valves

a. 1 Connect the ball valves to **Supply** and **Return** ports.
b. 2 Wrap the interface around with the clamp.
c. 3 Close the clamp.
d. 4 Lift the screw upright.
e. 5 Tighten the screw and make sure that it is secured.

Step 8. Install the connection set to manifolds.

Note: Install the supply side first, then install the return side.

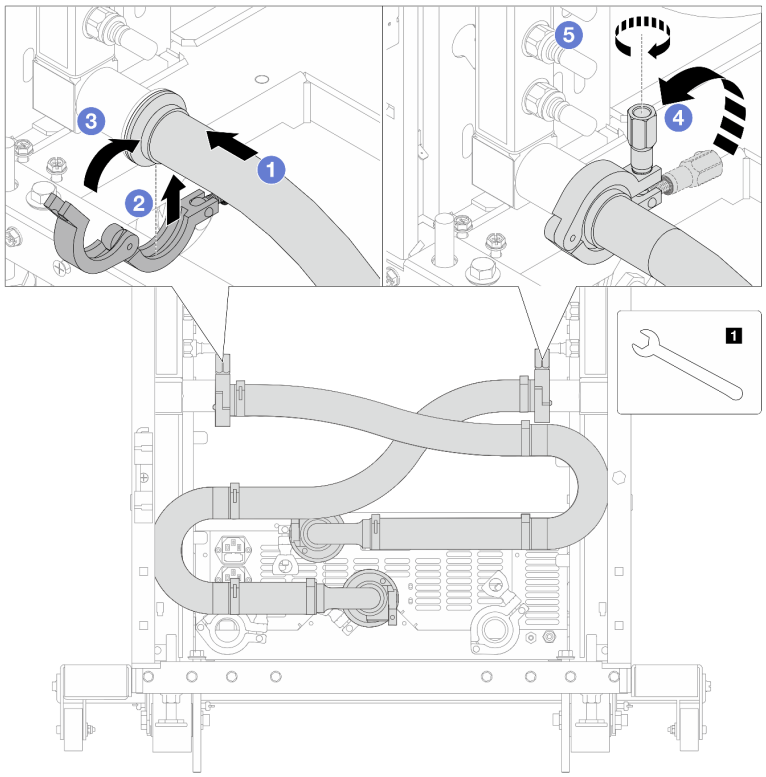


Figure 152. Installing the connection set

1	17 mm wrench

a. 1 Connect the connection set to both manifolds.
b. 2 Wrap the interface around with the clamp.
c. 3 Close the clamp.
d. 4 Lift the screw upright.
e. 5 Tighten the screw and make sure that it is secured.

Step 9. Install the connection set to ball valves.

Note: Install the supply side first, then install the return side.

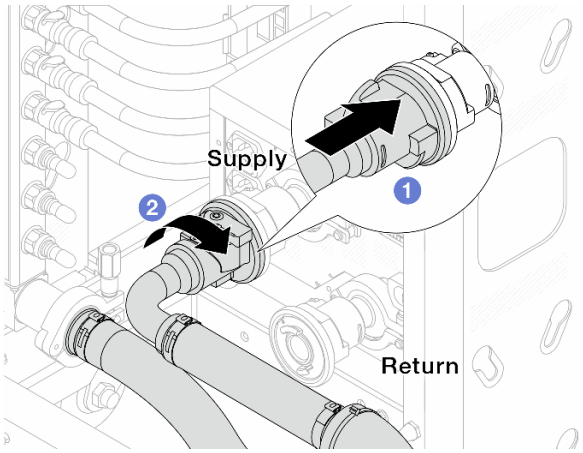


Figure 153. Connecting ball valves

a. 1 Connect ball valves.
b. 2 Rotate to the right to lock the two valves.

Step 10. Prepare the in-rack CDU.

a. Connect the feed hose to inlet port on the front.

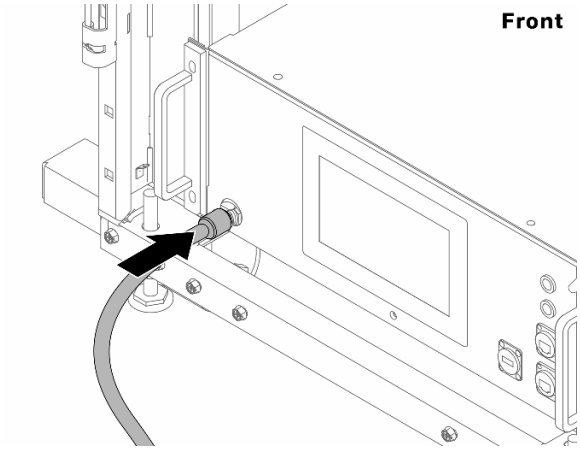


Figure 154. The front of CDU

b. Connect hoses to the drain port and bleeder port on the rear.

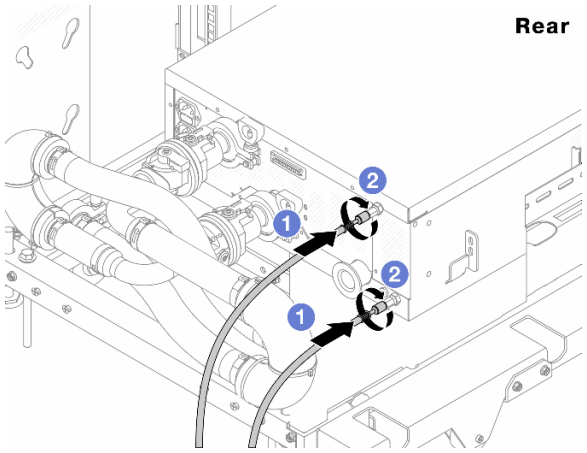


Figure 155. The rear of CDU

1. Connect both drain and bleeder hoses to CDU.
2. Rotate the connectors to the right to secure the connection.

Important:

- For more operation and maintenance guidelines, see Lenovo Neptune DWC RM100 in-rack Coolant Distribution Unit (CDU) Operation & Maintenance Guide.
- For service support, associated warranty and maintenance sizing, contact Lenovo Professional Services team at cdusupport@lenovo.com.

Step 11. Install the quick connect plug to the manifolds.

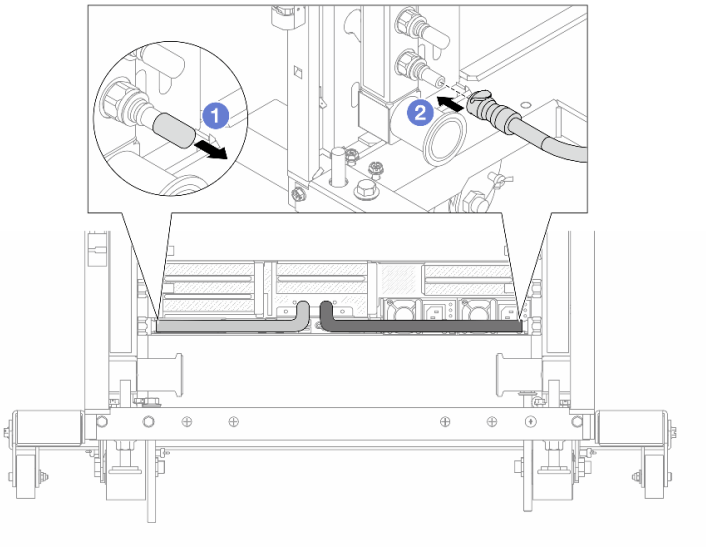


Figure 156. Installing the quick connect plug

a. 1 Remove the rubber quick connect plug covers from the ports on the manifold.

b. 2 Connect the plug to the manifold port.

Step 12. Install the bleeder kit to the manifold supply side.

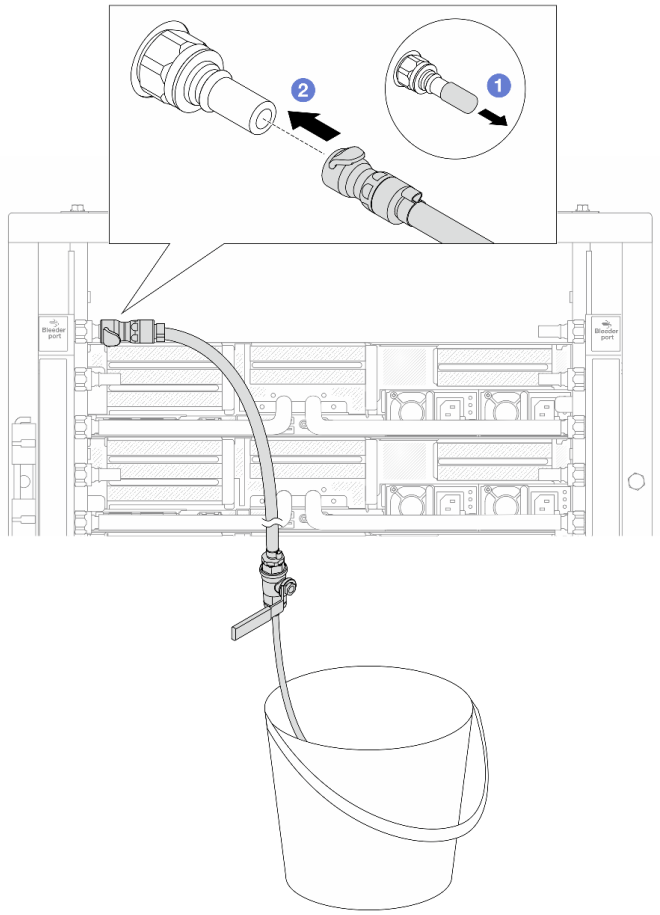


Figure 157. Installing the bleeder kit to the supply side

a. 1 Remove the rubber quick connect plug covers from the ports on the manifold.

b. 2 Plug the bleeder kit to the manifold.

Step 13. To push the air out of the manifolds, open ball valve switches to let coolant fill the system.

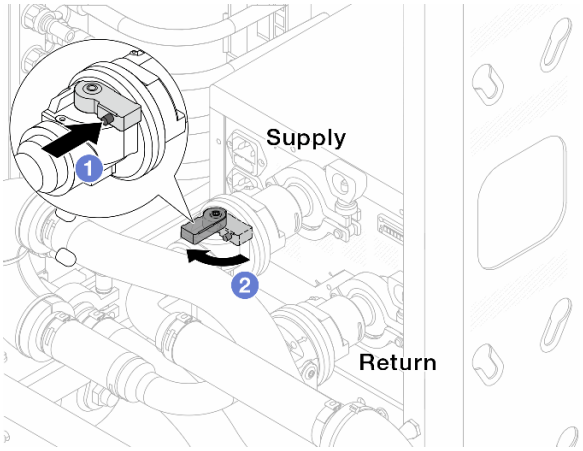


Figure 158. Opening ball valves

a. 1 Press the button on the ball valve switch.

b. (2) Rotate the switch to fully open the valves as illustrated above.

Attention:

- Pay close attention to the front display of CDU and maintain the system pressure at **one bar**.
- For more information about coolant temperature and system pressure requirements, see “Water requirements” on page 11.

Step 14. Slowly open the bleeder valve to conduct the air out of the hose. Close the bleeder valve once a steady stream of water flows into the bucket or there are only minimal bubbles in the bleeder hose.

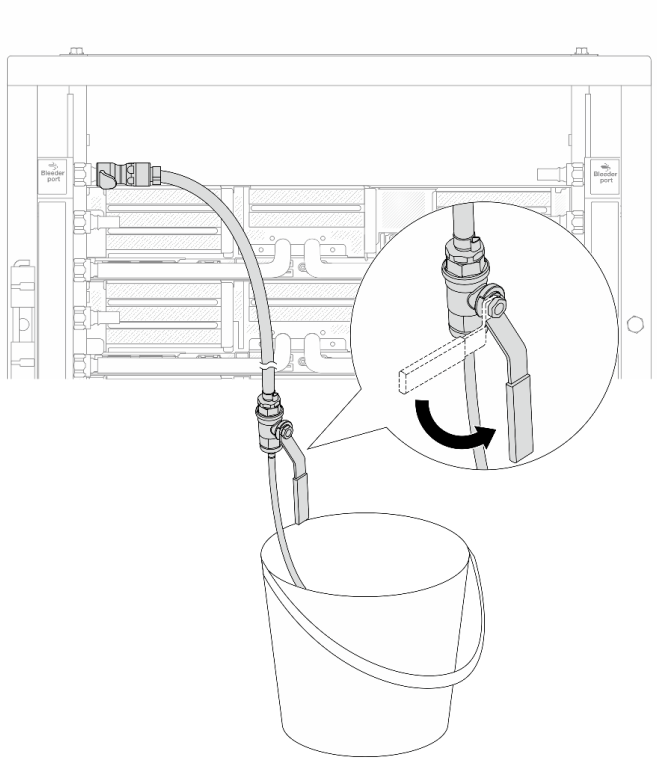


Figure 159. Opening the bleeder valve on the supply side

Step 15. Install the bleeder kit to the manifold return side.

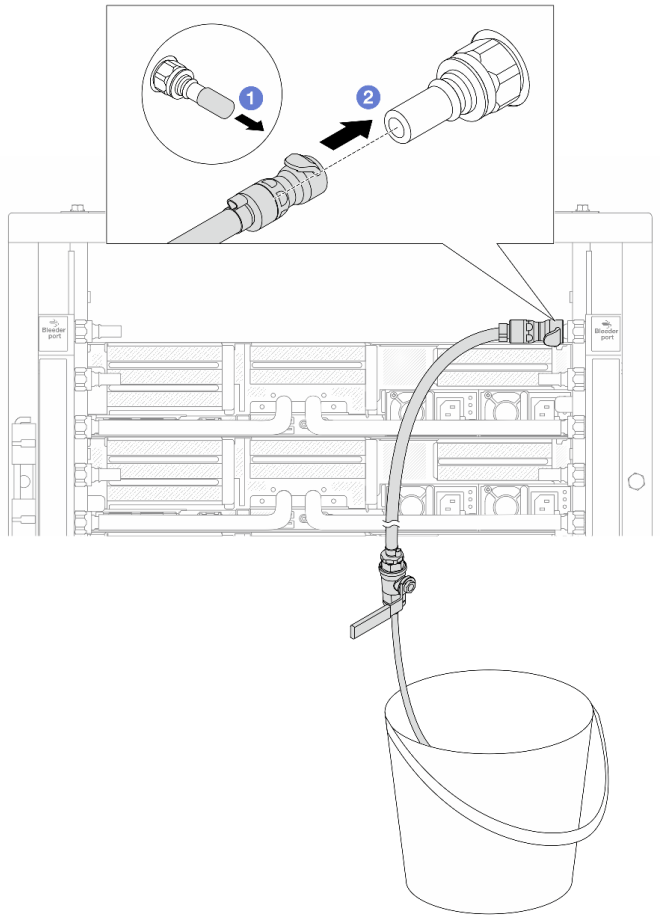


Figure 160. Installing the bleeder kit on the return side

a. 1 Remove the rubber quick connect plug covers from the ports on the manifold.

b. 2 Plug the bleeder kit to the manifold.

Step 16. Slowly open the bleeder valve to conduct the air out of the hose. Close the bleeder valve once a steady stream of water flows into the bucket or there are only minimal bubbles in the bleeder hose.

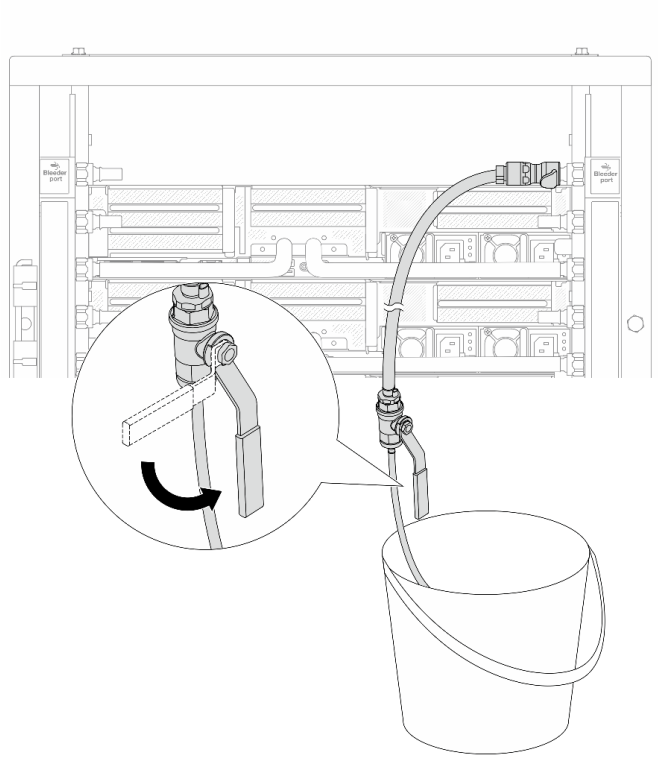


Figure 161. Opening the bleeder valve on the return side

Step 17. (For precaution) To make sure that the air inside is as little as possible, re-install the bleeder kit back to manifold supply side and do it one more time. Close the bleeder valve once a steady stream of water flows into the bucket or there are only minimal bubbles in the bleeder hose.

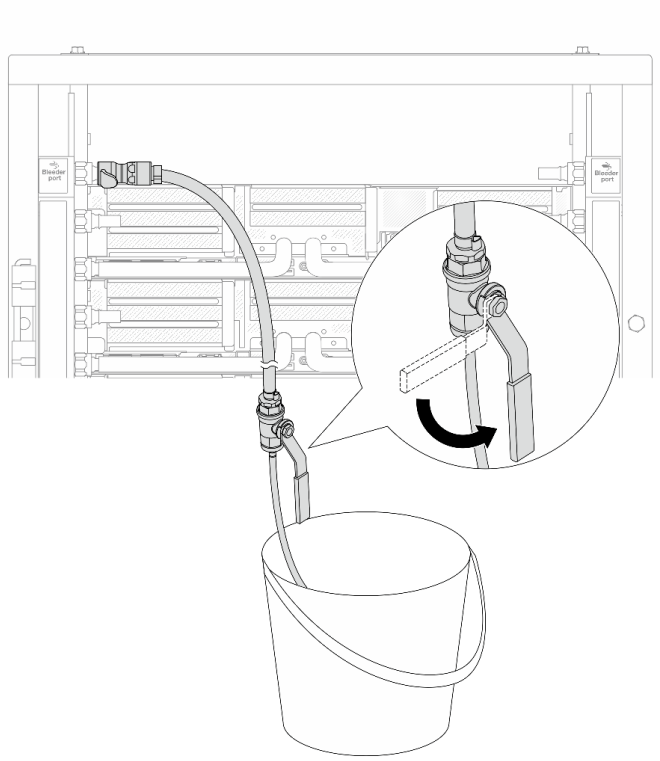


Figure 162. Opening the bleeder valve on the supply side

Step 18. Once completed, pay close attention to the front display of CDU and maintain the system pressure at **one bar**. For more information about coolant temperature and system pressure requirements, see “Water requirements” on page 11.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 345.

Demo video

Watch the procedure on YouTube

Remove the manifold (in-row system)

Use this information to remove the manifold in an in-row direct water cooling system.

About this task

Important: This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install the part without proper training and qualification.

CAUTION:
The coolant might cause irritation to the skin and eyes. Avoid direct contact with the coolant.

S002



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

S011



CAUTION:
Sharp edges, corners, or joints nearby.

S038



CAUTION:
Eye protection should be worn for this procedure.

S040



CAUTION:
Protective gloves should be worn for this procedure.

S042



DANGER

Risk of electric shock due to water or a water solution which is present in this product. Avoid working on or near energized equipment with wet hands or when spilled water is present.

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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 systems.
- Ensure proper handling procedures are followed when working with any chemically treated coolant used in the rack cooling system. Ensure that material safety data sheets (MSDS) and safety information are provided by the coolant chemical treatment supplier and that proper personal protective equipment (PPE) is available as recommended by the coolant chemical treatment supplier. Protective gloves and eyewear may be recommended as a precaution.
- This task requires two or more people.

Procedure

Step 1. Close both ball valves.

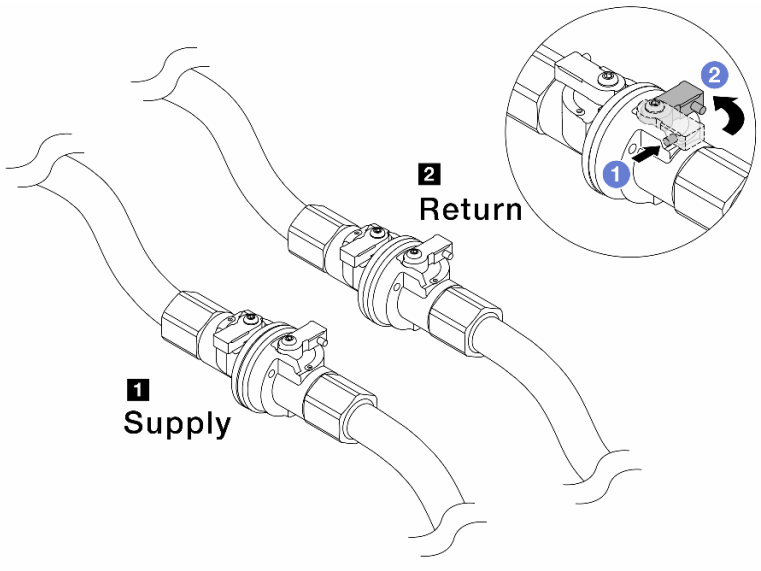


Figure 163. Closing ball valves

Note:

1 Manifold supply connects to facility supply	**2 Manifold return connects to facility return**

a. 1 Press the button on the ball valve switch.

b. 2 Rotate the switches to close the valves as illustrated above.

Step 2. Remove the quick connect plugs to separate the DWCM hoses from the manifold.

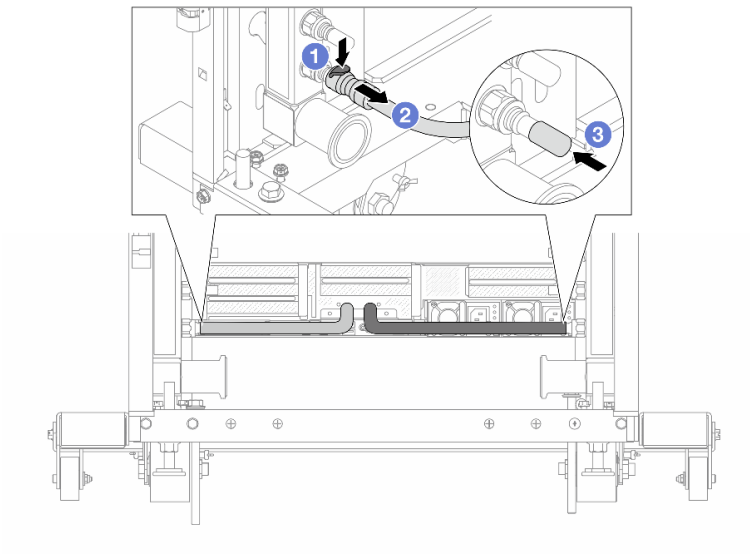


Figure 164. Quick connect plug removal

a. 1 Press the latch down to unlock the hose.
b. 2 Pull the hose off.
c. 3 Re-install the rubber quick connect plug covers to the ports on the manifold.

Step 3. Repeat Step 2 on page 196 to the other manifold.

Step 4. Remove the manifold with the hose kit attached.

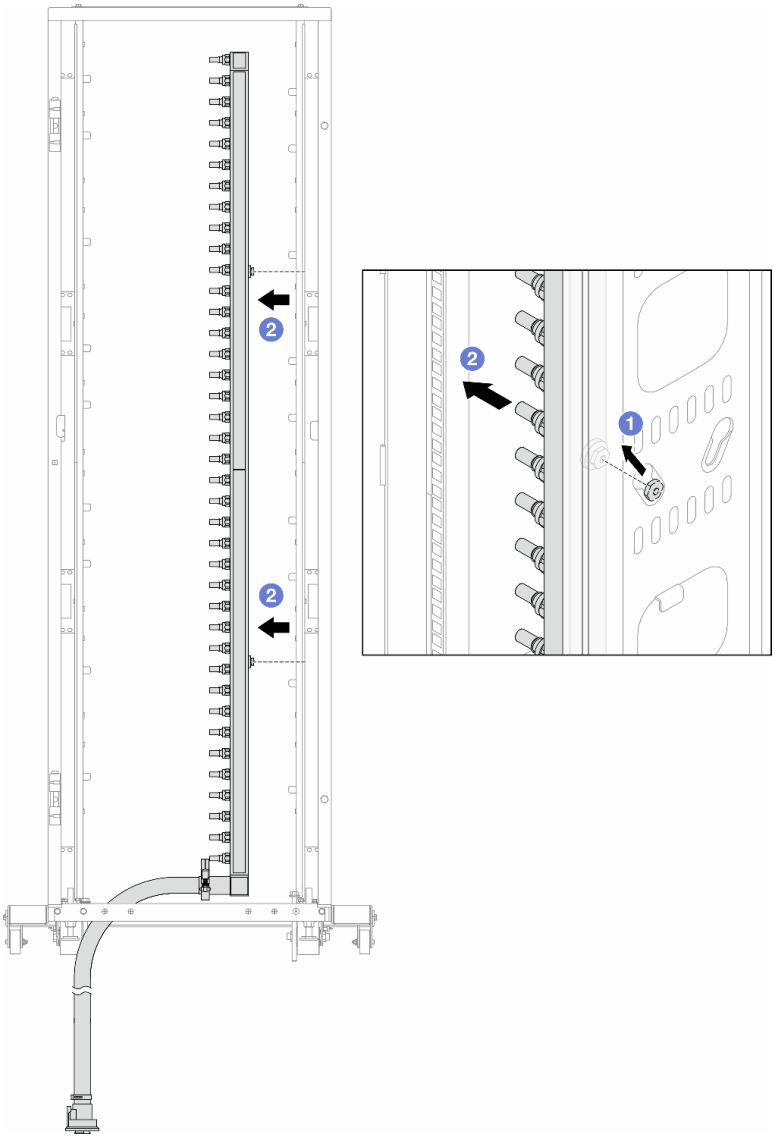


Figure 165. Removing the manifold

a. 1 Hold the manifold with both hands, and lift it upward to relocate the spools from the small openings to large ones on the rack cabinet.

b. 2 Remove the manifold with the hose kit attached.

Step 5. Repeat Step 4 on page 197 to the other manifold.

Notes:

- There is remaining coolant inside the manifold and the hose kit. Remove both together and leave the further draining to the next step.
- For more information about the rack cabinet, see ThinkSystem Heavy Duty Full Depth Rack Cabinets User Guide.

Step 6. Install the bleeder kit to the manifold supply side.

Note: This step drains the coolant with the help of a pressure difference inside and outside the supply manifold.

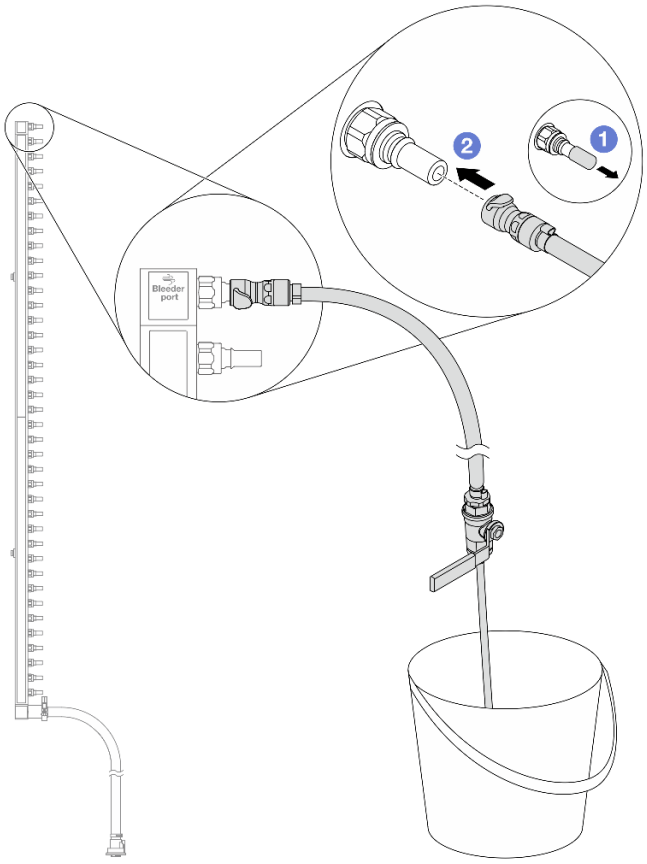


Figure 166. Installing the bleeder kit to the supply side

a. 1 Remove the rubber quick connect plug covers from the ports on the manifold.

b. 2 Plug the bleeder kit to the manifold.

Step 7. Slowly open the bleeder valve to allow a steady stream of coolant to drain. Close the bleeder valve once coolant stops flowing.

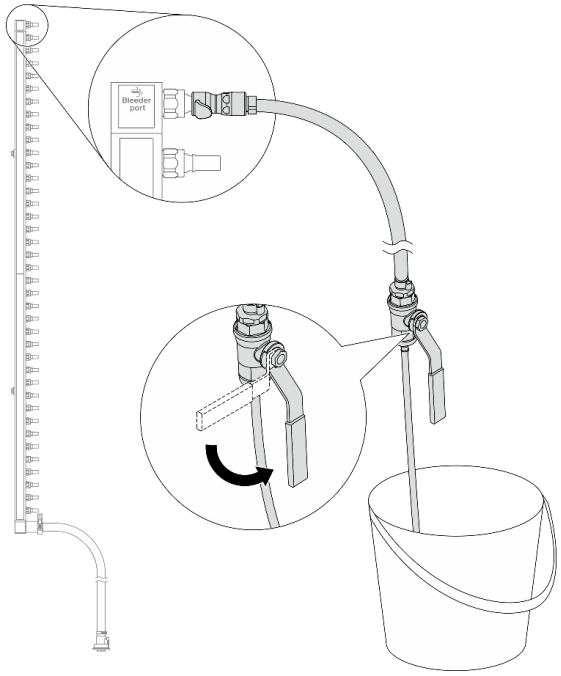


Figure 167. Opening the bleeder valve

Step 8. Install the bleeder kit to the manifold return side.

Note: This step drains the coolant with the help of a pressure difference inside and outside the return manifold.

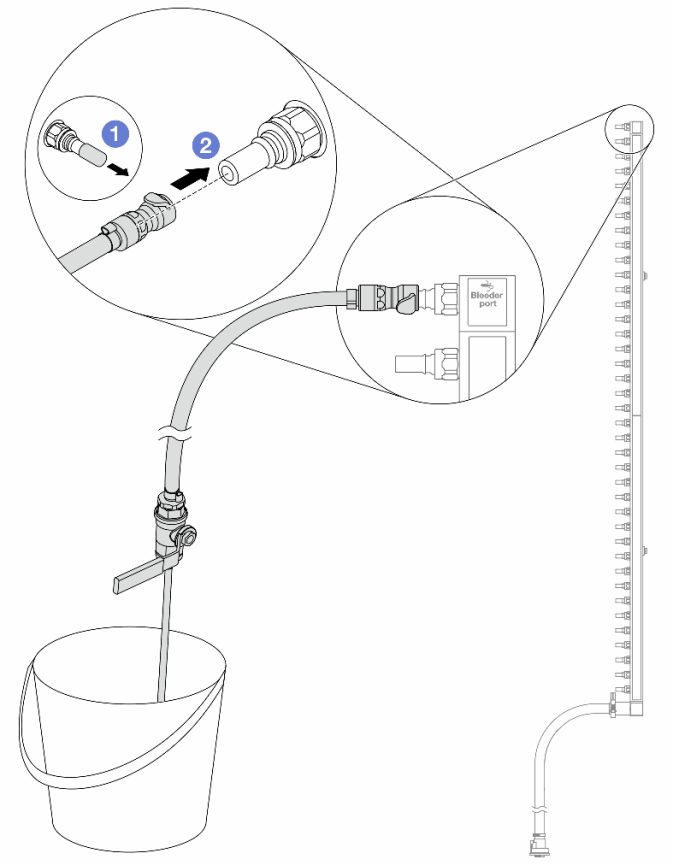


Figure 168. Installing the bleeder kit to the return side

a. 1 Remove the rubber quick connect plug covers from the ports on the manifold.

b. 2 Plug the bleeder kit to the manifold.

Step 9. Slowly open the bleeder valve to allow a steady stream of coolant to drain. Close the bleeder valve once coolant stops flowing.

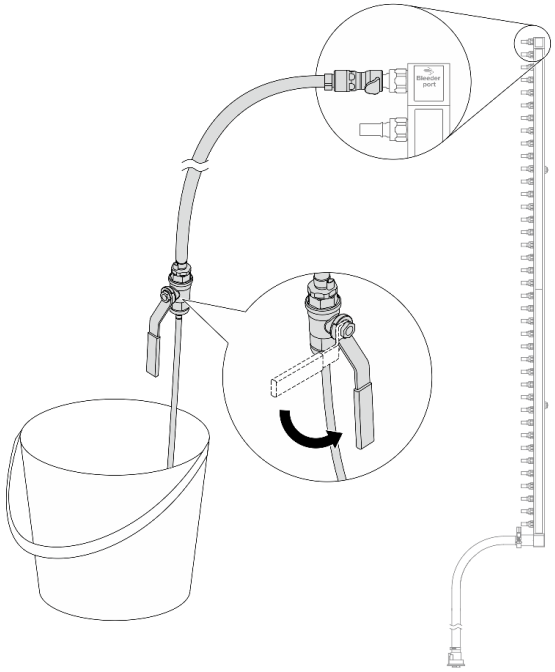


Figure 169. Opening the bleeder valve

Step 10. Separate the manifold from the hose kit in a dry and clean work area, and keep a bucket and absorbent cloths around to collect any coolant that may drain out.

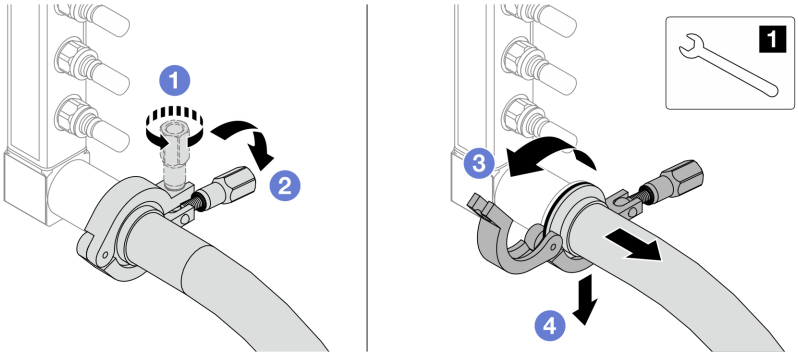


Figure 170. Separating the manifold from the hose kit

1 17 mm wrench

a. 1 Loosen the screw that locks the ferrule.
b. 2 Put the screw down.
c. 3 Open the clamp.
d. 4 Remove the ferrule and hose kit from the manifold.

Step 11. Repeat Step 10 on page 202 to the other manifold.

Step 12. For better sanitation, keep the manifold ports and hose kits dry and clean. Re-install quick connect plug covers or any covers that protect hose kits and manifold ports.

Step 13. To remove the server from the rack, see “Remove the server from rack” on page 68.

Step 14. To remove the Direct Water Cooling Module (DWCM), see “Remove the Lenovo Neptune Processor Direct Water Cooling Module” on page 150.

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 manifold (in-row system)

Use this information to install the manifold in an in-row direct water cooling system.

About this task

Important: This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install the part without proper training and qualification.

CAUTION:
The coolant might cause irritation to the skin and eyes. Avoid direct contact with the coolant.

S002



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

S011



CAUTION:
Sharp edges, corners, or joints nearby.

S038



CAUTION:
Eye protection should be worn for this procedure.

S040



CAUTION:
Protective gloves should be worn for this procedure.

S042



DANGER

Risk of electric shock due to water or a water solution which is present in this product. Avoid working on or near energized equipment with wet hands or when spilled water is present.

Attention:

- Read "Installation Guidelines" on page 49 and "Safety inspection checklist" on page 50 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 68.
- 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 systems.
- Ensure proper handling procedures are followed when working with any chemically treated coolant used in the rack cooling system. Ensure that material safety data sheets (MSDS) and safety information are provided by the coolant chemical treatment supplier and that proper personal protective equipment (PPE) is available as recommended by the coolant chemical treatment supplier. Protective gloves and eyewear may be recommended as a precaution.
- This task requires two or more people.

Procedure

Step 1. To install the Direct Water Cooling Module (DWCM), see "Install the Lenovo Neptune Processor Direct Water Cooling Module" on page 154.

Step 2. To install the server into the rack, see "Install the server to rack" on page 71.

Step 3. Install the manifold.

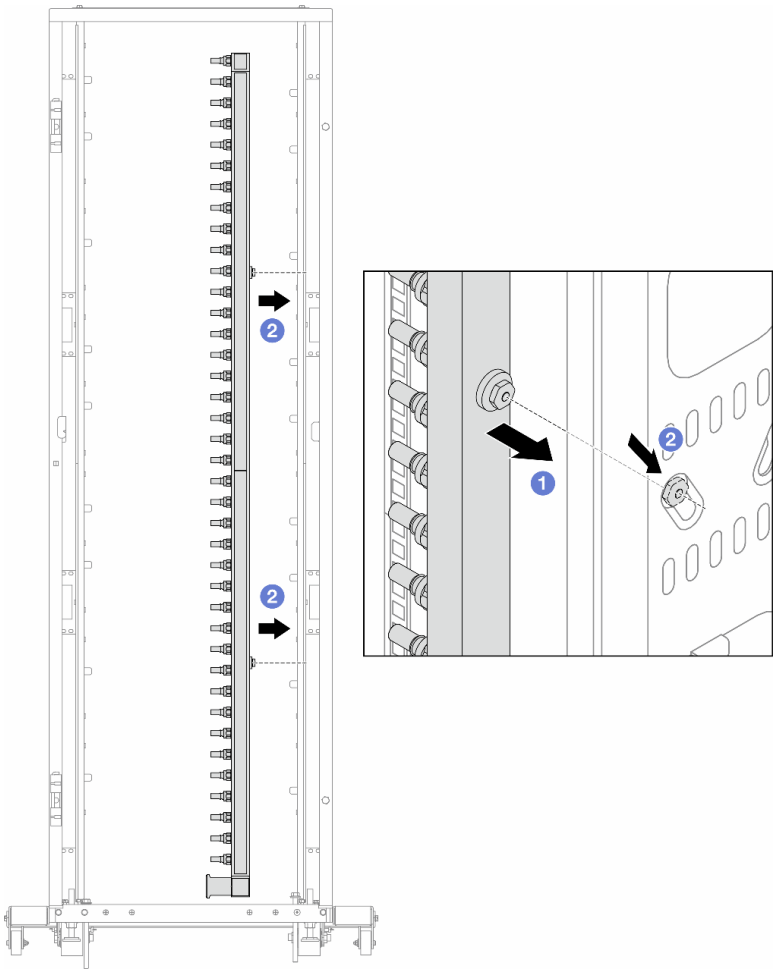


Figure 171. Installing the manifold

a. 1 Hold the manifold with both hands, and mount it onto the rack cabinet.

b. 2 Align the spools with holes, and clutch the cabinet.

Note: For more information about the rack cabinet, see ThinkSystem Heavy Duty Full Depth Rack Cabinets User Guide.

Step 4. Repeat Step 3 on page 204 to the other manifold.

Step 5. Install the quick connect plug to the manifolds.

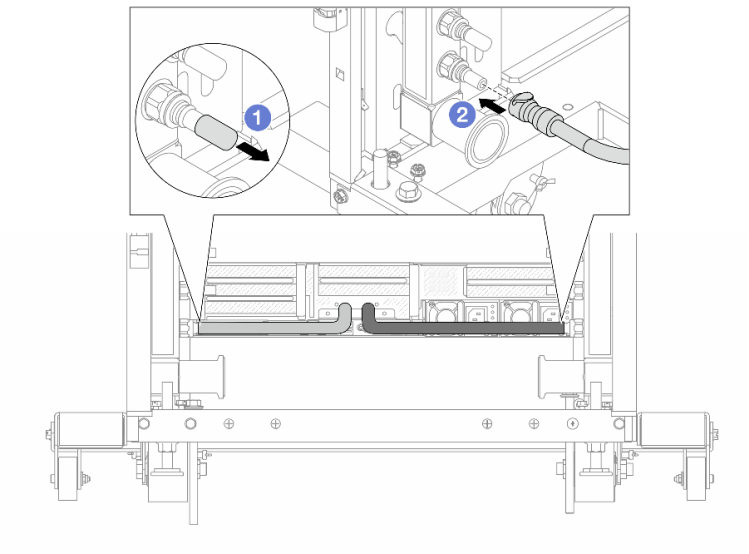


Figure 172. Installing the quick connect plug

a. 1 Remove the rubber quick connect plug covers from the ports on the manifold.

b. 2 Connect the plug to the manifold port.

Step 6. Install the hose kit to the manifold.

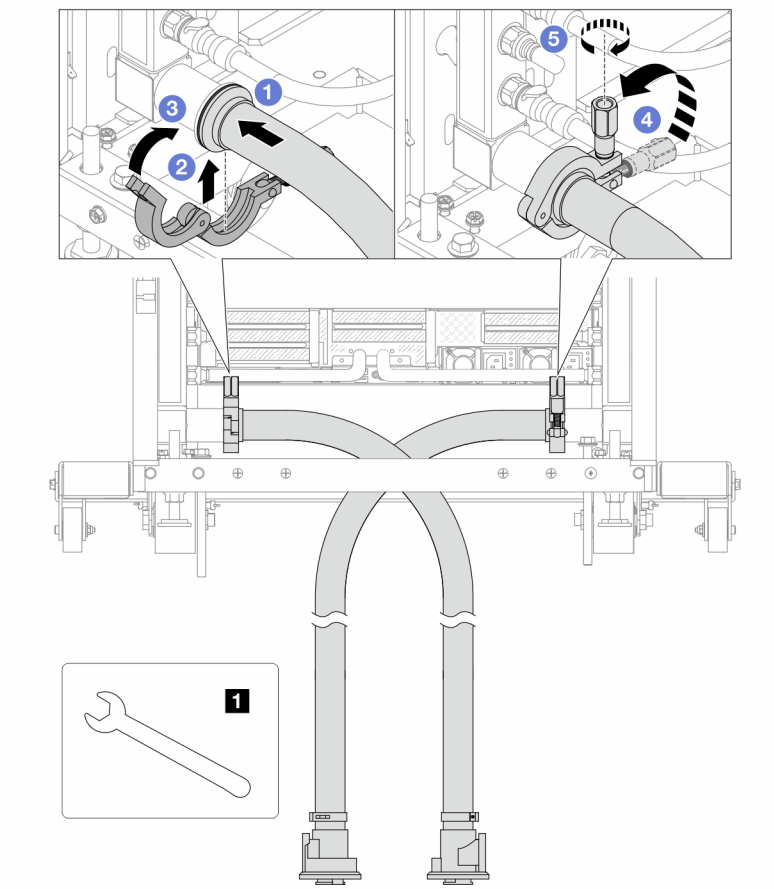


Figure 173. Installing the hose kit

1 17 mm wrench

a. 1 Connect the hose kits to both manifolds.
b. 2 Wrap the interface around with the clamp.
c. 3 Close the clamp.
d. 4 Lift the screw upright.
e. 5 Tighten the screw and make sure that it is secured.

Step 7. Install the bleeder kit to the manifold supply side.

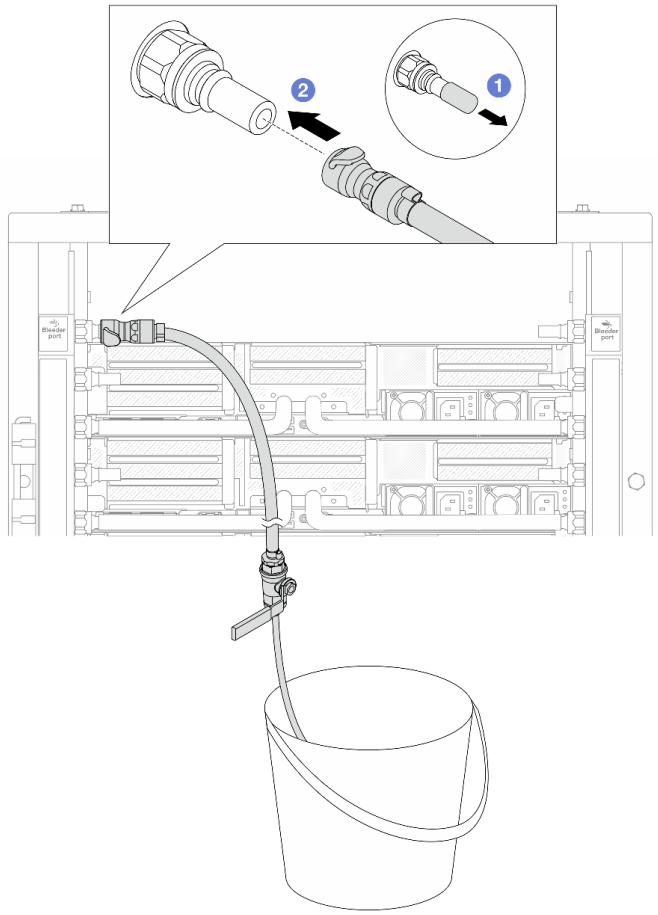


Figure 174. Installing the bleeder kit to the supply side

a. 1 Remove the rubber quick connect plug covers from the ports on the manifold.

b. 2 Plug the bleeder kit to the manifold.

Step 8. To push the air out of the manifold supply side, connect **facility supply** to **manifold return**.

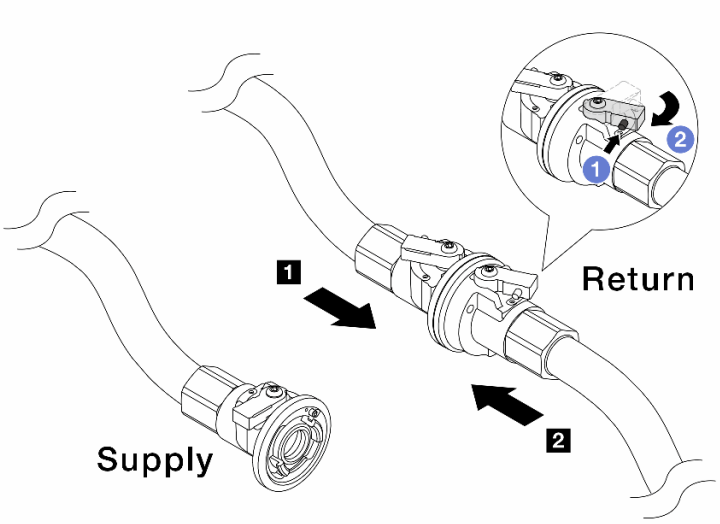


Figure 175. Facility supply to manifold return

a. 1 Press the button on the ball valve switch.

b. 2 Rotate both switches open and stop at around 1/4 of 90 degrees.

Attention:

- Open the ball valves on 1 manifold return side and 2 facility supply side, while keep manifold supply side closed.
- Do not fully open the ball valves, or the water flow gets too rapid to contain.

Step 9. Slowly open the bleeder valve to conduct the air out of the hose. Close the bleeder valve once a steady stream of water flows into the bucket or there are only minimal bubbles in the bleeder hose.

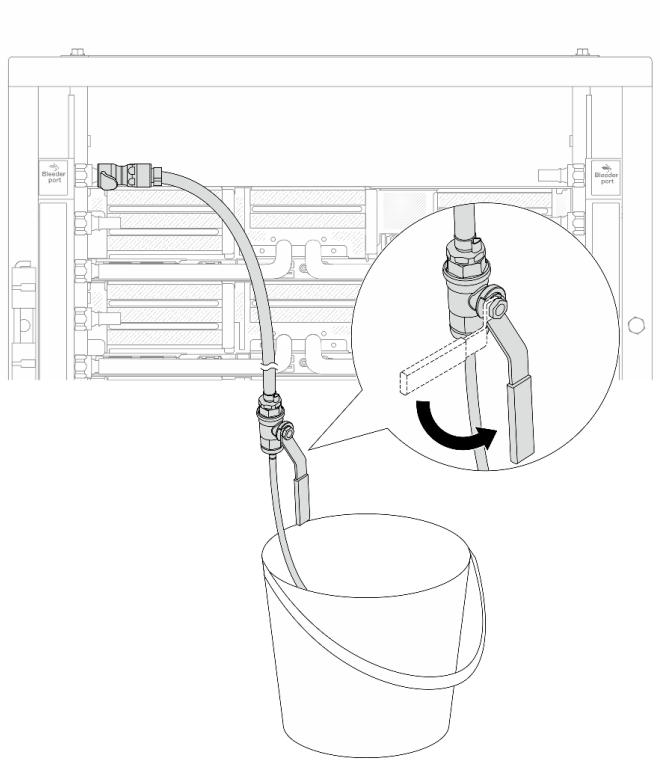


Figure 176. Opening the bleeder valve on the supply side

Step 10. Install the bleeder kit to the manifold return side.

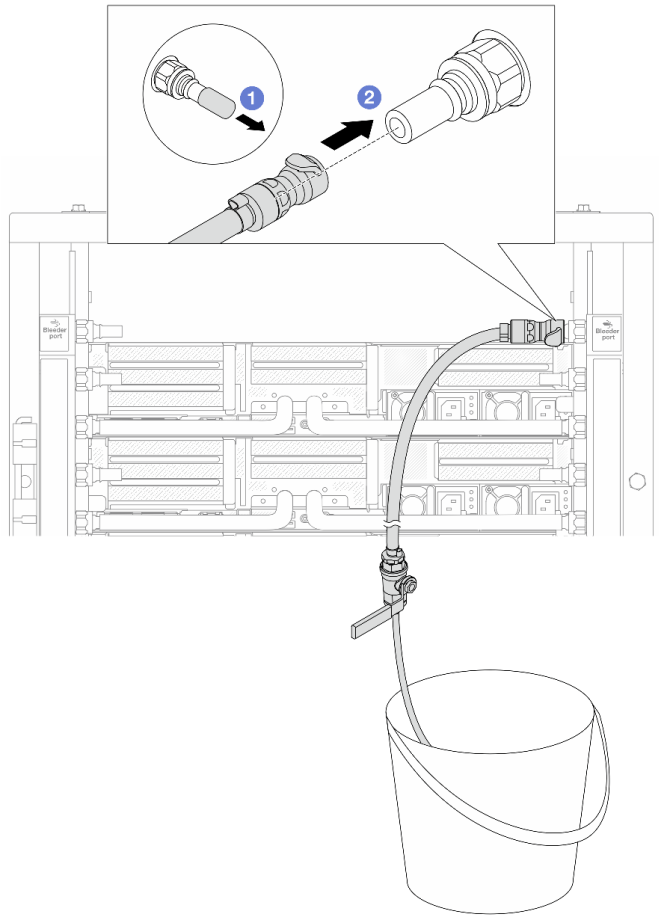


Figure 177. Installing the bleeder kit on the return side

a. 1 Remove the rubber quick connect plug covers from the ports on the manifold.

b. 2 Plug the bleeder kit to the manifold.

Step 11. To push the air out of the manifold return side, connect **facility supply** to **manifold supply**.

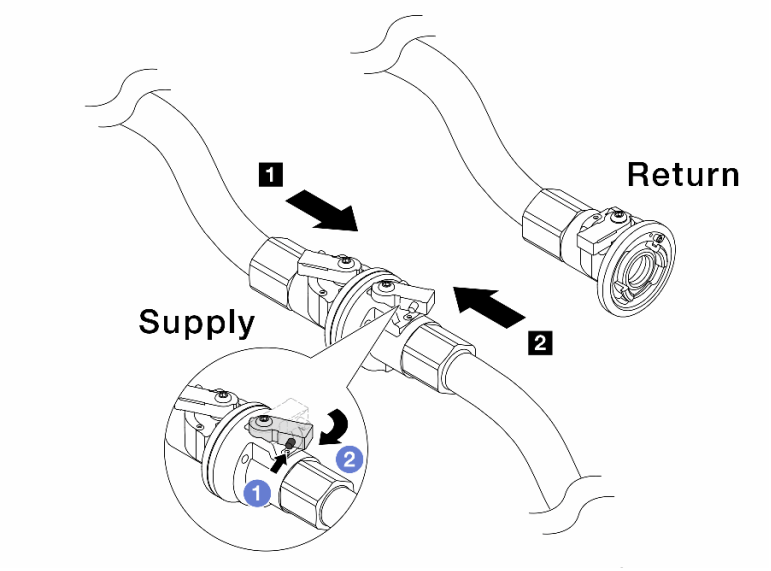


Figure 178. Facility supply to manifold supply

a. 1 Press the button on the ball valve switch.

b. 2 Rotate both switches open and stop at around 1/4 of 90 degrees.

Attention:

- Open the ball valves on 1 manifold supply side and 2 facility supply side, while keep manifold return side closed.
- Do not fully open the ball valves, or the water flow gets too rapid to contain.

Step 12. Slowly open the bleeder valve to conduct the air out of the hose. Close the bleeder valve once a steady stream of water flows into the bucket or there are only minimal bubbles in the bleeder hose.

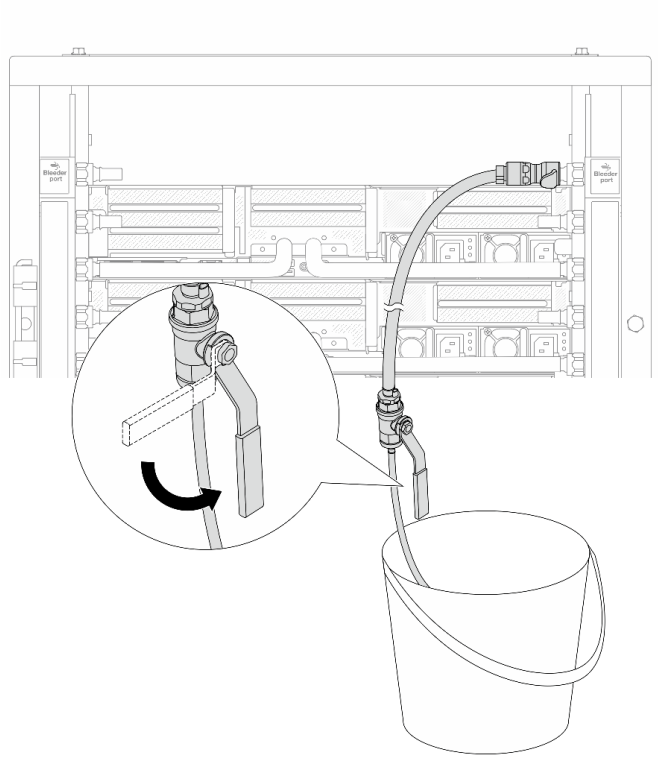


Figure 179. Opening the bleeder valve on the return side

Step 13. (For precaution) To make sure that the air inside is as little as possible, re-install the bleeder kit back to manifold supply side and do it one more time. Close the bleeder valve once a steady stream of water flows into the bucket or there are only minimal bubbles in the bleeder hose.

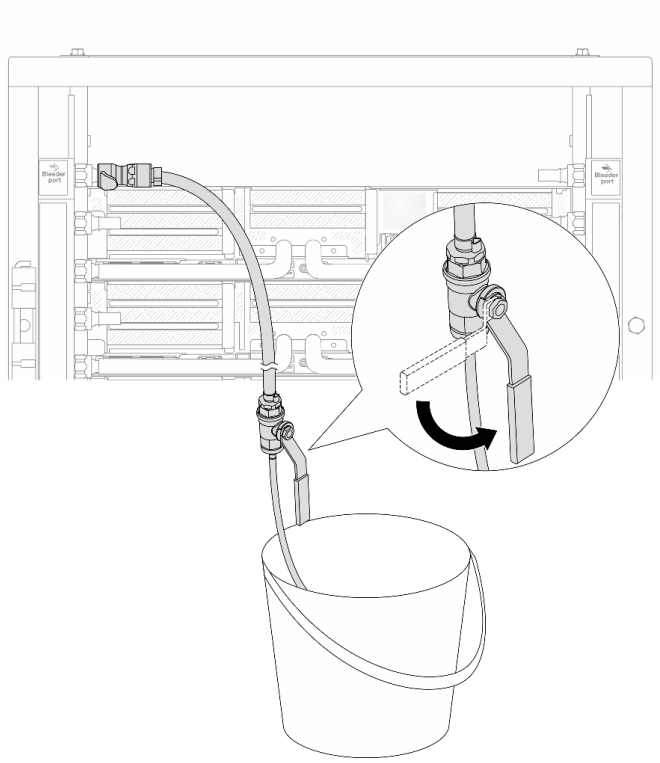


Figure 180. Opening the bleeder valve on the supply side

Step 14. Once completed, connect the supply and return of manifold and facility correspondingly. Fully open all connections on both supply and return sides.

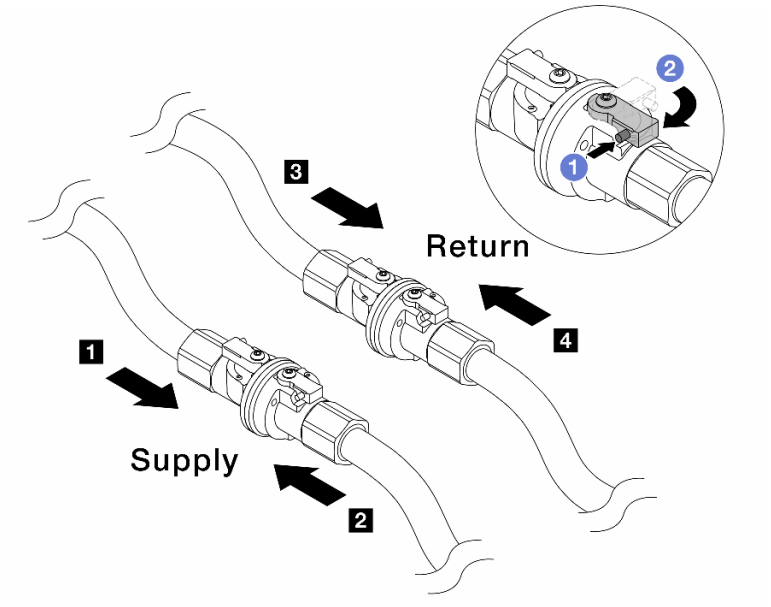


Figure 181. Opening ball valves

Note:

1 Manifold supply connects to 2 facility supply	**3 Manifold return connects to 4 facility return**

a. 1 Press the button on the ball valve switch.

b. 2 Rotate the switch to fully open the valves as illustrated above.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 345.

Demo video

Memory module replacement

Use the following procedures to remove and install a memory module.

Remove a memory module

Follow instructions in this section to remove a memory module.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.

- Make sure to remove or install memory module 20 seconds after disconnecting power cords from the system. It allows the system to be completely discharged of electricity and safe for handling memory module.
- Memory modules are sensitive to static discharge and require special handling. Refer to the standard guidelines for “Handling static-sensitive devices” on page 52.
  - 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.
- In the case of processor board replacement, keep records of the slots in which the modules are installed, and make sure to install them back to the exact same slots after processor board replacement.
- If you are not installing a replacement memory module to the same slot, make sure you have memory module filler available.

Procedure

Attention: Make sure to remove or install memory module 20 seconds after disconnecting power cords from the system. It allows the system to be completely discharged of electricity and safe for handling memory module.

Step 1. Make preparation for the task.

a. Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 68.

b. 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 68.

c. Remove the top cover. See “Remove the top cover” on page 342.

d. Remove the air baffle. See “Remove the air baffle” on page 76.

e. Locate the memory module slots and determine which memory module you want to remove from the server.

Step 2. Remove the memory module from the slot.

Attention: To avoid breaking the retaining clips or damaging the memory module slots, handle the clips gently.

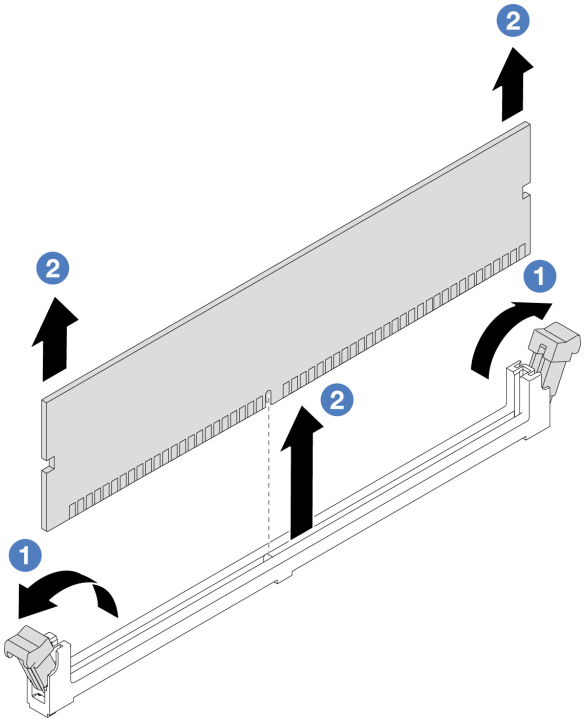


Figure 182. Removing the memory module

a. 1 Gently open the retaining clip on each end of the memory module slot.
b. 2 Grasp the memory module at both ends and carefully lift it out of the slot.

After you finish

1. A memory module slot must be installed with a memory module or a memory module filler. See "Install a memory module" on page 217.
2. 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 a memory module

Follow instructions in this section to install a memory module.

About this task

Attention:

- Read "Installation Guidelines" on page 49 and "Safety inspection checklist" on page 50 to ensure that you work safely.
- Make sure to remove or install memory module 20 seconds after disconnecting power cords from the system. It allows the system to be completely discharged of electricity and safe for handling memory module.
- Memory modules are sensitive to static discharge and require special handling. Refer to the standard guidelines at "Handling static-sensitive devices" on page 52:

- 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.

Firmware and driver download: You might need to update the firmware or driver after replacing a component.

- Go to https://datacentersupport.lenovo.com/products/servers/thinksystem/sr655v3/7d9e/downloads/driver-list/ to see the latest firmware and driver updates for your server.
- Go to "Update the firmware" on page 495 for more information on firmware updating tools.

Procedure

Attention: Make sure to remove or install memory module 20 seconds after disconnecting power cords from the system. It allows the system to be completely discharged of electricity and safe for handling memory module.

Step 1. Locate the required memory module slot on the system board assembly.

Note: Ensure that you observe the installation rules and sequence in "Memory module installation rules and order" on page 53.

Step 2. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 3. Install the memory module into the slot.

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.

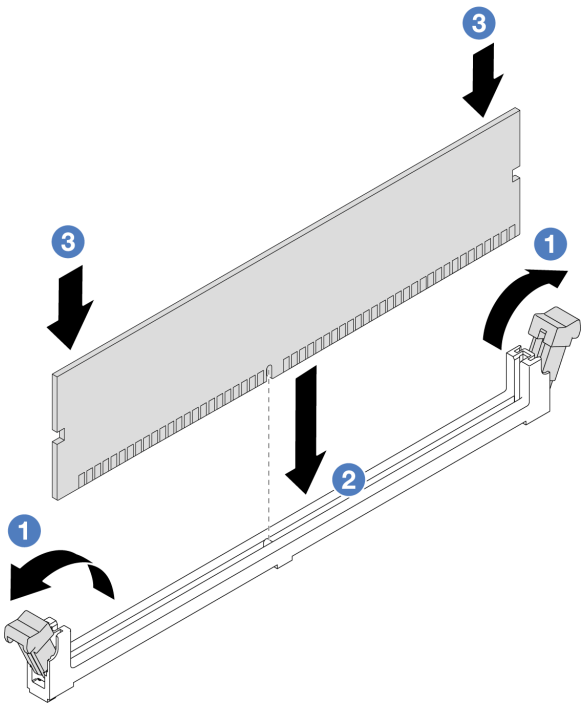


Figure 183. Installing the memory module

a. ❶ Gently open the retaining clip on each end of the memory module slot.

b. ❷ Align the memory module with the slot, and gently place the memory module on the slot with both hands.

c. ❸ Firmly press both ends of the memory module straight down into the slot until the retaining clips snap into the locked position.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 345.

Demo video

Watch the procedure on YouTube

MicroSD card replacement

Follow the instructions in this section to remove and install the MicroSD card.

Remove the MicroSD card

Follow the instructions in this section to remove the MicroSD card.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.

Procedure

Step 1. Make preparations for this task.

a. 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 68.

b. Remove the top cover. See “Remove the top cover” on page 342.

c. Remove risers. See “Remove a rear riser assembly” on page 230.

d. If your server comes with a rear drive assembly, remove it first. See “Rear drive backplane and drive cage replacement” on page 292.

e. If your server comes with a 7mm rear drive assembly, remove it first. See “Rear 7mm drive backplane and drive cage replacement” on page 283.

f. Record where the cables are connected to the system board assembly; then, disconnect all the cables.

Attention: Disengage all latches, cable clips, release tabs, or locks on cable connectors beforehand. Failing to release them before removing the cables will damage the cable connectors on the system board assembly. Any damage to the cable connectors may require replacing the system board assembly.

Step 2. Remove the MicroSD card.

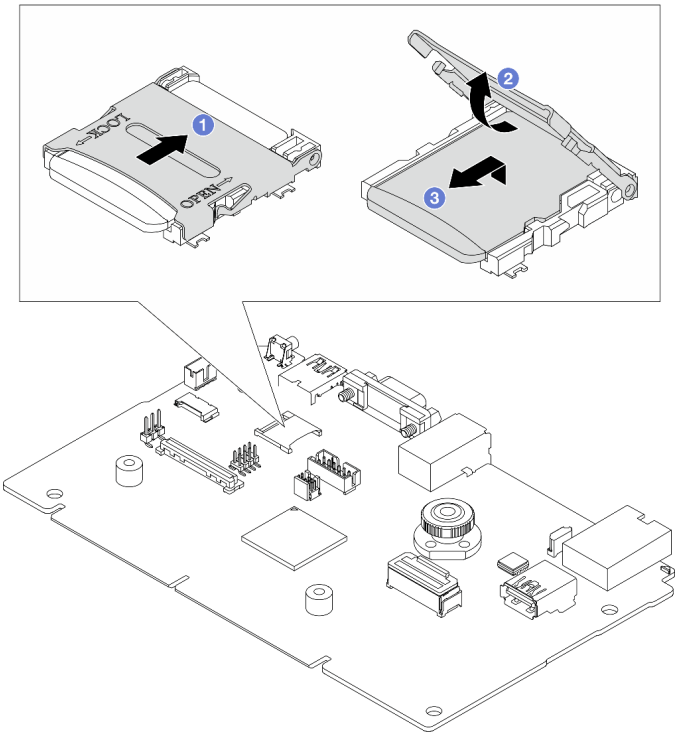


Figure 184. Removing MicroSD card

a. Slide the socket lid to the open position.

b. Lift open the socket lid.

c. Remove the MicroSD card from the socket.

Note: If the removed MicroSD card is defective, the historical data of the firmware and user data uploaded through Remote Disc On Card (RDOC) will be lost. To roll back firmware versions without the card installed, do it in Lenovo XClarity Controller.

If the removed MicroSD card works normally, install it to a new system I/O board.

After you finish

1. Install a replacement unit. See "Install the MicroSD card" on page 221.
2. If you are instructed to return the old RAID flash power module, follow all packaging instructions and use any packaging materials that are provided.

Demo video

Watch the procedure on YouTube

Install the MicroSD card

Follow the instructions in this section to install the MicroSD card.

About this task

Attention:

- Read "Installation Guidelines" on page 49 and "Safety inspection checklist" on page 50 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 68.
- 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.

Procedure

Notes:

- If replacing with a new MicroSD card, the firmware historical data and user data stored in the defective MicroSD card will be lost. After a new MicroSD card is installed, subsequent firmware update history will be saved to the new card.
- To update firmware, refer to “Updating Server Firmware” section in Lenovo XClarity Controller 2.

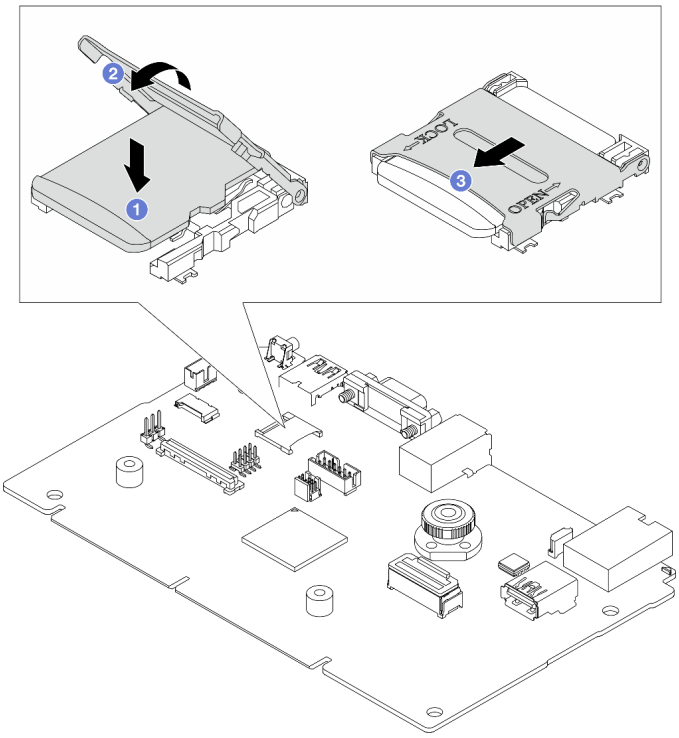


Figure 185. Installing the MicroSD card

Step 1. 1 Place the MicroSD card into the socket.

Step 2. 2 Close the socket lid.

Step 3. 2 Slide the socket lid to the lock position.

After you finish

If you are instructed to return the old RAID flash power module, follow all packaging instructions and use any packaging materials that are provided.

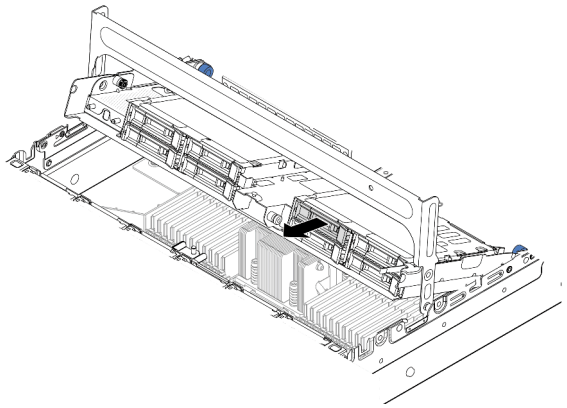
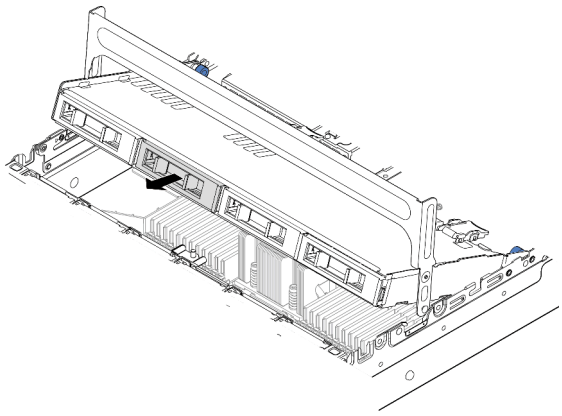
Demo video

Watch the procedure on YouTube

Middle drive cage and drive backplane replacement

Follow instructions in this section to remove and install the middle drive cage and drive backplanes.

Depending on the server configurations, the server supports one of the following middle drive cages. For detailed information, see “Technical rules” on page 52.

Drive cage type	Backplane type
Middle 2.5-inch 8-bay drive cage 	• Two 2.5-inch SAS/SATA 4-bay backplanes • Two 2.5-inch NVMe 4-bay backplanes
Middle 3.5-inch 4-bay drive cage 	One 3.5-inch SAS/SATA 4-bay backplane

- “Remove the middle drive cage and drive backplanes” on page 223
- “Install the middle drive backplanes and drive cage” on page 226

Remove the middle drive cage and drive backplanes

Follow instructions in this section to remove the middle drive cage and drive backplanes.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), 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.
- If one or more NVMe solid-state drives are to be removed, it is recommended to disable them beforehand via the operating system.

Procedure

Step 1. Make preparation for the task.

a. 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 68.

b. Remove the top cover. See “Remove the top cover” on page 342.

c. Remove the system fan cage for easier operation. See “Remove the system fan cage” on page 335.

d. Disconnect cables from the middle drive backplanes.

Step 2. Remove the middle drive cage.

Note: The illustration shows removing the middle 2.5-inch drive cage. The procedure is the same for removing the middle 3.5-inch drive cage.

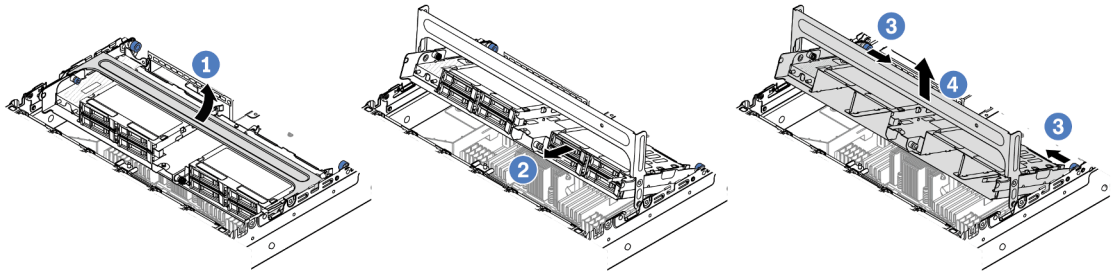


Figure 186. Removing the middle drive cage

a. 1 Rotate the drive cage handle to open it.

b. 2 Remove the drives from the drive cage.

c. 3 Pull and twist plunger pins to release the drive cage.

d. 4 Carefully lift the drive cage up from the chassis.

Step 3. Remove the middle drive backplane.

Note: Depending on the specific type, your backplane might look different from the illustration.

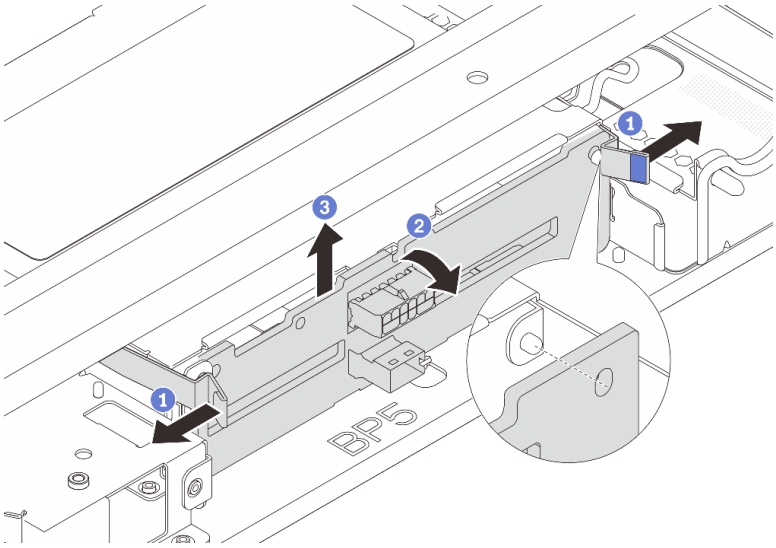


Figure 187. Removing the middle 2.5-inch drive backplane

a. 1 Slightly pivot the release latches outwards in the direction as shown.
b. 2 Rotate the backplane from the top to disengage it from the pins on the drive cage.
c. 3 Carefully lift the backplane out of the drive cage.

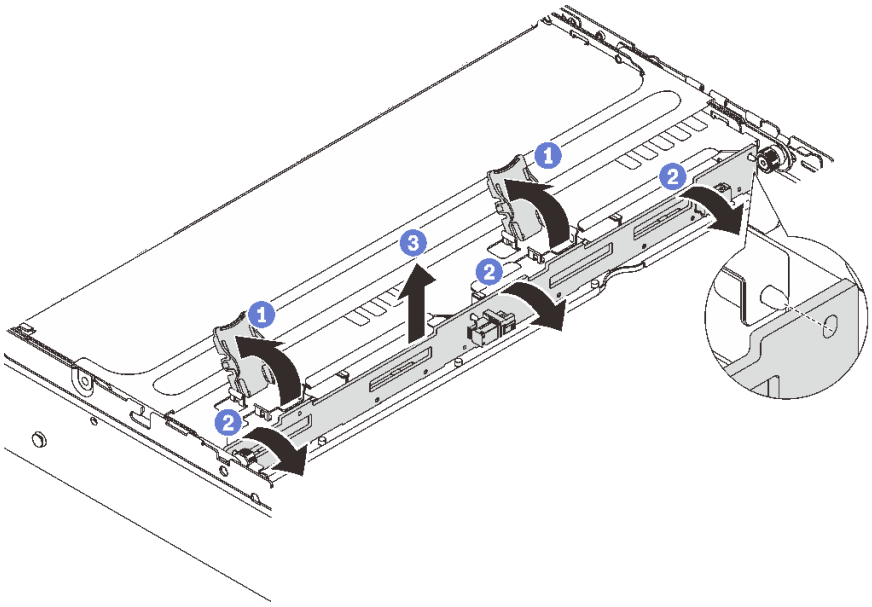


Figure 188. Removing the middle 3.5-inch drive backplane

a. 1 Open the release latches in the direction as shown.
b. 2 Rotate the backplane from the top to disengage it from the pins on the drive cage.
c. 3 Carefully lift the backplane out of the drive 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

Install the middle drive backplanes and drive cage

Follow instructions in this section to install the middle drive backplanes and drive cage.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.
- The middle drive cage is supported on some server models with thermal requirements. See “Thermal rules” on page 60 to ensure that the server is under permitted ambient temperature and the correct heat sink and system fans are used. If needed, replace your heat sink or system fan first.
  - “Processor and heat sink replacement (trained technician only)” on page 255
  - “System fan replacement” on page 331

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Install the drive backplane into the middle drive cage.

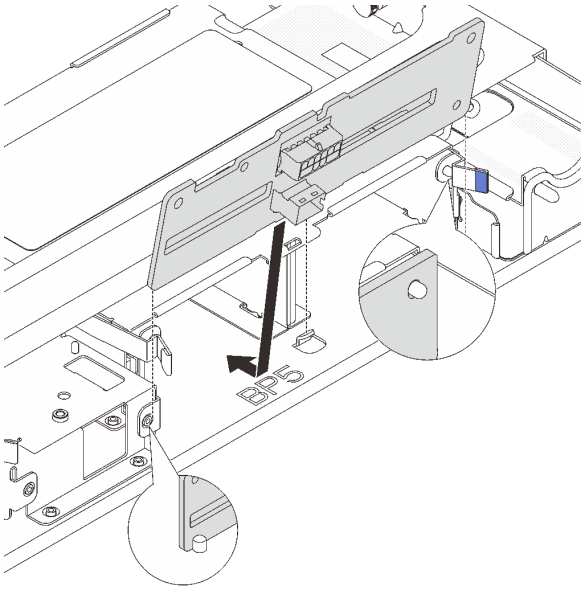


Figure 189. Installing the middle 2.5-inch drive backplane

a. Align the bottom of the backplane with the studs at the bottom of the drive cage, and lower the backplane into the drive cage.

b. Push the top of the backplane forward until it clicks in place. Ensure that the holes in the backplane pass through the pins on the drive cage, and the release latches secure the backplane in position.

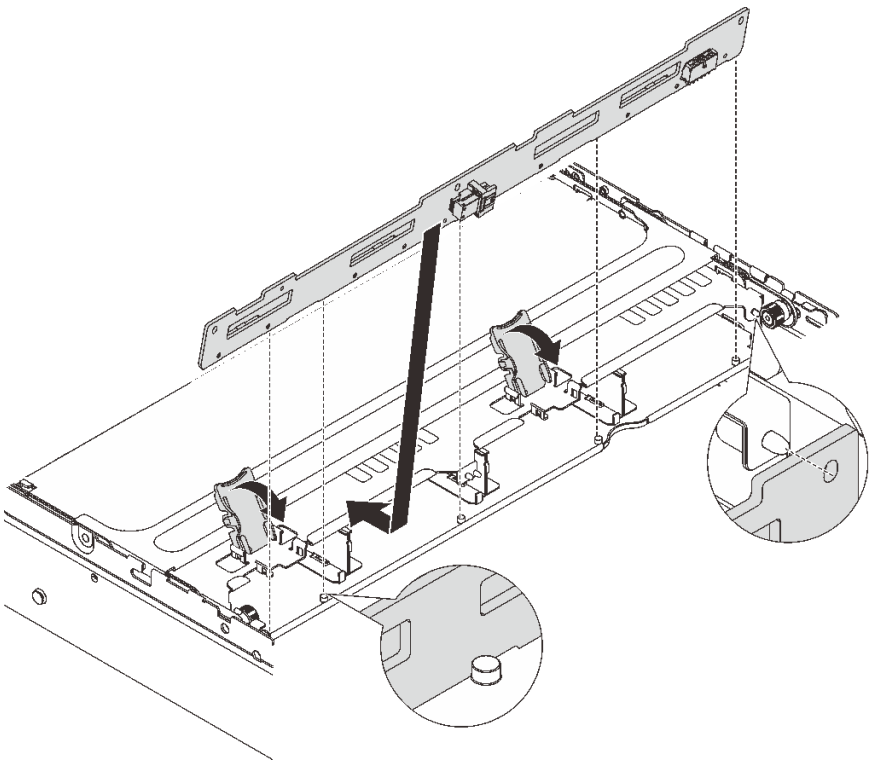


Figure 190. Installing the middle 3.5-inch drive backplane

a. Align the bottom of the backplane with the studs at the bottom of the drive cage, and lower the backplane into the drive cage.

b. Push the top of the backplane forward so that the holes in the backplane pass through the pins on the drive cage, and close the release latches to secure the backplane in position.

Step 3. Install the middle drive cage and drives.

Note: The illustration shows installing the middle 2.5-inch drive cage. The procedure is the same for installing the middle 3.5-inch drive cage.

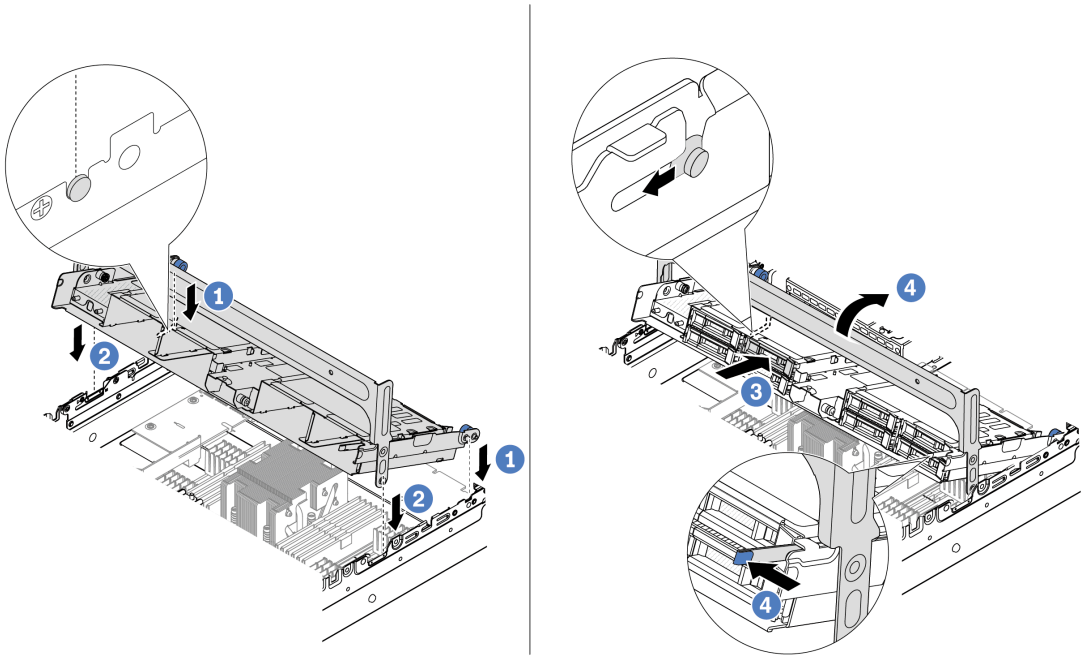


Figure 191. Installing the middle drive cage and drives

a. Align the pins on the middle cage with the corresponding slots on the chassis.

b. Lower the drive cage down into place.

c. Install drives into the middle drive cage.

d. Press the latch as shown and close the handle.

Step 4. Connect the cables to the drive backplane. See Chapter 6 “Internal cable routing” on page 347.

After you finish

1. Install the system fan cage. See “Install the system fan cage” on page 336.
2. Complete the parts replacement. See “Complete the parts replacement” on page 345.

Demo video

Watch the procedure on YouTube

Rear PCIe adapter and riser assembly replacement

Follow instructions in this section to remove and install a rear riser assembly and PCIe adapter. The PCIe adapter can be an Ethernet card, a host bus adapter, a RAID adapter, an add-in PCIe SSD adapter, or any other supported PCIe adapters. PCIe adapters vary by type, but the installation and removal procedures are the same.

Riser cages vary by server rear configurations.

Notes:

- The server supports one 7mm drive cage on the location of riser 1 cage or riser 2 cage. For 7mm drive cage installation rules, see "PCIe slots and PCIe adapters" on page 55. To replace a 7mm drive cage, see "Rear 7mm drive backplane and drive cage replacement" on page 283.
- The riser card shown in each riser cage is an example for illustration. Some riser cages support different types of riser cards. For details, see "PCIe slots and PCIe adapters" on page 55.

Table 25. Riser cages

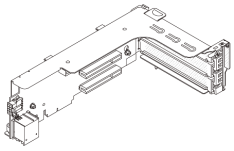
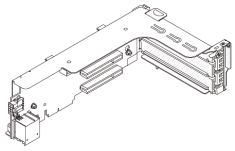
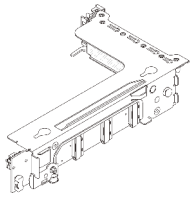
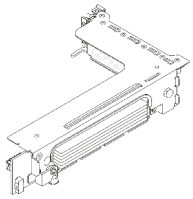
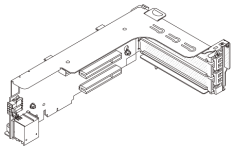
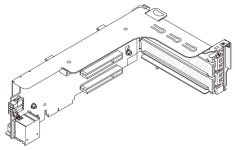
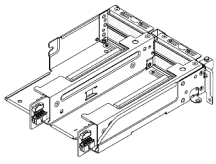
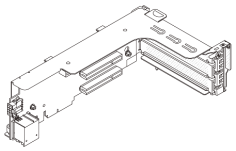
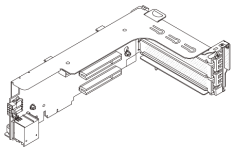
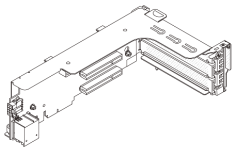
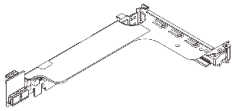
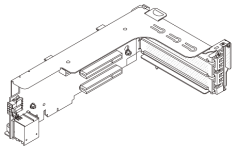
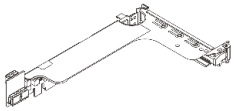
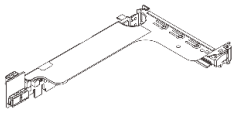
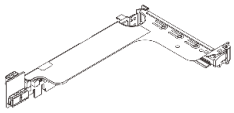
Server rear configuration	Riser 1 cage	Riser 2 cage	Riser 3 cage or 4LP riser 3/4 cage
Configuration with 8 PCIe slots	• 3-slot riser cage 	• 3-slot riser cage 	Riser 3 cage • Gen 4  • Gen 5 
Configuration with 10 PCIe slots	• 3-slot riser cage 	• 3-slot riser cage 	• 4LP riser 3/4 cage  LP: low profile

Table 25. Riser cages (continued)

Server rear configuration	Riser 1 cage	Riser 2 cage	Riser 3 cage or 4LP riser 3/4 cage
Configuration with a 4 x 2.5-inch rear drive cage	• 3-slot riser cage 	• 3-slot riser cage 	
Configuration with an 8 x 2.5-inch rear drive cage	• 3-slot riser cage 	• 1-slot riser cage 	
Configuration with a 2 x 3.5-inch rear drive cage	• 3-slot riser cage 	• 1-slot riser cage 	
Configuration with a 4 x 3.5-inch rear drive cage	• 1-slot riser cage 	• 1-slot riser cage 	

- “Remove a rear riser assembly” on page 230
- “Remove a rear PCIe adapter” on page 233
- “Install a rear PCIe adapter” on page 236
- “Install a rear riser assembly” on page 239

Remove a rear riser assembly

Follow instructions in this section to remove a rear riser assembly.

About this task

The server supports different types of riser cages (see Table 25 “Riser cages” on page 229). This topic uses the 3FH riser 1 cage and Gen 4 riser 3 cage as an example for illustration. The replacement procedure is the same for other riser cages.

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.

Procedure

Step 1. Make preparation for the task.

a. 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 68.

b. Remove the top cover. See “Remove the top cover” on page 342.

c. If there is any PCIe adapter installed on the riser card, record the cable connections first. Then, disconnect all cables from the PCIe adapter.

Step 2. Remove the riser assembly.

- **Riser 1 assembly (same for riser 2 assembly)**

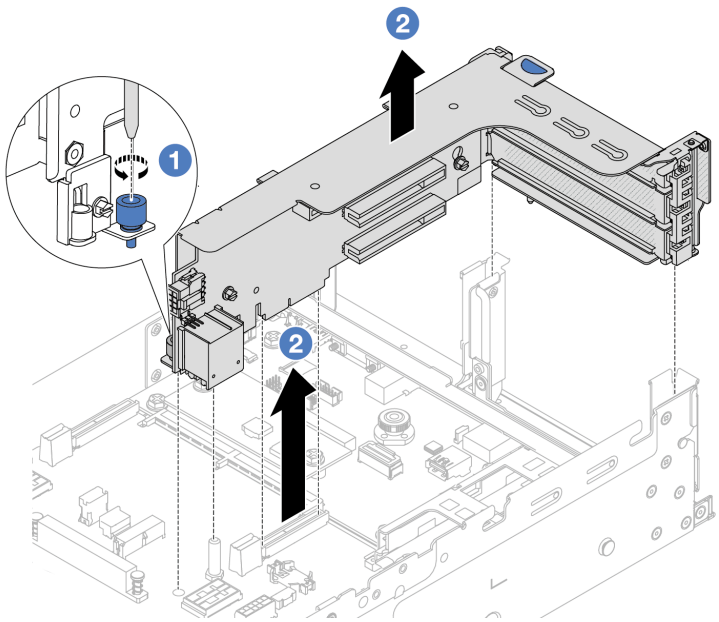


Figure 192. Removing the riser 1 assembly

a. 1 Loosen the screw that secures the riser assembly.

b. 2 Grasp the riser assembly by its edges and carefully lift it straight up and off the chassis.

- **Riser 3 assembly**

  Grasp the riser assembly by its edges and carefully lift it straight up and off the chassis.

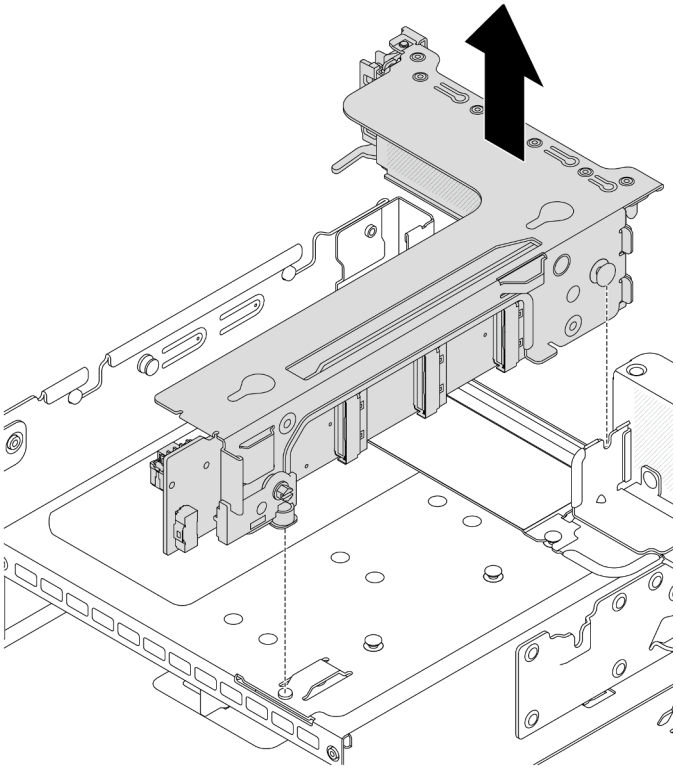


Figure 193. Removing the riser 3 assembly

- **4LP riser 3/4 assembly**
  1. Remove riser 3 assembly and riser 4 assembly.

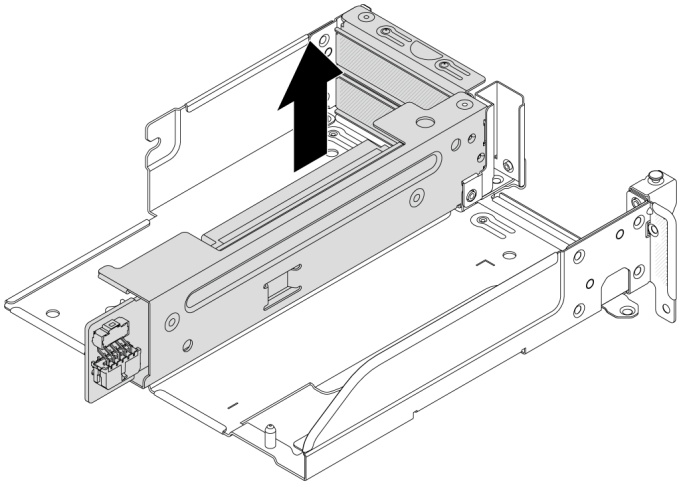


Figure 194. Removing the riser 3/4 assembly

  2. Remove the riser cage tray.

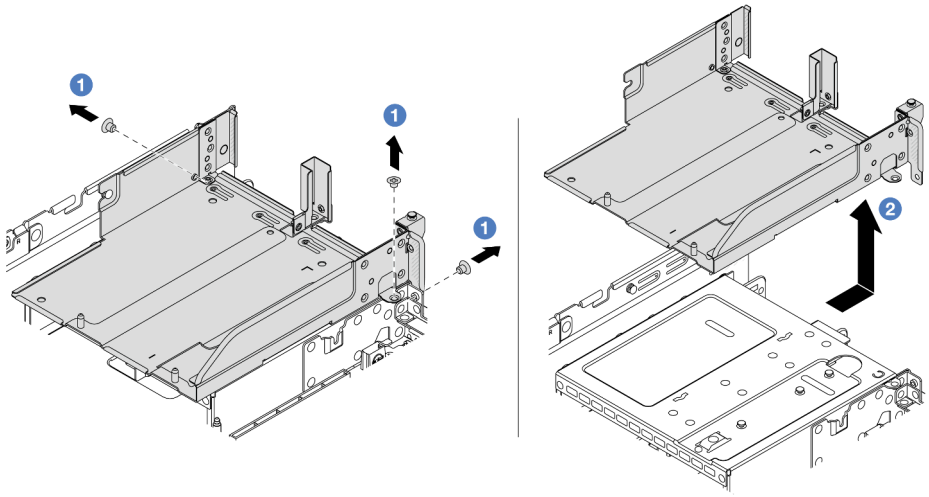


Figure 195. Removing the riser cage tray

a. (1) Remove the screws that secure the riser cage tray.

b. (2) Slide the riser cage tray backwards and then lift it out the chassis.

After you finish

1. Remove the PCIe adapter from the riser assembly. See "Remove a rear PCIe adapter" on page 233.
2. 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 rear PCIe adapter

Follow instructions in this section to remove a rear PCIe adapter.

About this task

Attention:

- Read "Installation Guidelines" on page 49 and "Safety inspection checklist" on page 50 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 68.
- 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.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.

Procedure

Step 1. Make preparation for the task.

a. 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 68.

b. Remove the top cover. See “Remove the top cover” on page 342.

c. Remove the riser assembly. See “Remove a rear riser assembly” on page 230.

Step 2. Remove the PCIe adapter from the riser assembly.

Note: For PCIe adapters in riser 1 and riser 2 and ThinkSystem AMD X3522 10/25GbE DSFP28 2-port PCIe Ethernet Adapter, remove the screw that secures the adapter first.

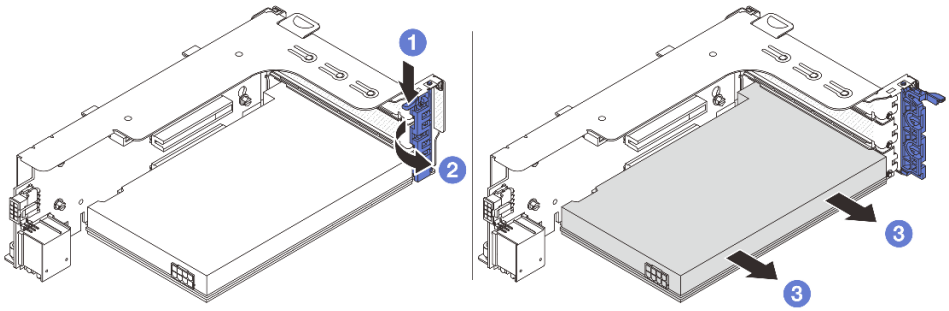


Figure 196. Removing the PCIe adapter from riser 1 or 2 assembly

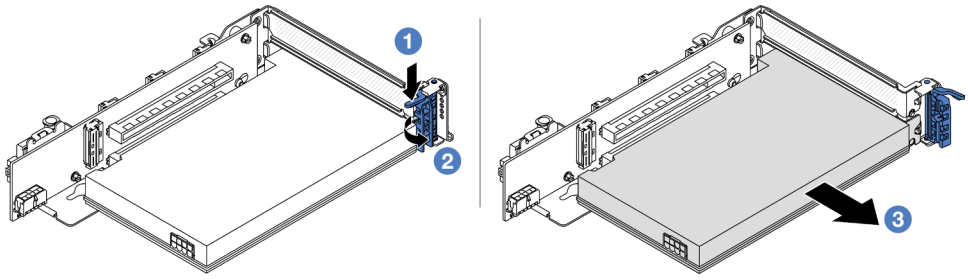


Figure 197. Removing the PCIe adapter from riser 3 assembly

a. 1 Press the retainer clip downward.

b. 2 Rotate the PCIe adapter retention latch to the open position.

c. 3 Grasp the PCIe adapter by its edges and carefully pull it out of the PCIe slot.

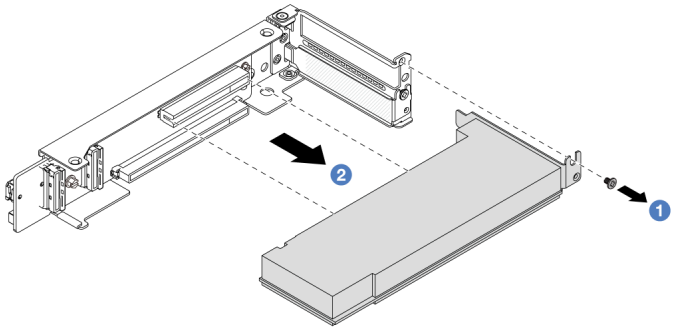


Figure 198. Removing a PCIe adapter from the 4LP riser 3/4 assembly

a. 1 Remove the screw that secures the PCIe adapter.

b. 2 Grasp the PCIe adapter by its edges and carefully pull it out of the PCIe slot.

Step 3. (Optional) If you are replacing the riser card, remove the riser card from the riser cage.

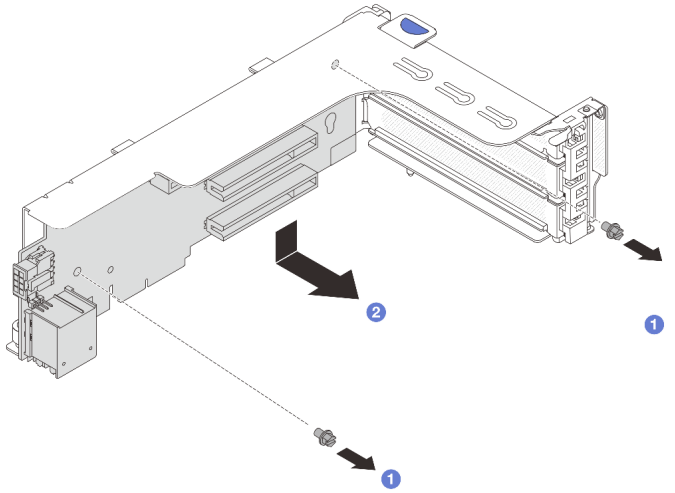


Figure 199. Removing riser card 1 (same for riser card 2)

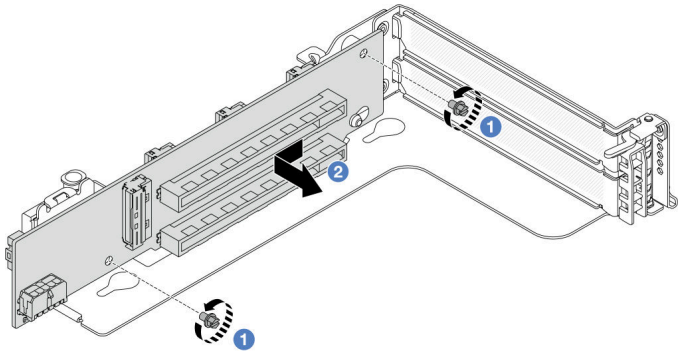


Figure 200. Removing riser card 3

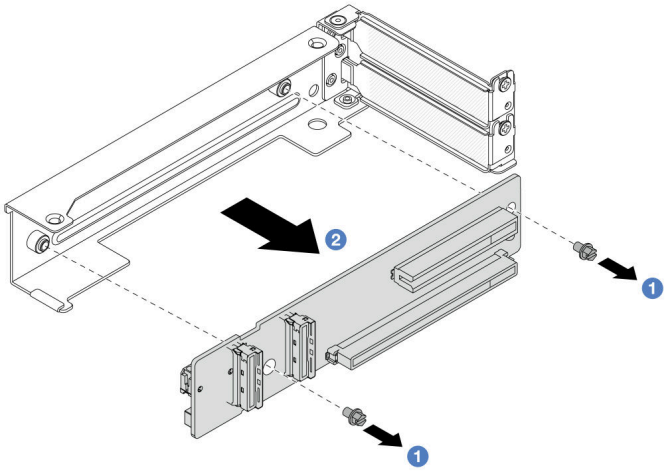


Figure 201. Removing the riser card from 4LP riser 3/4 cage

a. 1 Loosen the screws that secure the riser card.

b. 2 Grasp the riser card by its edges and carefully take it out of the riser bracket in the shown direction.

After you finish

1. Install a new PCIe adapter to the riser assembly. See “Install a rear PCIe adapter” on page 236.
2. 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 a rear PCIe adapter

Follow instructions in this section to install a rear PCIe adapter.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. (Optional) If you have removed the riser card, install the riser card first.

Note: For the 9450-8i, 5450-16i, 9450-16i, and 4450-16i PCIe adapters, make sure to install x8 or x16 slot holders to protect the slots if the server needs to be shipped.

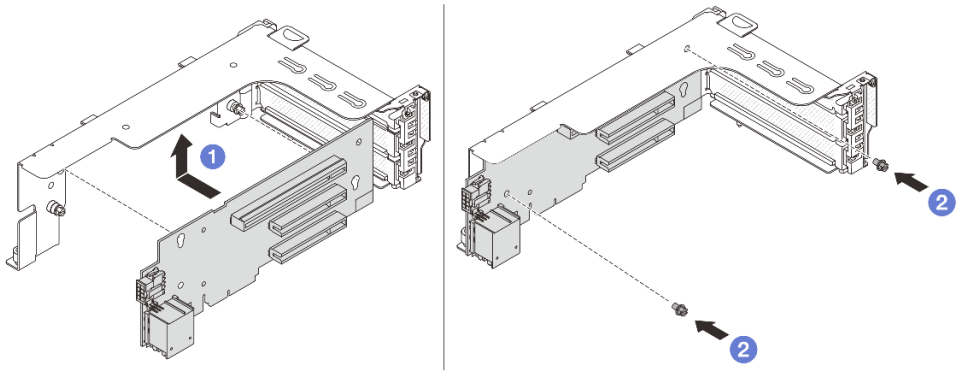


Figure 202. Installing riser card 1

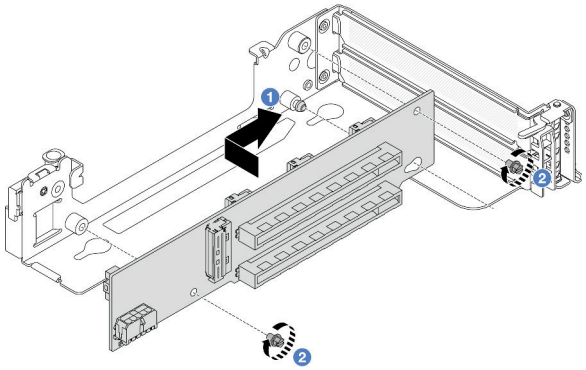


Figure 203. Installing riser card 3

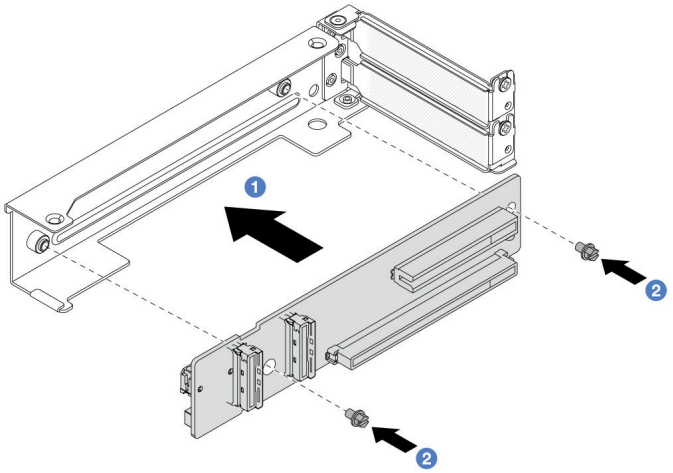


Figure 204. Installing the riser card to 4LP riser 3/4 cage

a. 1 Align the riser card with the riser bracket and install it into the riser bracket in the shown direction.

b. 2 Install the screws to secure the riser card into place.

Step 3. Install the new PCIe adapter to the riser assembly.

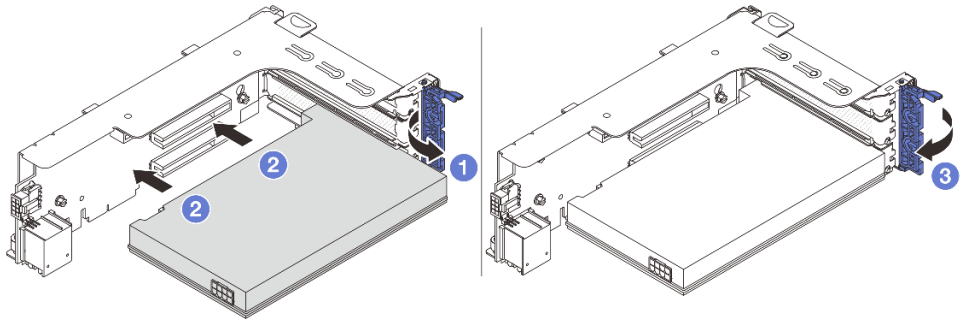


Figure 205. Installing the PCIe adapter on riser 1 or 2 assembly

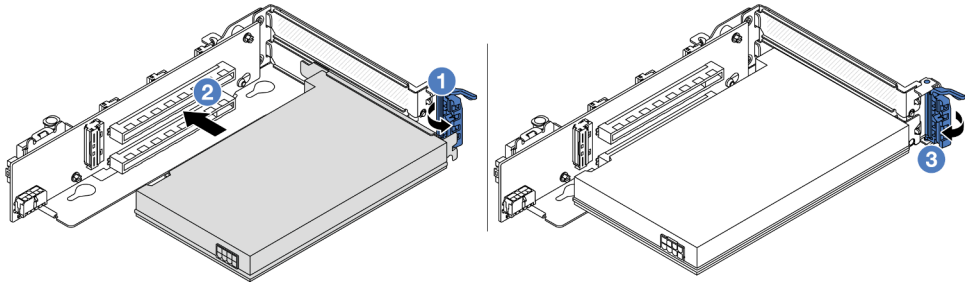


Figure 206. Installing the PCIe adapter on riser 3 assembly

a. 1 Open the retention latch.

b. 2 Align the PCIe adapter with the PCIe slot on the riser card. Carefully press the PCIe adapter straight into the slot until it is securely seated and its bracket also is secured.

c. 3 Close the retention latch.

Note: For PCIe adapters in riser 1 and riser 2 and ThinkSystem AMD X3522 10/25GbE DSFP28 2-port PCIe Ethernet Adapter, install the screw to secure the adapter before closing the retention latch if the server needs to be shipped.

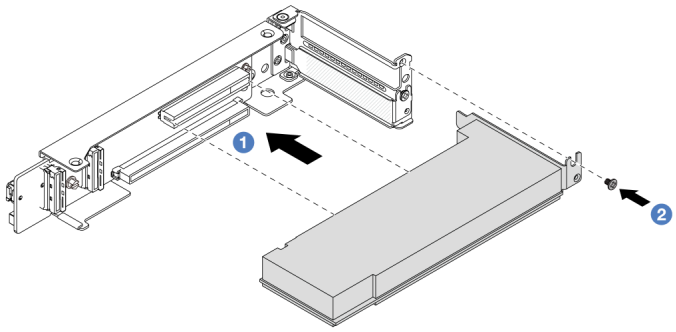


Figure 207. Installing the PCIe adapter to the 4LP riser 3/4 assembly

a. 1 Align the PCIe adapter with the PCIe slot on the riser card. Carefully press the PCIe adapter straight into the slot until it is securely seated and its bracket also is secured.

b. 2 Tighten the screw to secure the PCIe adapter into place.

After you finish

1. Install the riser assembly into chassis. See "Install a rear riser assembly" on page 239.
2. If you have installed a RAID 930 or 940 adapter, install a RAID flash power module. See "RAID flash power module replacement" on page 268.

Demo video

Watch the procedure on YouTube

Install a rear riser assembly

Follow instructions in this section to install a rear riser assembly.

About this task

The server supports different types of riser cages (see Table 25 "Riser cages" on page 229). This topic uses the 3FH riser 1 cage and Gen 4 riser 3 cage as an example for illustration. The replacement procedure is the same for other riser cages.

Attention:

- Read "Installation Guidelines" on page 49 and "Safety inspection checklist" on page 50 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 68.
- 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.

Procedure

Step 1. Install the riser assembly into the chassis.

- **Riser 1 assembly (same for riser 2 assembly)**

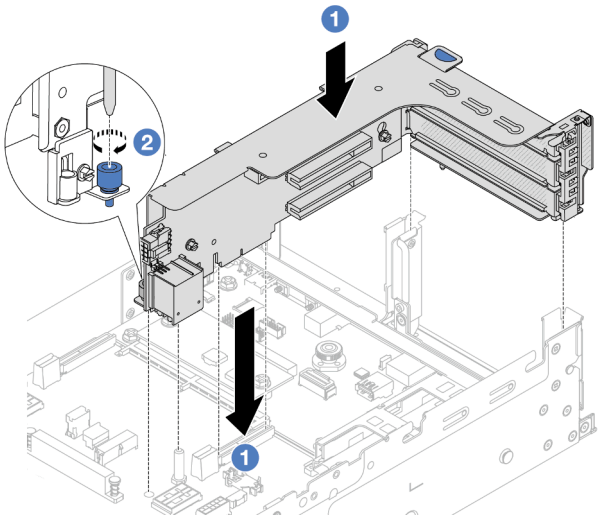


Figure 208. Installing the riser 1 assembly

a. 1 Align the riser card with the riser slot on the processor board. Carefully press the riser card straight into the slot until it is securely seated.

b. 2 Tighten the screw to secure the riser cage.

- **Riser 3 assembly**

  Align the securing clip at the end of the riser cage with the pin on the rear chassis, and the pin on the right side of the riser cage with the pin slot on the C1 rearwall bracket. Carefully put down the riser 3 assembly until it is securely seated.

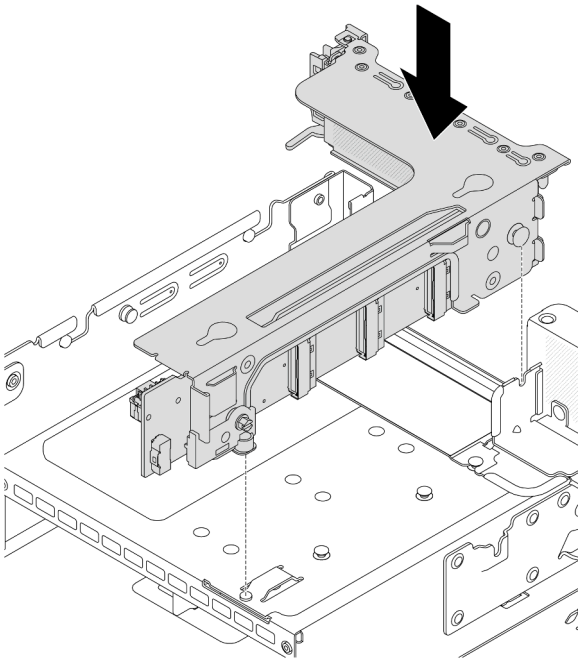


Figure 209. Installing the riser 3 assembly

- **4LP riser 3/4 assembly**
  1. Install the riser cage tray.

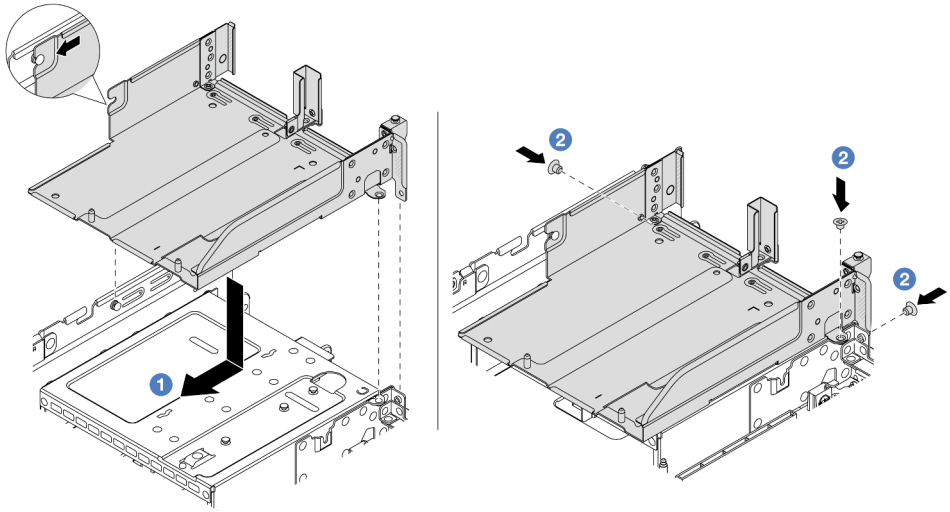


Figure 210. Installing the riser cage tray

  a. (1) Align the riser cage tray with the screws that secure the riser cage tray.
  b. (2) Install the screws to fix the riser cage tray to the chassis.
  2. Install the riser 3 assembly and riser 4 assembly into the riser cage.

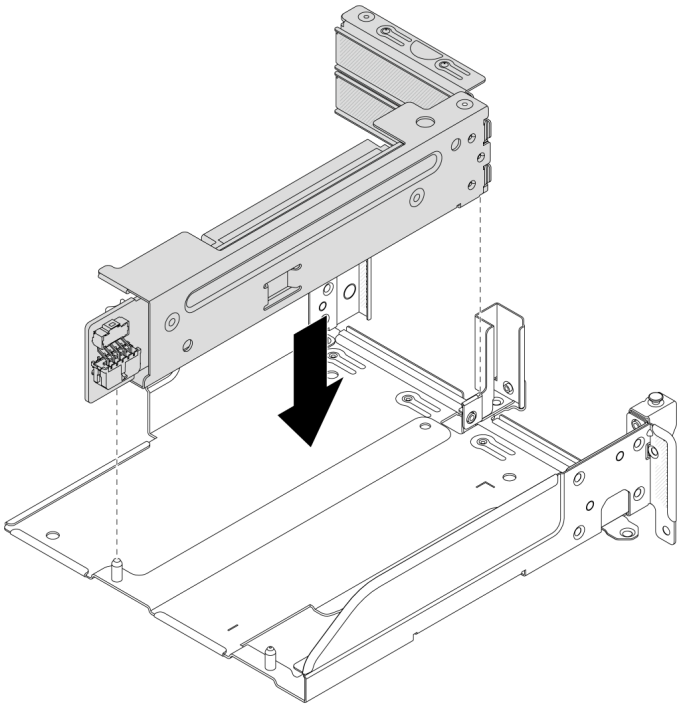


Figure 211. Installing the riser 3/4 assembly

Step 2. Connect cables to the riser card and PCIe adapter. See Chapter 6 “Internal cable routing” on page 347.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 345.

Demo video

Watch the procedure on YouTube

Rear OCP module replacement

Follow instructions in this section to remove and install the rear OCP module.

- “Remove the rear OCP module” on page 242
- “Install the rear OCP module” on page 243

Remove the rear OCP module

Follow instructions in this section to remove the rear OCP module.

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.

- 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.

Procedure

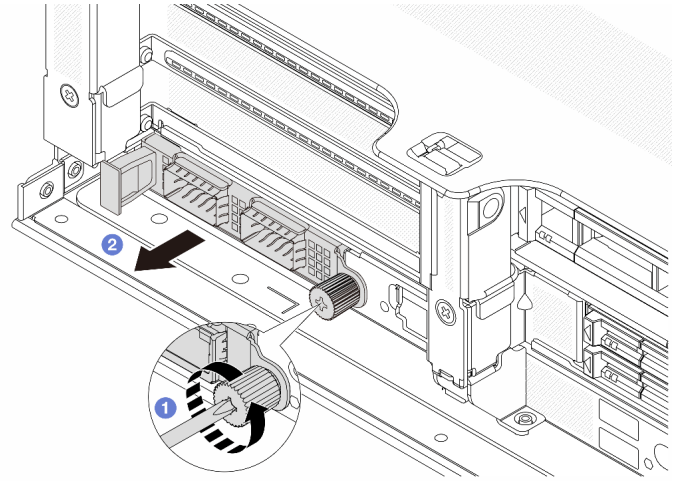


Figure 212. Removing the rear OCP module

Step 1. 1 Loosen the thumbscrew that secures the OCP module. Use a screwdriver if needed.

Step 2. 2 Pull out the OCP module.

After you finish

1. Install a new rear OCP module or an OCP module filler. See “Install the rear OCP module” on page 243.
2. 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 rear OCP module

Follow instructions in this section to install the rear OCP module.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Remove the OCP module filler if there is.

Step 3. Install the OCP module.

Note: Ensure that the OCP module is fully seated and the thumbscrew is securely tightened. Otherwise, the OCP module will not get full connection and may not function.

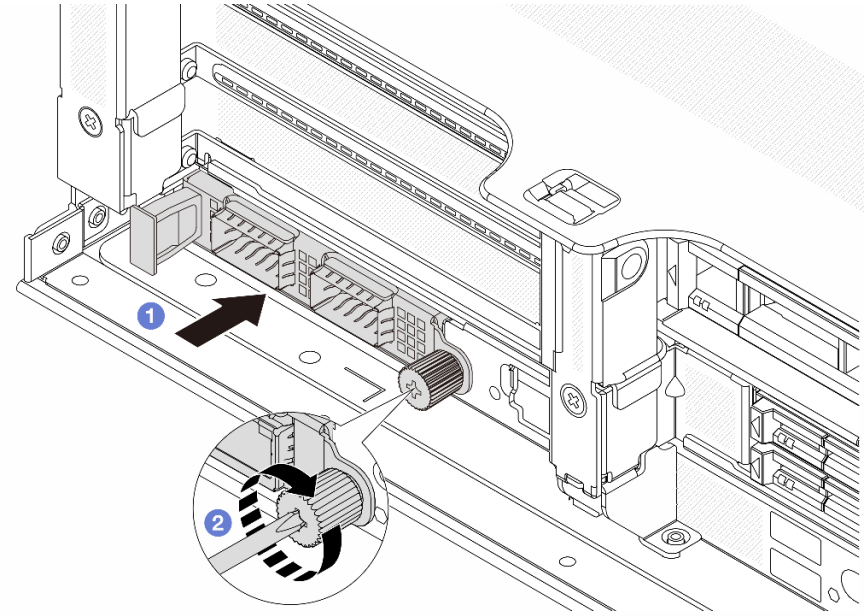


Figure 213. Installing the rear OCP module

a. 1 Push the OCP module into the slot until it is fully seated.

b. 2 Tighten the thumbscrew to secure the OCP module. Use a screwdriver if needed.

Notes:

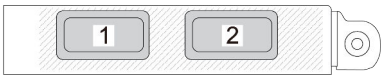


Figure 214. OCP module (two connectors)

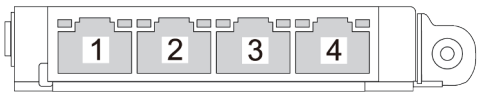


Figure 215. OCP module (four connectors)

- The OCP module provides two or four extra Ethernet connectors for network connections.
- By default, one of the Ethernet connectors on the OCP module can also function as a management connector using the shared management capacity.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 345.

Demo video

Watch the procedure on YouTube

Power inverter board (PIB) replacement

Follow instructions in this section to remove and install the power inverter board (PIB) replacement.

Remove the PIB

Follow instructions in this section to remove the PIB.

About this task

Important: This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install the part without proper training and qualification.

S002



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.

Procedure

Step 1. Make preparation for the task.

a. Remove the top cover. See “Remove the top cover” on page 342.

b. If your server comes with an air baffle, remove it first. See “Remove the air baffle” on page 76.

c. If your server comes with a middle drive cage, remove it first. See “Middle drive cage and drive backplane replacement” on page 222.

d. Pull out the power supplies slightly. Ensure that they are disconnected from the system board.

e. Remove the system board assembly out of chassis. See “Remove the processor board” on page 324.

Step 2. Gently hold and slide the PIB out of the system board tray.

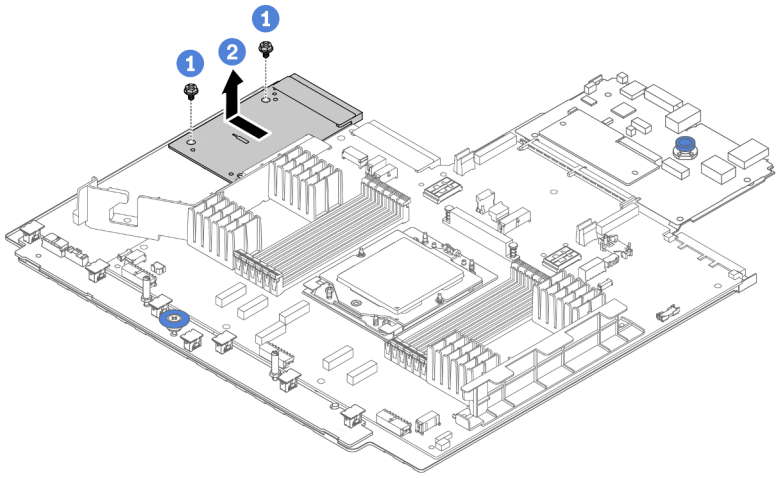


Figure 216. PIB removal

a. 1 Loosen the two screws that secure the PIB.
b. 2 Pull out the PIB outward from the system board tray.

After you finish

- If you are replacing a PIB, install a new PIB. See “Install the PIB” on page 246.
- 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 PIB

Follow the instructions in this section to install the PIB.

About this task

Important: This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install the part without proper training and qualification.

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.

Procedure

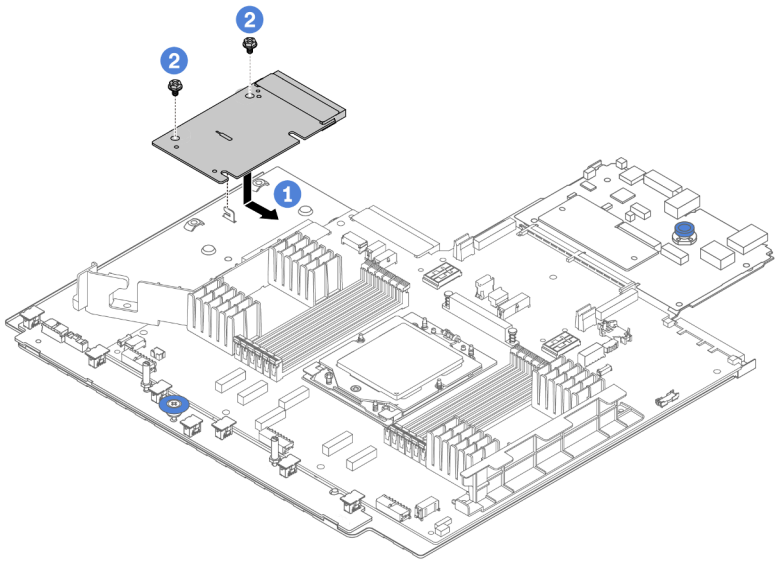


Figure 217. PIB installation

Step 1. 1 Align the PIB with the connector on the processor board, and use both hands to push the PIB and slightly insert it into the connector.

Step 2. 2 Install the two screws to secure the PIB.

After you finish

1. Install the system board assembly into the chassis. See “Install the processor board” on page 328.
2. Install the middle drive cage if you have removed it. See “Middle drive cage and drive backplane replacement” on page 222.
3. Install the air baffle. See “Install the air baffle” on page 78.
4. Push the power supplies into the bays until they click into place.
5. Complete the parts replacement. See “Complete the parts replacement” on page 345.

Demo video

Watch the procedure on YouTube

Power supply unit replacement

Follow instructions in this section to remove and install a power supply unit.

- “Remove a power supply unit” on page 250
- “Install a power supply unit” on page 252

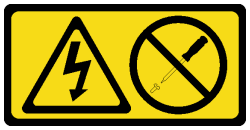
Safety precautions

The section lists safety precautions that apply to AC and DC power supply units respectively. Understand and apply the safety precautions before removing or installing a power supply unit.

Safety precautions for AC power supplies

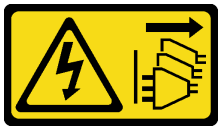
The following tips describe the information that you must consider when you replace an AC power supply.

S035



CAUTION:
Never remove the cover on a power supply or any part that has this label attached. Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

S002



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

S001



DANGER

Electrical current from power, telephone, and communication cables is hazardous.
To avoid a shock hazard:

- **Connect all power cords to a properly wired and grounded electrical outlet/source.**
- **Connect any equipment that will be attached to this product to properly wired outlets/sources.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **The device might have more than one power cord, to remove all electrical current from the device, ensure that all power cords are disconnected from the power source.**

Safety precautions for DC power supplies

The following tips describe the information that you must consider when you replace a DC power supply.

CAUTION:

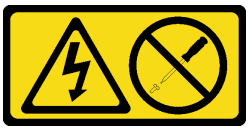


240 V DC input (input range: 180-300 V) is supported in Chinese Mainland ONLY.

Perform the following steps to safely remove the power cord of one 240 V DC power supply unit. Otherwise, there can be data loss and other damages to the equipment. Damages and losses resulting from inappropriate operations will not be covered by the manufacturer's warranty.

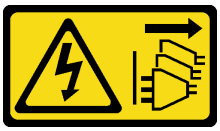
1. **Turn off the server.**
2. **Disconnect the power cord from the power source.**
3. **Disconnect the power cord from the power supply unit.**

S035



CAUTION:
Never remove the cover on a power supply or any part that has this label attached. Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

S019



CAUTION:
The power-control button on the device does not turn off the electrical current supplied to the device. The device also might have more than one connection to dc power. To remove all electrical current from the device, ensure that all connections to dc power are disconnected at the dc power input terminals.

S029



DANGER

For -48V dc power supply, electrical current from power cords is hazardous.
To avoid a shock hazard:

- **To connect or disconnect -48V dc power cords when you need to remove/install redundancy power supply unit(s).**

To Connect:

1. Turn OFF subject dc power source(s) and equipment (s) that are attached to this product.
2. Install the power supply unit(s) into the system housing.
3. Attach dc power cord(s) to the product.
   - Ensure correct polarity of -48 V dc connections: RTN is + and -Vin (typical -48 V) dc is -. Earth ground should be connected very well.
4. Connect dc power cord(s) to subject power source (s).
5. Turn ON all the power source(s).

To Disconnect:

1. Disconnect or turn off the subject dc power source(s) (at the breaker panel) before removing the power supply unit(s).
2. Remove the subject dc cord(s) and make sure the wire terminal of power cord(s) is insulated.
3. Unplug the subject power supply unit(s) from the system housing.

Remove a power supply unit

Follow instructions in this section to remove a power supply unit.

About this task

If the power supply unit to be removed is the only one installed, the power supply unit is non-hot-swap. Before removing it, you must turn off the server first. To support redundancy mode or hot-swap, install an additional hot-swap power supply unit.

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 to ensure that you work safely.
- 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.

Procedure

Step 1. If a cable management arm (CMA) is installed, adjust the CMA to gain access to the power supply bay.

a. Press down the stop bracket 1 and rotate it to the open position.

b. Rotate the CMA out of the way to gain access to the power supply unit.

Note: Your CMA kit might look different from the illustration.

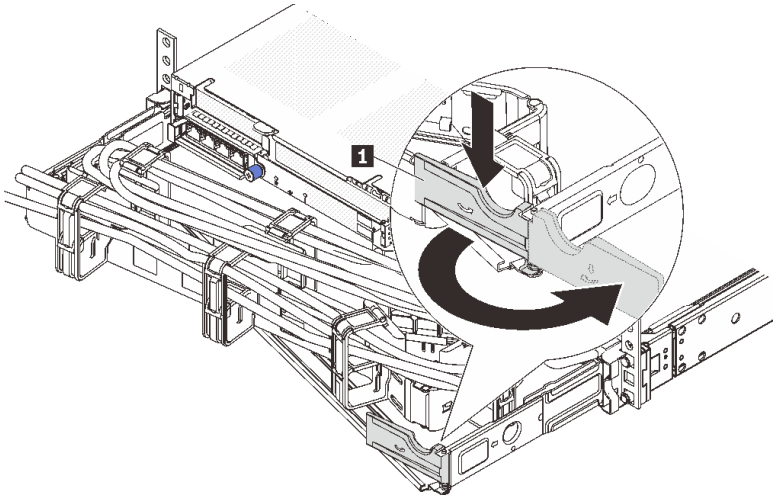


Figure 218. Adjusting the CMA

Step 2. Disconnect the power cord from the hot-swap power supply unit and the electrical outlet.

- For AC power supply units, disconnect both ends of the power cord and keep it in an ESD-safe place.
- For 240 V DC power supply units, turn off the server, and then disconnect both ends of the power cord and keep it in an ESD-safe place.
- For –48V DC power input:
  1. Disconnect the power cords from the electrical outlet.
  2. Use a slotted screwdriver to loosen the captive screws on the power supply terminal block.
  3. Disconnect the power cords from the power supply unit, make the wire terminal insulated, and keep them in an ESD-safe place.

Note: If you are replacing two power supplies, replace them one by one to ensure that the power supply to the server is not interrupted. Do not disconnect the power cord from the secondly replaced power supply until the power output LED for the firstly replaced power supply unit is lit. For the location of the power output LED, refer to "Power supply LEDs" on page 519.

Step 3. Press the release tab toward the handle and carefully pull the handle at the same time to slide the hot-swap power supply unit out of the chassis.

Note: If your CMA kit obstructs in the way, slightly pull the power supply unit upwards when sliding the power supply unit out of the chassis.

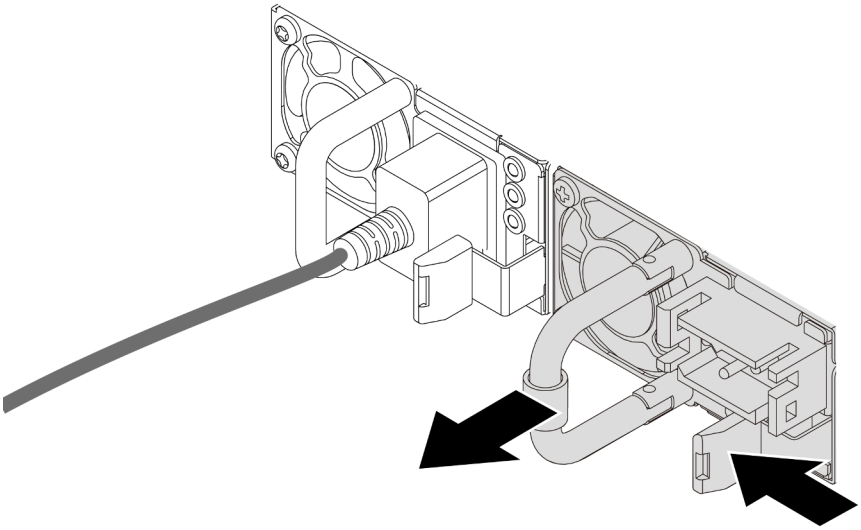


Figure 219. Removing the power supply unit

After you finish

1. Install a new power supply unit or install the power-supply filler to cover the power supply bay. See "Install a power supply unit" on page 252.

   Important: To ensure proper cooling during normal server operation, both of the power supply bays must be occupied. This means that each bay must have a power supply unit installed; or one has a power supply unit installed and the other has a power supply filler installed.
2. 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 a power supply unit

Follow instructions in this section to install a power supply unit.

About this task

If you are replacing the existing power supply unit with a new one:

- Use Lenovo Capacity Planner to calculate the required power capacity for what is configured for your server. More information about Lenovo Capacity Planner is available at:

  https://datacentersupport.lenovo.com/solutions/lnvo-lcp
- Ensure that the devices that you are installing are supported. For a list of supported optional devices for the server, go to:
  https://serverproven.lenovo.com
- Attach the power information label that comes with this option onto the existing label near the power supply unit.



Figure 220. Example power supply unit label on the top cover

Attention:

- Read "Installation Guidelines" on page 49 and "Safety inspection checklist" on page 50 to ensure that you work safely.
- 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.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Slide the new hot-swap power supply unit into the bay until it snaps into position.

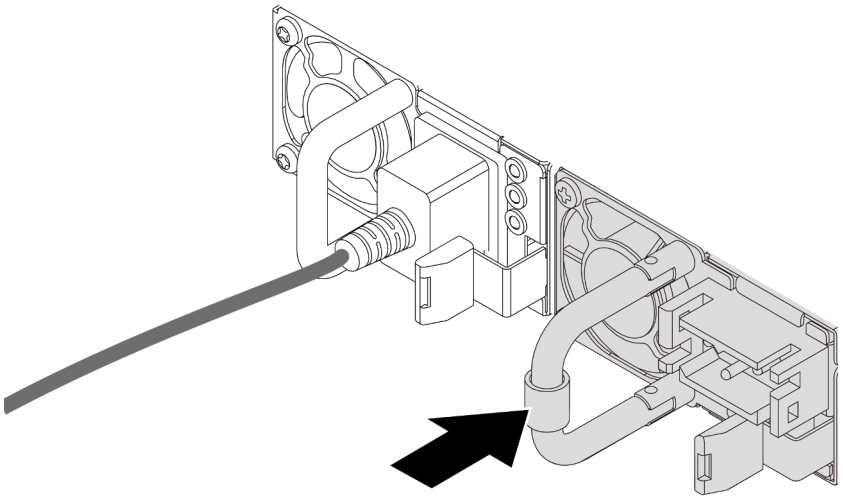


Figure 221. Installing the power supply unit

Step 3. Connect the power supply unit to a properly grounded electrical outlet.

- For AC power supply units:
  1. Connect one end of the power cord to the power connector on the power supply unit.
  2. Connect the other end of the power cord to a properly grounded electrical outlet.
- For 240 V DC power supply units:
  1. Turn off the server.
  2. Connect one end of the power cord to the power connector on the power supply unit.
  3. Connect the other end of the power cord to a properly grounded electrical outlet.
- For –48V DC power supply units:
  1. Use a slotted screwdriver to loosen the 3 captive screws on the power supply terminal block.

2. Check the type label on the power supply block and each power cord.

Type	PSU terminal block	Power cord
Input	-Vin	-Vin
Ground	⏚	GND
Input	RTN	RTN

3. Face the groove side of each power cord pin upwards, and plug the pins into corresponding holes on the power block. Use the table above for guidance to ensure that the pins find correct slots.
4. Tighten the captive screws on the power block. Ensure that the screws and cord pins are secured in place and no bare metal parts are shown.
5. Connect the other end of the cables to a properly grounded electrical outlet, and ensure that the cable ends find correct outlets.

After you finish

1. If you have adjusted the CMA to gain access to the power supply bay, properly readjust the CMA back in place.
2. If the server is turned off, turn on the server. Ensure that both the power input LED and the power output LED on the power supply unit are lit, indicating that the power supply unit is operating properly.

Demo video

Watch the procedure on YouTube

Processor and heat sink replacement (trained technician only)

Follow instructions in this section to remove and install a processor or a heat sink.

Important:

- This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install the part without proper training and qualification.
- Before replacing a processor, check the current PSB fuse policy. See *Service process before replacement* at Service process for updating PSB fuse state (Lenovo service technicians only).
- After replacing a processor, ensure that the processor fuse status is expected without unexpected XCC event logs. See *Service process after replacing a processor* at Service process for updating PSB fuse state (Lenovo service technicians only). The fuse status must be the same as the original fuse status of the server.

The server supports two types of heat sinks. Depending on the specific type, the heat sink on your server might be different from that shown in the illustrations. For detailed information on heat sink selection, see "Thermal rules" on page 60.

Attention:

- Before you begin replacing a processor, make sure that you use Lenovo proven alcohol cleaning pad and thermal grease.
- Each processor socket must always contain a cover or a processor. When replacing a processor, protect the empty processor socket with a cover.
- Do not touch the processor socket or processor contacts. Processor-socket contacts are very fragile and easily damaged. Contaminants on the processor contacts, such as oil from your skin, can cause connection failures.
- Do not allow the thermal grease on the processor or heat sink to come in contact with anything. Contact with any surface can compromise the thermal grease, rendering it ineffective. Thermal grease can damage components, such as the electrical connectors in the processor socket.

The following illustration shows the components of the processor and heat sink.

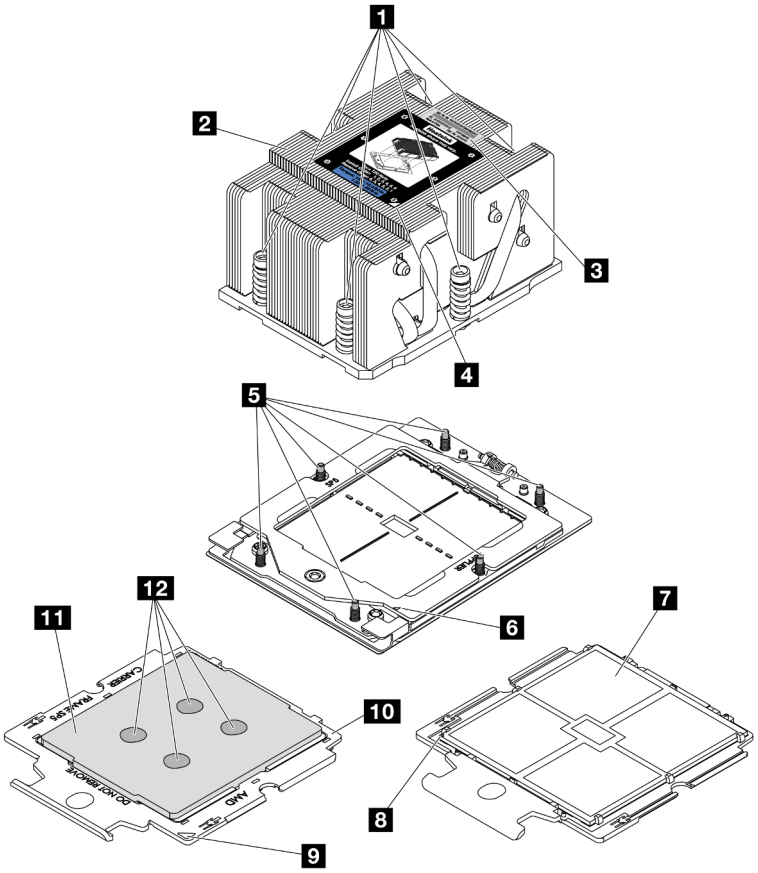


Figure 222. Processor and heat sink components

1 Captive screws (6)	7 Processor contacts
2 Heat sink	8 Processor triangular mark
3 Processor identification label	9 Carrier triangular mark
4 Heat sink triangular mark	10 Processor carrier
5 Screw bolts (6)	11 Processor heat spreader
6 Retention frame triangular mark	12 Thermal grease

- “Remove a heat sink” on page 256
- “Remove a processor” on page 259
- “Install a processor” on page 260
- “Install a heat sink” on page 261

Remove a heat sink

Follow instructions in this section to remove a heat sink. This task requires a Torx T20 screwdriver.

About this task

Important: This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install the part without proper training and qualification.

S002



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Attention:

- Read "Installation Guidelines" on page 49 and "Safety inspection checklist" on page 50 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 68.
- 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.

Note: Prepare the following screwdrivers to ensure you can install and remove the corresponding screws properly.

Torque screwdriver type list	Screw Type
Torx T20 screwdriver	Torx T20 screw

Procedure

Step 1. Make preparation for the task.

a. 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 68.

b. Remove the top cover. See "Remove the top cover" on page 342.

c. If your server comes with an air baffle or a middle cage, remove it first.

- "Remove the air baffle" on page 76
- "Remove the middle drive cage and drive backplanes" on page 223

d. Remove the system fan cage (only for removing the performance heat sink). See "Remove the system fan cage" on page 335.

Step 2. Remove the heat sink.

Notes:

- Do not touch the contacts on the bottom of the processor.
- Keep the processor socket clean from any object to prevent possible damages.

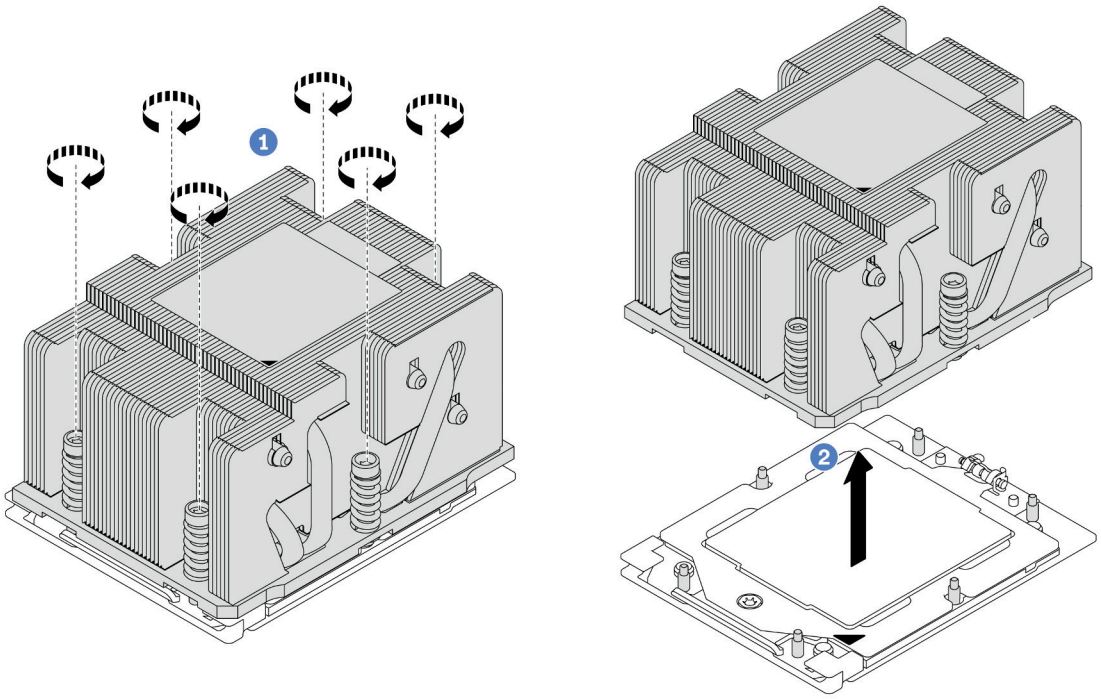


Figure 223. Removing a standard heat sink

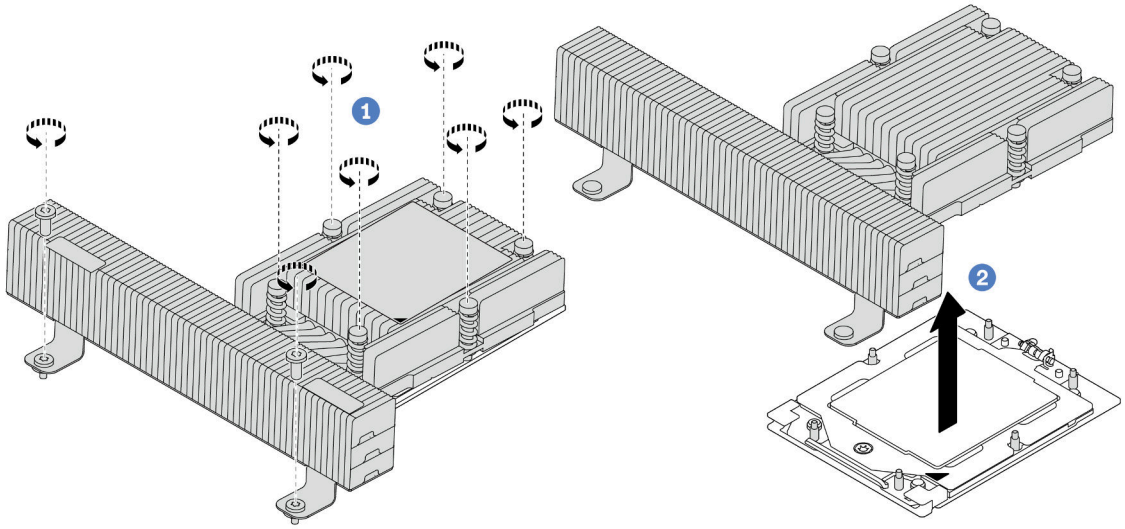


Figure 224. Removing a performance heat sink

a. 1 Fully loosen all the screws on the heat sink ***in the removal sequence shown*** on the heat-sink label.

b. 2 Carefully lift the heat sink from the processor socket.

After you finish

- If you are replacing a heat sink, install a new heat sink. See “Install a heat sink” on page 261.
- If you are replacing a processor, remove the processor. See “Remove a processor” on page 259.
- 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 processor

Follow instructions in this section to remove a processor. This task requires a Torx T20 driver.

About this task

Important: This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install the part without proper training and qualification.

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.
- The system will load factory default UEFI settings when the processor is removed. Back up the UEFI settings before processor removal.

Procedure

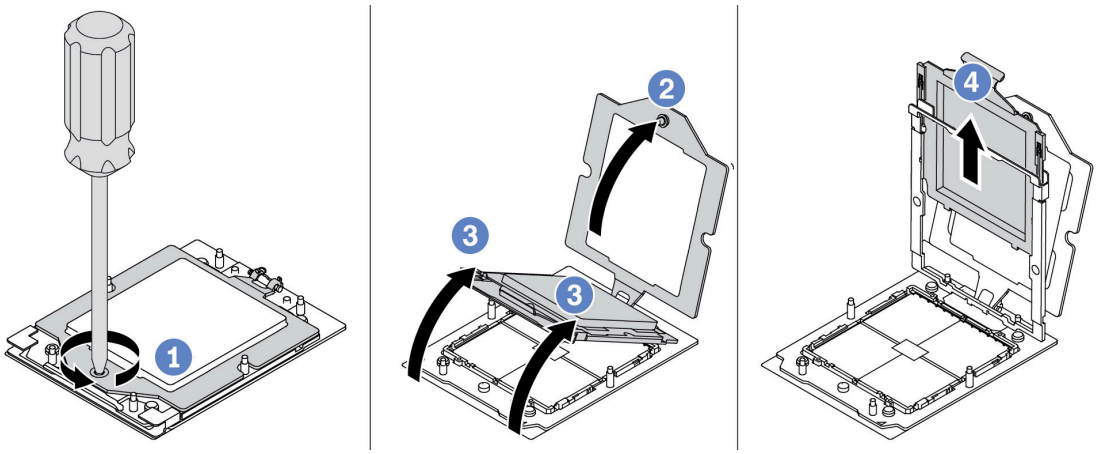


Figure 225. Removing a processor

Step 1. 1 Use a Torx T20 screwdriver to loosen the screw.

Step 2. 2 Slightly lift up the retention frame in the direction shown.

Step 3. 3 Slightly lift up the rail frame in the direction shown. The processor in the rail frame is spring-loaded.

Step 4. 4 Hold the blue tab of the processor carrier and slide the processor carrier out of the rail frame.

After you finish

- If you are going to install a new processor, See “Install a processor” on page 260.
- 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 a processor

Follow instructions in this section to install a processor. This task requires a Torx T20 driver.

About this task

Important: This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install the part without proper training and qualification.

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.

Notes:

- See https://serverproven.lenovo.com for a list of processors supported for your server. All processors on the system board assembly must have the same speed, number of cores, and frequency.
- Before you install a new processor, update your system firmware to the latest level. See “Update the firmware” on page 495.

Firmware and driver download: You might need to update the firmware or driver after replacing a component.

- Go to https://datacentersupport.lenovo.com/products/servers/thinksystem/sr655v3/7d9e/downloads/driver-list/ to see the latest firmware and driver updates for your server.
- Go to “Update the firmware” on page 495 for more information on firmware updating tools.

Procedure

Step 1. Install the processor.

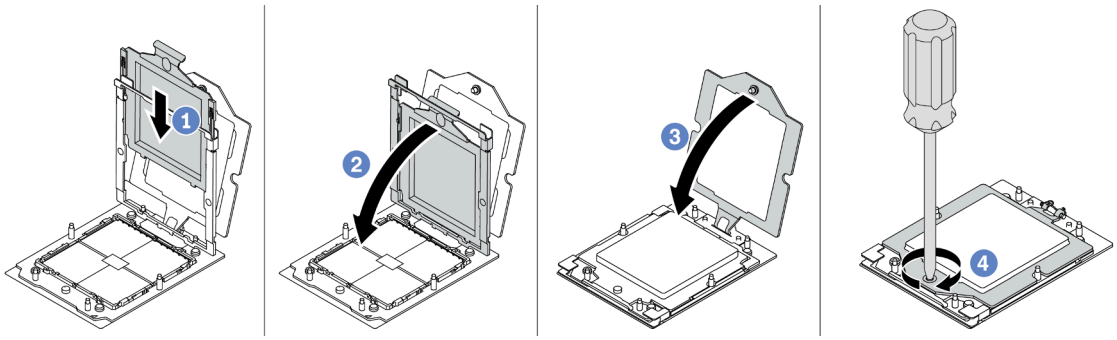


Figure 226. Installing a processor

a. Slide the processor carrier into the rail frame.
b. Push the rail frame down until the blue latches lock into place.
c. Close the retention frame.
d. Use a Torx T20 screwdriver to tighten the screw.

After you finish

Install the heat sink. See "Install a heat sink" on page 261.

Demo video

Watch the procedure on YouTube

Install a heat sink

Follow the instructions in this section to install a heat sink. This task requires a Torx T20 driver.

About this task

Important: This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install the part without proper training and qualification.

Attention:

- Read "Installation Guidelines" on page 49 and "Safety inspection checklist" on page 50 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 68.
- 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.

Note: Prepare the following screwdrivers to ensure you can install and remove the corresponding screws properly.

Torque screwdriver type list	Screw Type
Torx T20 screwdriver	Torx T20 screw

Procedure

Step 1. Do the following according to your need.

If you are replacing a processor and reusing the heat sink:

1. Remove the processor identification label from the heat sink and replace it with the new label that comes with the replacement processor.
2. Wipe off old thermal grease on the heat sink with an alcohol cleaning pad.

If you are replacing a heat sink and reusing the processor:

1. Remove the processor identification label from the old heat sink and place it on the new heat sink in the same location.

   Note: If you are unable to remove the label and place it on the new heat sink, or if the label is damaged during transfer, write the processor serial number from the processor identification label on the new heat sink in the same location as the label would be placed using a permanent marker.
2. Wipe off old thermal grease on the processor with an alcohol cleaning pad.
3. Check whether the manufacturing date on the new heat sink exceeds two years.
   - If yes, wipe off the thermal grease on the new heat sink with an alcohol cleaning pad, and go to Step 2 step 2 on page 262.
   - If no, go to Step 3 step 3 on page 262.

Step 2. Apply new thermal grease on the top of the processor with a syringe by forming four uniformly spaced dots, while each dot consists of about 0.1 ml of thermal grease.

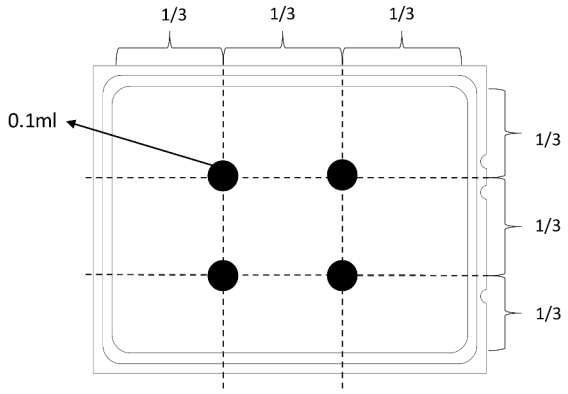


Figure 227. Applying thermal grease

Step 3. Install the heat sink.

Note: For reference, the torque required for the fasteners to fully tighten is 1.22-1.46 newton-meters (10.8-13.0 inch-pounds).

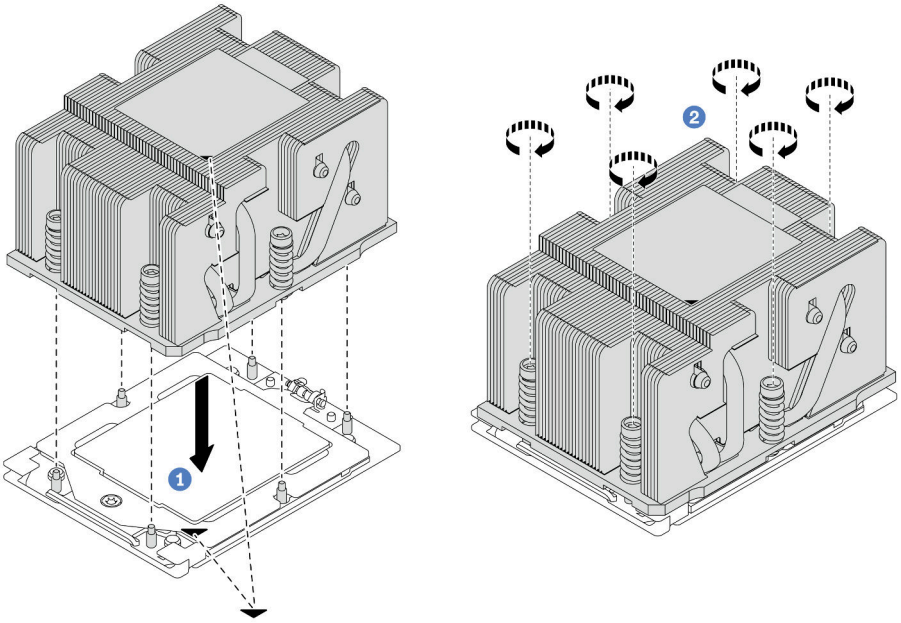


Figure 228. Installing a standard heat sink

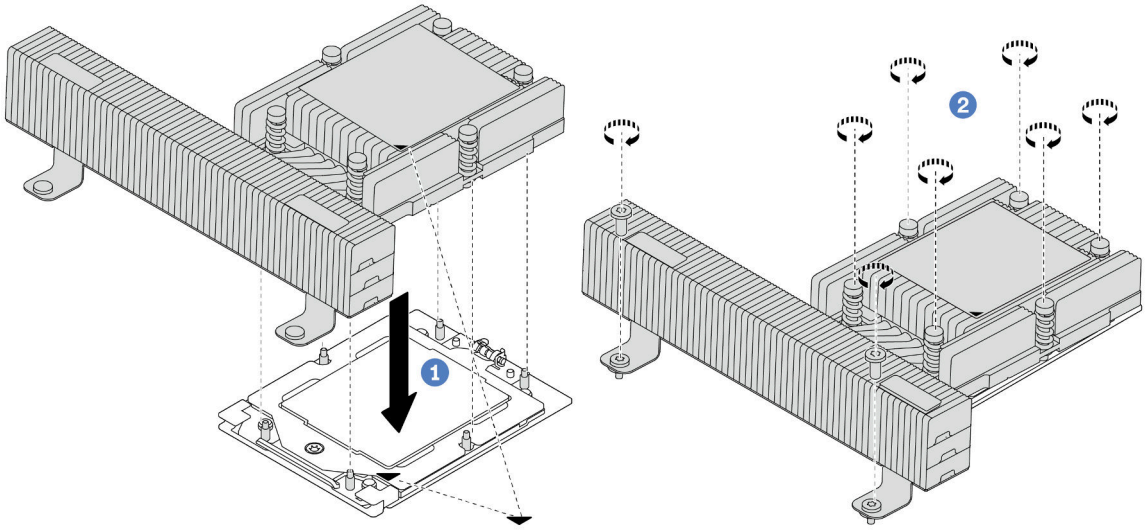


Figure 229. Installing a performance heat sink

a. 1 Align the triangular mark and screws on the heat sink with the triangular mark and threaded posts on the processor socket; then install the heat sink on the processor socket.

b. 2 Fully tighten all the screws ***in the installation sequence shown*** on the heat-sink label.

After you finish

1. Install the system fan cage if you have removed it. See "Install the system fan cage" on page 336.
2. Complete the parts replacement. See "Complete the parts replacement" on page 345.

Demo video

Watch the procedure on YouTube

Rack latches replacement

Follow the instructions in this section to remove and install the rack latches.

Notes:

- Depending on the model, the left rack latch might be assembled with a VGA connector and the right rack latch might be assembled with the front I/O module.
- This section uses the right rack latch as an example for illustration. The replacement procedure for the left rack latch is similar.

- "Remove the rack latches" on page 264
- "Install the rack latches" on page 266

Remove the rack latches

Follow the instructions in this section to remove the rack latches.

About this task

Attention:

- Read "Installation Guidelines" on page 49 and "Safety inspection checklist" on page 50 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 68.
- 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.

Procedure

Step 1. Make preparation for the task.

a. 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 68.

b. If the server is installed with the security bezel, remove it first. See "Remove the security bezel" on page 307.

c. Remove the top cover. See "Remove the top cover" on page 342.

d. Remove the air baffle. See "Remove the air baffle" on page 76.

e. Remove the system fan cage. See "Remove the system fan cage" on page 335.

Step 2. Disconnect the cable on the rack latch from the system board assembly.

Attention: To avoid damaging the system board assembly, make sure to follow the instructions in Chapter 6 "Internal cable routing" on page 347 when disconnecting cables from the system board assembly.

Step 3. Remove the cable retainer.

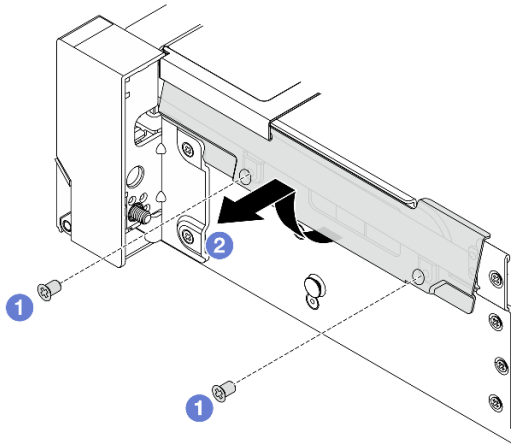


Figure 230. Removing the cable retainer

a. 1 Remove the screws that secure the cable retainer on the side of the server.
b. 2 Rotate the lower part of the cable retainer and remove it from the chassis.

Step 4. Remove the screws that secure the rack latch.

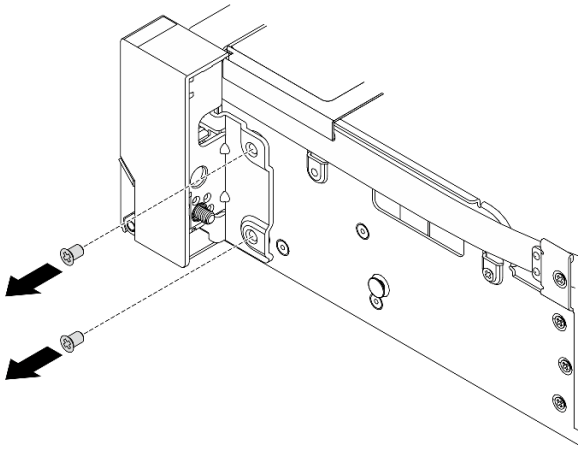


Figure 231. Removing the screws

Step 5. Slide the rack latch forward slightly and then remove the rack latch from the chassis.

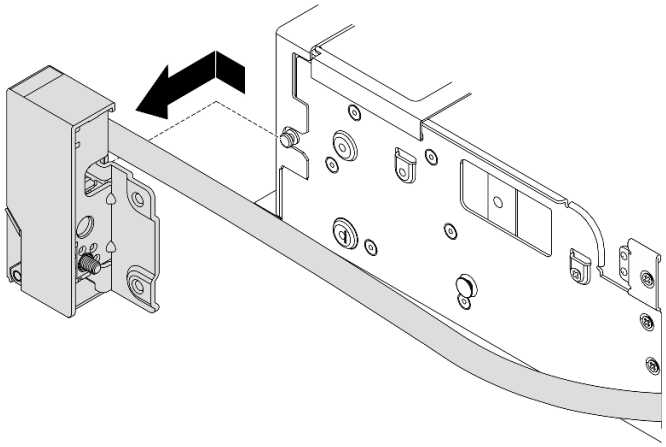


Figure 232. Removing the rack latch

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 rack latches

Follow the instructions in this section to install the rack latches.

About this task

Attention:

- Read "Installation Guidelines" on page 49 and "Safety inspection checklist" on page 50 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 68.
- 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.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Align the rack latch with the pin on the chassis. Then, press the rack latch onto the chassis and slightly slide it backward.

Note: To avoid damage to the cable, make sure that the cable is properly routed and does not cover the screw holes, as shown below.

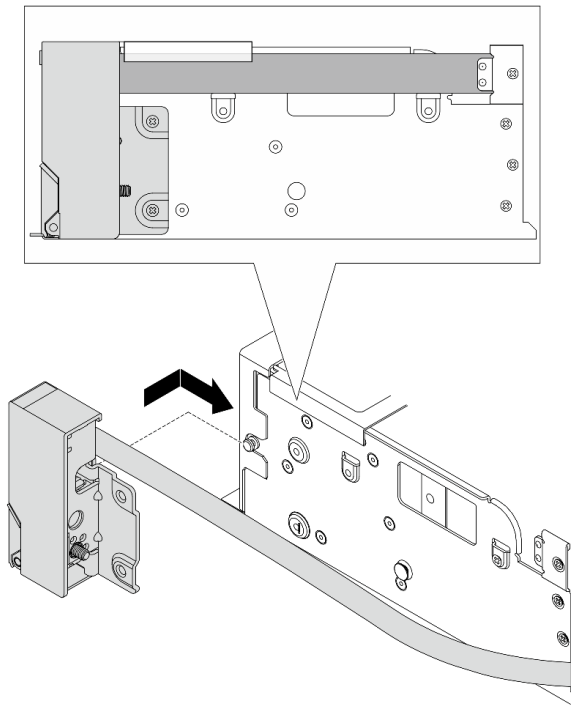


Figure 233. Installing the rack latch

Step 3. Install the screws to secure the rack latch on the side of the server.

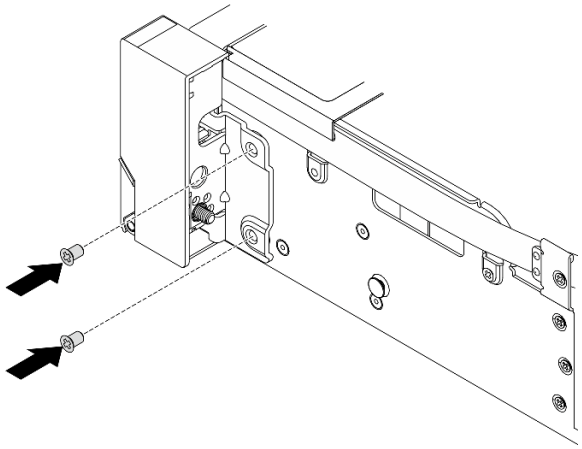


Figure 234. Installing the screws

Step 4. Install the cable retainer.

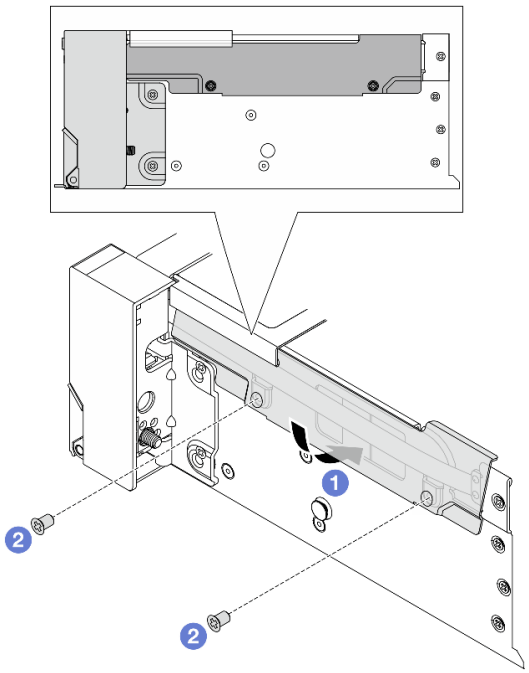


Figure 235. Installing the cable retainer

a. 1 Insert the upper part of the cable retainer into the chassis, and then rotate the lower part to install the rack latch in place.

b. 2 Install the screws to secure the cable retainer.

Step 5. Connect the cable on the rack latch to the system board assembly. See Internal cable routing.

After you finish

1. Install the system fan cage. See “Install the system fan cage” on page 336.
2. Install the air baffle. See “Install the air baffle” on page 78.
3. Complete the parts replacement. See “Complete the parts replacement” on page 345.

Demo video

Watch the procedure on YouTube

RAID flash power module replacement

The RAID flash power module protects the cache memory on the installed RAID adapter. Follow instructions in this section to remove and install a RAID flash power module (also called supercap).

The location of RAID flash power modules varies by the server hardware configurations.

Table 26. Location of RAID flash power modules

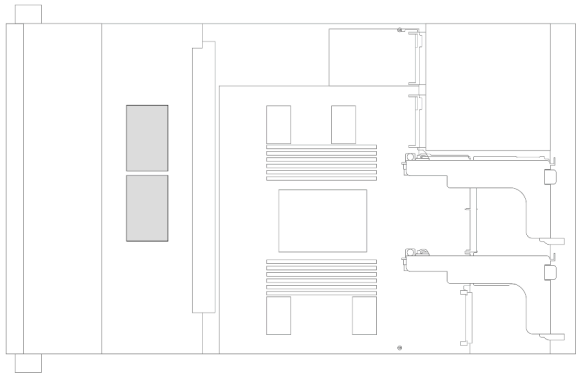


Figure 236. On the chassis



Figure 237. On standard air baffle



Figure 238. On GPU air baffle

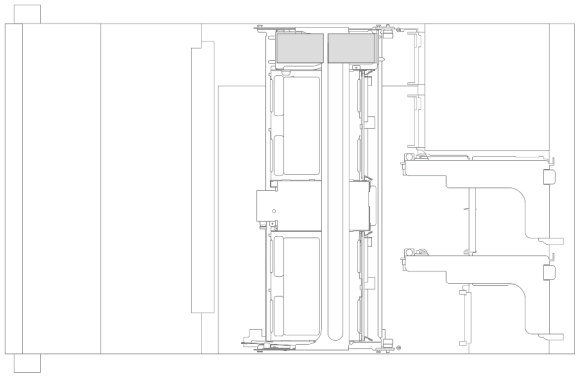


Figure 239. On the 2.5-inch middle drive cage

- “Remove a RAID flash power module from the chassis” on page 269
- “Install a RAID flash power module on the chassis” on page 271
- “Remove a RAID flash power module from the air baffle” on page 272
- “Install a RAID flash power module on the air baffle” on page 274
- “Remove a RAID flash power module from the middle 2.5-inch drive cage” on page 275
- “Install a RAID flash power module on the middle 2.5-inch drive cage” on page 276

Remove a RAID flash power module from the chassis

Follow instructions in this section to remove a RAID flash power module from the chassis.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), drive backplanes or drive cables, back up all important data that is stored on drives.

Watch the procedure

A video of this procedure is available at YouTube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-BashWCNZQEDP7o3EohXPEV.

Procedure

Step 1. Make preparation for the task.

a. 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 68.

b. Remove the top cover. See "Remove the top cover" on page 342.

c. Remove the system fan cage. See "Remove the system fan cage" on page 335.

d. Disconnect the cable of the RAID flash power module.

Step 2. Remove the RAID flash power module.

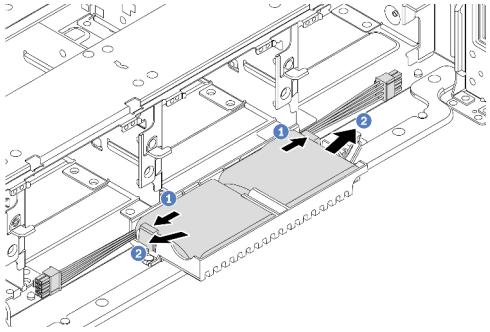


Figure 240. Removing the RAID flash power module from the supercap holder

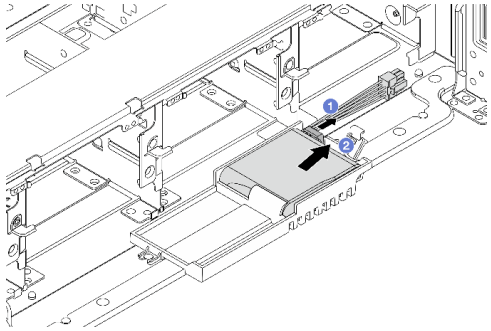


Figure 241. Removing the RAID flash power module from the supercap holder

a. 1 Open the retention clip on the supercap holder.

b. 2 Take the RAID flash power module out of the holder.

Step 3. Remove the supercap holder as shown if necessary.

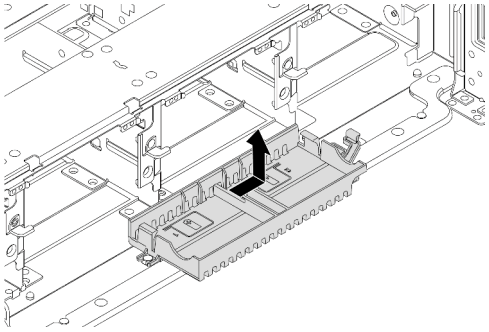


Figure 242. Removing the supercap holder

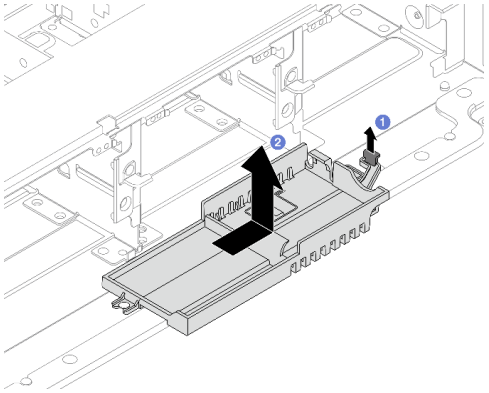


Figure 243. Removing the supercap holder

1. (1) Lift the latch.
2. (2) Slide the supercap holder in the shown direction and lift it out of the chassis.

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.

Install a RAID flash power module on the chassis

Follow instructions in this section to install a RAID flash power module (also called supercap) on the chassis.

About this task

Attention:

- Read "Installation Guidelines" on page 49 and "Safety inspection checklist" on page 50 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 68.
- 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.

Watch the procedure

A video of this procedure is available at YouTube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-BashWCNZQEDP7o3EohXPEV.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Install the supercap holder if you have removed it.

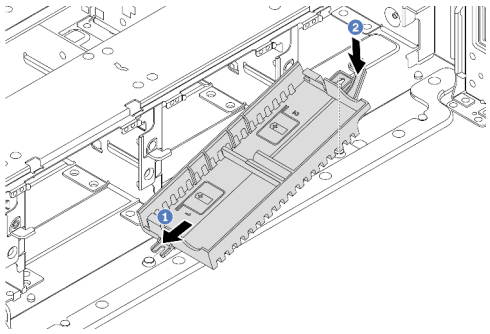


Figure 244. Installing the supercap holder

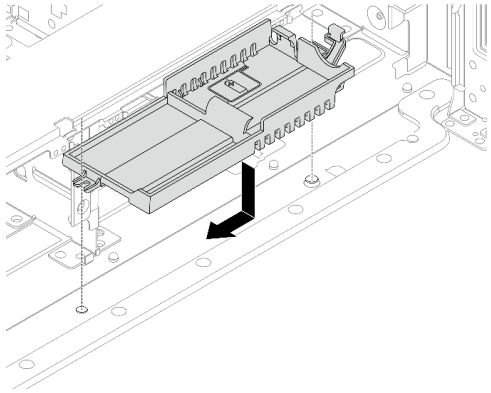


Figure 245. Installing the supercap holder

1. Align the notch on the supercap holder with the pin on the chassis.
2. Pivot the supercap holder inward until the other side clicks into place.

1. Align the keyhole on the supercap holder with the pin on the chassis, and lower the supercap holder into the chassis.
2. Slide the supercap holder in the shown direction until it clicks into place.

Step 3. Install the RAID flash power module.

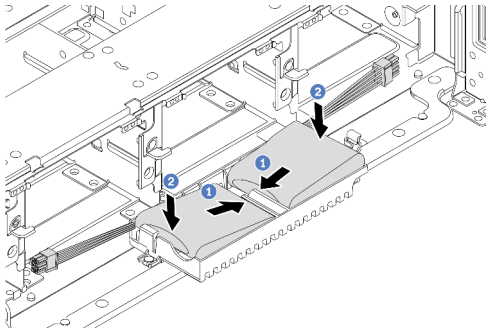


Figure 246. Installing the RAID flash power module on the supercap holder

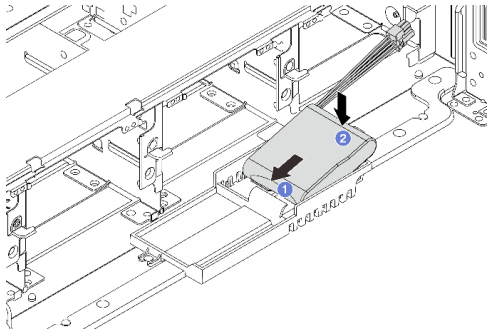


Figure 247. Installing the RAID flash power module on the supercap holder

a. Insert the RAID flash power module into the retaining clip at one side as shown.

b. Press the RAID flash power module down on the other side until it snaps into place.

Step 4. Connect the RAID flash power module to an adapter with the extension cable that comes with the RAID flash power module. See Chapter 6 “Internal cable routing” on page 347.

After you finish

1. Install the system fan cage. See “Install the system fan cage” on page 336.
2. Complete the parts replacement. See “Complete the parts replacement” on page 345.

Remove a RAID flash power module from the air baffle

Follow instructions in this section to remove a RAID flash power module (also called supercap) from the air baffle.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), drive backplanes or drive cables, back up all important data that is stored on drives.

Procedure

Step 1. Make preparation for the task.

a. 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 68.

b. Remove the top cover. See “Remove the top cover” on page 342.

c. Disconnect the cable of the RAID flash power module.

Step 2. Remove the RAID flash power module from the air baffle.

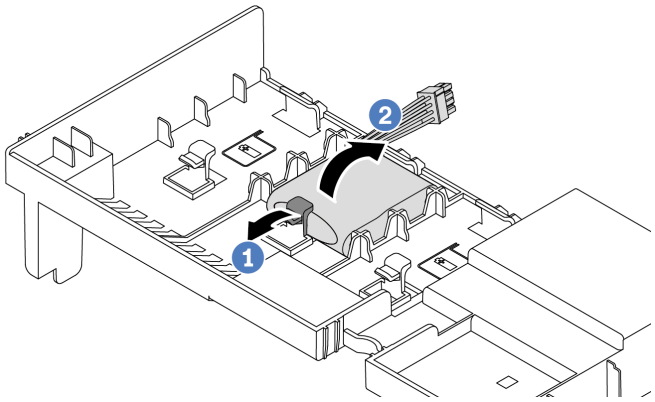


Figure 248. Removing the RAID flash power module from the air baffle

a. 1 Open the retention clip on the holder of the RAID flash power module.

b. 2 Take the RAID flash power module out of the holder.

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 a RAID flash power module on the air baffle

Follow instructions in this section to install a RAID flash power module (also called supercap) on the air baffle.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Install the RAID flash power module on the air baffle.

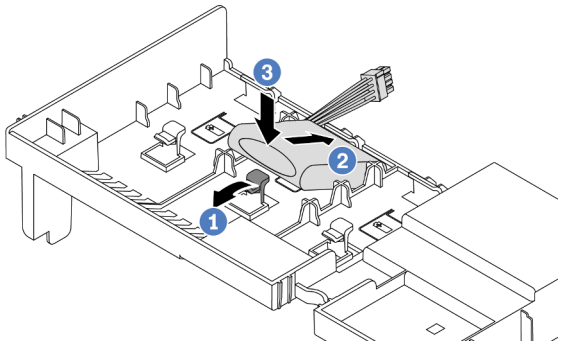


Figure 249. Installing the RAID flash power module on the air baffle

a. 1 Open the retention clip on the holder.

b. 2 Put the RAID flash power module into the holder.

c. 3 Press it down to secure it into the holder.

Step 3. Connect the RAID flash power module to an adapter with the extension cable that comes with the RAID flash power module. See Chapter 6 “Internal cable routing” on page 347.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 345.

Demo video

Watch the procedure on YouTube

Remove a RAID flash power module from the middle 2.5-inch drive cage

Follow instructions in this section to remove a RAID flash power module (also called supercap) from the middle 2.5-inch drive cage.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), drive backplanes or drive cables, back up all important data that is stored on drives.

Watch the procedure

A video of this procedure is available at YouTube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-BashWCNZQEDP7o3EohXPEV.

Procedure

Step 1. Make preparation for the task.

a. 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 68.

b. Remove the top cover. See “Remove the top cover” on page 342.

c. Disconnect the cable of the RAID flash power module.

Step 2. Remove the rubber on the cover of the supercap holder.

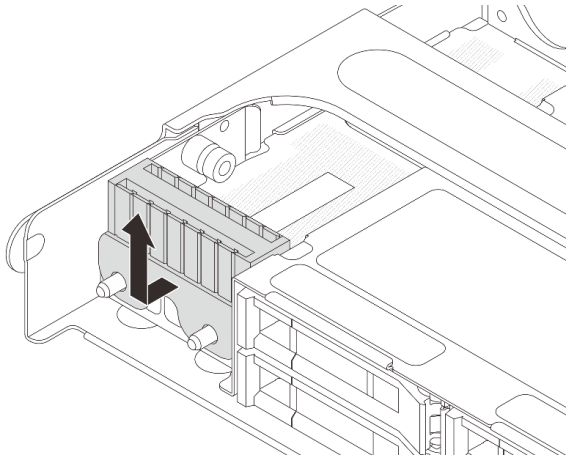


Figure 250. Removing the rubber

Step 3. Open the drive cage handle.

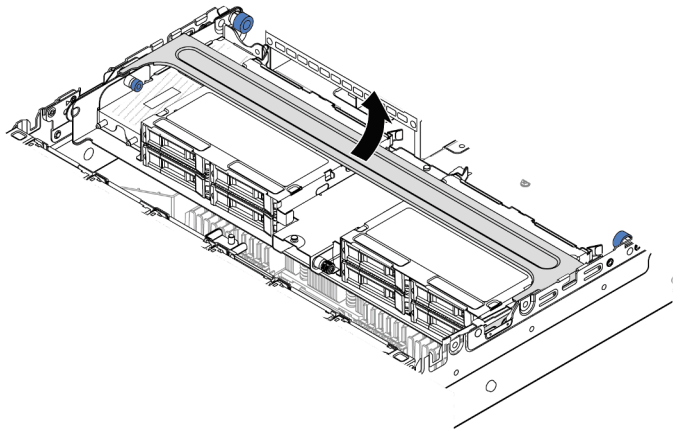


Figure 251. Opening the handle of the middle drive cage

Step 4. Remove the RAID flash power module from the middle drive cage.

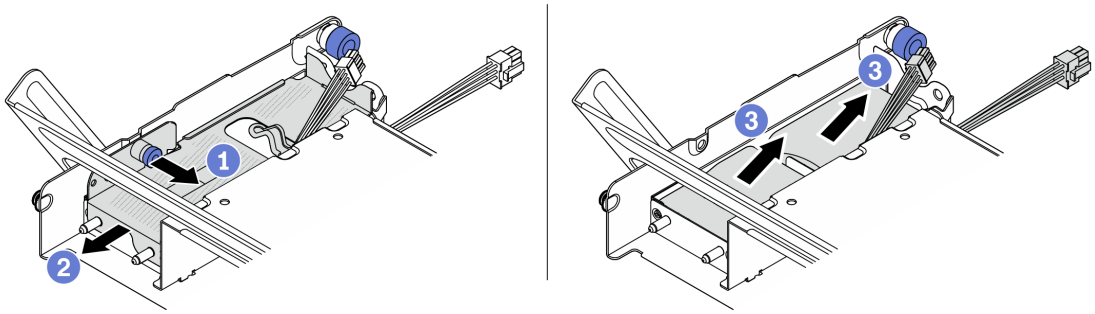


Figure 252. Removing the RAID flash power module from the middle drive cage

a. 1 Pull out the blue latch on the supercap cover.
b. 2 Slide the cover out of the holder.
c. 3 Take the RAID flash power module out of the holder.

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.

Install a RAID flash power module on the middle 2.5-inch drive cage

Follow instructions in this section to install a RAID flash power module (also called supercap) on the middle 2.5-inch drive cage.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.

Watch the procedure

A video of this procedure is available at YouTube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-BashWCNZQEDP7o3EohXPEV.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Install the RAID flash power module on the middle drive cage.

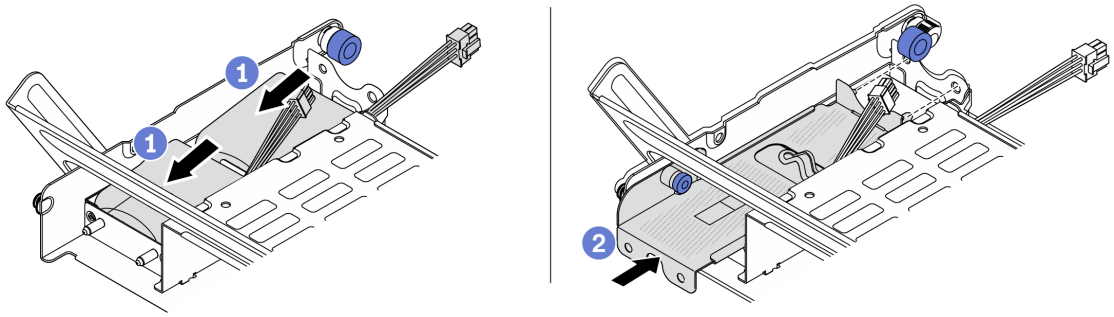


Figure 253. Installing the RAID flash power module on the middle drive cage

a. 1 Put the RAID flash power module into the holder, and press it down to secure it into the holder.

b. 2 Align the pins on the metal cover with the holes in the supercap holder, pull out the blue latch on the cover, and slide the cover into the holder until the pins pass through the holes. Then, release the blue latch to lock the cover into place.

Step 3. Press the latch as shown and close the handle.

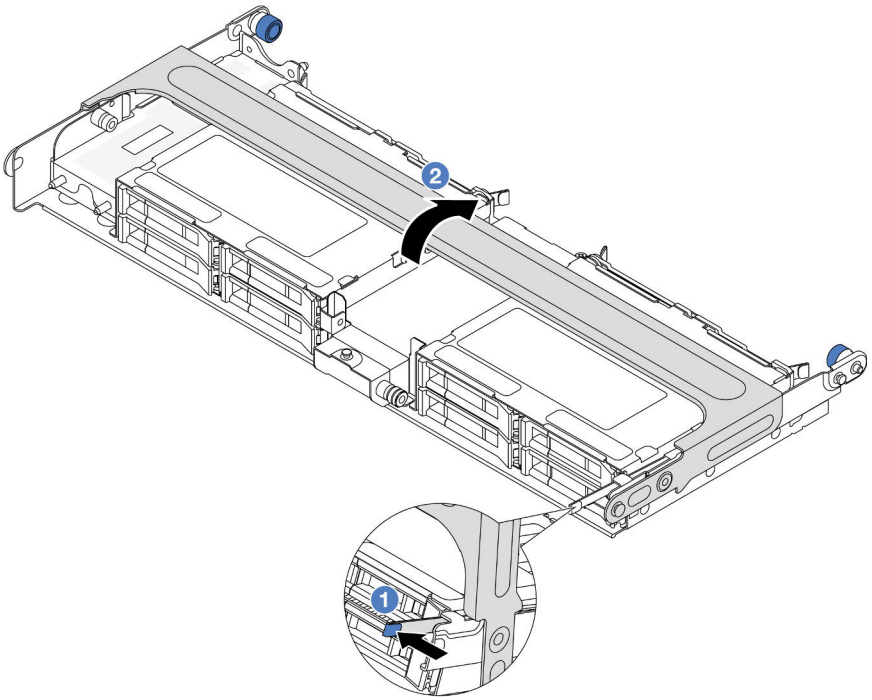


Figure 254. Closing the handle of the middle drive cage

Step 4. Install the rubber onto the cover of the supercap holder.

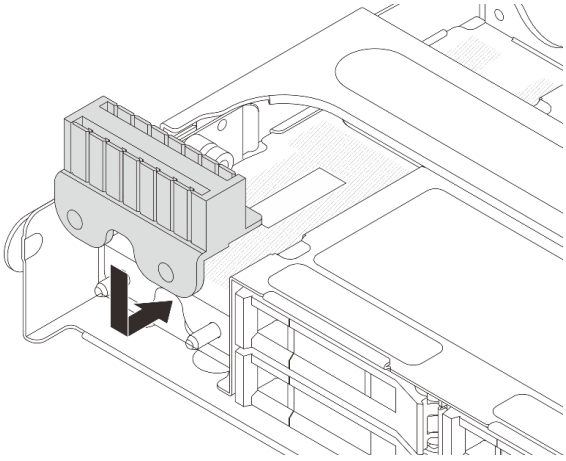


Figure 255. Installing the rubber

Step 5. Connect the RAID flash power module to an adapter with the extension cable that comes with the RAID flash power module. See Chapter 6 “Internal cable routing” on page 347.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 345.

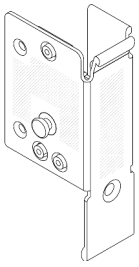
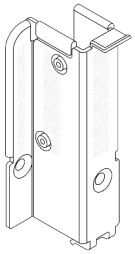
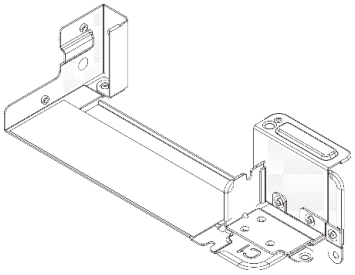
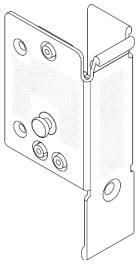
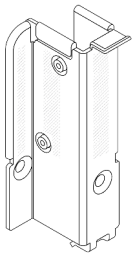
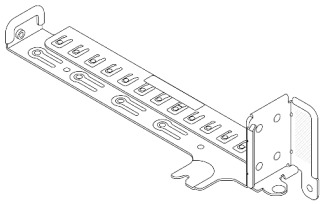
Rearwall bracket replacement

Follow instructions in this section to remove and install a rearwall bracket.

The rearwall brackets vary by server rear configurations.

- “Remove a rearwall bracket” on page 279
- “Install a rearwall bracket” on page 281

Rearwall bracket matrix

Server rear config.	Required rearwall brackets		
Configuration with 8 PCIe slots	A1 rearwall bracket on the left 	B1 rearwall bracket on the middle 	C1 rearwall bracket on the right 
Configuration with 4 x 2.5-inch rear drives	A1 rearwall bracket on the left 	B1 rearwall bracket on the middle 	C2 rearwall bracket on the right 

Remove a rearwall bracket

Follow instructions in this section to remove a rearwall bracket.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.

Procedure

Step 1. Make preparation for the task.

a. 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 68.

b. Remove the top cover. See “Remove the top cover” on page 342.

c. Remove the riser assembly or rear drive cage.

- “Rear PCIe adapter and riser assembly replacement” on page 229
- “Rear drive backplane and drive cage replacement” on page 292

Step 2. Remove the rearwall bracket.

a. (1) Remove the screws.

b. (2) Remove the bracket from the chassis as shown.

Note: The illustrations show removing the A1, B1, and C1 rearwall brackets. The procedure is the same for removing other rearwall brackets.

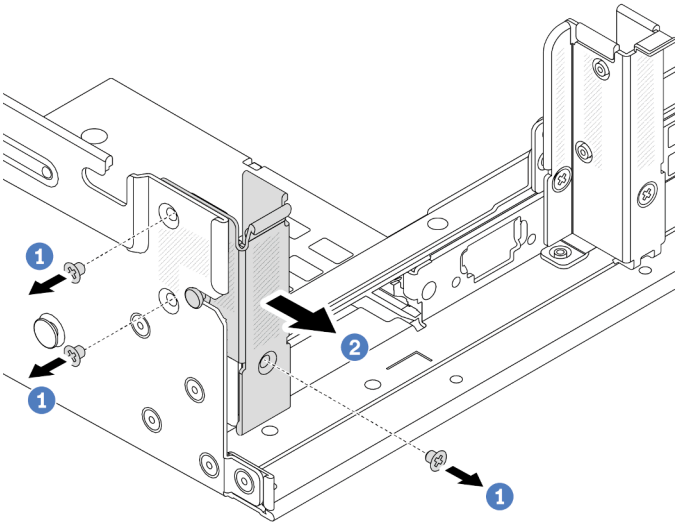


Figure 256. Removing the A1 rearwall bracket (left)

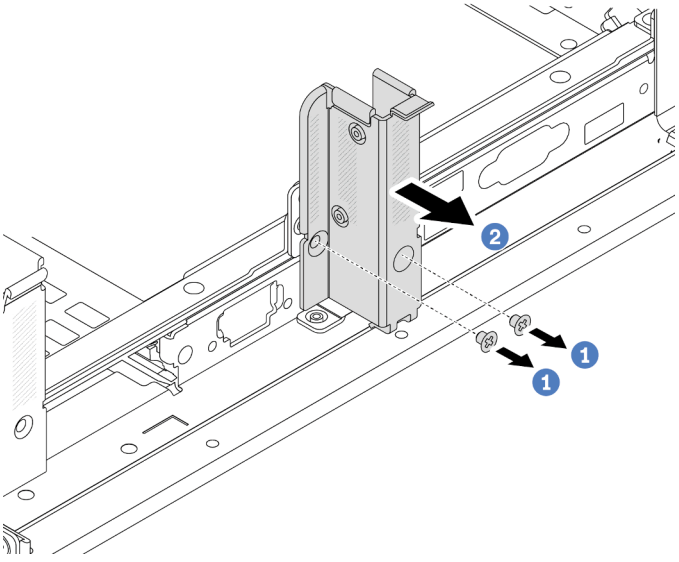


Figure 257. Removing the B1 rearwall bracket (middle)

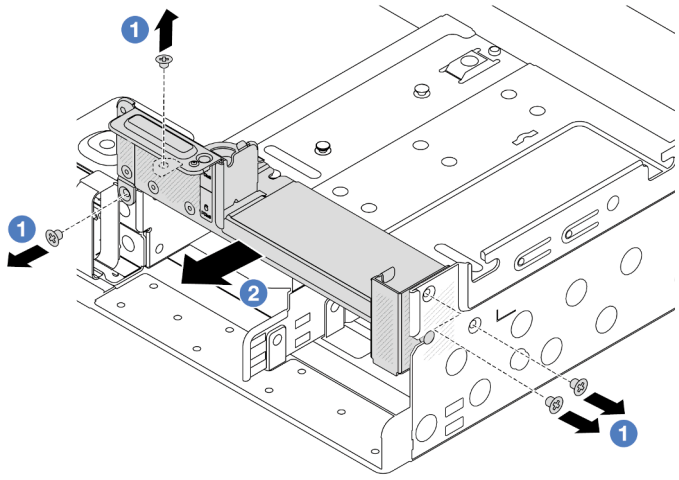


Figure 258. Removing the C1 rearwall bracket (right)

After you finish

1. Install required rearwall brackets back to the rear chassis.
2. 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 a rearwall bracket

Follow instructions in this section to install a rearwall bracket.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Install the rearwall brackets.

a. (1) Align the rearwall bracket with the chassis, and insert the bracket into place.

b. (2) Install the screws to secure the rearwall bracket.

Note: The illustrations show installing the A1, B1, and C1 rearwall brackets. The procedure is the same for installing other rearwall brackets.

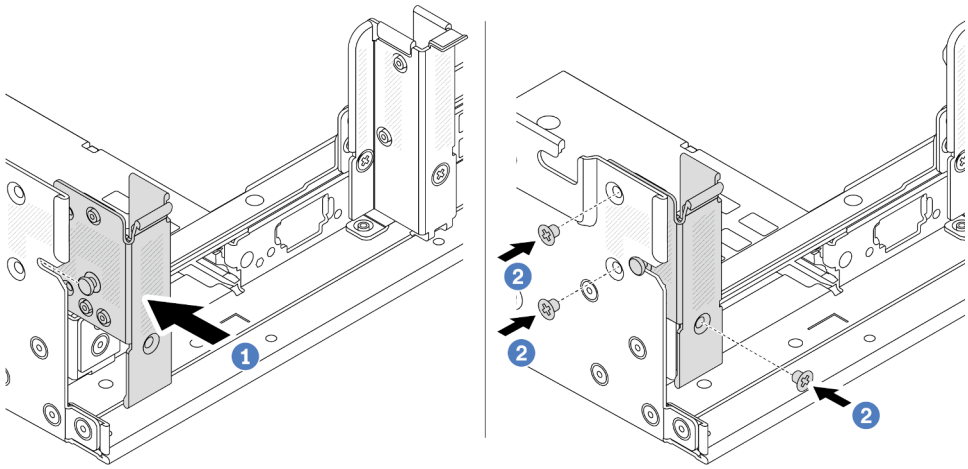


Figure 259. Installing the A1 rearwall bracket (left)

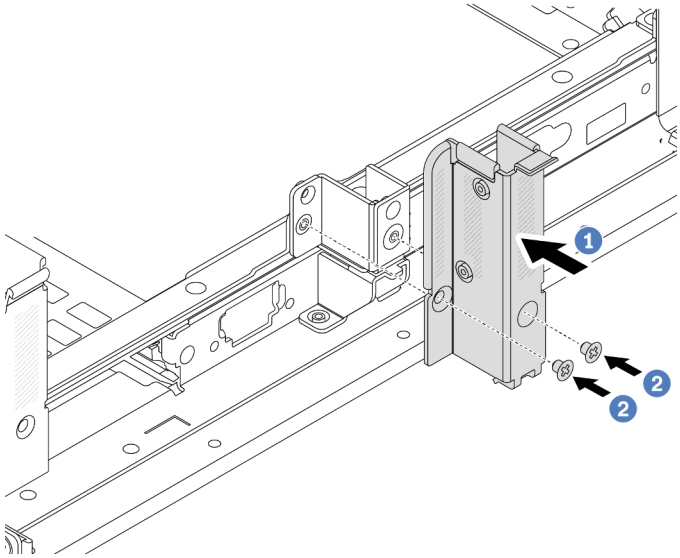


Figure 260. Installing the B1 rearwall bracket (middle)

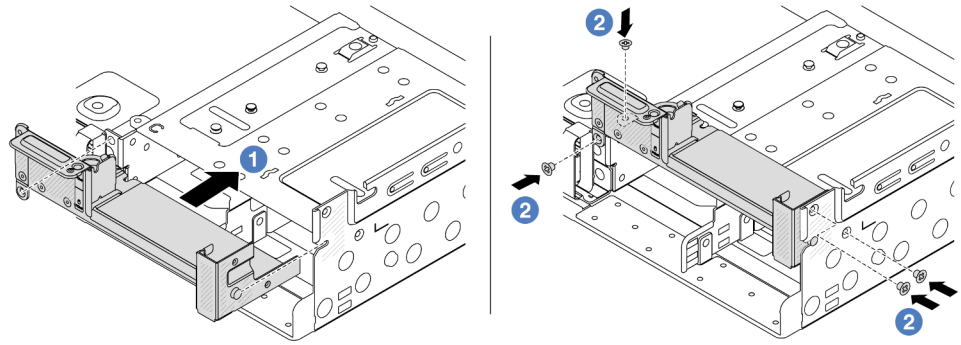


Figure 261. Installing the C1 rearwall bracket (right)

After you finish

1. Install a rear drive cage or riser assemblies.
   - “Rear PCIe adapter and riser assembly replacement” on page 229
   - “Rear drive backplane and drive cage replacement” on page 292
2. Complete the parts replacement. See “Complete the parts replacement” on page 345.

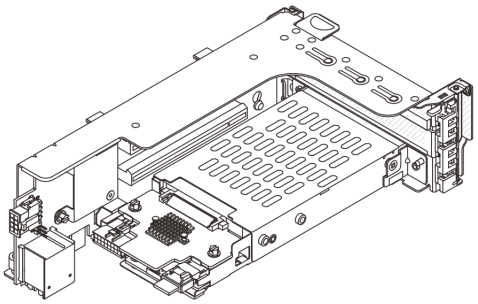
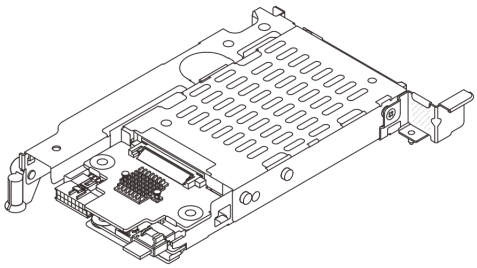
Demo video

Watch the procedure on YouTube

Rear 7mm drive backplane and drive cage replacement

Follow instructions in this section to remove and install the rear 7mm drive backplanes and drive cage.

Depending on server configuration, the server supports one of the below rear 7mm drive cages. The replacement procedures for both drive cages and drive backplanes are similar.

1 2FH+7mm SSD riser cage	2 7mm SSD riser cage
	

- “Remove the 7mm drive cage” on page 283
- “Remove the 7mm drive backplanes” on page 286
- “Install the 7mm drive backplanes” on page 288
- “Install the 7mm drive cage” on page 289

Remove the 7mm drive cage

Follow instructions in this section to remove the 7mm drive cage.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.

- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), 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.
- If one or more NVMe solid-state drives are to be removed, it is recommended to disable them beforehand via the operating system.

Procedure

Step 1. Make preparation for the task.

a. 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 68.

b. Remove the top cover. See "Remove the top cover" on page 342.

c. Remove all the installed drives and fillers (if any) from the drive bays. See "Remove a hot-swap drive" on page 140.

d. Record the cable connections for 7mm drives and then disconnect all cables from the backplanes.

Step 2. Remove the riser assembly with 7mm drive cage from the chassis.

- **2FH+7mm SSD riser cage**

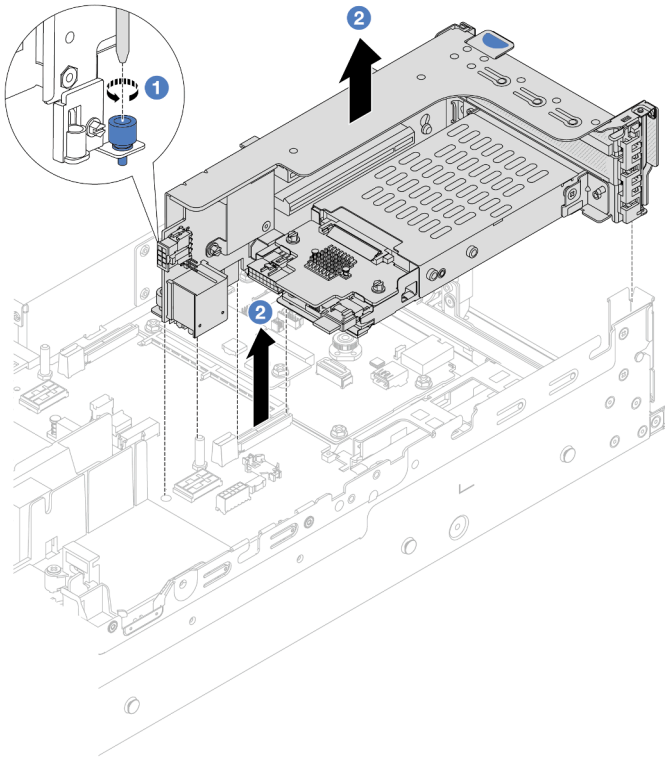


Figure 262. Removing the 2FH+7mm SSD riser cage

a. 1 Loosen the screw of the riser cage.

b. 2 Carefully lift the riser assembly up from the chassis.

- **7mm SSD riser cage**

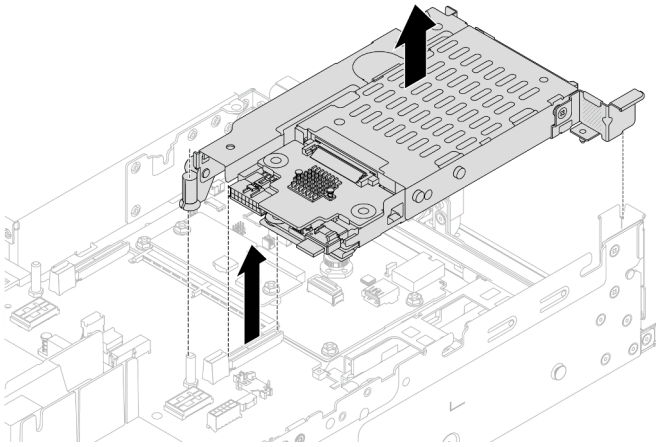


Figure 263. Removing the 7mm SSD riser cage

Step 3. (Only for the 2FH+7mm SSD riser cage) Remove the 7mm drive cage from the riser assembly.

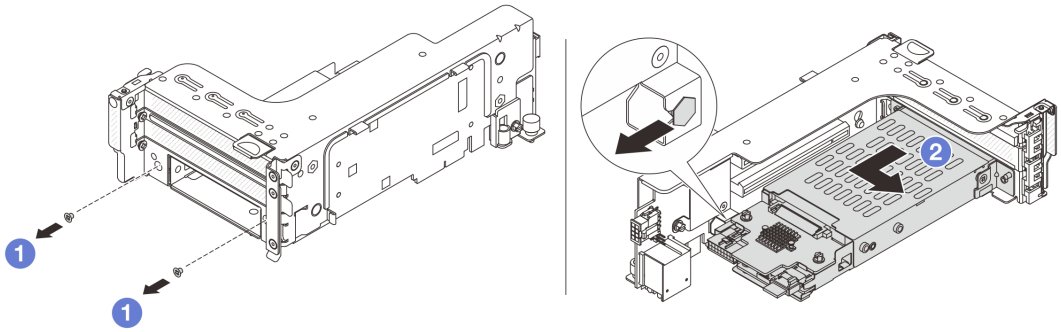


Figure 264. Removing the 7mm drive cage from the riser assembly

a. 1 Remove the two screws.

b. 2 Slightly and horizontally slide the cage out of the riser cage.

Step 4. (Only for the 2FH+7mm SSD riser cage) Remove the 7mm drive cage securing clip from the riser cage.

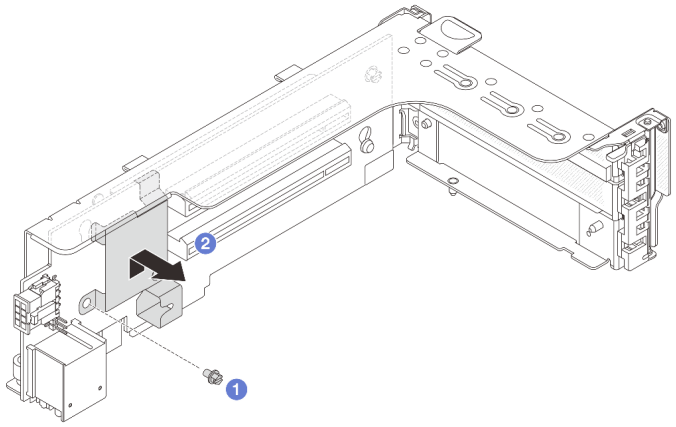


Figure 265. Removing the 7mm drive cage securing clip

After you finish

Remove the two 7mm backplanes. See “Remove the 7mm drive backplanes” on page 286.

Demo video

Watch the procedure on YouTube

Remove the 7mm drive backplanes

Follow instructions in this section to remove the 7mm drive backplanes.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), 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.
- If one or more NVMe solid-state drives are to be removed, it is recommended to disable them beforehand via the operating system.

Procedure

Step 1. Remove the 7mm drive backplane on the top.

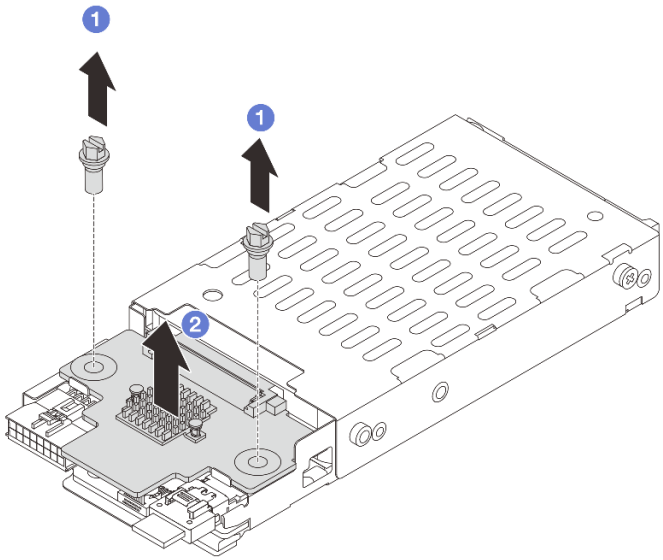


Figure 266. Removing the 7mm drive backplane (top)

a. 1 Remove the two screws.
b. 2 Vertically lift the backplane up and put it aside.

Step 2. Remove the 7mm drive backplane at the bottom.

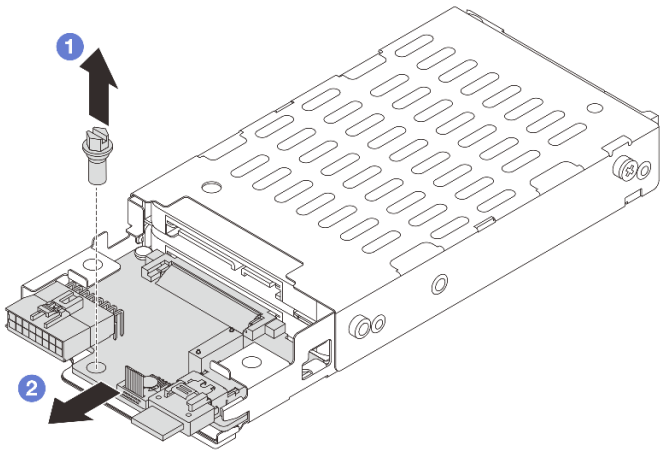


Figure 267. Removing the 7mm drive backplane (bottom)

a. 1 Remove the screw.
b. 2 Remove the backplane horizontally from the cage as shown.

After you finish

1. Do one of the following:
   - If you are replacing the backplanes, install new backplanes to the drive cage.

- If you are replacing the drive cage, install the backplanes to a new drive cage.

2. 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 7mm drive backplanes

Follow instructions in this section to install the 7mm drive backplanes.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Install the 7mm drive backplane at the bottom.

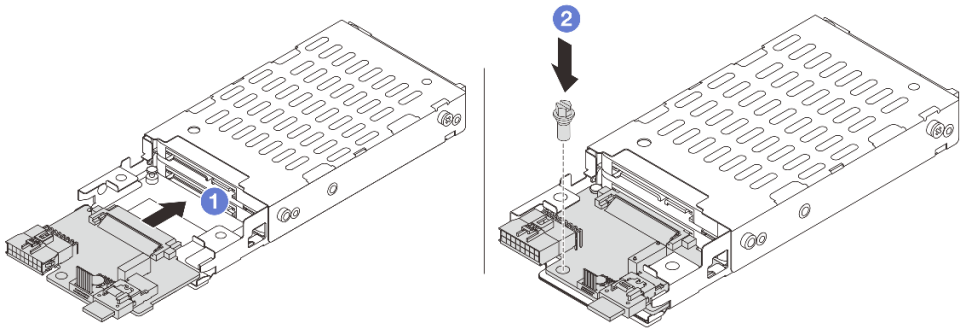


Figure 268. Installing the 7mm drive backplane (bottom)

a. 1 Align the notch at the edge of the backplane with the pin on the cage, and slightly slide the backplane into the cage until it is fully seated.

b. 2 Install the screw to secure it.

Step 3. Install the 7mm drive backplane on the top.

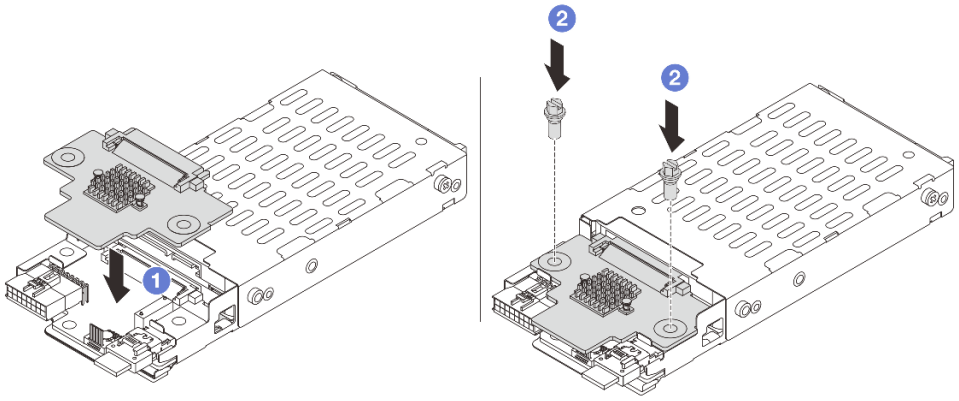


Figure 269. Installing the 7mm drive backplane (top)

a. 1 Align the holes in the backplane with the holes on the cage, and put the backplane down onto the cage.

b. 2 Install the two screws to secure the backplane in place.

After you finish

Install the 7mm drive cage. See “Install the 7mm drive cage” on page 289.

Demo video

Watch the procedure on YouTube

Install the 7mm drive cage

Follow instructions in this section to install the 7mm drive cage.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.

Procedure

Step 1. (Only for the 2FH+7mm SSD riser cage) Hook the securing clip over the riser adapter on the riser cage.

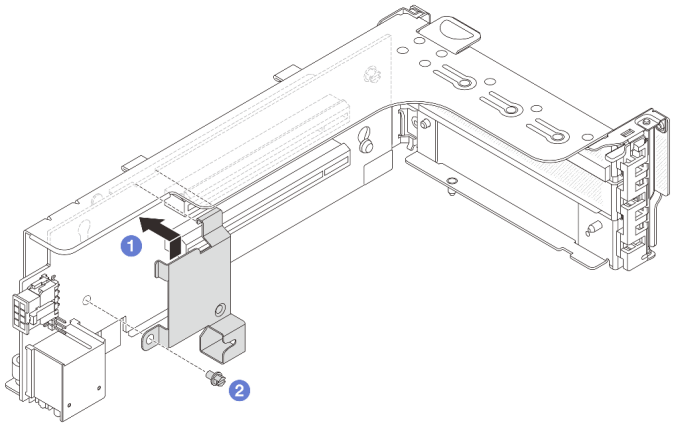


Figure 270. Installing the 7mm drive cage securing clip

Step 2. (Only for the 2FH+7mm SSD riser cage) Install the 7mm drive cage to the riser assembly.

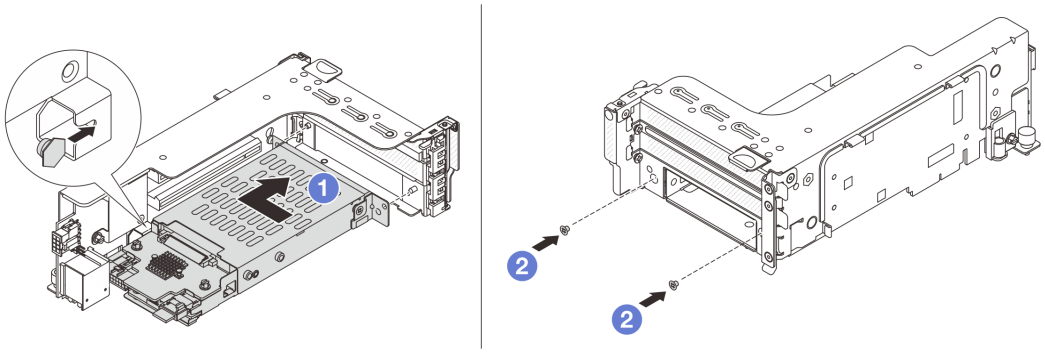


Figure 271. Installing the 7mm drive cage to the riser assembly

a. 1 Align the left-side pin on the 7mm drive cage with the positioning slot on the securing clip, the two holes on the side brackets of the 7mm drive cage with the two holes on the front of the riser cage. Install the 7mm drive cage to the riser assembly.

b. 2 Install the two screws to secure the 7mm drive cage in place.

Step 3. Install the 7mm riser assembly to the chassis.

- **2FH+7mm SSD riser cage**

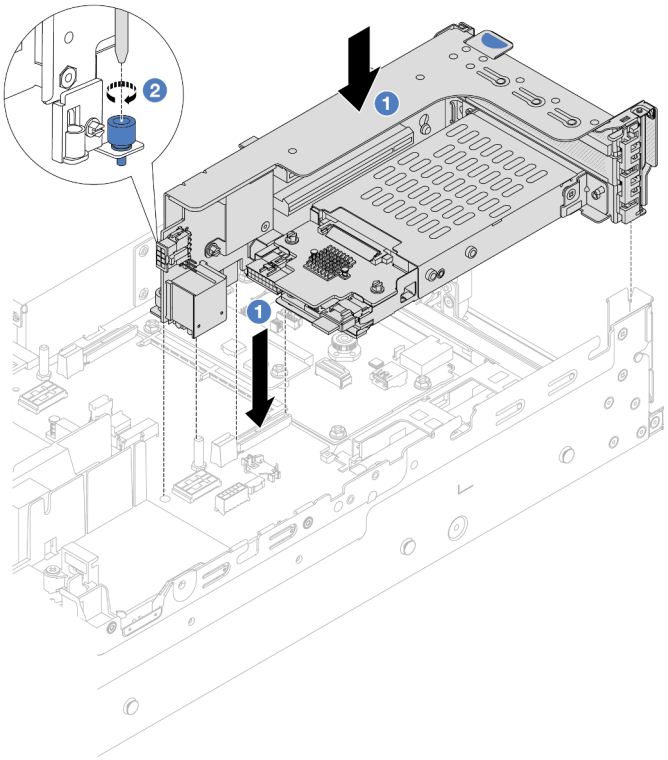


Figure 272. Installing the 2FH+7mm SSD riser cage

a. 1 Align the riser assembly with the slot on the system board assembly, and lower and insert the riser into the riser slot.

b. 2 Tighten the screw to secure the riser assembly in place.

- **7mm SSD riser cage**

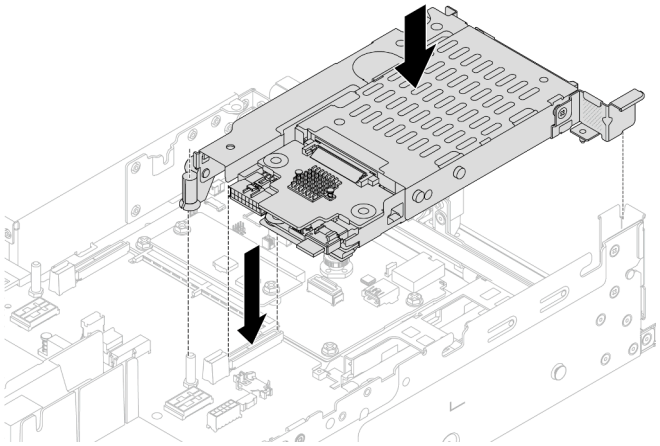


Figure 273. Installing the 7mm SSD riser cage

Step 4. Connect the cables to the backplanes. See Chapter 6 “Internal cable routing” on page 347.

After you finish

1. Reinstall all the drives and fillers (if any) into the drive bays. See “Install a hot-swap drive” on page 141.
2. Complete the parts replacement. See “Complete the parts replacement” on page 345.

Demo video

Watch the procedure on YouTube

Rear drive backplane and drive cage replacement

Follow instructions in this section to remove and install rear drive backplanes and drive cages.

Remove the 4 x 2.5" drive backplane and drive cage

Follow instructions in this section to remove the rear 2.5-inch 4-bay drive backplane and drive cage.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), 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.
- If one or more NVMe solid-state drives are to be removed, it is recommended to disable them beforehand via the operating system.

Watch the procedure

A video of this procedure is available at YouTube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-BashWCNZQEDP7o3EohXPEV.

Procedure

Step 1. Make preparation for the task.

a. 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 68.

b. Remove the top cover. See “Remove the top cover” on page 342.

c. Disconnect cables from the rear drive backplane.

d. Remove all the installed drives and fillers (if any) from the drive bays. See “Remove a hot-swap drive” on page 140.

Step 2. Remove the rear drive cage.

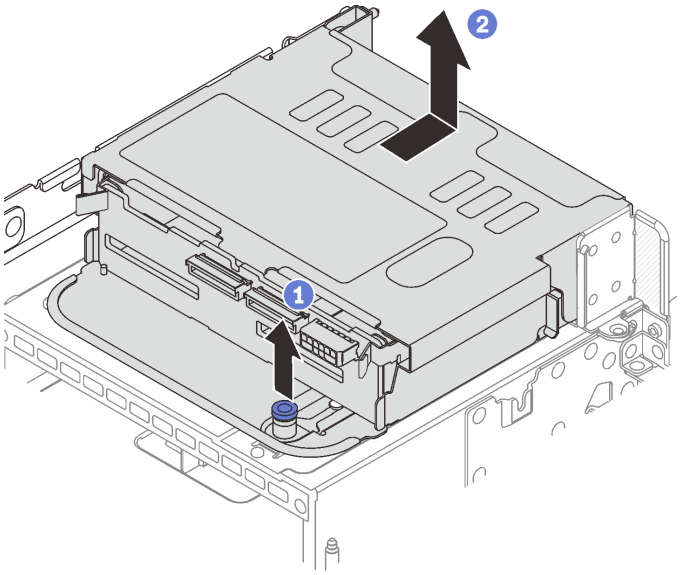


Figure 274. Removing the 4 x 2.5-inch rear drive cage

a. Twist and pull out the blue plungers.

b. Slide the drive cage towards the rear of the chassis to release it, and lift the drive cage out of the chassis.

Step 3. Remove the rear drive backplane.

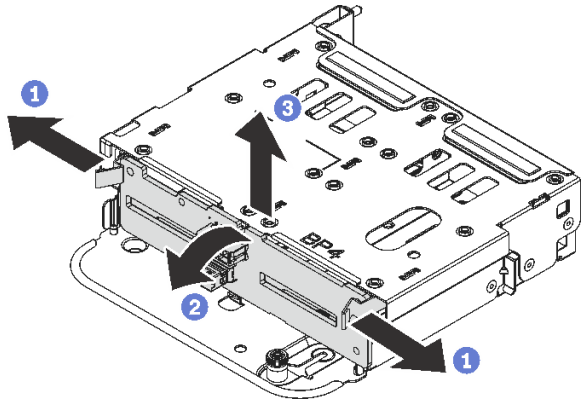


Figure 275. Removing the 4 x 2.5-inch rear drive backplane

a. Open the release latches in the direction shown.

b. Rotate the backplane from the top to disengage it from the pins on the drive cage.

c. Carefully lift the backplane out of the drive 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.

Install the 4 x 2.5" drive backplane and drive cage

Follow instructions in this section to install the rear 2.5-inch 4-bay drive backplane and drive cage.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.
- The rear drive cage is supported on some server models with thermal requirements. See “Thermal rules” on page 60 to ensure that the server is under permitted ambient temperature and the correct heat sink and system fans are used. If needed, replace your heat sink or system fan first.
  - “Processor and heat sink replacement (trained technician only)” on page 255
  - “System fan replacement” on page 331

Watch the procedure

A video of this procedure is available at YouTube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-BashWCNZQEDP7o3EohXPEV.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Install the drive backplane into the rear drive cage.

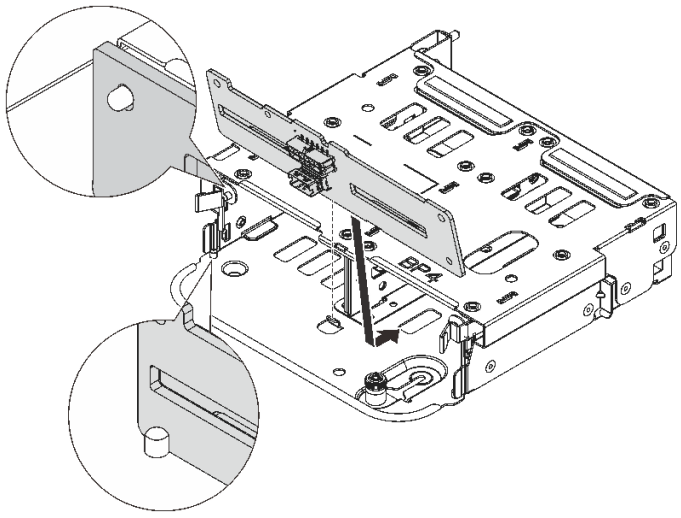


Figure 276. Installing the 4 x 2.5-inch rear drive backplane

a. Align the bottom of the backplane with the studs at the bottom of the drive cage.

b. Lower the backplane into the drive cage so that the holes in the backplane pass through the pins on the drive cage, and press the backplane into position. The release latches will secure the backplane in place.

Step 3. Install the rear drive cage.

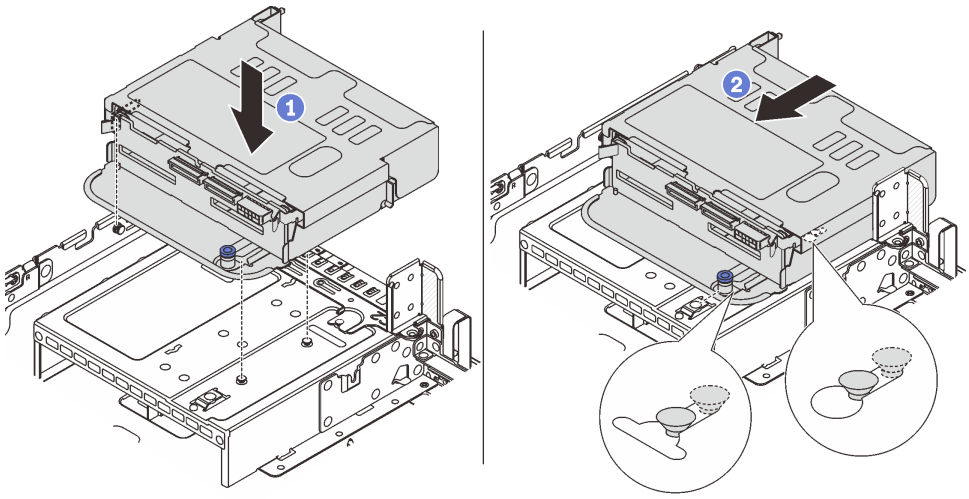


Figure 277. Installing the 4 x 2.5-inch rear drive cage

a. (1) Align the rear drive cage with the chassis, and lower the drive cage into the chassis.

b. (2) Move the rear drive cage forward until it clicks into position.

Step 4. Connect cables to the drive backplane. See Chapter 6 “Internal cable routing” on page 347.

After you finish

1. Reinstall the drives or drive fillers into the rear drive cage. See “Install a hot-swap drive” on page 141.
2. Complete the parts replacement. See “Complete the parts replacement” on page 345.

Remove the 8 x 2.5" drive backplane and drive cage

Follow instructions in this section to remove the rear 2.5-inch 8-bay drive backplane and drive cage.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), 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.
- If one or more NVMe solid-state drives are to be removed, it is recommended to disable them beforehand via the operating system.

Procedure

Step 1. Make preparation for the task.

a. 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 68.

b. Remove the top cover. See “Remove the top cover” on page 342.

c. Disconnect cables from the rear drive backplane.

d. Remove all the installed drives and fillers (if any) from the drive bays. See “Remove a hot-swap drive” on page 140.

Step 2. Remove the rear drive cage.

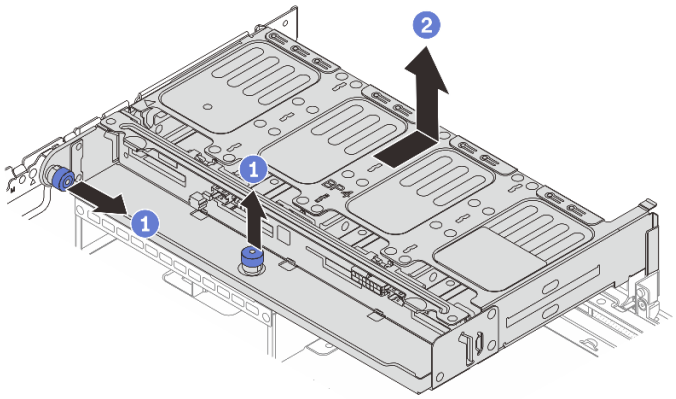


Figure 278. Removing the 8 x 2.5-inch rear drive cage

a. 1 Twist and pull out the blue plungers.

b. 2 Slide the drive cage towards the rear of the chassis to release it, and lift the drive cage out of the chassis.

Step 3. Hold the backplane and carefully lift the backplane out of the drive cage.

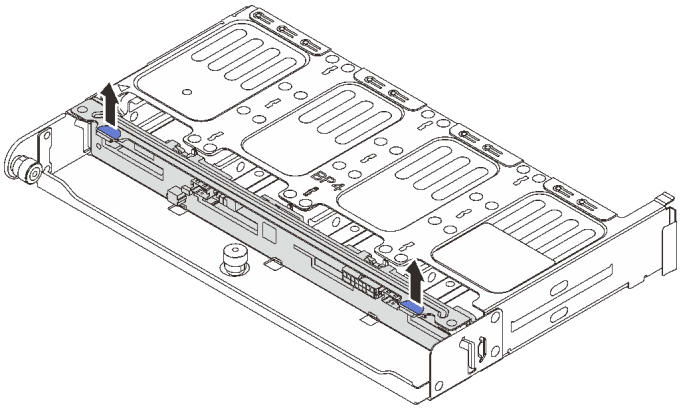


Figure 279. Removing the rear 8 x 2.5-inch drive backplane

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 8 x 2.5" drive backplane and drive cage

Follow instructions in this section to install the 2.5-inch 8-bay drive backplane and drive cage.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.
- The rear drive cage is supported on some server models with thermal requirements. See “Thermal rules” on page 60 to ensure that the server is under permitted ambient temperature and the correct heat sink and system fans are used. If needed, replace your heat sink or system fan first.
  - “Processor and heat sink replacement (trained technician only)” on page 255
  - “System fan replacement” on page 331

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Install the drive backplane into the rear drive cage.

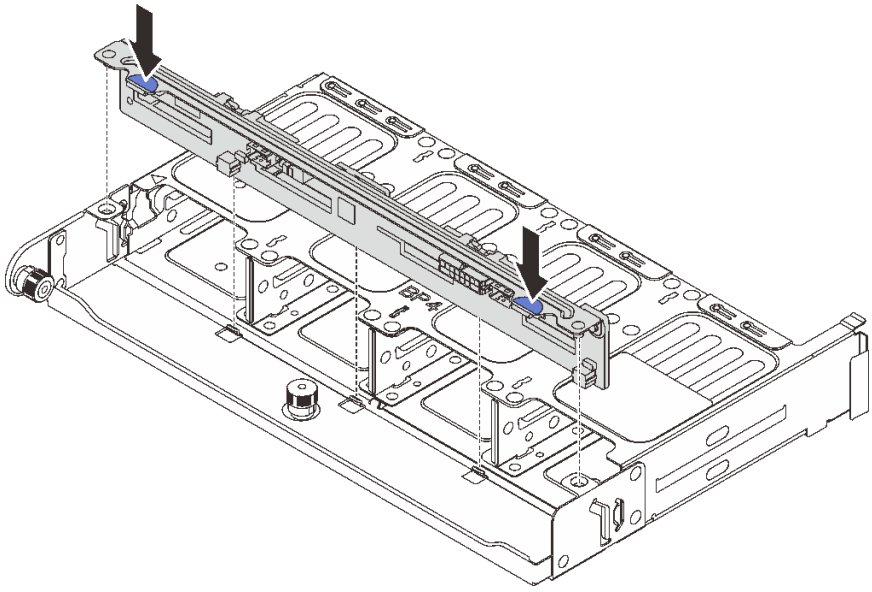


Figure 280. Installing the 8 x 2.5-inch rear drive backplane

a. Align the pins of the backplane with the holes at both sides of the drive cage.

b. Lower the backplane into the drive cage so that the pins of the backplane pass through the holes on the drive cage, and press the backplane into position.

Step 3. Install the rear drive cage.

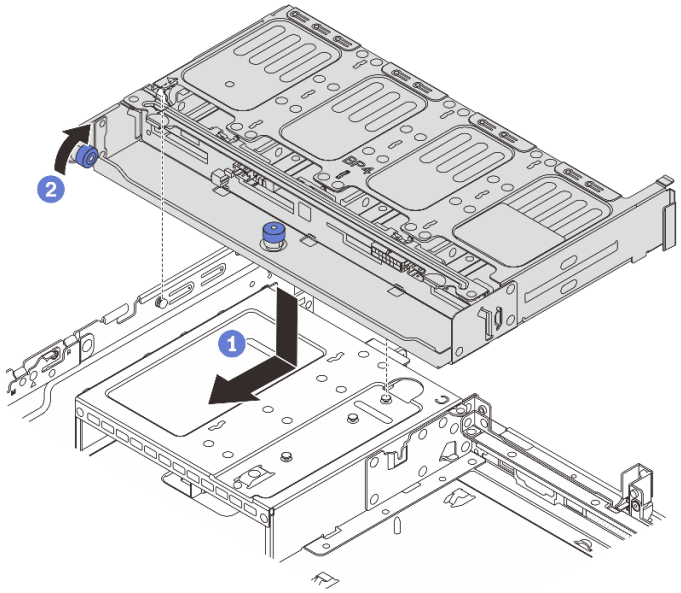


Figure 281. Installing the 8 x 2.5-inch rear drive cage

a. 1 Align the rear drive cage with the chassis, and lower the drive cage into the chassis. Move the rear drive cage forward until it clicks into position.

b. 2 Twist and release the blue plunger to secure the drive cage in place.

Step 4. Connect cables to the drive backplane. See Chapter 6 “Internal cable routing” on page 347.

After you finish

1. Reinstall the drives or drive fillers into the rear drive cage. See “Install a hot-swap drive” on page 141.
2. Complete the parts replacement. See “Complete the parts replacement” on page 345.

Demo video

Watch the procedure on YouTube

Remove the 2 x 3.5" drive backplane and drive cage

Follow instructions in this section to remove the rear 3.5-inch 2-bay drive backplane and drive cage.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), 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.
- If one or more NVMe solid-state drives are to be removed, it is recommended to disable them beforehand via the operating system.

Watch the procedure

A video of this procedure is available at YouTube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-BashWCNZQEDP7o3EohXPEV.

Procedure

Step 1. Make preparation for the task.

a. 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 68.
b. Remove the top cover. See “Remove the top cover” on page 342.
c. Disconnect cables from the rear drive backplane.
d. Remove all the installed drives and fillers (if any) from the drive bays. See “Remove a hot-swap drive” on page 140.

Step 2. Remove the rear drive cage.

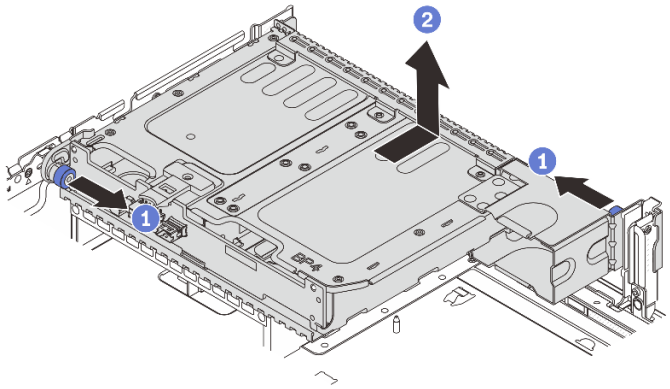


Figure 282. Removing the 2 x 3.5-inch rear drive cage

a. 1 Twist and pull out the blue plungers.

b. 2 Slide the drive cage towards the rear of the chassis to release it, and lift the drive cage out of the chassis.

Step 3. Remove the rear drive backplane.

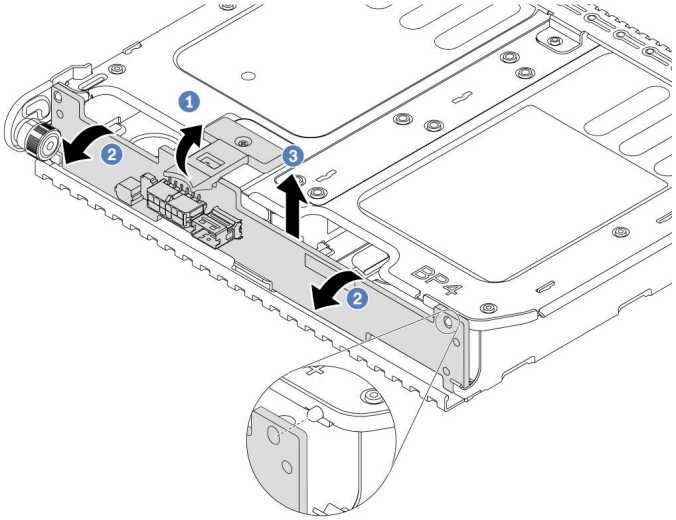


Figure 283. Removing the 2 x 3.5-inch rear drive backplane

a. 1 Open the release latch in the direction shown.

b. 2 Rotate the backplane from the top to disengage it from the pins on the drive cage.

c. 3 Carefully lift the backplane out of the drive 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.

Install the 2 x 3.5" drive backplane and drive cage

Follow instructions in this section to install the 3.5-inch 2-bay drive backplane and drive cage.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.
- The rear drive cage is supported on some server models with thermal requirements. See “Thermal rules” on page 60 to ensure that the server is under permitted ambient temperature and the correct heat sink and system fans are used. If needed, replace your heat sink or system fan first.
  - “Processor and heat sink replacement (trained technician only)” on page 255
  - “System fan replacement” on page 331

Watch the procedure

A video of this procedure is available at YouTube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-BashWCNZQEDP7o3EohXPEV.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Install the drive backplane into the rear drive cage.

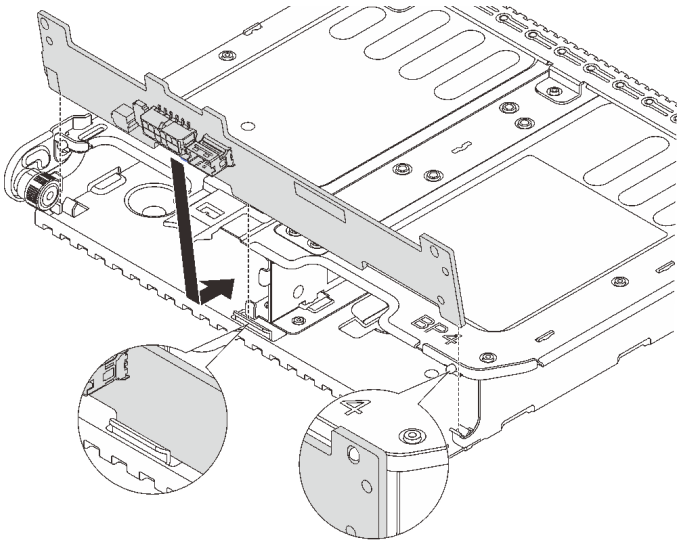


Figure 284. Installing the 2 x 3.5-inch rear drive backplane

a. Align the bottom of the backplane with the studs at the bottom of the drive cage.

b. Lower the backplane into the drive cage so that the holes in the backplane pass through the pins on the drive cage, and press the backplane into position.

Step 3. Install the rear drive cage.

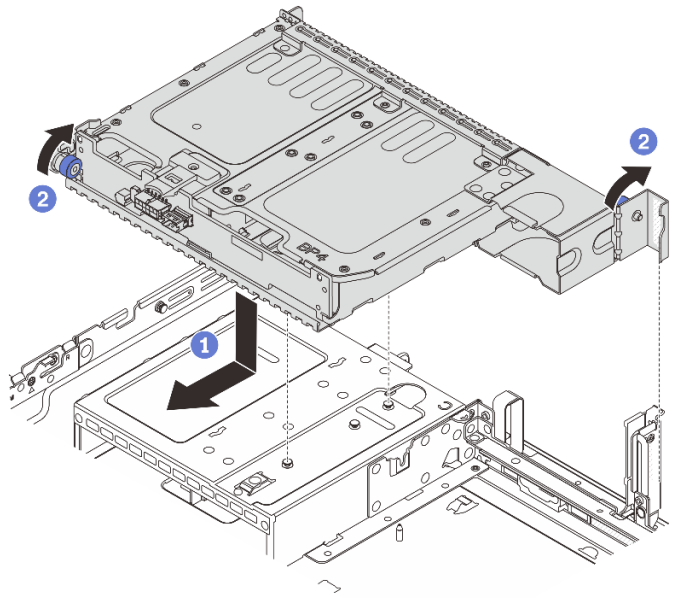


Figure 285. Installing the 2 x 3.5-inch rear drive cage

a. 1 Align the rear drive cage with the chassis, and lower the drive cage into the chassis. Move the rear drive cage forward until it clicks into position.

b. 2 Twist and release the blue plunger to secure the drive cage in place.

Step 4. Connect cables to the drive backplane. See Chapter 6 “Internal cable routing” on page 347.

After you finish

1. Reinstall the drives or drive fillers into the rear drive cage. See “Install a hot-swap drive” on page 141.
2. Complete the parts replacement. See “Complete the parts replacement” on page 345.

Remove the 4 x 3.5" drive backplane and drive cage

Follow instructions in this section to remove the rear 3.5-inch 4-bay drive backplane and drive cage.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), 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.
- If one or more NVMe solid-state drives are to be removed, it is recommended to disable them beforehand via the operating system.

Procedure

Step 1. Make preparation for the task.

a. 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 68.

b. Remove the top cover. See “Remove the top cover” on page 342.

c. Disconnect cables from the rear drive backplane.

d. Remove all the installed drives and fillers (if any) from the drive bays. See “Remove a hot-swap drive” on page 140.

Step 2. Remove the rear drive cage.

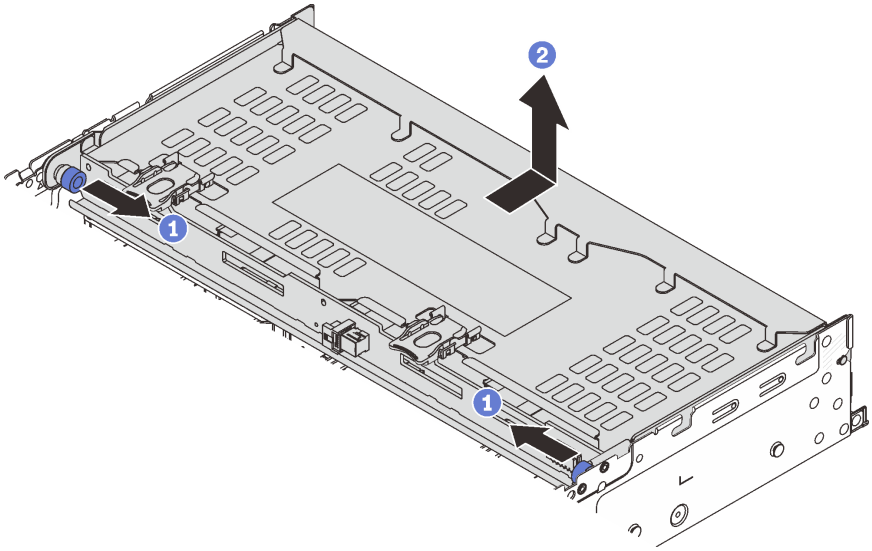


Figure 286. Removing the 4 x 3.5-inch rear drive cage

a. 1 Twist and pull out the blue plungers.

b. 2 Slide the drive cage towards the rear of the chassis to release it, and lift the drive cage out of the chassis.

Step 3. Remove the rear drive backplane.

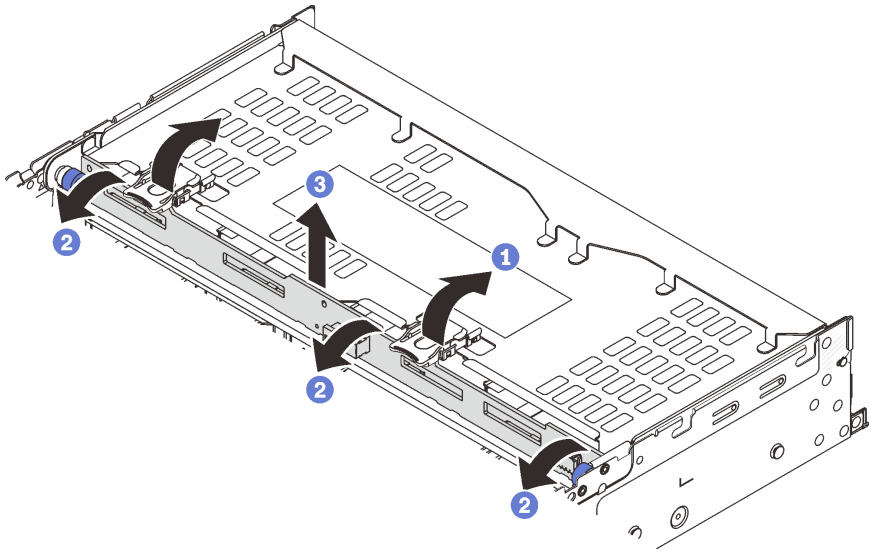


Figure 287. Removing the 4 x 3.5-inch rear drive backplane

a. 1 Open the release latches in the direction as shown.

b. 2 Rotate the backplane from the top to disengage it from the pins on the drive cage.

c. 3 Carefully lift the backplane out of the drive 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

Install the 4 x 3.5" drive backplane and drive cage

Follow instructions in this section to install the 3.5-inch 4-bay drive backplane and drive cage.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.
- The rear drive cage is supported on some server models with thermal requirements. See “Thermal rules” on page 60 to ensure that the server is under permitted ambient temperature and the correct heat sink and system fans are used. If needed, replace your heat sink or system fan first.
  - “Processor and heat sink replacement (trained technician only)” on page 255

– “System fan replacement” on page 331

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Install the drive backplane into the rear drive cage.

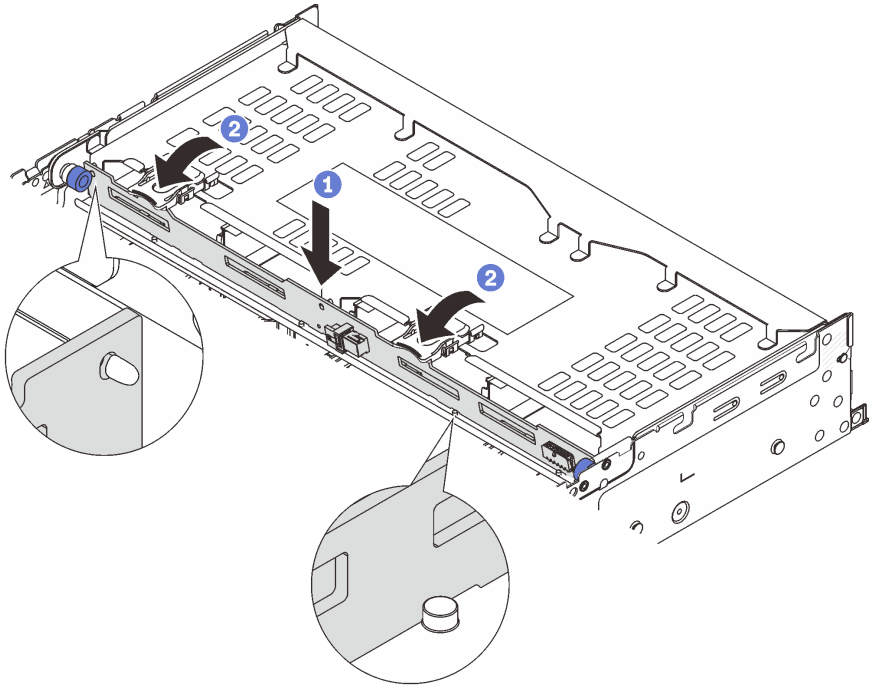


Figure 288. Installing the 4 x 3.5-inch rear drive backplane

a. 1 Align the bottom of the backplane with the studs at the bottom of the drive cage, and lower the backplane into the drive cage.

b. 2 Push the top of the backplane so that the holes in the backplane pass through the pins on the drive cage, and close the release latches to secure the backplane in place.

Step 3. Install the rear drive cage.

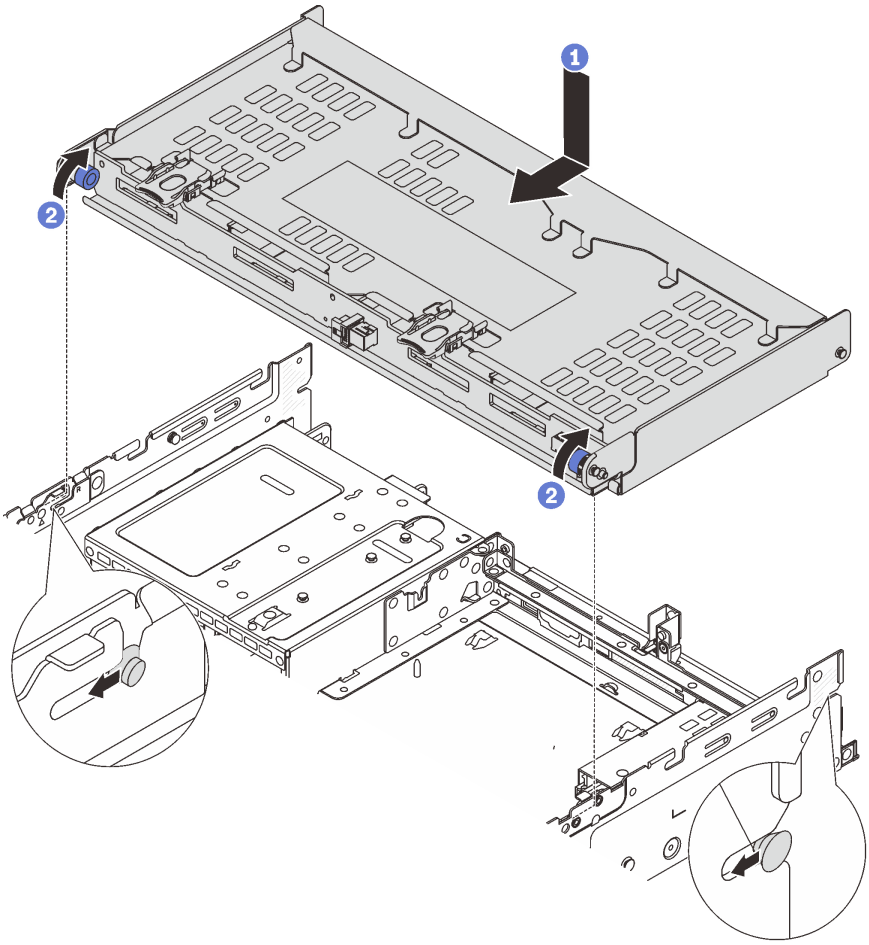


Figure 289. Installing the 4 x 3.5-inch rear drive cage

a. 1 Align the rear drive cage with the chassis, and lower the drive cage into the chassis. Move the rear drive cage forward until it clicks into position.

b. 2 Twist and release the blue plungers to secure the drive cage in place.

Step 4. Connect cables to the drive backplane. See Chapter 6 “Internal cable routing” on page 347.

Step 5. (Optional) Install the top cover support bracket.

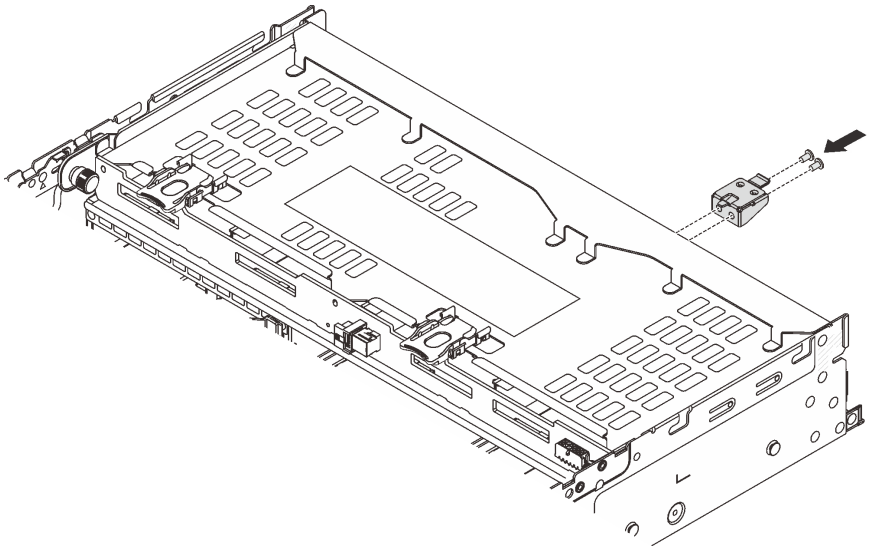


Figure 290. Installing the top cover support bracket

After you finish

1. Reinstall the drives or drive fillers into the rear drive cage. See “Install a hot-swap drive” on page 141.
2. Complete the parts replacement. See “Complete the parts replacement” on page 345.

Demo video

Watch the procedure on YouTube

Security bezel replacement

Follow instructions in this section to remove and install the security bezel.

- “Remove the security bezel” on page 307
- “Install the security bezel” on page 308

Remove the security bezel

Follow instructions in this section to remove the security bezel.

About this task

Attention: Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 to ensure that you work safely.

Procedure

Step 1. Use the key to unlock the security bezel.

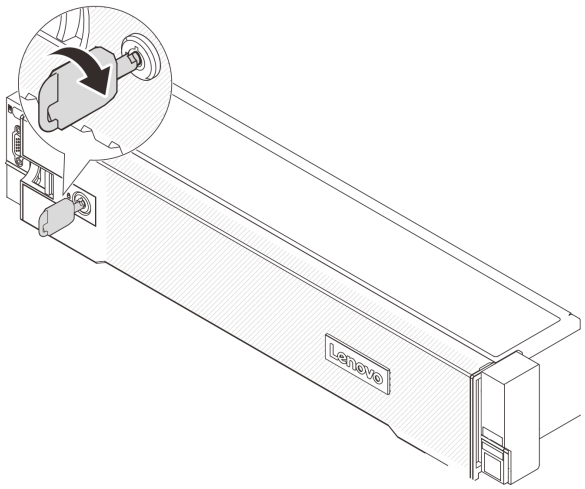


Figure 291. Unlocking the security bezel

Step 2. Press the release latch 1 and rotate the security bezel outward to remove it from the chassis.

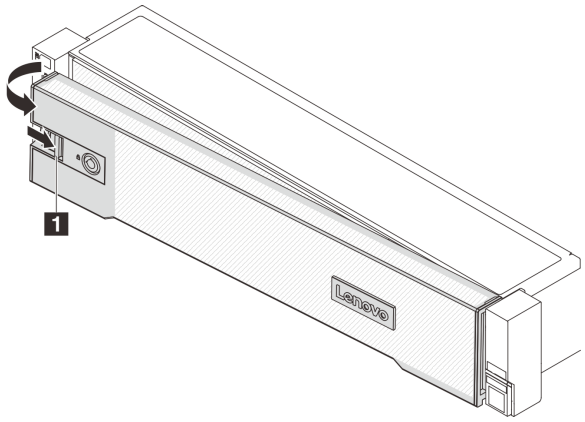


Figure 292. Removing the security bezel

After you finish

Note: Before you ship the rack with the server installed, reinstall and lock the security bezel into place.

Demo video

Watch the procedure on YouTube

Install the security bezel

Follow instructions in this section to install the security bezel.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 to ensure that you work safely.
- Before you ship the rack with the server installed, reinstall and lock the security bezel into place.

Procedure

Step 1. If the key is held inside the security bezel, remove it out of the security bezel.

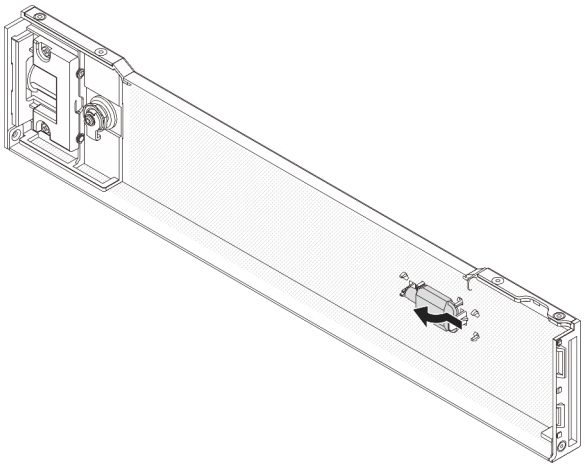


Figure 293. Removing the key

Step 2. Carefully insert the tabs on the security bezel into the slots on the right rack latch. Then, press and hold the release latch 1 and rotate the security bezel inward until the other side clicks into place.

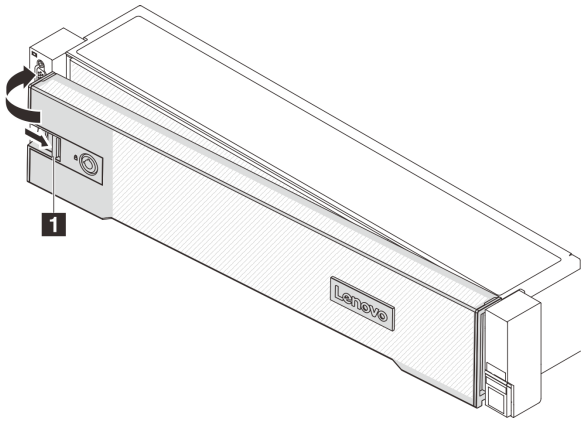


Figure 294. Installing the security bezel

Step 3. Use the key to lock the security bezel to the closed position.

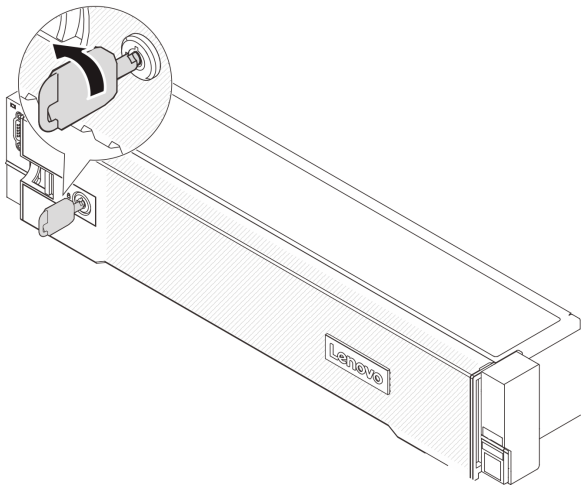


Figure 295. Locking the security bezel

Demo video

Watch the procedure on YouTube

System board assembly replacement (trained technician only)

Follow instructions in this section to remove and install the system board assembly.

Important:

- This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install the part without proper training and qualification.
- If you need to replace a processor board and a firmware and RoT security module together, do the following:
  - Check the current PSB fuse policy before replacement. See *Service process before replacement* at Service process for updating PSB fuse state (Lenovo service technicians only).
  - Ensure that the processor fuse status is expected without unexpected XCC event logs after replacement. See *Service process after replacing a processor board and a firmware and RoT security module together* at Service process for updating PSB fuse state.

The following illustration shows the layout of the system board assembly that contains the system I/O board, firmware and RoT security module, fan board, power inverter board (PIB) and processor board.

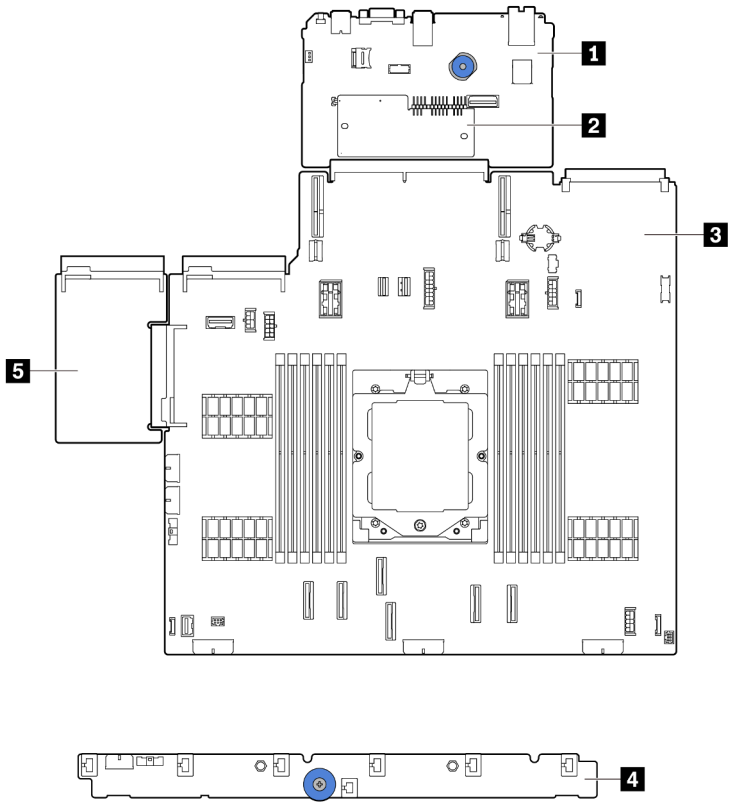


Figure 296. System-board-assembly layout

1 System I/O board	2 Firmware and RoT security module	3 Processor board
4 Fan board	5 Power inverter board (PIB)	

For the installation and replacement of the fan board and the PIB board, see “Fan board replacement” on page 114 and “Power inverter board (PIB) replacement” on page 245.

- “Remove the firmware and RoT security module” on page 312
- “Install the firmware and RoT security module” on page 313
- “Remove the processor board” on page 324
- “Install the processor board” on page 328

Firmware and RoT Security Module replacement (trained technician only)

Follow the instructions in this section to remove and install the ThinkSystem V3 Firmware and Root of Trust Security Module (firmware and RoT security module).

Important: This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install the part without proper training and qualification.

Remove the firmware and RoT security module

Follow instructions in this section to remove the ThinkSystem V3 Firmware and Root of Trust Security Module (firmware and RoT security module).

About this task

Important: This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install the part without proper training and qualification.

Attention:

- Read "Installation Guidelines" on page 49 and "Safety inspection checklist" on page 50 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 68.
- 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.
- After replacing the firmware and RoT security module, update the firmware to the specific version supported by the server. Make sure that you have the required firmware or a copy of the pre-existing firmware before you proceed.

Firmware and driver download: You might need to update the firmware or driver after replacing a component.

- Go to https://datacentersupport.lenovo.com/products/servers/thinksystem/sr655v3/7d9e/downloads/driver-list/ to see the latest firmware and driver updates for your server.
- Go to "Update the firmware" on page 495 for more information on firmware updating tools.

Procedure

Step 1. Make preparation for the task.

a. Perform OneCLI commands to back up the UEFI settings. See OneCLI commands that save configuration settings.

b. Perform both OneCLI commands and XCC actions to back up the XCC settings. See OneCLI commands that save configuration settings and Using XCC to back up the BMC configuration.

c. 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 68.

d. Remove the top cover. See "Remove the top cover" on page 342.

e. If your server comes with riser assemblies or a rear drive cage, remove it first.

- "Remove a rear riser assembly" on page 230
- "Remove the 7mm drive cage" on page 283
- "Rear drive backplane and drive cage replacement" on page 292

Step 2. Remove the firmware and RoT security module.

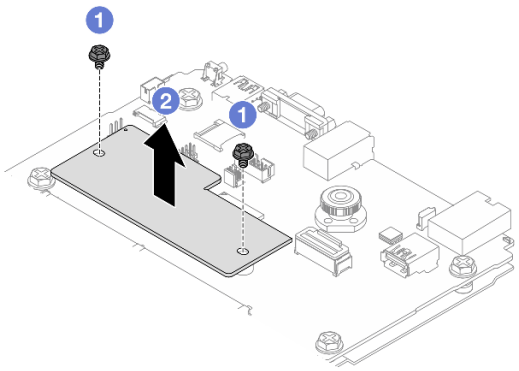


Figure 297. Removing the firmware and RoT security module

a. Loosen the two screws on the firmware and RoT security module.

b. Lift the firmware and RoT security module out of the chassis.

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 firmware and RoT security module

Follow instructions in this section to install the ThinkSystem V3 Firmware and Root of Trust Security Module (firmware and RoT security module).

About this task

Important: This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install the part without proper training and qualification.

(Lenovo Trained technicians only) After replacing the firmware and RoT security module, update the UEFI, XCC and LXPM firmware to the specific version supported by the server. For detailed information on how to update the firmware, see Tip for replacing a Firmware and RoT Security Module.

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.

Firmware and driver download: You might need to update the firmware or driver after replacing a component.

- Go to https://datacentersupport.lenovo.com/products/servers/thinksystem/sr655v3/7d9e/downloads/driver-list/ to see the latest firmware and driver updates for your server.
- Go to “Update the firmware” on page 495 for more information on firmware updating tools.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Install the firmware and RoT security module to the server.

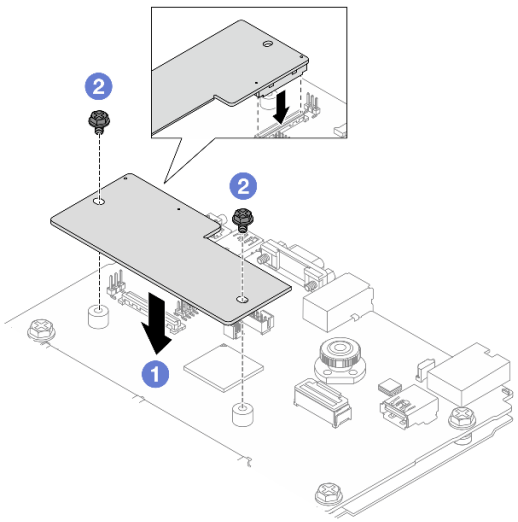


Figure 298. Installing the firmware and RoT security module

a. 1 Lower the firmware and RoT security module onto the system I/O board and ensure that the connector on the module is correctly inserted into the slot on the system I/O board.

b. 2 Tighten the two screws to secure the firmware and RoT security module in place.

After you finish

1. Install any components that you have removed:
   - “Rear drive backplane and drive cage replacement” on page 292
   - “Install the 7mm drive cage” on page 289
   - “Install a rear riser assembly” on page 239
2. Complete the parts replacement. See “Complete the parts replacement” on page 345.
3. Update the UEFI, XCC and LXPM firmware to the specific version supported by the server. See Tip for replacing a firmware and RoT security module.
4. Perform OneCLI commands to restore the UEFI settings. See OneCLI commands that restore configuration settings.
5. Perform both OneCLI commands and XCC actions to restore the XCC settings. See OneCLI commands that restore configuration settings and Using XCC to restore the BMC configuration.
6. If there is a software (SW) key, for example, XCC FoD key, installed in the system, inject the key again to ensure that the key functions properly. See Using Lenovo Features on Demand.

Note: If you need to replace the processor board together with the firmware and RoT security module, update the VPD before injecting the key. See Update the Vital Product Data (VPD).

7. Optionally, do the following if needed:
   - Hide TPM. See “Hide TPM” on page 315.
   - Update the TPM firmware. See “Update the TPM firmware” on page 316.
   - Enable UEFI Secure Boot. See “Enable UEFI Secure Boot” on page 316.

Demo video

Watch the procedure on YouTube

Hide/observe TPM

TPM is enabled by default to encrypt data transfer for system operation. Optionally, you can disable TPM using Unified Extensible Firmware Interface (UEFI) or Lenovo XClarity Essentials OneCLI.

Using UEFI

For details, see “Hide TPM from OS” in *UEFI User Guide* at https://pubs.lenovo.com/uefi-overview/.

Using Lenovo XClarity Essentials OneCLI

To disable TPM, do the following:

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. Run the following command:

   `OneCli.exe config set TrustedComputingGroup.HideTPMfromOS "Yes" -bmc <userid>:<password>@<ip_address>`

   where:

   - *<userid>:<password>* are the credentials used to access the BMC (Lenovo XClarity Controller interface) of your server. The default user ID is USERID, and the default password is PASSW0RD (zero, not an uppercase o)
   - *<ip_address>* is the IP address of the BMC.

   Example:

```
D:\onecli>OneCli.exe config set UEFI.TrustedComputingGroup_TPMDevice "Disabled" --bmc USERID:PASSWORD@10.245.38.64
[1s]Certificate check finished [100%][==========================================================================>]
Start to connect BMC at 10.245.38.64 to apply config set
Invoking SET command ...
UEFI.TrustedComputingGroup_TPMDevice=Disabled
Changes completed successfully, but these changes will not take effect until next reboot.
Succeed.
```

3. Reboot the system.

If you want to enable TPM again, run the following command and reboot the system:
`OneCli.exe config set TrustedComputingGroup.HideTPMfromOS "No" -bmc <userid>:<password>@<ip_address>`

Example:

```
D:\onecli>OneCli.exe config set UEFI.TrustedComputingGroup_TPMDevice "Enabled" --bmc USERID:PASSWORD@10.245.38.64
[1s]Certificate check finished [100%][==========================================================================>]
Start to connect BMC at 10.245.38.64 to apply config set
Invoking SET command ...
UEFI.TrustedComputingGroup_TPMDevice=Enabled
Changes completed successfully, but these changes will not take effect until next reboot.
Succeed.
```

Update the TPM firmware

Optionally, you can update the TPM firmware using Lenovo XClarity Essentials OneCLI.

Note: TPM firmware update is irreversible. After update, the TPM firmware cannot be downgraded to earlier versions.

TPM firmware version

Follow the procedure below to see the TPM firmware version:

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. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.)
2. If the power-on Administrator password is required, enter the password.
3. From the UEFI Setup page, click **System Settings → Security → Trusted Platform Module → TPM 2.0 → TPM Firmware Version**.

Update the TPM firmware

To update the TPM firmware, do the following:

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. Run the following command:
   `OneCli.exe config set TrustedComputingGroup.DeviceOperation "Update to TPM 2.0 firmware version <x.x.x.x>" --bmc <userid>:<password>@<ip_address>`

   where:

   - *<x.x.x.x>* is the target TPM version.

     e.g. TPM 2.0 (7.2.1.0) -> TPM 2.0 (7.2.2.0):

     `OneCli.exe config set TrustedComputingGroup.DeviceOperation "Update to TPM 2.0 firmware version 7.2.2.0" --bmc <userid>:<password>@<ip_address>`

   - *<userid>:<password>* are the credentials used to access the BMC (Lenovo XClarity Controller interface) of your server. The default user ID is USERID, and the default password is PASSW0RD (zero, not an uppercase o).
   - *<ip_address>* is the IP address of the BMC.

Enable UEFI Secure Boot

Optionally, you can enable UEFI Secure Boot.

There are two methods available to enable UEFI Secure Boot:

- From Lenovo XClarity Provisioning Manager

  To enable UEFI Secure Boot 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. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.)
2. If the power-on Administrator password is required, enter the password.
3. From the UEFI Setup page, click **System Settings → Security → Secure Boot Configuration → Secure Boot Setting**.
4. Enable Secure Boot and save the settings.

Note: If disabling UEFI secure boot is needed, select Disable in step 4.

- From Lenovo XClarity Essentials OneCLI

  To enable UEFI Secure Boot 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. Run the following command to enable Secure Boot:
     `OneCli.exe config set UEFI.SecureBootConfiguration_SecureBootSetting Enabled --bmc <userid>:<password>@<ip_address>`

     where:

     – *<userid>:<password>* are the credentials used to access the BMC (Lenovo XClarity Controller interface) of your server. The default user ID is USERID, and the default password is PASSW0RD (zero, not an uppercase o)

     – *<ip_address>* is the IP address of the BMC.

     For more information about the Lenovo XClarity Essentials OneCLI `set` command, see:

     https://pubs.lenovo.com/lxce-onecli/onecli_r_set_command

  Note: If disabling UEFI secure boot is needed, run the following command:
  `OneCli.exe config set UEFI.SecureBootConfiguration_SecureBootSetting Disabled --bmc <userid>:<password>@<ip_address>`

System I/O board replacement (trained technicians only)

Follow the instructions in this section to remove and install the system I/O board from the system board assembly.

Important: This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install the part without proper training and qualification.

Remove the system I/O board

Follow instructions in this section to remove the system I/O board.

About this task

Important:

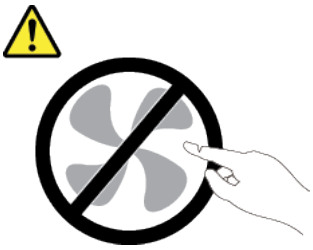
- This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install the part without proper training and qualification.
- When removing the memory modules, label the slot number on each memory module, remove all the memory modules from the processor board, and set them aside on a static-protective surface for reinstallation.

- **When disconnecting cables, make a list of each cable and record the connectors the cable is connected to, and use the record as a cabling checklist after installing the new system board assembly.**

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.

CAUTION:
Hazardous moving parts. Keep fingers and other body parts away.

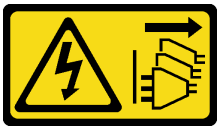


CAUTION:



The heat sinks and processors might be very hot. Turn off the server and wait several minutes to let the server cool before removing the server cover.

S002



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Procedure

Step 1. Make preparation for this task.

a. Record all system configuration information, such as Lenovo XClarity Controller IP addresses, vital product data, and the machine type, model number, serial number, Universally Unique Identifier, and asset tag of the server.

b. Save the system configuration to an external device with Lenovo XClarity Essentials.

c. Save the system event log to external media.

d. Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 68.

e. 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 68.

f. Remove the top cover. See “Remove the top cover” on page 342.

g. If your server comes with an air baffle, a middle cage, or a rear cage, remove it first.

- “Remove the air baffle” on page 76
- “Remove the middle drive cage and drive backplanes” on page 223
- “Rear drive backplane and drive cage replacement” on page 292

h. Record where the cables are connected to the system board assembly; then, disconnect all the cables.

Attention: To avoid damaging the system board assembly, make sure to follow the instructions in Chapter 6 “Internal cable routing” on page 347 when disconnecting cables from the system board assembly.

i. Remove any of the following components that are installed on the system board assembly and put them in a safe, static-protective place.

- “Remove the system fan cage” on page 335
- “Remove a memory module” on page 215 (for processor board replacement only)
- “Remove a heat sink” on page 256
- “Remove a processor” on page 259
- “Remove the CMOS battery” on page 80 (for processor board replacement only)
- “Remove a rear riser assembly” on page 230
- “Remove the rear OCP module” on page 242

j. Pull out the power supply units slightly. Ensure that they are disconnected from the system board assembly.

Step 2. Remove the system board assembly.

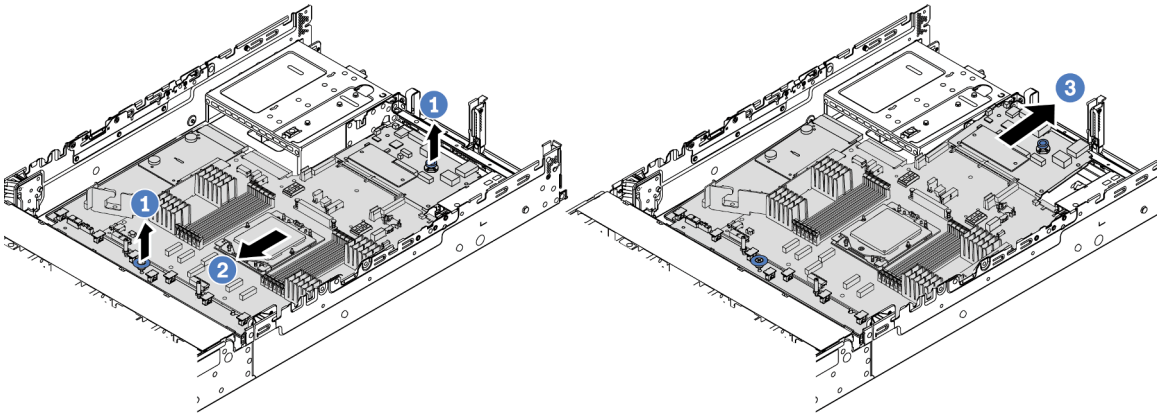


Figure 299. Removing the system board assembly

a. 1 Lift the two lift handles at the same time.

b. 2 Slide the system board assembly towards the front of the chassis until it stops.

c. 3 Tilt and lift the system board assembly out of the chassis.

Step 3. Remove the fan board and the PIB board from the processor board. See “Remove the fan board” on page 114 and “Remove the PIB” on page 245.

Step 4. (Optional) If you are going to replace the system I/O board, remove the firmware and RoT security module from the system I/O board. See “Remove the firmware and RoT security module” on page 312. If you are going to replace the processor board, go to the next step directly.

Step 5. (Optional) Remove the MicroSD card. See “Remove the MicroSD card” on page 219.

Step 6. Separate the system I/O board from the processor board.

Note: To prevent the contact of the system I/O board from damage, pinch and lift the plunger on the system I/O board upward a little and pull out the system I/O board outward. During the entire pulling action, ensure that the system I/O board remains as horizontal as possible.

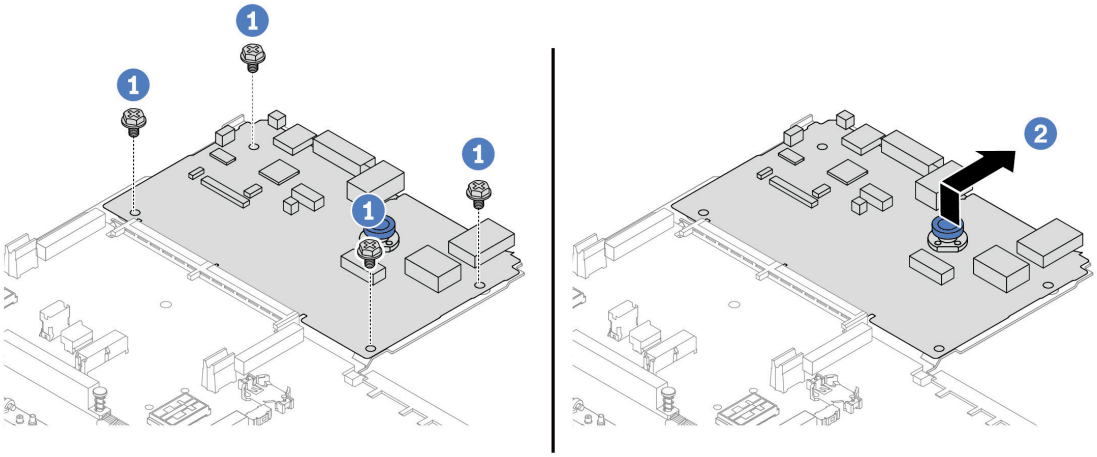


Figure 300. Separating the system I/O board from the processor board

a. 1 Remove the screws that secure the system I/O board.

b. 2 Lift and hold the rear lift handle and slide the system I/O board towards the rear to disengage it from the processor 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.

  Important: Before you return the processor board, make sure that you install the processor socket covers from the new processor board. To replace a processor socket cover:

  1. Slide the cover out from the processor socket of the new processor board.
  2. Install the cover on the processor socket of the removed processor board.

- If you plan to recycle the component, see “Disassemble the system board assembly for recycle” on page 547.

Demo video

Watch the procedure on YouTube

Install the system I/O board

Follow instructions in this section to install the system I/O board.

About this task

Important: This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install the part without proper training and qualification.

Attention:

- Read "Installation Guidelines" on page 49 and "Safety inspection checklist" on page 50 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 68.
- 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.

Firmware and driver download: You might need to update the firmware or driver after replacing a component.

- Go to https://datacentersupport.lenovo.com/products/servers/thinksystem/sr655v3/7d9e/downloads/driver-list/ to see the latest firmware and driver updates for your server.
- Go to "Update the firmware" on page 495 for more information on firmware updating tools.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Install the fan board and the PIB onto the processor board. See "Install the fan board" on page 116 and "Install the PIB" on page 246.

Step 3. Depending on your need, do one of the following:

- If you are going to replace the system I/O board and reuse the processor board, install a new system I/O board onto the processor board.
- If you are going to replace the processor board and reuse the system I/O board, install the existing system I/O board onto a new processor board.

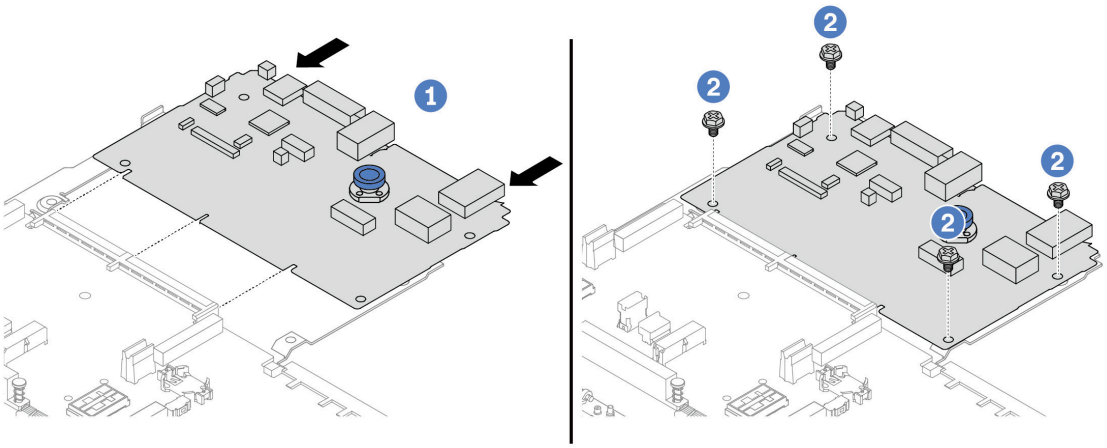
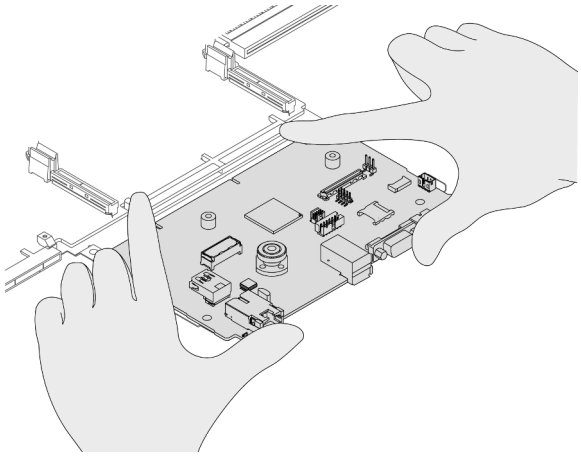


Figure 301. Installing the system I/O board onto the processor board

a. 1 Align the system I/O board with the connector on the processor board, and use both hands to push the system I/O board and slightly insert it into the connector.

Note: To prevent the contact of the system I/O board from damage, ensure that the system I/O board is aligned correctly with the connector on the processor board, and remains as horizontal as possible during the insertion.



b. 2 Install the screws to fix the system I/O board into place.

Step 4. (Optional) If you are replacing the system I/O board, install the firmware and RoT security module that is removed from the old system I/O board onto the new system I/O board. See “Install the firmware and RoT security module” on page 313.

Step 5. Install the SD card. See “Install the MicroSD card” on page 221.

Step 6. Install the system board assembly into the server.

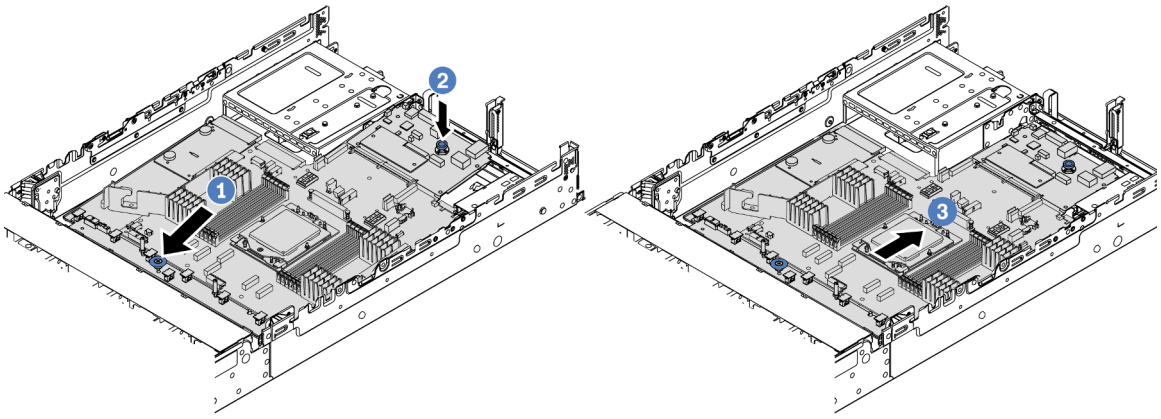


Figure 302. Installing the system board assembly

a. 1 Insert the front end of the system board assembly towards the front of the chassis until it stops.

b. 2 Lower the other end down into the chassis.

c. 3 Slide the system board assembly towards the rear of the chassis until it clicks into place. Ensure that rear connectors on the system I/O board are inserted into the corresponding holes in the rear panel.

After you finish

1. Install any components that you have removed:
   - “Install a processor” on page 260
   - “Install a heat sink” on page 261
   - “Install a memory module” on page 217
   - “Install the CMOS battery” on page 82
   - “Install a RAID flash power module on the chassis” on page 271
   - “Install the system fan cage” on page 336
   - “Install a rear riser assembly” on page 239
   - “Install the middle drive backplanes and drive cage” on page 226
   - “Install the rear OCP module” on page 243
   - “Rear drive backplane and drive cage replacement” on page 292
2. Push the power supply units in place. Ensure that they are connected to the system board assembly.
3. Reconnect all the required cables to the same connectors on the system board assembly. See Chapter 6 “Internal cable routing” on page 347.
4. Ensure that all components have been reassembled correctly and that no tools or loose screws are left inside the server.
5. Reinstall the top cover. See “Install the top cover” on page 344.
6. If the sever was installed in a rack, reinstall the server into the rack. See “Install the server to rack” on page 71.
7. Reconnect the power cords and any cables that you removed.
8. Power on the server and any peripheral devices. See “Power on the server” on page 67.
9. Reset the UEFI password if you set the password before. See “Reset the UEFI password” on page 324.

Demo video

Watch the procedure on YouTube

Reset the UEFI password

Use this topic to reset the UEFI password after replacing the system I/O board.

Recommended tool:

- Lenovo XClarity Essentials OneCLI commands

Using Lenovo XClarity Essentials OneCLI commands

1. Clear the UEFI password.
   - To clear the power-on password, run the following command:

     `OneCli.exe config set IMM.UefiPowerOnPassword "" -imm <userid>:<password>@<ip_address>`
   - To clear the admin password, run the following command:
     `OneCli.exe config set IMM.UefiAdminPassword "" -imm <userid>:<password>@<ip_address>`
2. Set a new UEFI password.
   - To set a new power-on password, run the following command:
     `OneCli.exe config set IMM.UefiPowerOnPassword "<new_password>" -imm <userid>:<password>@<ip_address>`
   - To set a new admin password, run the following command:
     `OneCli.exe config set IMM.UefiAdminPassword "<new_password>" -imm <userid>:<password>@<ip_address>`

where:

- *<userid>*:*<password>* are the credentials used to access the Lenovo XClarity Controller interface of your server. The default user ID is USERID, and the default password is PASSW0RD (zero, not an uppercase o).
- *<ip_address>* is the IP address of the Lenovo XClarity Controller.
- *<new_password>* is the new password that you need to set.

Processor board replacement (trained technicians only)

Follow the instructions in this section to remove and install the processor board from the system board assembly.

Important: This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install the part without proper training and qualification.

Remove the processor board

Follow instructions in this section to remove the processor board.

About this task

Important:

- This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install the part without proper training and qualification.
- When removing the memory modules, label the slot number on each memory module, remove all the memory modules from the processor board, and set them aside on a static-protective surface for reinstallation.

- **When disconnecting cables, make a list of each cable and record the connectors the cable is connected to, and use the record as a cabling checklist after installing the new system board assembly.**

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.

CAUTION:
Hazardous moving parts. Keep fingers and other body parts away.

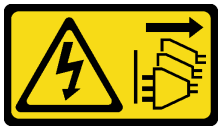


CAUTION:



The heat sinks and processors might be very hot. Turn off the server and wait several minutes to let the server cool before removing the server cover.

S002



CAUTION:
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Procedure

Step 1. Make preparation for this task.

a. Record all system configuration information, such as Lenovo XClarity Controller IP addresses, vital product data, and the machine type, model number, serial number, Universally Unique Identifier, and asset tag of the server.

b. Save the system configuration to an external device with Lenovo XClarity Essentials.

c. Save the system event log to external media.

d. Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 68.

e. 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 68.

f. Remove the top cover. See “Remove the top cover” on page 342.

g. If your server comes with an air baffle, a middle cage, or a rear cage, remove it first.

- “Remove the air baffle” on page 76
- “Remove the middle drive cage and drive backplanes” on page 223
- “Rear drive backplane and drive cage replacement” on page 292

h. Record where the cables are connected to the system board assembly; then, disconnect all the cables.

Attention: To avoid damaging the system board assembly, make sure to follow the instructions in Chapter 6 “Internal cable routing” on page 347 when disconnecting cables from the system board assembly.

i. Remove any of the following components that are installed on the system board assembly and put them in a safe, static-protective place.

- “Remove the system fan cage” on page 335
- “Remove a memory module” on page 215 (for processor board replacement only)
- “Remove a heat sink” on page 256
- “Remove a processor” on page 259
- “Remove the CMOS battery” on page 80 (for processor board replacement only)
- “Remove a rear riser assembly” on page 230
- “Remove the rear OCP module” on page 242

j. Pull out the power supply units slightly. Ensure that they are disconnected from the system board assembly.

Step 2. Remove the system board assembly.

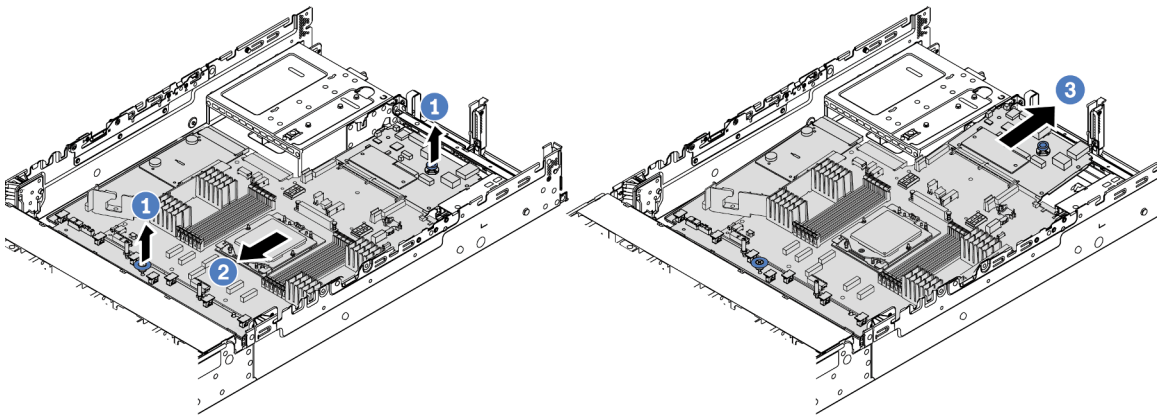


Figure 303. Removing the system board assembly

a. 1 Lift the two lift handles at the same time.

b. 2 Slide the system board assembly towards the front of the chassis until it stops.

c. 3 Tilt and lift the system board assembly out of the chassis.

Step 3. Remove the fan board and the PIB board from the processor board. See “Remove the fan board” on page 114 and “Remove the PIB” on page 245.

Step 4. (Optional) If you are going to replace the system I/O board, remove the firmware and RoT security module from the system I/O board. See “Remove the firmware and RoT security module” on page 312. If you are going to replace the processor board, go to the next step directly.

Step 5. (Optional) Remove the MicroSD card. See “Remove the MicroSD card” on page 219.

Step 6. Separate the system I/O board from the processor board.

Note: To prevent the contact of the system I/O board from damage, pinch and lift the plunger on the system I/O board upward a little and pull out the system I/O board outward. During the entire pulling action, ensure that the system I/O board remains as horizontal as possible.

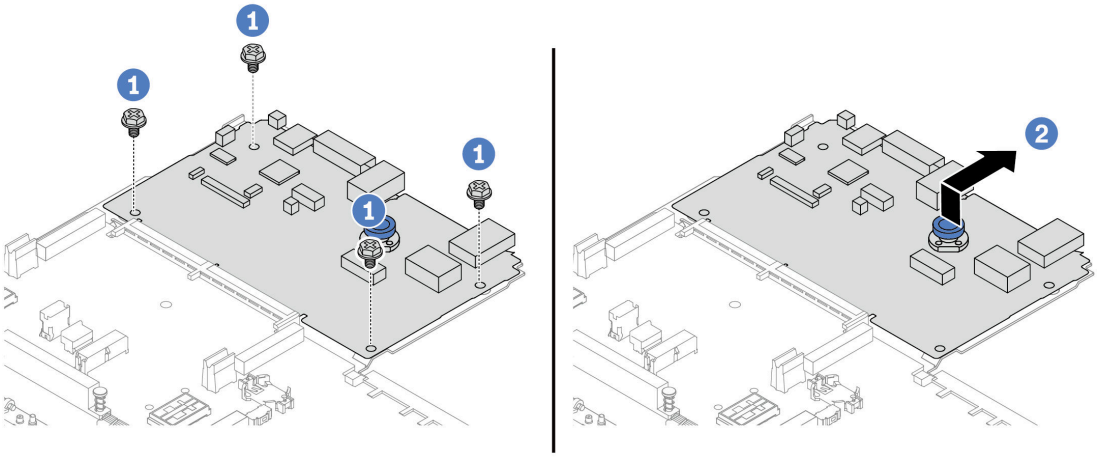


Figure 304. Separating the system I/O board from the processor board

a. 1 Remove the screws that secure the system I/O board.

b. 2 Lift and hold the rear lift handle and slide the system I/O board towards the rear to disengage it from the processor 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.

  Important: Before you return the processor board, make sure that you install the processor socket covers from the new processor board. To replace a processor socket cover:

  1. Slide the cover out from the processor socket of the new processor board.
  2. Install the cover on the processor socket of the removed processor board.

- If you plan to recycle the component, see “Disassemble the system board assembly for recycle” on page 547.

Demo video

Watch the procedure on YouTube

Install the processor board

Follow instructions in this section to install the processor board.

About this task

Important: This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install the part without proper training and qualification.

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.

Firmware and driver download: You might need to update the firmware or driver after replacing a component.

- Go to https://datacentersupport.lenovo.com/products/servers/thinksystem/sr655v3/7d9e/downloads/driver-list/ to see the latest firmware and driver updates for your server.
- Go to “Update the firmware” on page 495 for more information on firmware updating tools.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Install the fan board and the PIB onto the processor board. See “Install the fan board” on page 116 and “Install the PIB” on page 246.

Step 3. Install the system I/O board. See “Install the system I/O board” on page 321.

Step 4. (Optional) Install the firmware and RoT security module. See “Install the firmware and RoT security module” on page 313.

Step 5. (Optional) Install the SD card. See “Install the MicroSD card” on page 221.

Step 6. Install the system board assembly into the server.

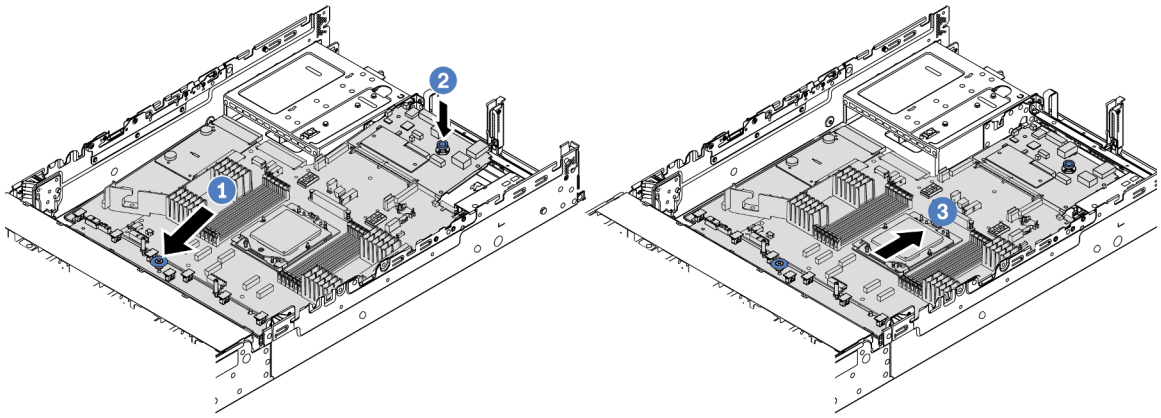


Figure 305. Installing the system board assembly

a. Insert the front end of the system board assembly towards the front of the chassis until it stops.

b. Lower the other end down into the chassis.

c. Slide the system board assembly towards the rear of the chassis until it clicks into place. Ensure that rear connectors on the system I/O board are inserted into the corresponding holes in the rear panel.

After you finish

1. Install any components that you have removed:
   - “Install a processor” on page 260
   - “Install a heat sink” on page 261
   - “Install a memory module” on page 217
   - “Install the CMOS battery” on page 82
   - “Install a RAID flash power module on the chassis” on page 271
   - “Install the system fan cage” on page 336
   - “Install a rear riser assembly” on page 239
   - “Install the middle drive backplanes and drive cage” on page 226
   - “Install the rear OCP module” on page 243
   - “Rear drive backplane and drive cage replacement” on page 292
2. Push the power supply units in place. Ensure that they are connected to the system board assembly.
3. Reconnect all the required cables to the same connectors on the system board assembly. See Chapter 6 “Internal cable routing” on page 347.
4. Ensure that all components have been reassembled correctly and that no tools or loose screws are left inside the server.
5. Reinstall the top cover. See “Install the top cover” on page 344.
6. If the sever was installed in a rack, reinstall the server into the rack. See “Install the server to rack” on page 71.
7. Reconnect the power cords and any cables that you removed.
8. Power on the server and any peripheral devices. See “Power on the server” on page 67.
9. Update the vital product data (VPD). See “Update the Vital Product Data (VPD)” on page 329.

   Machine type number and serial number can be found on the ID label, see “Identify the server and access the Lenovo XClarity Controller” on page 45.

Demo video

Watch the procedure on YouTube

Update the Vital Product Data (VPD)

Use this topic to update the Vital Product Data (VPD).

- **(Required)** Machine type
- **(Required)** Serial number
- **(Required)** System model
- (Optional) Asset tag
- (Optional) UUID

Recommended tools:

- Lenovo XClarity Provisioning Manager
- Lenovo XClarity Essentials OneCLI commands

Using Lenovo XClarity Provisioning Manager

Steps:

1. Start the server and press the key according to the on-screen instructions. The Lenovo XClarity Provisioning Manager interface is displayed by default.
2. Click ⚙ on the top right corner of the Lenovo XClarity Provisioning Manager main interface.
3. Click **Update VPD**; then, follow on-screen instructions to update the VPD.

Using Lenovo XClarity Essentials OneCLI commands

- Updating **machine type**
  `onecli config set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model> [access_method]`
- Updating **serial number**
  `onecli config set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n> [access_method]`
- Updating **system model**

  `onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifier <system model> [access_method]`
- Updating **asset tag**
  `onecli config set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag> [access_method]`
- Updating **UUID**
  `onecli config createuuid SYSTEM_PROD_DATA.SysInfoUUID [access_method]`

Variable	Description
<m/t_model>	The server machine type and model number. Type `xxxxyyyyyy`, where `xxxx` is the machine type and `yyyyyy` is the server model number.
<s/n>	The serial number on the server. Type `zzzzzzzz` (length 8-10 characters), where `zzzzzzzz` is the serial number.
<system model>	The system model on the server. Type `system yyyyyyyy`, where *yyyyyyyy* is the product identifier.

<asset_tag>	The server asset tag number. Type `aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa`, where `aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa` is the asset tag number.
[access_method]	The access method that you select to access the target server. • Online KCS (unauthenticated and user restricted): You can directly delete *[access_method]* from the command. • Online authenticated LAN: In this case, specify below LAN account information at the end of the OneCLI command: `--bmc-username` *<user_id>* `--bmc-password` *<password>* • Remote WAN/LAN: In this case, specify below XCC account information and IP address at the end of the OneCLI command: `--bmc` *<bmc_user_id>*:*<bmc_password>*`@`*<bmc_external_IP>* **Notes:** – *<bmc_user_id>* The BMC account name (1 of 12 accounts). The default value is USERID. – *<bmc_password>* The BMC account password (1 of 12 accounts).

System fan replacement

Follow instructions in this section to remove and install a system fan.

- "Remove a system fan" on page 331
- "Install a system fan" on page 333

Remove a system fan

Follow instructions in this section to remove a system fan.

About this task

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.

S017



CAUTION:
Hazardous moving fan blades nearby. Keep fingers and other body parts away.

Attention:

- Read "Installation Guidelines" on page 49 and "Safety inspection checklist" on page 50 to ensure that you work safely.
- 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.
- When removing a hot-swap fan without powering off the server, do not touch the system fan cage. With power on, complete the replacement within 30 seconds to ensure proper operation.

Procedure

Step 1. 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 68.

Step 2. Remove the top cover. See "Remove the top cover" on page 342.

Step 3. Remove the system fan.

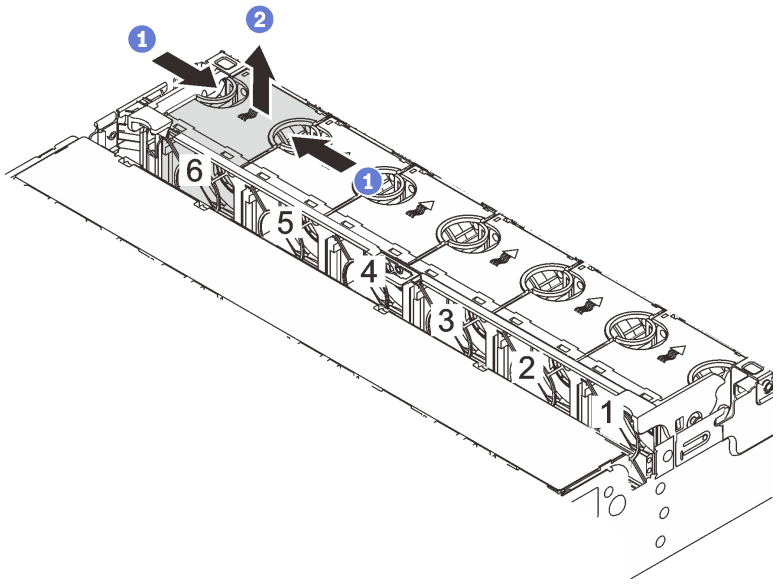


Figure 306. Removing the system fan

a. 1 Grasp the top of the system fan with your fingers.

b. 2 Lift the system fan out of the server.

After you finish

1. Install a new system fan or install a fan filler to cover the place. See "Install a system fan" on page 333.

2. 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 a system fan

Follow instructions in this section to install a system fan.

About this task

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.

S017



CAUTION:
Hazardous moving fan blades nearby. Keep fingers and other body parts away.

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 to ensure that you work safely.
- 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.
- When installing a hot-swap fan without powering off the server, do not touch the system fan cage. With power on, complete the replacement within 30 seconds to ensure proper operation.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Position the system fan above the system fan cage. The system fan connector on the bottom of the system fan should face the rear of the chassis. Press the system fan straight down until it is seated into place.

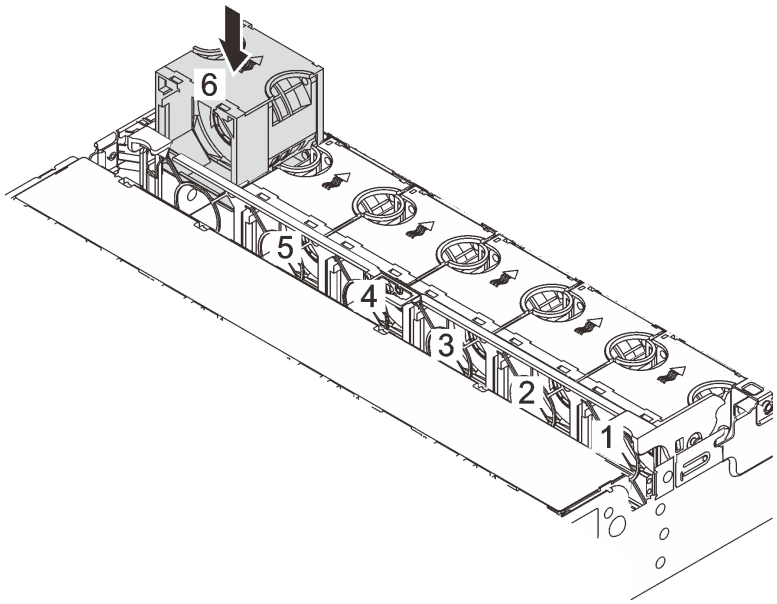


Figure 307. Installing the system fan

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 345.

Demo video

Watch the procedure on YouTube

System fan cage replacement

Follow instructions in this section to remove and install the system fan cage.

- "Remove the system fan cage" on page 335
- "Install the system fan cage" on page 336

Remove the system fan cage

Follow instructions in this section to remove the system fan cage.

About this task

Attention:

- Read "Installation Guidelines" on page 49 and "Safety inspection checklist" on page 50 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 68.
- 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.

Procedure

Step 1. 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 68.

Step 2. Remove the top cover. See "Remove the top cover" on page 342.

Step 3. (Optional) If you are replacing the system fan cage, remove all system fans first. See "Remove a system fan" on page 331.

Note: If you are removing the system fan cage to access other components, you can remove it with the system fans installed.

Step 4. Remove the system fan cage.

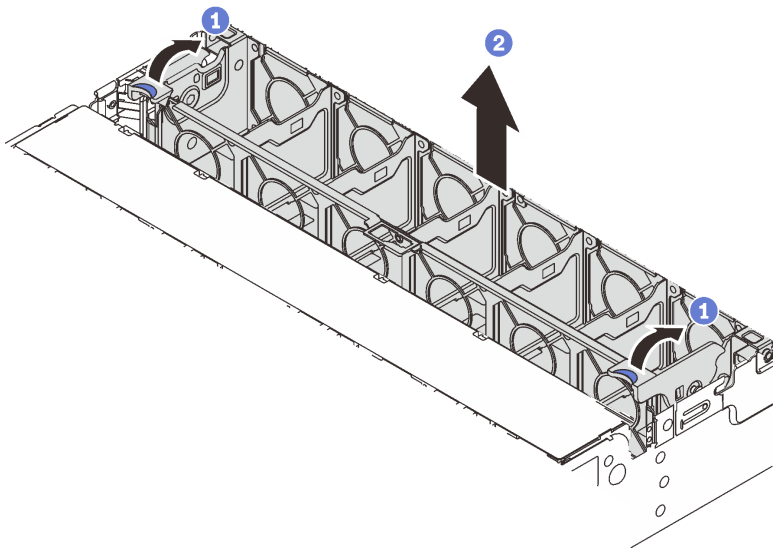


Figure 308. Removing the system fan cage

a. 1 Rotate the levers of the system fan cage to the rear of the server.

b. 2 Lift the system fan cage straight up and out of the chassis.

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 system fan cage

Follow instructions in this section to install the system fan cage.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.

Procedure

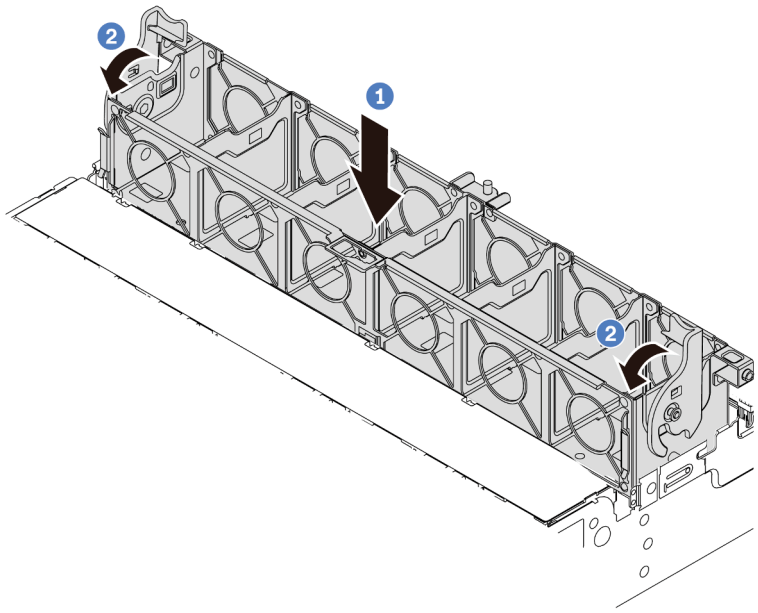


Figure 309. Installing the system fan cage

Step 1. (1) Align the system fan cage with the mounting guides on both sides of chassis, and lower it into the chassis.

Step 2. (2) Rotate the fan cage levers down until the fan cage clicks into place.

Note: If there are system fans installed in the system fan cage, ensure that the system fans are correctly connected to the system fan connectors on the system board assembly.

After you finish

1. If you have removed the system fans, reinstall them. See “Install a system fan” on page 333.
2. Complete the parts replacement. See “Complete the parts replacement” on page 345.

Demo video

Watch the procedure on YouTube

Serial port module replacement

Follow instructions in this section to remove and install a serial port module.

- “Remove a serial port module” on page 337
- “Install a serial port module” on page 340

Remove a serial port module

Follow instructions in this section to remove a serial port module.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.

Procedure

Note: The riser bracket in below illustrations might look different from your riser bracket. The removal procedure is the same.

Step 1. 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 68.

Step 2. Remove the top cover. See “Remove the top cover” on page 342.

Step 3. Disconnect the cable of the serial port module from the system I/O board.

Notes:

- If you need to disconnect cables from the system board assembly, disengage all latches or release tabs on cable connectors first. Failing to release the tab before removing the cables will damage the cable sockets on the system board assembly. Any damage to the cable sockets might require replacing the processor board or system I/O board.
- The connectors on your system board assembly might look different from those in the illustration, but the removal procedure is the same.
  1. Press the release tab to release the connector.
  2. Disengage the connector from the cable socket.

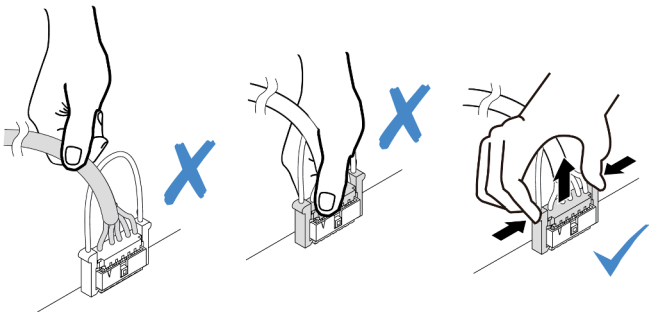


Figure 310. Disconnecting the cable from the system I/O board

Step 4. Remove the riser bracket from the server.

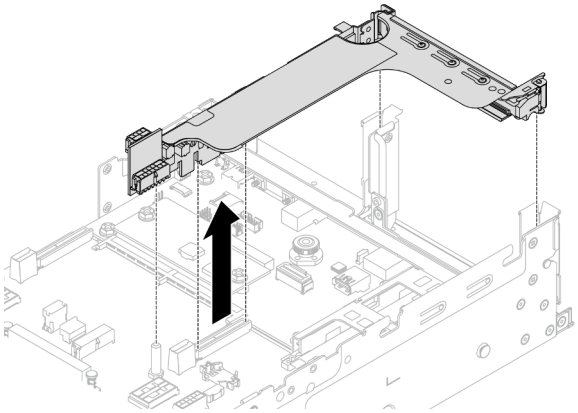


Figure 311. Removing the riser bracket

Step 5. Remove the serial port module out of the riser bracket.

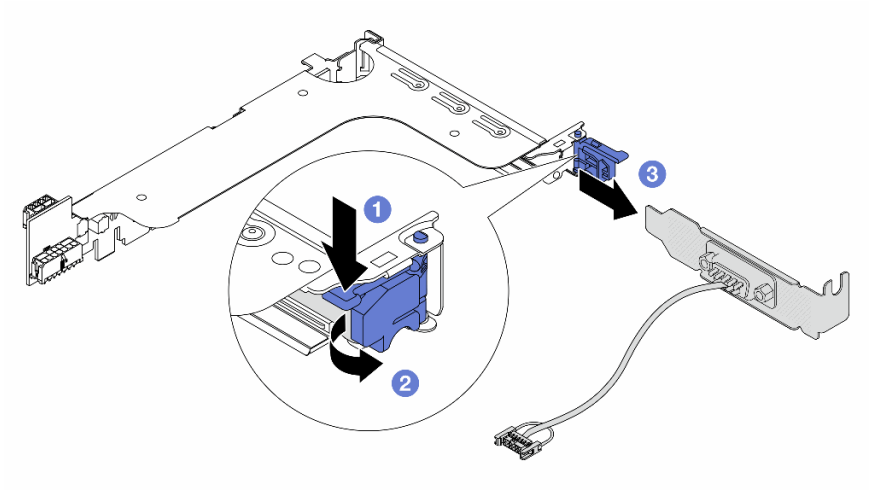


Figure 312. Removing the serial port module

a. 1 Press down the bracket latch.
b. 2 Open the latch.
c. 3 Slide the serial port module out of the riser bracket.

Step 6. (Optional) If you need to replace the serial port bracket, use a 5 mm wrench to disassemble the serial port cable from the bracket.

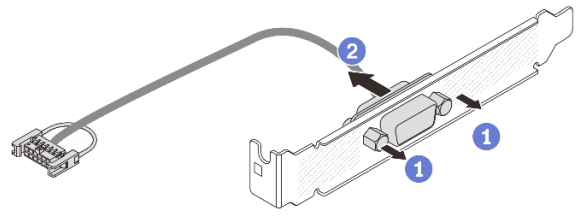


Figure 313. Disassembling the serial port module

After you finish

1. Install a new serial port module, a PCIe adapter, or a filler to cover the place. See “Install a serial port module” on page 340 or “Install a rear riser assembly” on page 239.
2. 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 a serial port module

Follow instructions in this section to install a serial port module.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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 68.
- 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.

Procedure

Note: The riser bracket in below illustrations might look different from your riser bracket. The installation procedure is the same.

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. (Optional) Use a 5 mm wrench to install the serial port cable into the bracket.

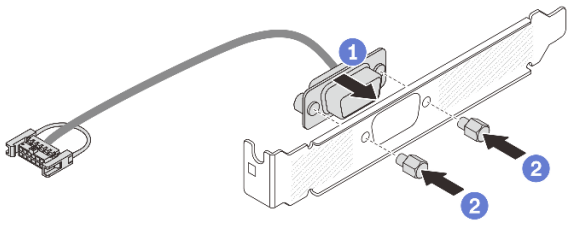


Figure 314. Assembling the serial port module

a. 1 Align the connector of the serial port cable with the holes in the bracket.

b. 2 Install the two screws to secure the cable connector into the bracket.

Step 3. Install the serial port module to the riser bracket.

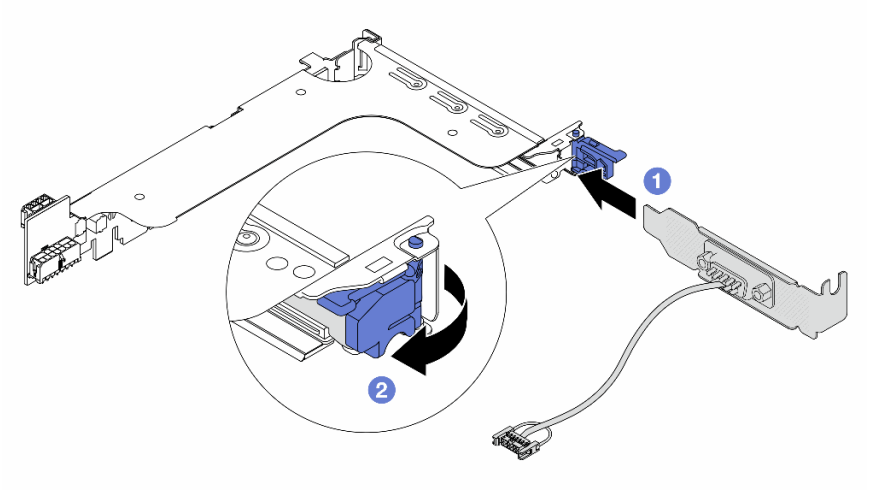


Figure 315. Installing the serial port module

a. 1 Align the serial port module with the riser bracket and insert it into the riser bracket.

b. 2 Close the bracket latch to secure the serial port module.

Step 4. Install the riser assembly back to the server.

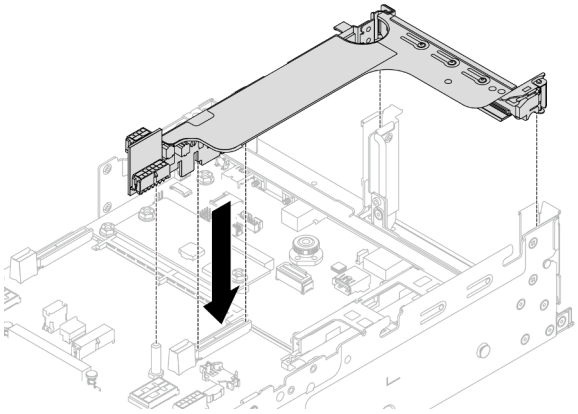


Figure 316. Installing the riser assembly

Step 5. Connect the cable of the serial port module to the serial port connector on the system board assembly. For the location of the connector, refer to "System-board-assembly connectors" on page 33.

After you finish

1. Complete the parts replacement. See "Complete the parts replacement" on page 345.
2. To enable the serial port module on Linux or Microsoft Windows, do one of the followings according to the installed operating system:

   Note: If the Serial over LAN (SOL) or Emergency Management Services (EMS) feature is enabled, the serial port will be hidden on Linux and Microsoft Windows. Therefore, it is required to disable SOL and EMS to use the serial port on operating systems for serial devices.

   - For Linux:

Open the ipmitool and enter the following command to disable the Serial over LAN (SOL) feature:

```
-I lanplus -H IP -U USERID -P PASSWORD sol deactivate
```

- For Microsoft Windows:
  a. Open the ipmitool and enter the following command to disable the SOL feature:

     ```
     -I lanplus -H IP -U USERID -P PASSWORD sol deactivate
     ```

  b. Open Windows PowerShell and enter the following command to disable the Emergency Management Services (EMS) feature:

     ```
     Bcdedit /ems off
     ```

  c. Restart the server to ensure that the EMS setting takes effect.

Demo video

Watch the procedure on YouTube

Top cover replacement

Follow instructions in this section to remove and install the top cover.

- "Remove the top cover" on page 342
- "Install the top cover" on page 344

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 49 and "Safety inspection checklist" on page 50 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 68.
- Operating the server with the top cover removed might damage server components. For proper cooling and airflow, install the top cover before you turn on the server.

Procedure

Step 1. 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 68.

Step 2. Remove the top cover.

Attention: Handle the top cover carefully. Dropping the top cover with the cover latch open might damage the cover latch.

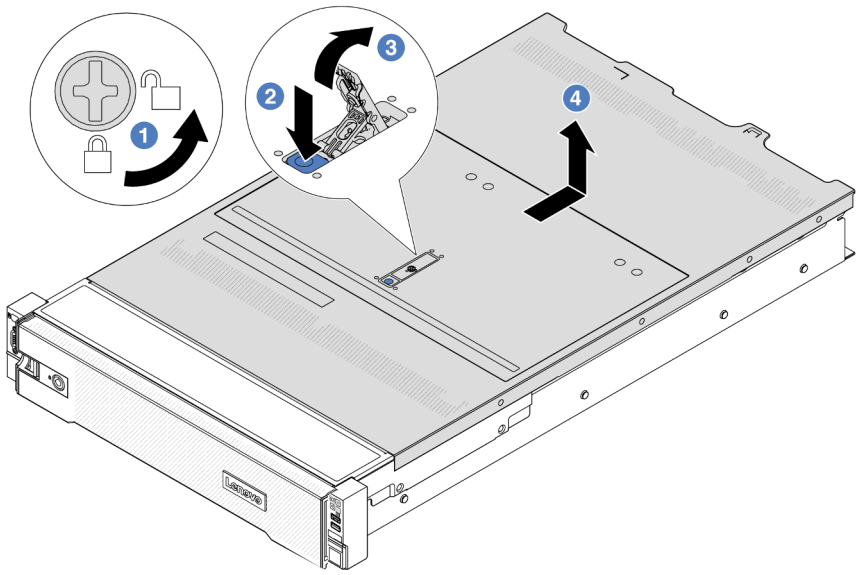


Figure 317. Removing the top cover

a. 1 Use a screwdriver to turn the cover lock to the unlocked position as shown.

b. 2 Press the release button on the cover latch. The cover latch then gets released to some extent.

c. 3 Fully open the cover latch as shown.

d. 4 Slide the top cover to the rear until it is disengaged from the chassis. Then, lift the top cover off the chassis and place the top cover on a flat clean surface.

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 top cover

Follow instructions in this section to install the top cover.

About this task

Attention:

- Read “Installation Guidelines” on page 49 and “Safety inspection checklist” on page 50 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. See Chapter 6 “Internal cable routing” on page 347.
- Handle the top cover carefully. Dropping the top cover with the cover latch open might damage the cover latch.

Procedure

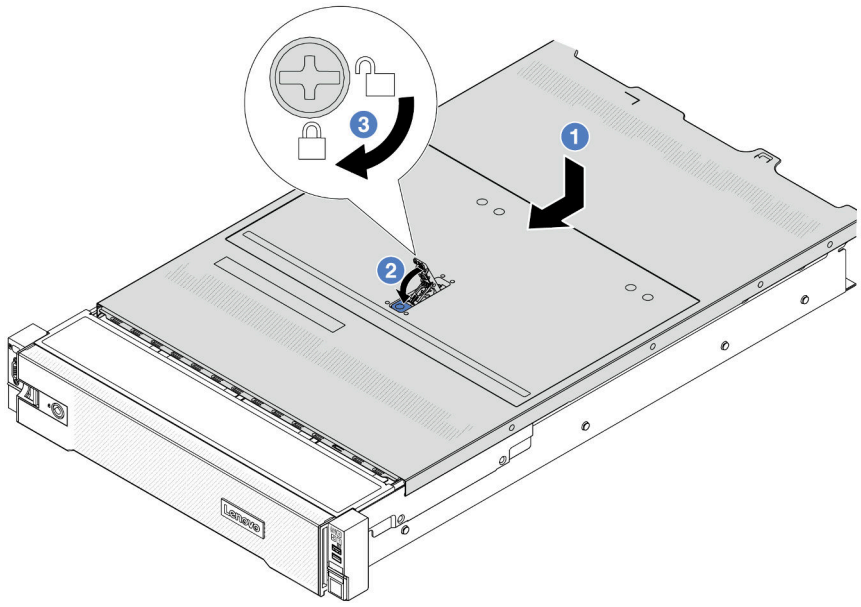


Figure 318. Installing the top cover

Step 1. Ensure that the cover latch is in the open position. Lower the top cover onto the chassis until both sides of the top cover engage with the guides on both sides of the chassis. Then, slide the top cover to the front of the chassis.

Note: Before you slide the top cover forward, ensure that all the tabs on the top cover engage with the chassis correctly.

Step 2. Rotate the cover latch until the top cover snaps into position. Ensure that the cover latch is completely closed.

Step 3. Use a screwdriver to turn the cover lock to the locked position.

Demo video

Watch the procedure on YouTube

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 78.

   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 344.
5. If the sever was installed in a rack, reinstall the server into the rack. See “Install the server to rack” on page 71.
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 67.
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 495.
   - 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 https://pubs.lenovo.com/lxpm-overview/ for the LXPM documentation compatible with your server.

Chapter 6. Internal cable routing

See this section to do cable routing for specific components.

To connect cables, observe the following guidelines:

- Turn off the server before you connect or disconnect any internal cables.
- See the documentation that comes with any external devices for additional cabling instructions. It might be easier for you to route cables before you connect the devices to the server.
- Cable identifiers of some cables are printed on the cables that come with the server and optional devices. Use these identifiers to connect the cables to the correct connectors.
- Ensure that the cable is not pinched and does not cover any connectors or obstruct any components on the system board assembly.
- Ensure that the relevant cables pass through the cable clips.
- Ensure the following cables pass through the cable wall brackets for better server thermal performance.
  - Signal cables that connect front backplanes and PCIe connectors 1/2 on the processor board
  - Signal cables that connect rear backplanes or riser 3 and PCIe connectors 1/2/3/4 on the processor board
  - Fan board power cable and signal cables

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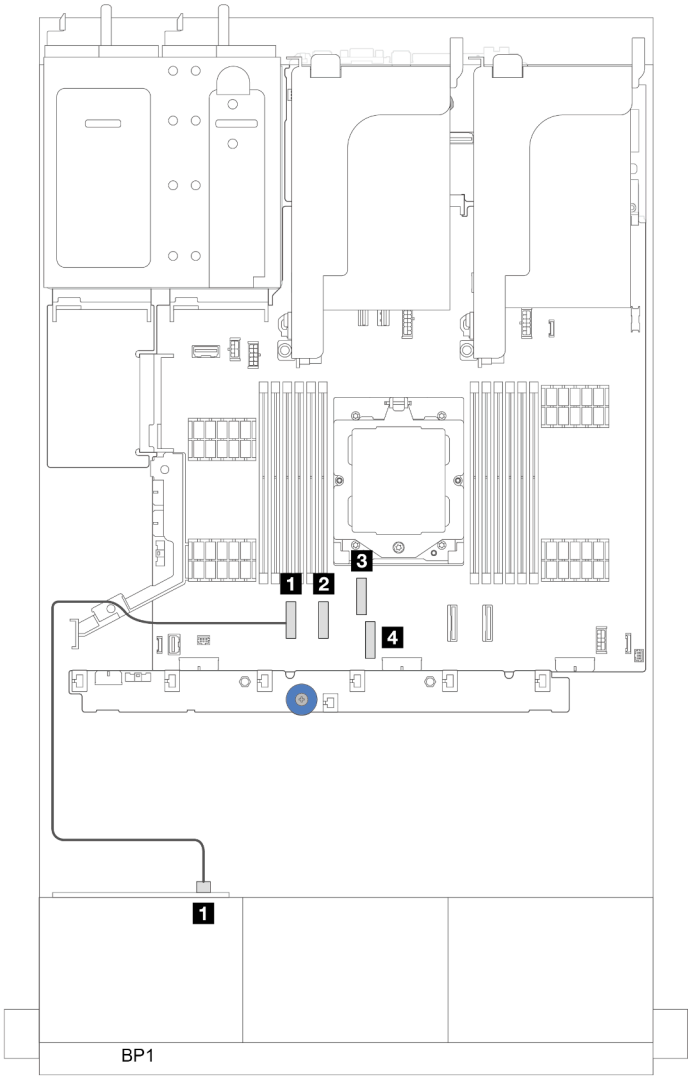
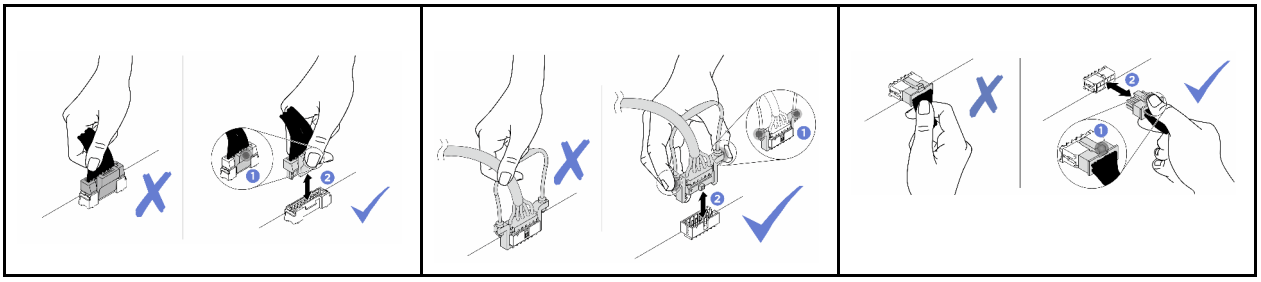


Figure 319. Example of cable passing through cable wall brackets

Attention: Strictly observe the following instructions to avoid damaging cable sockets on the system board assembly. Any damage to the cable sockets might require replacing the system board assembly.

- Connect cable connectors vertically or horizontally in alignment with the orientations of the corresponding cable sockets, avoiding any tilt.
- To disconnect cables from the system board assembly, do as follows:
  1. Press and hold all latches, release tabs, or locks on cable connectors to release the cable connectors.
  2. Remove the cable connectors vertically or horizontally in alignment with the orientations of the corresponding cable sockets, avoiding any tilt.

     Note: The cable connectors might look different from those in the illustration, but the removal procedure is the same.



Identifying connectors

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

- “Drive backplane connectors” on page 349

For the connectors on system board assembly, see “System-board-assembly connectors” on page 33.

Drive backplane connectors

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

The server supports the following backplanes depending on server configurations:

- “8 x 2.5-inch SAS/SATA front backplane” on page 349
- “8 x 2.5-inch AnyBay front backplane” on page 350
- “24 x 2.5-inch SAS/SATA expander backplane” on page 350
- “8 x 3.5-inch SAS/SATA front backplane” on page 350
- “12 x 3.5-inch SAS/SATA front backplane” on page 351
- “12 x 3.5-inch SAS/SATA expander backplane” on page 351
- “12 x 3.5-inch AnyBay front backplane” on page 351
- “4 x 2.5-inch SAS/SATA middle/rear backplane” on page 352
- “4 x 2.5-inch NVMe middle backplane” on page 352
- “4 x 3.5-inch SAS/SATA middle/rear backplane” on page 352
- “2 x 3.5-inch SAS/SATA rear backplane” on page 352
- “8 x 2.5-inch SAS/SATA rear backplane” on page 353
- “4 x 2.5-inch AnyBay rear backplane” on page 353

8 x 2.5-inch SAS/SATA front backplane

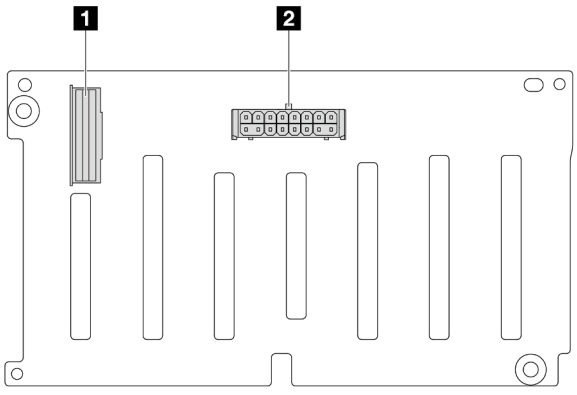


Figure 320. 8 x 2.5-inch SAS/SATA backplane connectors

1 SAS connector	2 Power connector

8 x 2.5-inch AnyBay front backplane

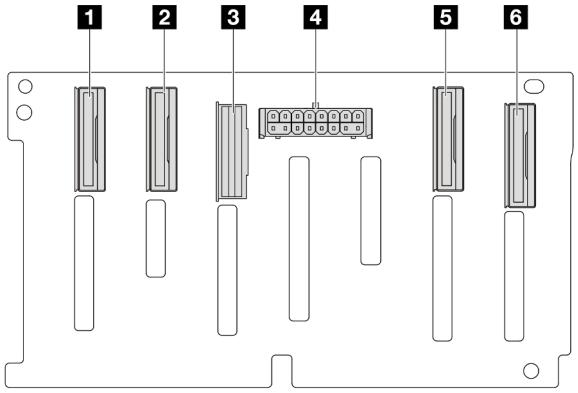


Figure 321. 8 x 2.5-inch AnyBay backplane connectors

1 NVMe 6-7 connector	2 NVMe 4-5 connector
3 SAS connector	4 Power connector
5 NVMe 2-3 connector	6 NVMe 0-1 connector

24 x 2.5-inch SAS/SATA expander backplane

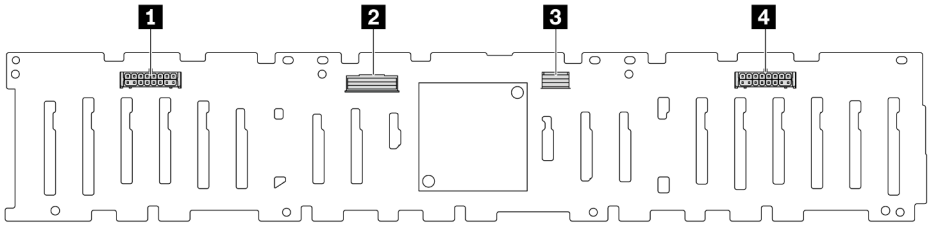


Figure 322. Connectors on 24 x 2.5-inch SAS/SATA expander backplane

1 Power connector 2	2 SAS 0 connector
3 SAS 1 connector	4 Power connector 1

8 x 3.5-inch SAS/SATA front backplane

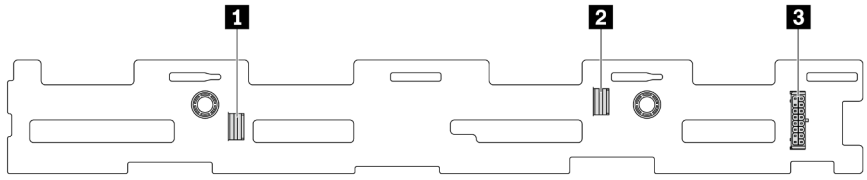


Figure 323. 8 x 3.5-inch SAS/SATA backplane connectors

1 SAS 1 connector	2 SAS 0 connector
3 Power connector	

12 x 3.5-inch SAS/SATA front backplane

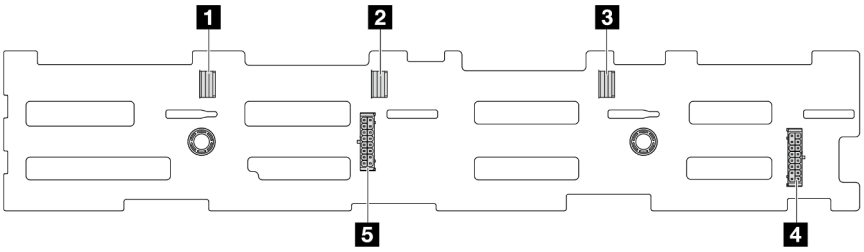


Figure 324. 12 x 3.5-inch SAS/SATA backplane connectors

1 SAS 2 connector	2 SAS 1 connector
3 SAS 0 connector	4 Power connector 1
5 Power connector 2	

12 x 3.5-inch SAS/SATA expander backplane

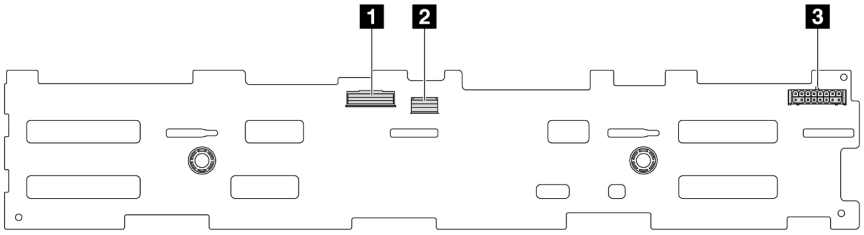


Figure 325. Connectors on 12 x 3.5-inch SAS/SATA expander backplane

1 SAS 0 connector	2 SAS 1 connector
3 Power connector	

12 x 3.5-inch AnyBay front backplane

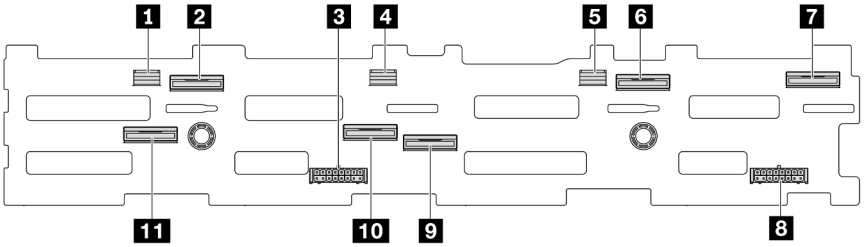


Figure 326. 12 x 3.5-inch AnyBay backplane connectors

1 SAS 2 connector	2 NVMe 8-9 connector
3 Power connector 2	4 SAS 1 connector
5 SAS 0 connector	6 NVMe 2-3 connector
7 NVMe 0-1 connector	8 Power connector 1
9 NVMe 4-5 connector	10 NVMe 6-7 connector
11 NVMe 10-11 connector	

4 x 2.5-inch SAS/SATA middle/rear backplane

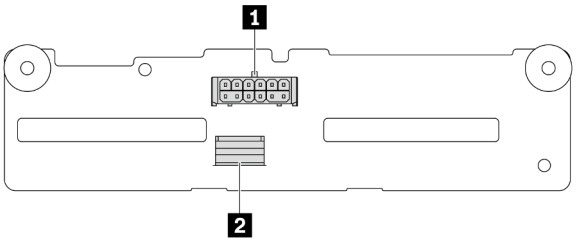


Figure 327. 4 x 2.5-inch SAS/SATA backplane connectors

1 Power connector	2 SAS connector

4 x 2.5-inch NVMe middle backplane

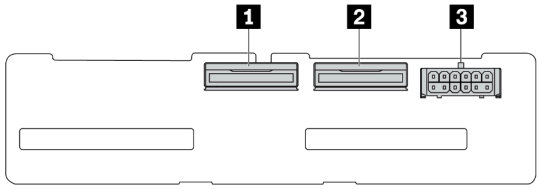


Figure 328. 4 x 2.5-inch NVMe backplane connectors

1 NVMe 2-3 connector	2 NVMe 0-1 connector
3 Power connector	

4 x 3.5-inch SAS/SATA middle/rear backplane

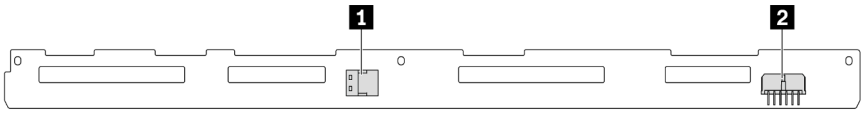


Figure 329. 4 x 3.5-inch SAS/SATA backplane connectors

1 SAS connector	2 Power connector

2 x 3.5-inch SAS/SATA rear backplane

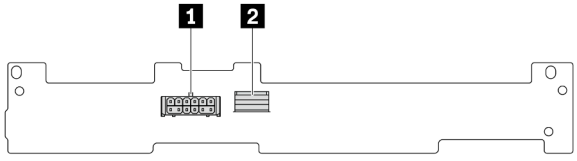


Figure 330. 2 x 3.5-inch SAS/SATA backplane connectors

1 Power connector	2 SAS connector

8 x 2.5-inch SAS/SATA rear backplane

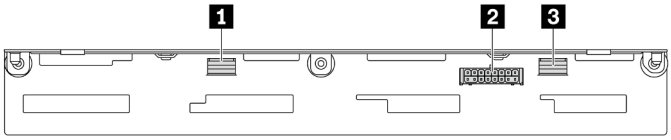


Figure 331. 8x2.5-inch SAS/SATA backplane connectors

1 SAS 1 connector	2 Power connector
3 SAS 0 connector	

4 x 2.5-inch AnyBay rear backplane

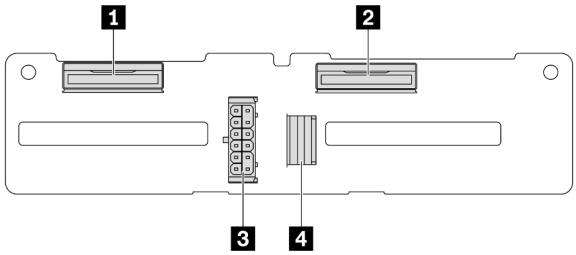


Figure 332. 4 x 2.5-inch AnyBay backplane connectors

1 NVMe 2-3 connector	3 Power connector
2 NVMe 0-1 connector	4 SAS connector

Front VGA connector and external diagnostics connector

This topic provides cable routing information for the front video graphic adapter (VGA) connector and external diagnostics connector.

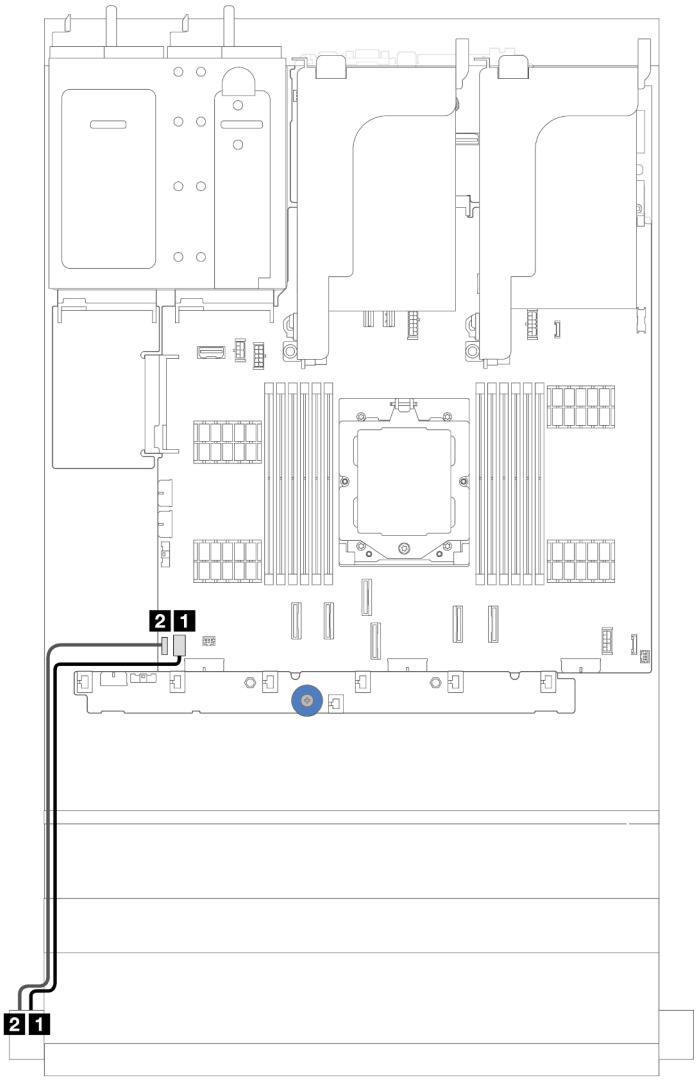


Figure 333. Cable routing for the front VGA connector and external diagnostics connector

From	To
1 VGA cable	1 VGA connector on the system board assembly
2 External diagnostics cable	2 External LCD connector on the system board assembly

7mm drive backplanes

This topic provides cable routing information for the 7mm drive backplanes.

The server supports one of the following 7mm drive backplanes:

- “7mm non-RAID SATA/NVMe 2-Bay backplanes” on page 355
- “7mm RAID NVMe 2-bay backplanes” on page 358
- “7mm RAID SATA/NVMe 2-bay backplanes” on page 359

7mm non-RAID SATA/NVMe 2-Bay backplanes

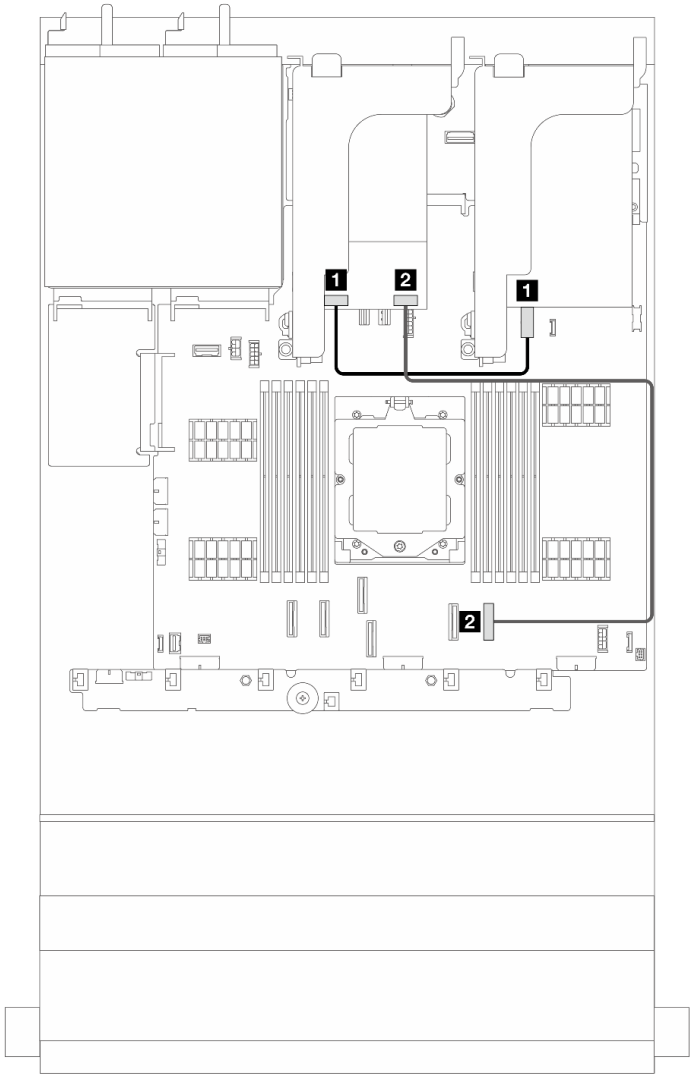


Figure 334. SATA cable routing for 7mm drive backplanes

From	To
1 7mm backplane power connector	1 7mm power connector on the system board assembly
2 7mm backplane signal connector	2 Onboard: PCIe 8

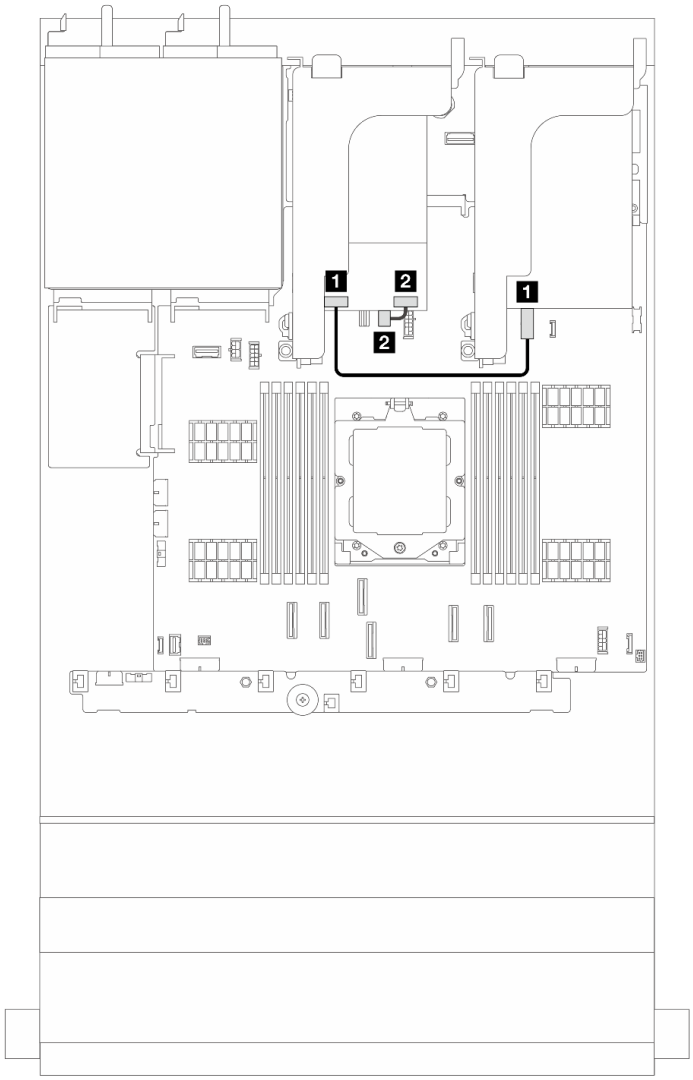


Figure 335. NVMe cable routing for 7mm drive backplanes

From	To
1 7mm backplane power connector	1 7mm power connector on the system board assembly
2 7mm backplane signal connector	2 7mm signal connector on the system board assembly

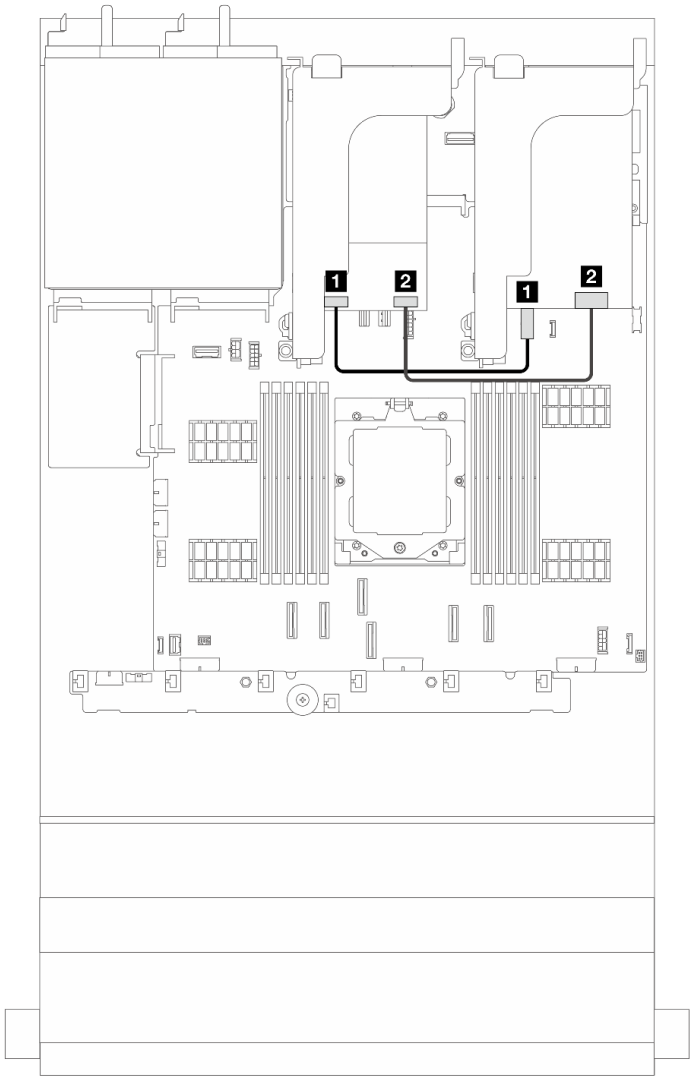


Figure 336. RAID cable routing for 7mm drive backplanes

From	To
1 7mm backplane power connector	1 7mm power connector on the system board assembly
2 7mm backplane signal connector	2 Riser 1 RAID adapter

7mm RAID NVMe 2-bay backplanes

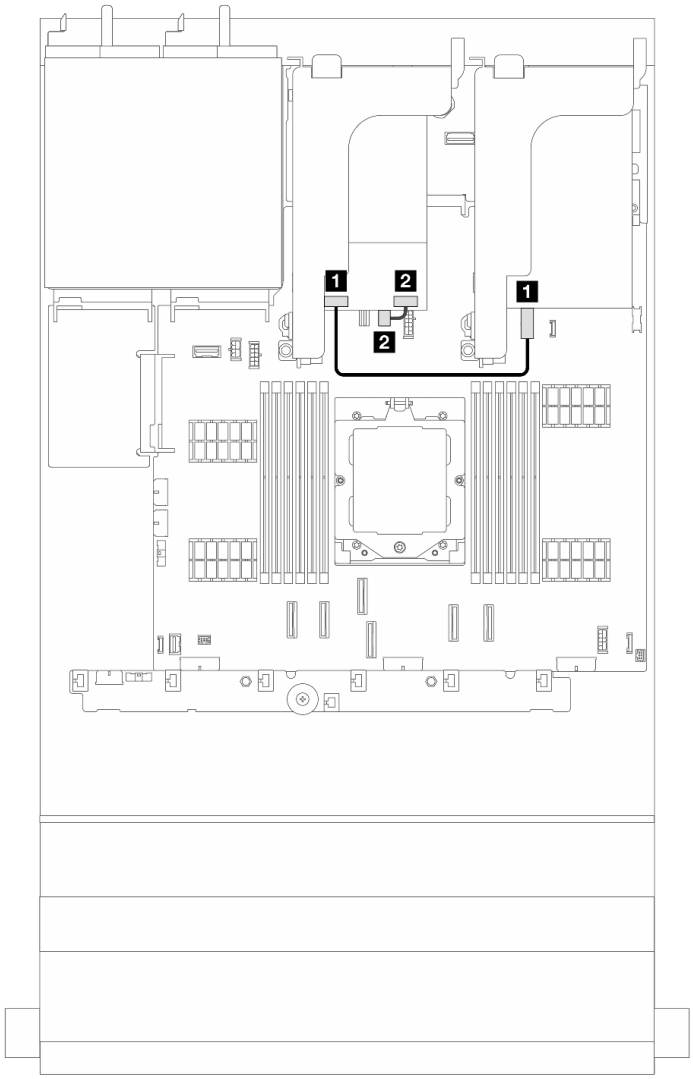


Figure 337. Cable routing for 7mm drive backplanes

From	To
1 7mm backplane power connector	1 7mm power connector on the system board assembly
2 7mm backplane signal connector	2 7mm signal connector on the system board assembly

7mm RAID SATA/NVMe 2-bay backplanes

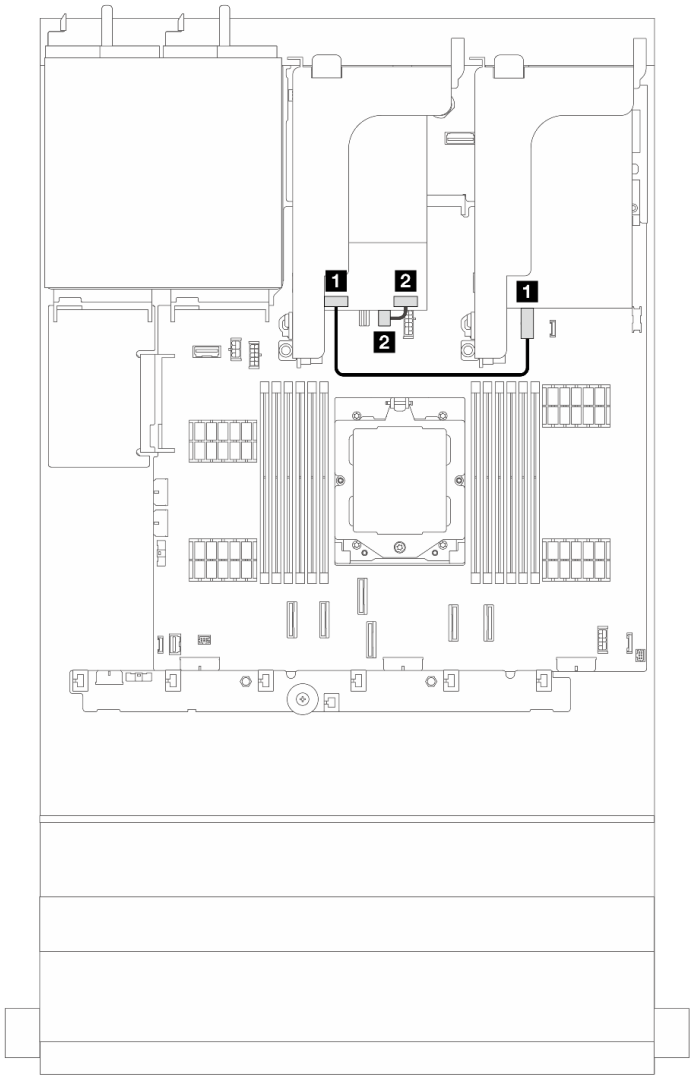


Figure 338. Cable routing for 7mm drive backplanes

From	To
1 7mm backplane power connector	1 7mm power connector on the system board assembly
2 7mm backplane signal connector	2 7mm signal connector on the system board assembly

7mm drive backplane cable routing at 12 x 3.5 SAS/SATA backplane configuration

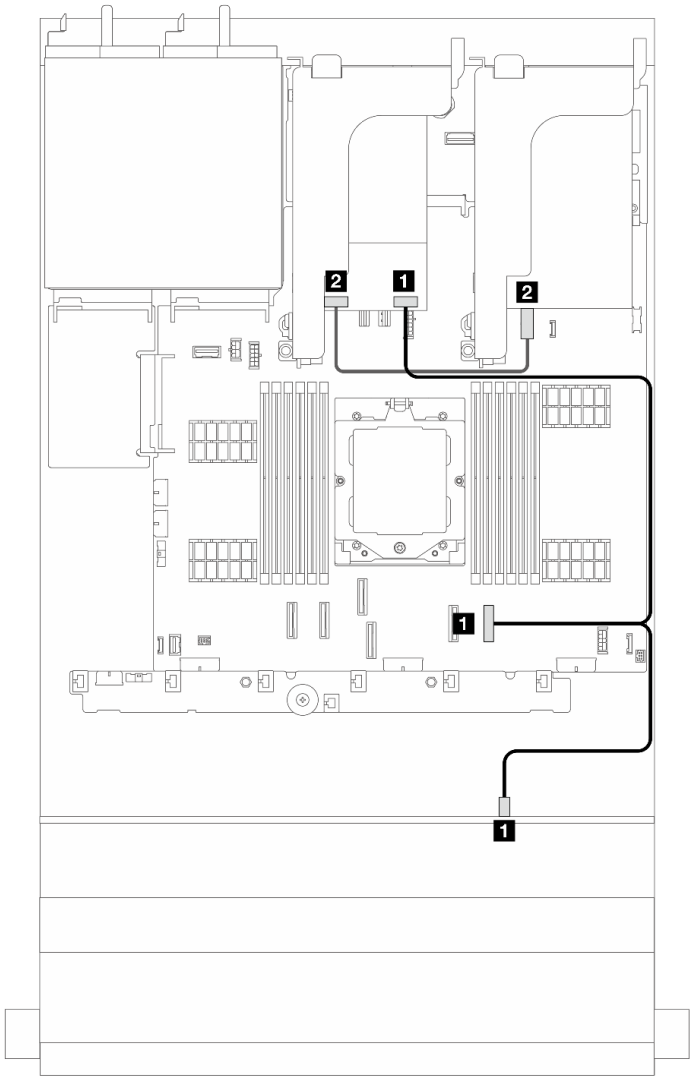


Figure 339. 7mm drive backplane cable routing at 12 x 3.5-inch SAS/SATA backplane configuration

From	To
1 Onbard: PCIe 8	1 7mm backplane signal connector and front backplane SAS 2
2 7mm backplane power connector	2 7mm power connector on the system board assembly

Direct water cooling module

Use this section to understand the cable routing of the Direct Water Cooling Module (DWCM).

Note: For better cable arrangement, it is required to install the hoses and liquid detection sensor module to a designated holder, and make sure that the module is secured in holder clips. Use the illustration below or "Install the Lenovo Neptune Processor Direct Water Cooling Module" on page 154 for details.

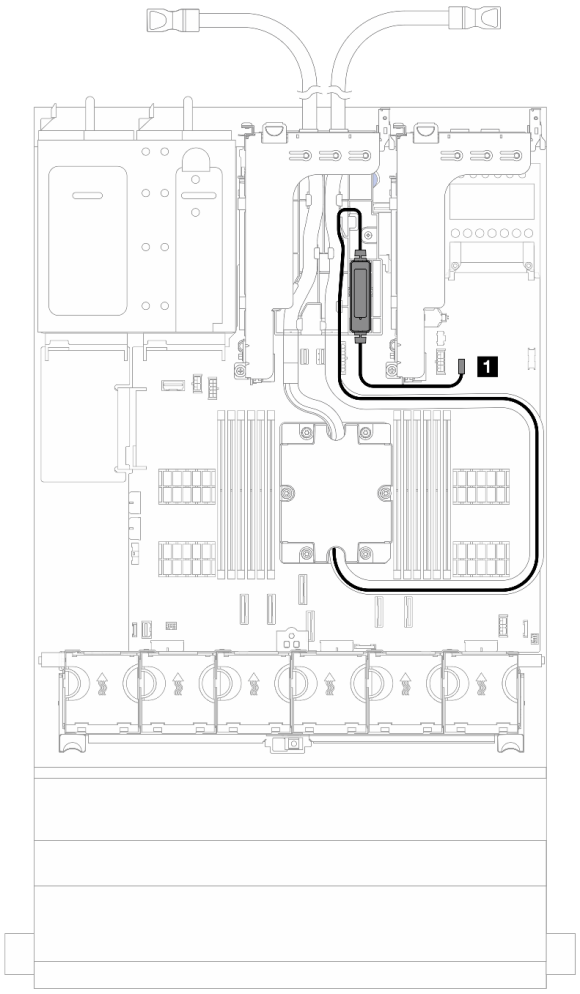


Figure 340. Direct water cooling module cable routing

From	To
Leak detection cable	Leak detection connector

Front I/O module

This topic provides cable routing information for the front I/O module.

Notes:

- The front I/O module varies by model. See “Front I/O module” on page 22.
- When routing the front I/O module cable, ensure that it is fixed on the upper frame of the cable retainer. For details, see “Install the rack latches” on page 266.

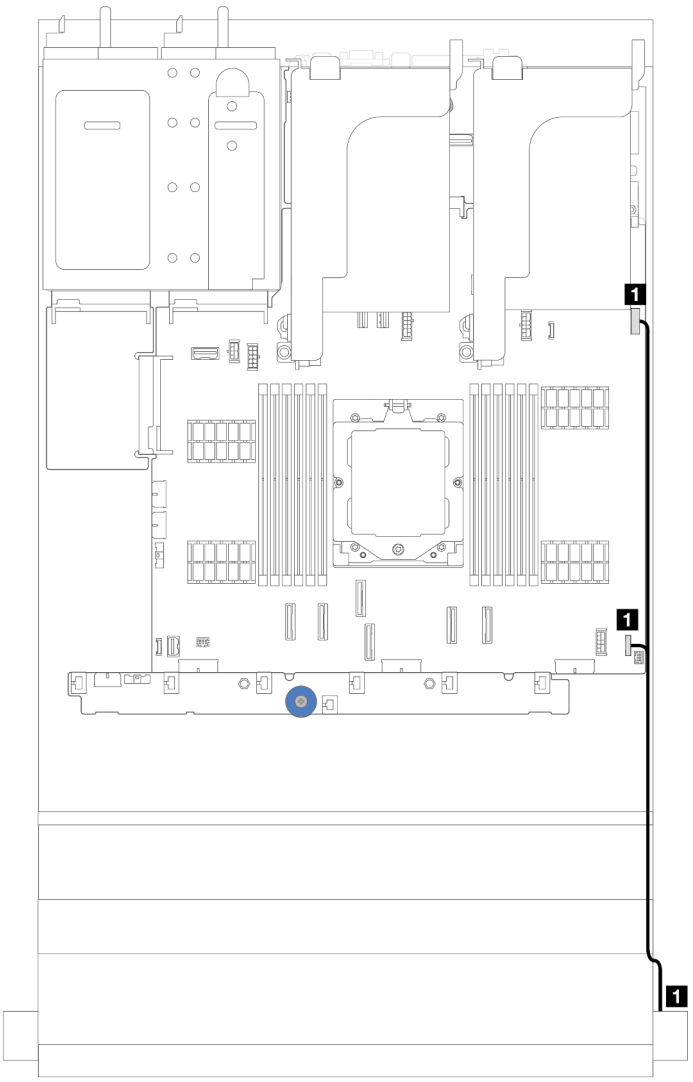


Figure 341. Cable routing for the front I/O module on the right rack latch

From	To
1 Front panel and USB cable	1 Front I/O connector and front USB connector on the system board assembly

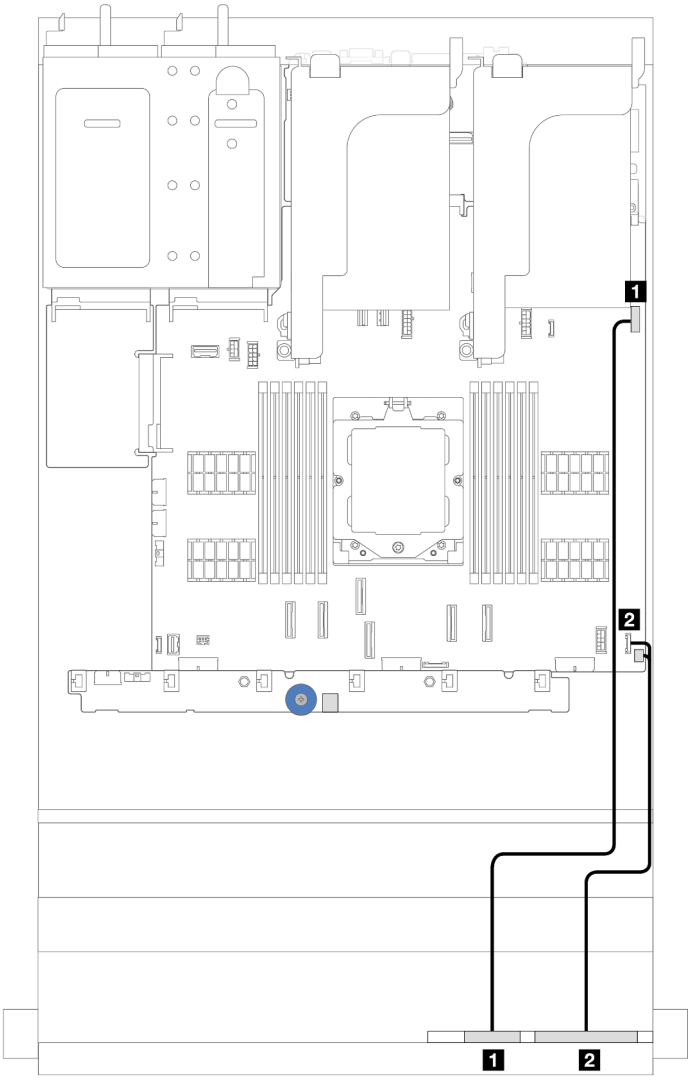


Figure 342. Cable routing for the integrated diagnostics panel on the media bay

From	To
1 Front USB cable	1 Front USB connector on the system board assembly
2 Front panel cable	2 Front I/O connector on the system board assembly

GPUs

This topic provides cable routing information for GPU adapters.

Cable routing for GPU adapters

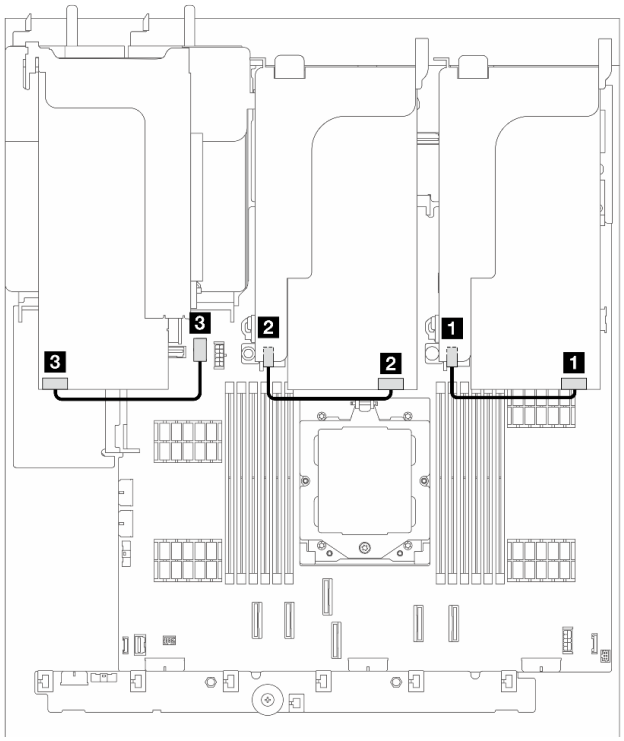
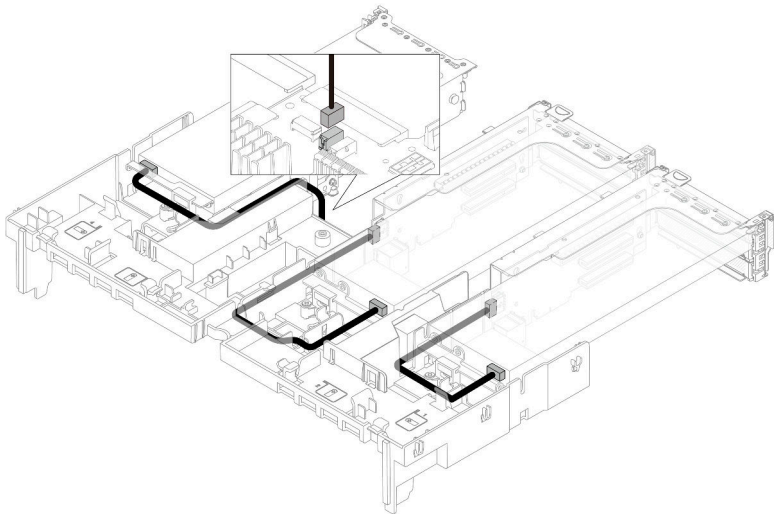


Figure 343. Cable routing for GPU adapters

From	To
1 GPU power cable	1 Power connector on the riser 1
2 GPU power cable	2 Power connector on the riser 2
3 GPU power cable	3 GPU power connector on the system board assembly

Note: If you need to install an M.2 backplane on the GPU air baffle, refer to below illustration for cable routing on the air baffle. Route the GPU power cable from riser 2 beneath the M.2 backplane holder to the GPU power connector on the GPU adapter.



Intrusion switch

This topic provides cable routing information for the intrusion switch.

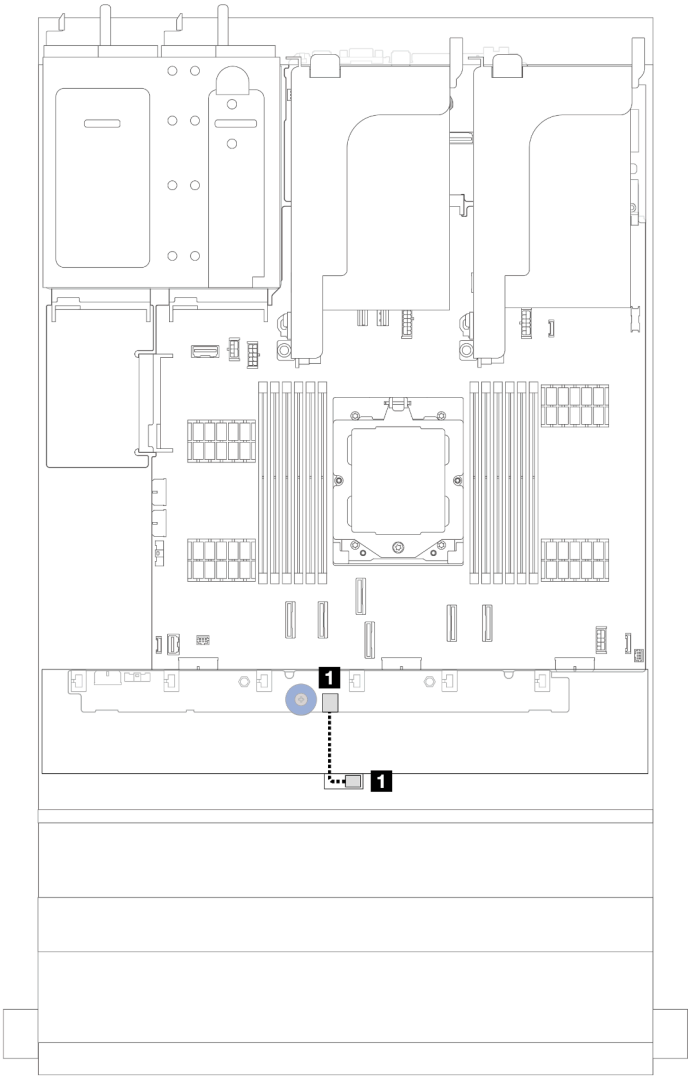


Figure 344. Intrusion switch cable routing

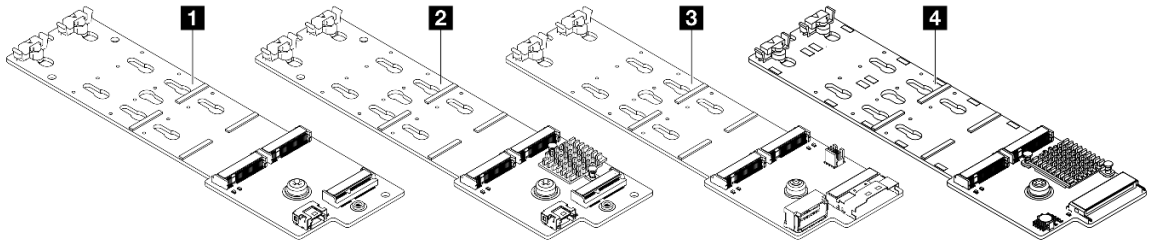
From	To
1 Intrusion switch cable	1 Intrusion switch connector on the fan board

M.2 drive backplane

This topic provides cable routing information for the M.2 drive backplane.

Based on different drive types, the M.2 drive backplanes differ. Thus cables, connector layout and the cable routing are also different.

The server supports the following M.2 drive backplanes (enablement kits):



1	“ThinkSystem M.2 SATA/NVMe 2-Bay Enablement Kit” on page 368
2	“ThinkSystem M.2 NVMe 2-Bay RAID Enablement Kit” on page 373
3	“ThinkSystem M.2 SATA/x4 NVMe 2-Bay Enablement Kit” on page 371
4	“ThinkSystem M.2 RAID B540i-2i SATA/NVMe Enablement Kit” on page 374

ThinkSystem M.2 SATA/NVMe 2-Bay Enablement Kit

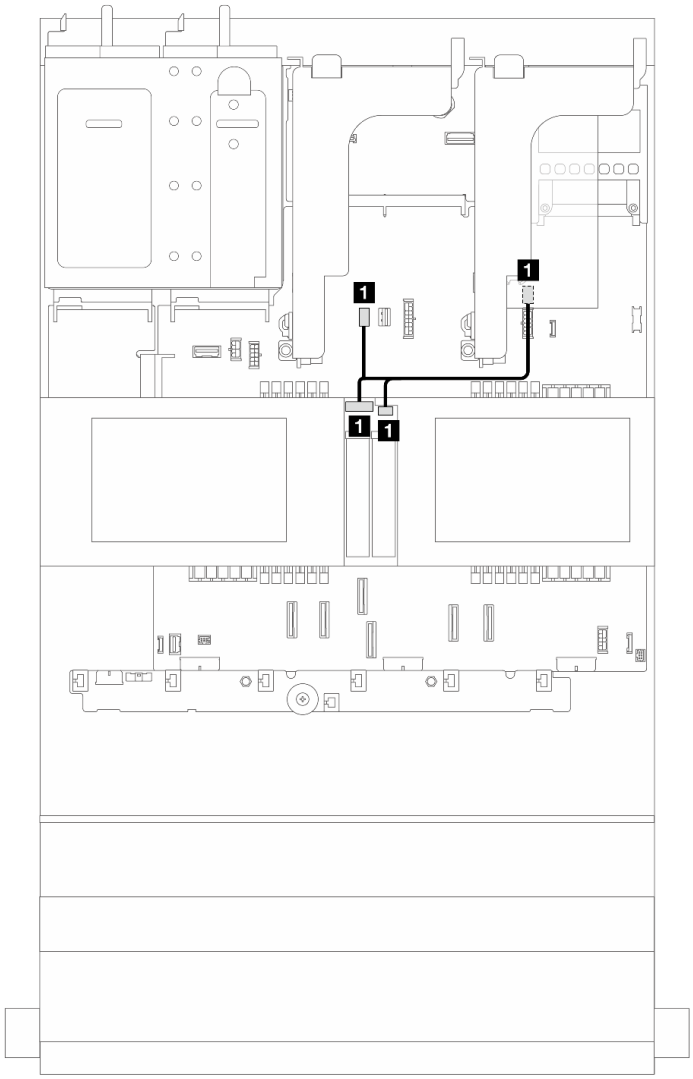


Figure 345. NVMe cable routing for M.2 drive backplane

From	To
1 M.2 drive backplane: power and signal connectors	1 M.2 power and signal connectors on the system board assembly

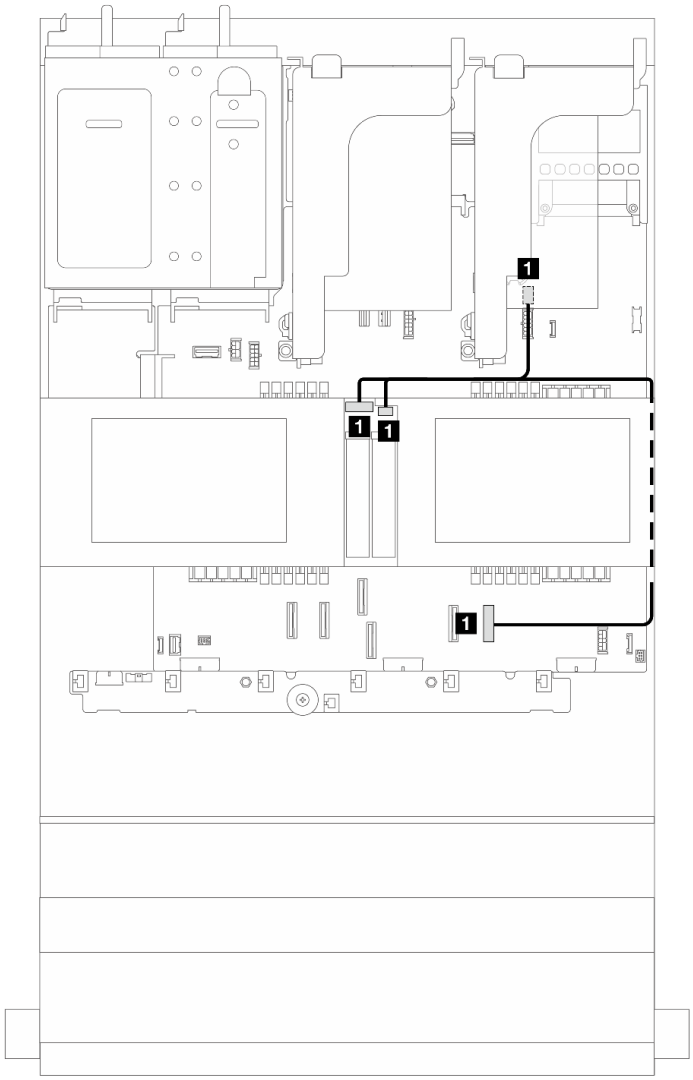


Figure 346. SATA cable routing for M.2 drive backplane

From	To
1 M.2 drive backplane: power and signal connectors	1 M.2 power and PCIe 8 connectors on the system board assembly

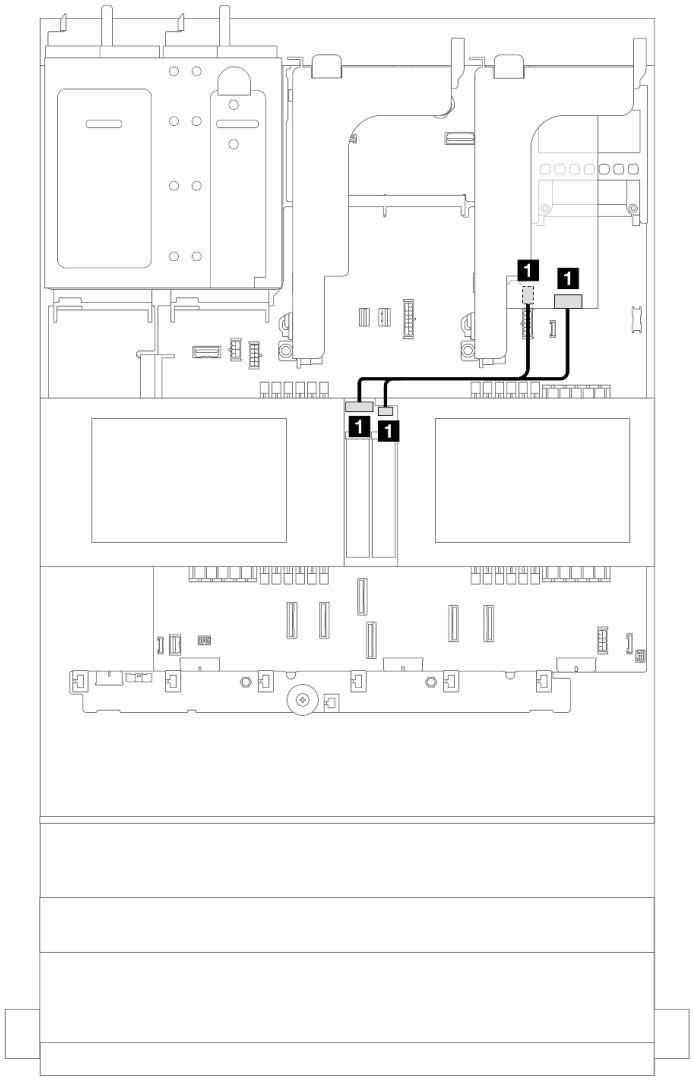


Figure 347. RAID cable routing for M.2 drive backplane

From	To
1 M.2 drive backplane: power and signal connectors	1 M.2 power connector on the system board assembly, and riser 1 RAID adapter

ThinkSystem M.2 SATA/x4 NVMe 2-Bay Enablement Kit

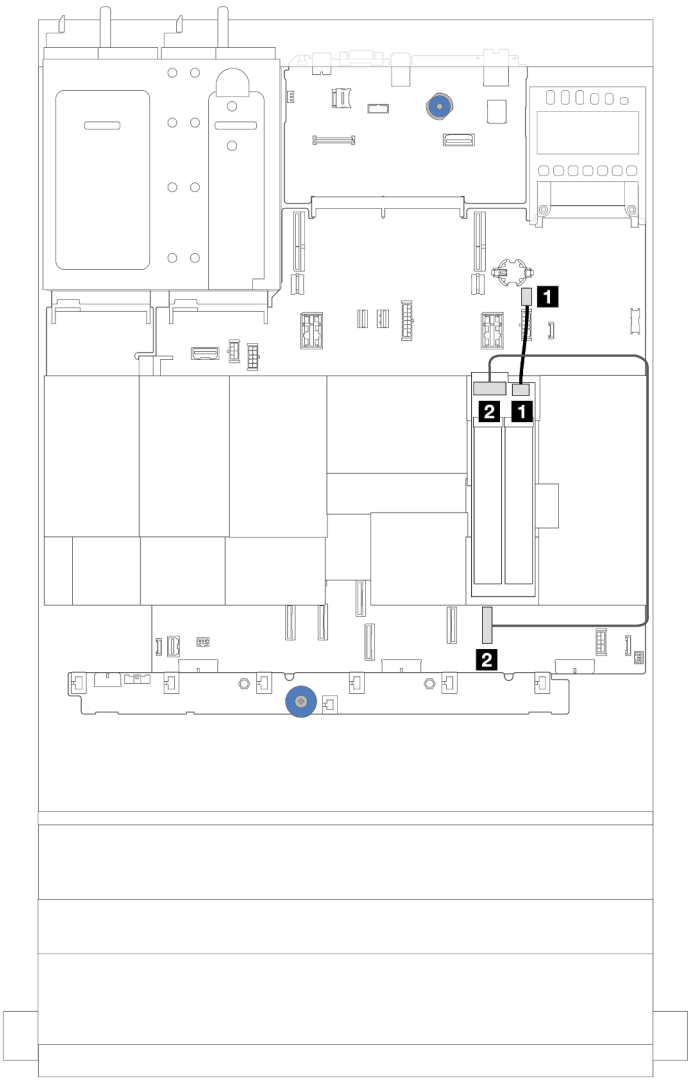


Figure 348. SATA/NVMe cable routing for M.2 drive backplane

From	To
1 M.2 power cable	1 M.2 power connector on the system board assembly
2 M.2 signal cable	2 PCIe connector 8 on the system board assembly

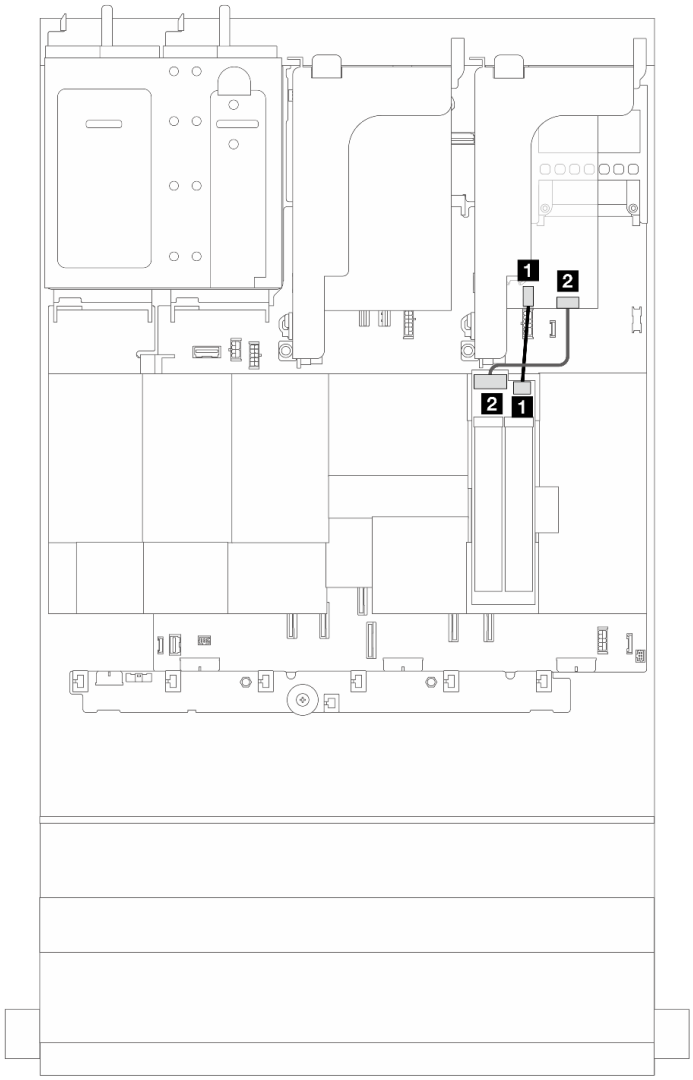


Figure 349. RAID cable routing for M.2 drive backplane

From	To
1 M.2 power cable	1 M.2 power connector on the system board assembly
2 M.2 signal cable	2 Riser 1 RAID adapter

ThinkSystem M.2 NVMe 2-Bay RAID Enablement Kit

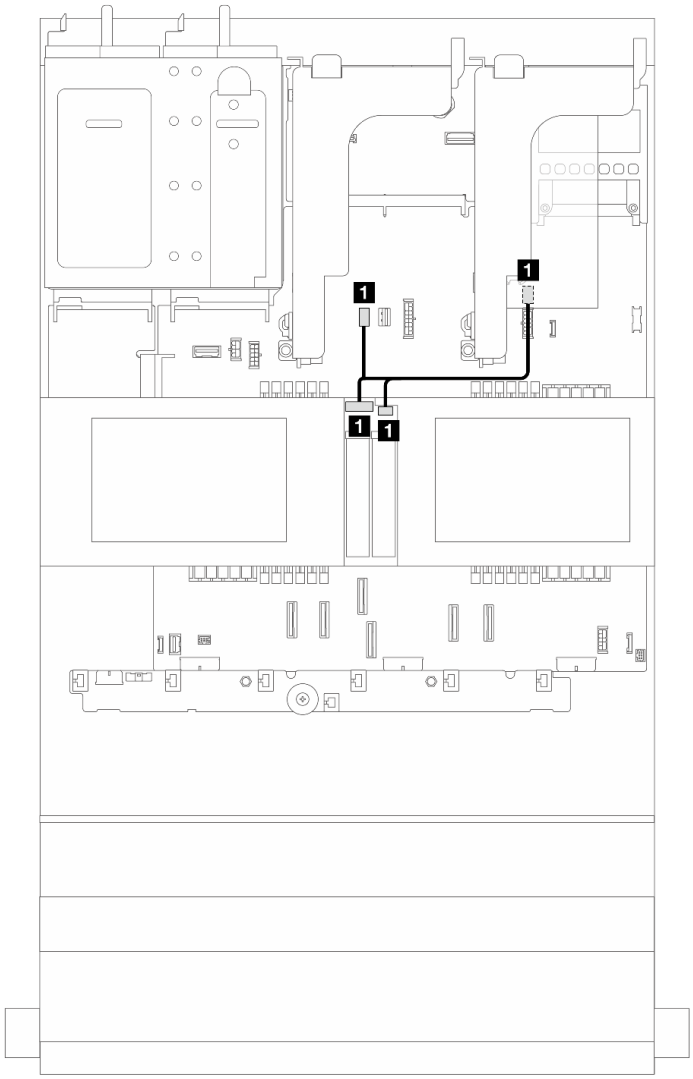


Figure 350. Cable routing for M.2 drive backplane

From	To
1 M.2 drive backplane: power and signal connectors	1 M.2 power and signal connectors on the system board assembly

ThinkSystem M.2 RAID B540i-2i SATA/NVMe Enablement Kit

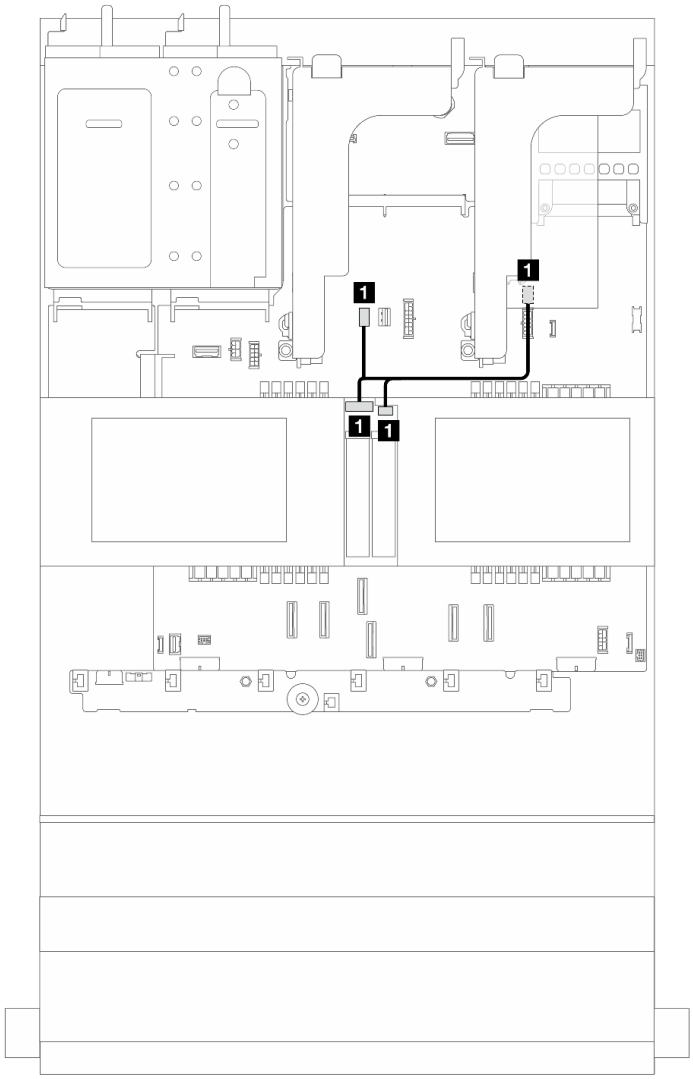


Figure 351. Cable routing for M.2 drive backplane

From	To
1 M.2 drive backplane: power and signal connectors	1 M.2 power and signal connectors on the system board assembly

Cable routing for M.2 drive backplane (when 7mm backplane used)

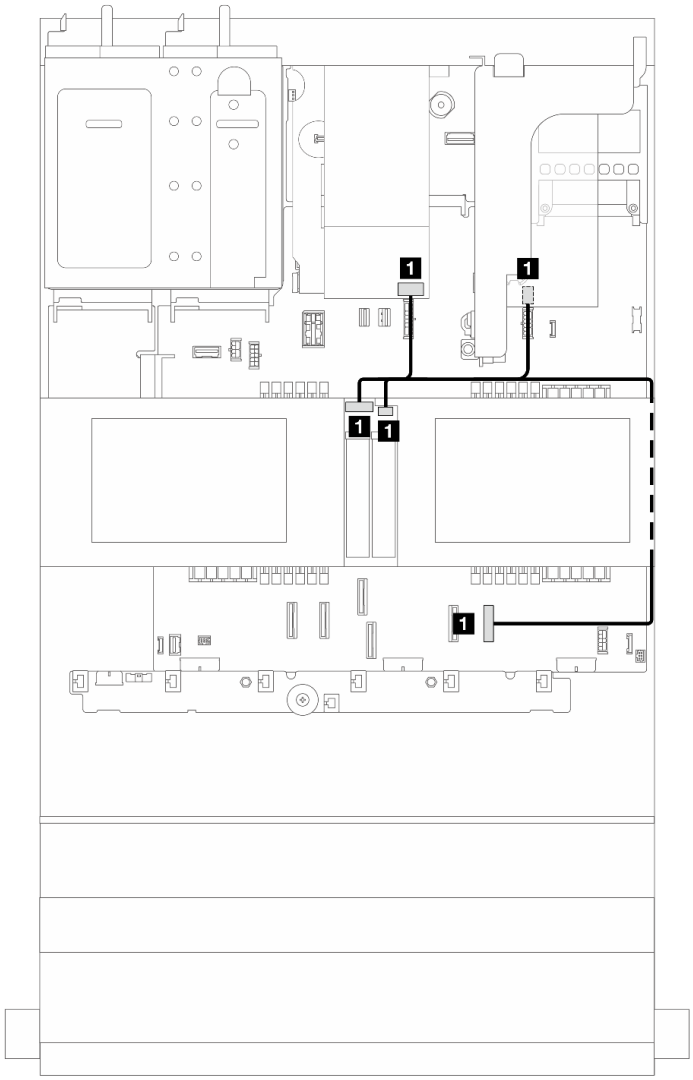


Figure 352. Cable routing for M.2 drive backplane (when 7mm backplane used)

From	To
1 M.2 drive backplane: power and signal connectors	1 M.2 power and PCIe 8 connectors on the system board assembly, and signal connector on 7mm backplane

Cable routing for M.2 drive backplane (in 12x3.5 SAS/SATA config)

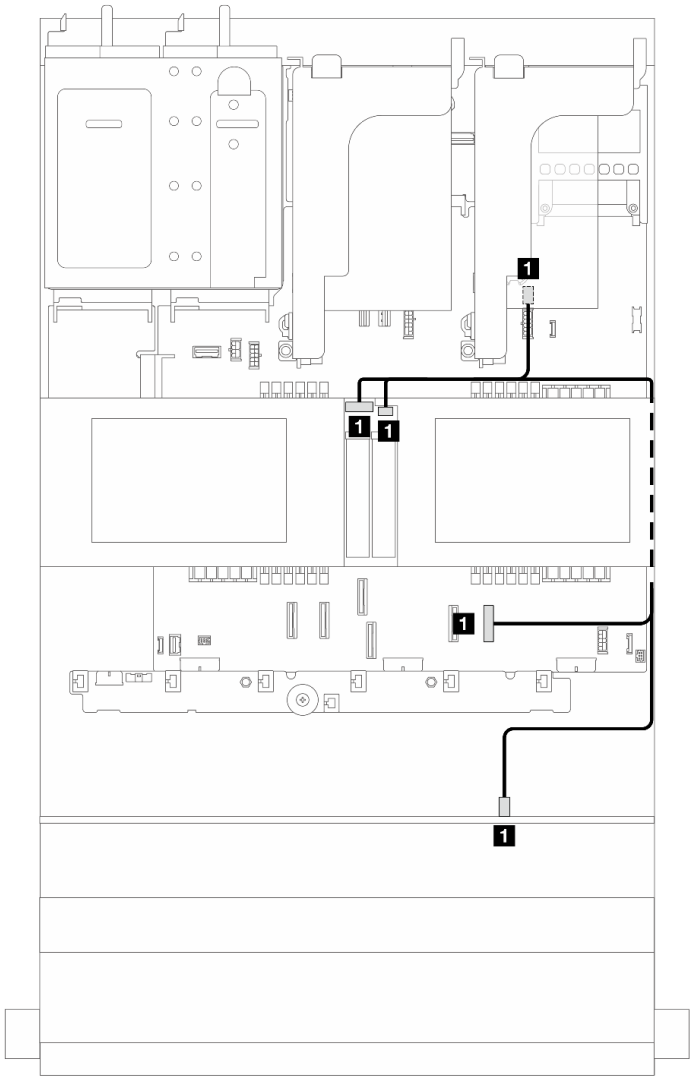


Figure 353. Cable routing for M.2 drive backplane (in 12x3.5 SAS/SATA config)

From	To
1 M.2 drive backplane: power and signal connectors	1 M.2 power and PCIe 8 connectors on the system board assembly, and SAS 2 connector on 12 x 3.5 SAS/SATA backplane

Management NIC adapter

This topic provides cable routing information for the ThinkSystem V3 Management NIC Adapter Kit (management NIC adapter).

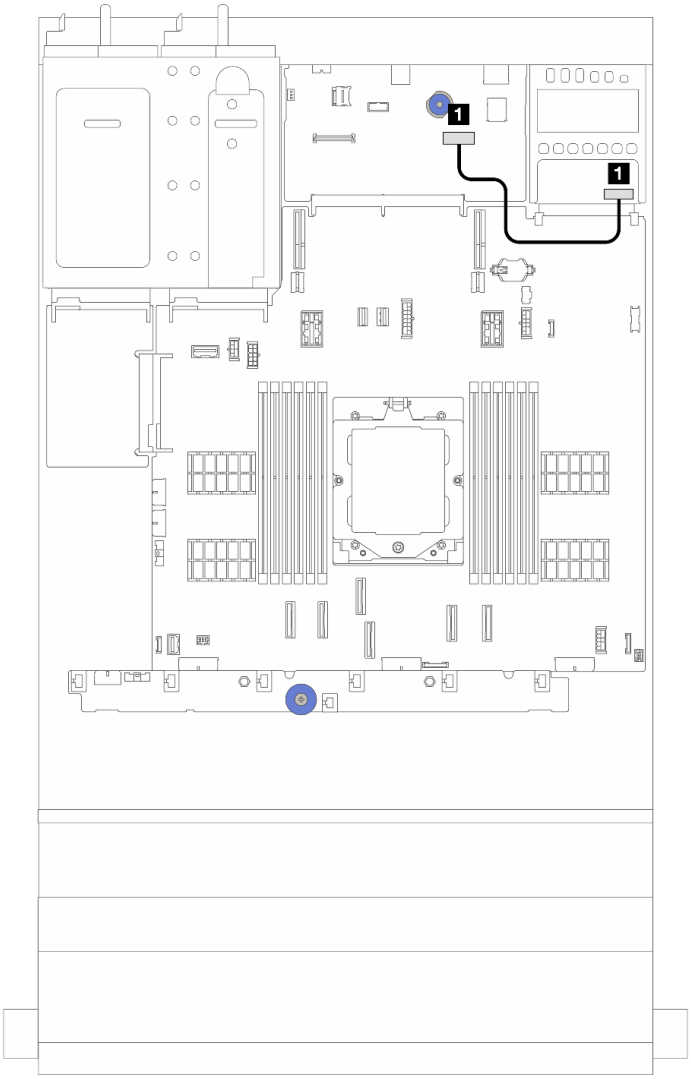


Figure 354. Cable routing for the management NIC adapter

From	To
1 Management NIC adapter	1 Second management Ethernet connector on the system board assembly

OCP interposer cards

This topic provides cable routing information for the front and rear OCP interposer cards.

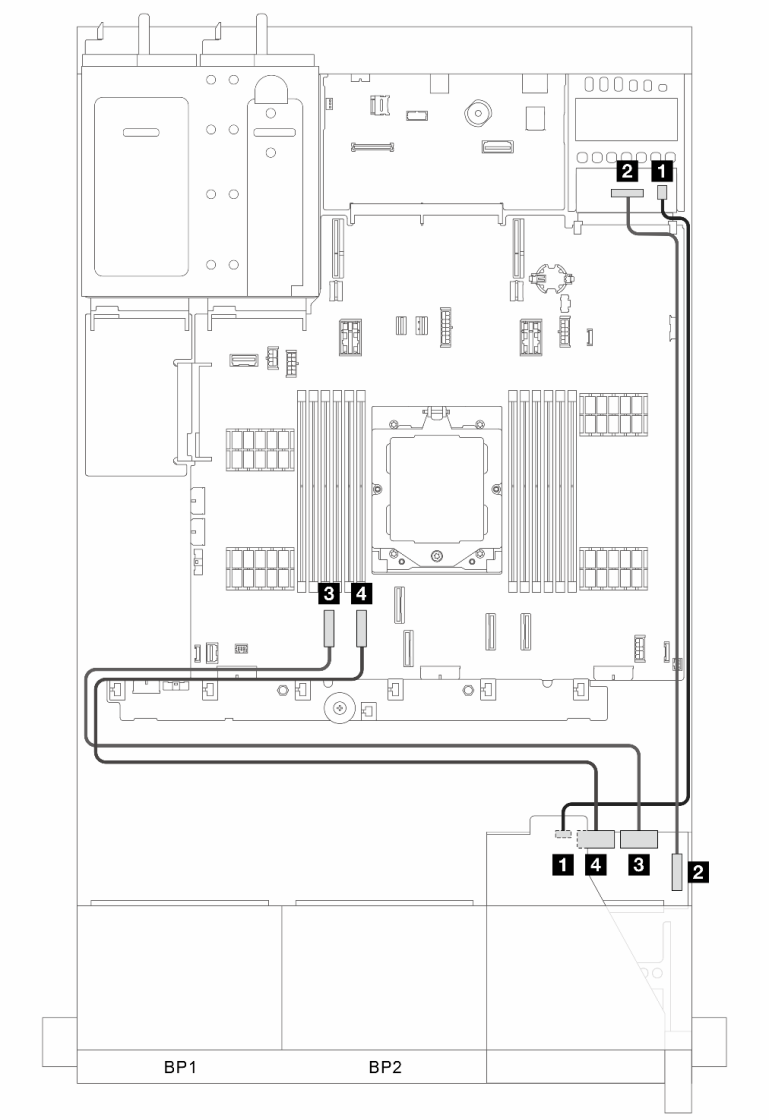


Figure 355. Cable routing for the front and rear OCP interposer cards

From	To
1 Front OCP interposer card: PWR	1 Rear OCP interposer card: PWR
2 Front OCP interposer card: F-SWIFT	2 Rear OCP interposer card: R-SWIFT
3 Front OCP interposer card: MCIO 1	3 Onboard: PCIe 1
4 Front OCP interposer card: MCIO 2	4 Onboard: PCIe 2

RAID flash power module

This topic provides cable routing information for the RAID flash power module (also called supercap).

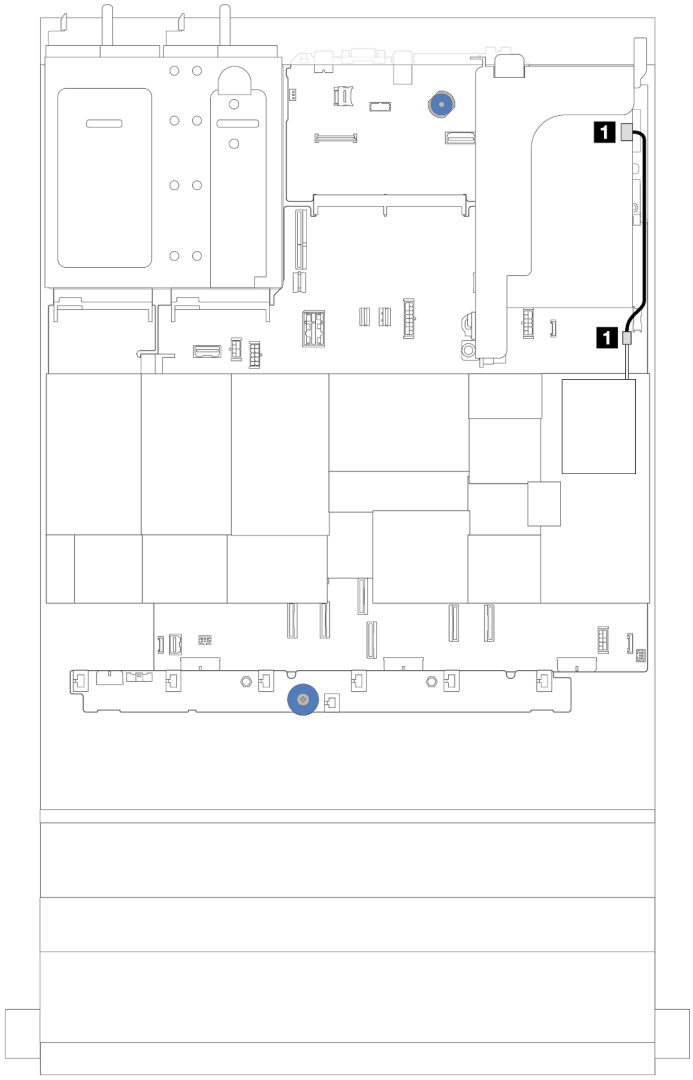
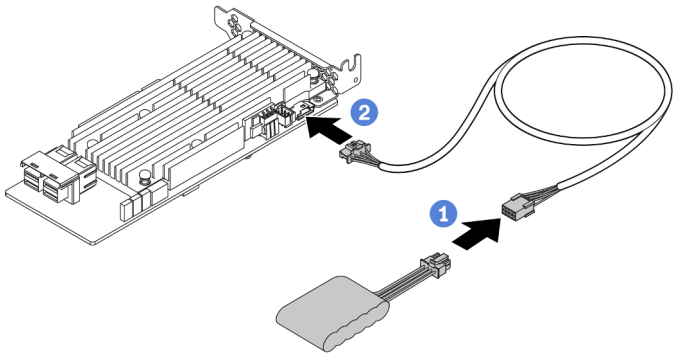


Figure 356. Cable routing for RAID flash power module

An extension cable is provided for each RAID flash power module for cable connection. Connect the cable from the RAID flash power module to the corresponding RAID adapter as shown.



From	To
1 RAID flash power module	1 Supercap connector on the RAID adapter

Riser 3

This topic provides cable routing information for the riser 3.

Riser 3 power and sideband connection (Gen 4/Gen 5)

The power and sideband connections for x8/x8 PCIe riser 3 and x16/x16 PCIe riser 3 are the same.

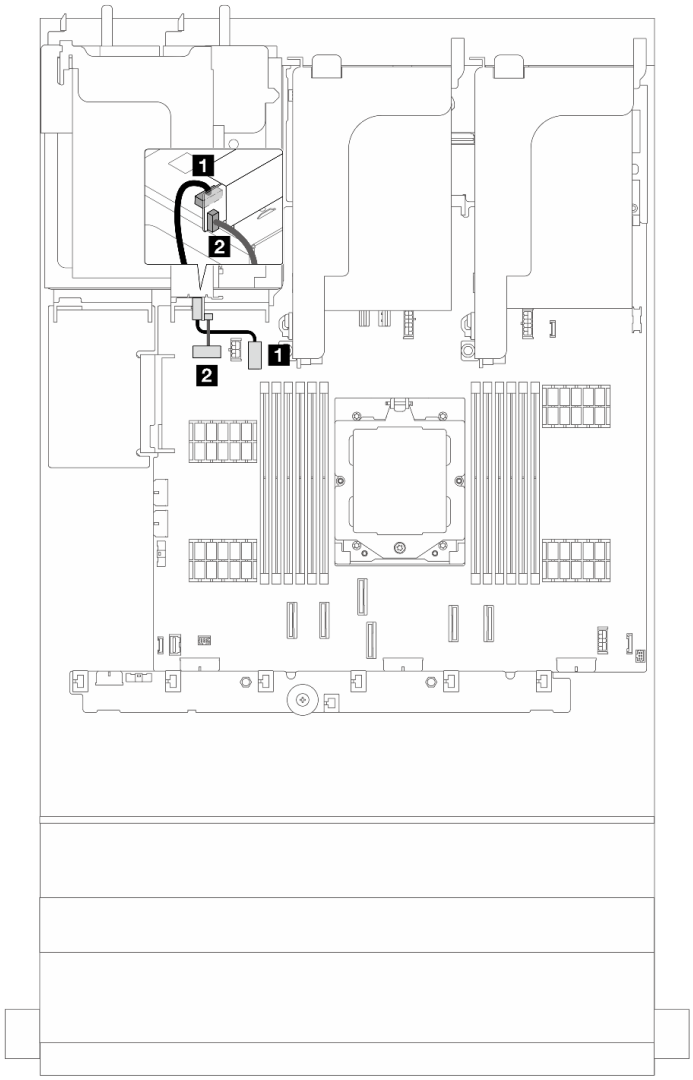


Figure 357. Riser 3 power and sideband connection (Gen4/Gen5)

From	To
1 Riser 3 power connector	1 Riser 3 power connector on the system board assembly
2 Riser 3 sideband connector	2 Riser 3 sideband connector on the system board assembly

Riser 3 (Gen 5) signal cable routing

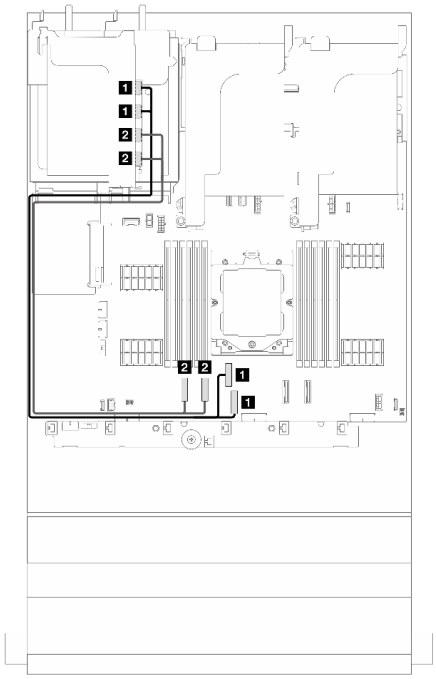


Figure 358. Riser 3 (x16/x16 Gen 5) signal cable routing

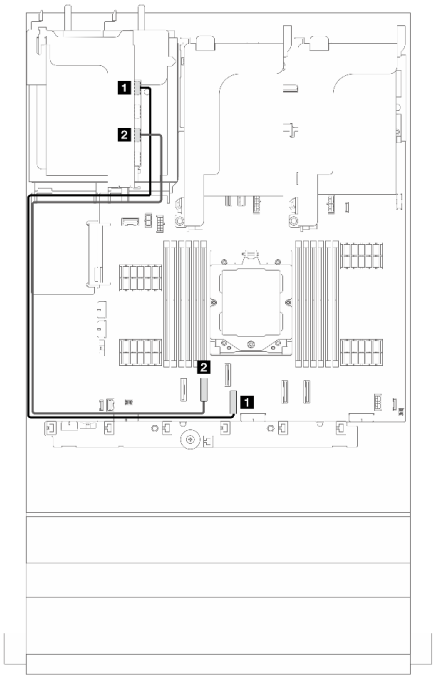


Figure 359. Riser 3 (x8/x8 Gen 5) signal cable routing

From	To
1 Riser 3: MCIO 1, 2	1 Onboard: PCIe 3, 4
2 Riser 3: MCIO 3, 4	2 Onboard: PCIe 1, 2

From	To
1 Riser 3: MCIO 1	1 Onboard: PCIe 3
2 Riser 3: MCIO 3	2 Onboard: PCIe 2

Riser 3 (Gen 4) signal cable routing

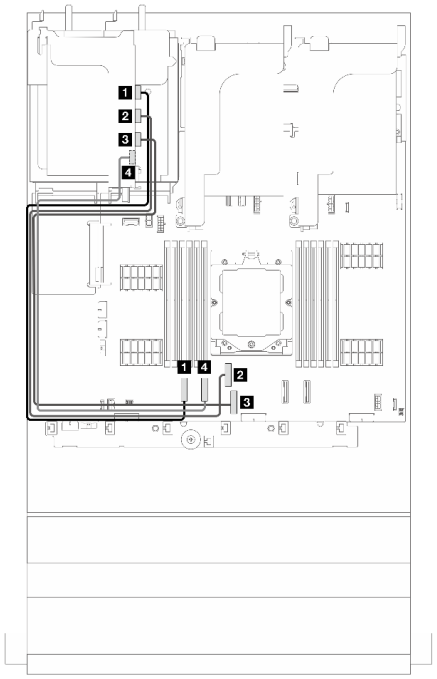


Figure 360. Riser 3 (x16/x16 Gen 4) signal cable routing

From	To
1 Riser 3: MCIO 1	1 Onboard: PCIe 1
2 Riser 3: MCIO 2	2 Onboard: PCIe 4
3 Riser 3: MCIO 3	3 Onboard: PCIe 3
4 Riser 3: MCIO 4	4 Onboard: PCIe 2

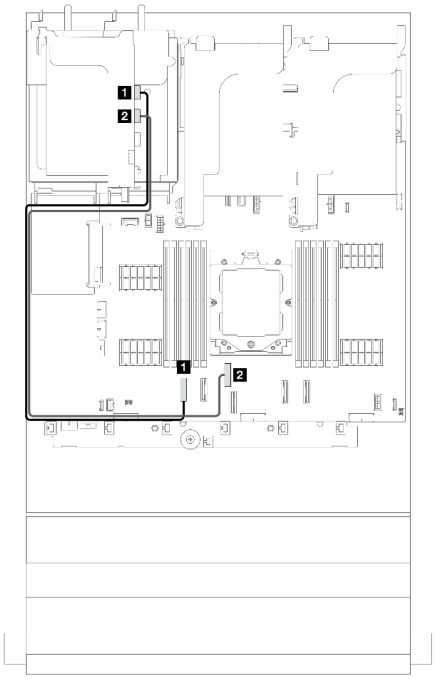


Figure 361. Riser 3 (x8/x8 Gen 4) signal cable routing

From	To
1 Riser 3: MCIO 1	1 Onboard: PCIe 1
2 Riser 3: MCIO 2	2 Onboard: PCIe 4

Riser 3/4

This topic provides cable routing information for the riser 3/4, which provide four low-profile (4LP) PCIe slots.

Cable routing for 4LP riser 3/4

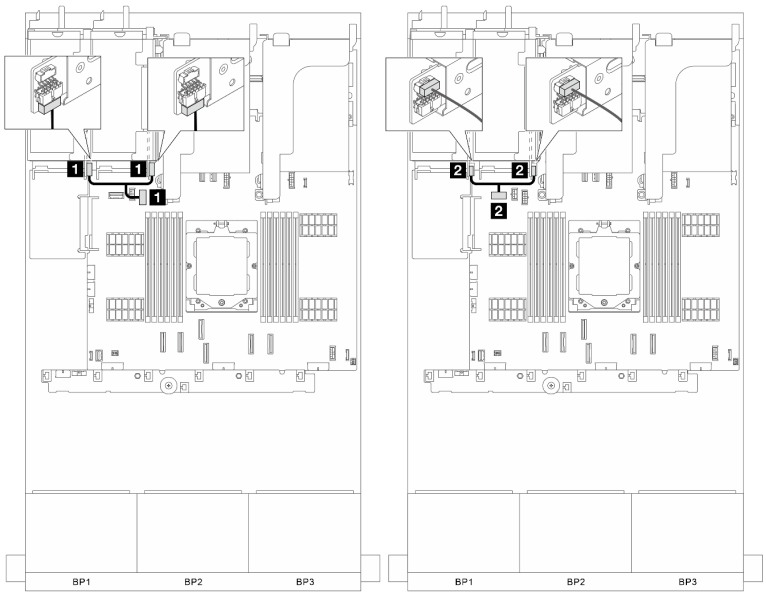


Figure 362. Riser 3/4 power and sideband connection

From	To
1 Riser 3 and riser 4 power connectors	1 Riser 3 power connector on the system board assembly
2 Riser 3 and riser 4 sideband connectors	2 Riser 3 sideband connector on the system board assembly

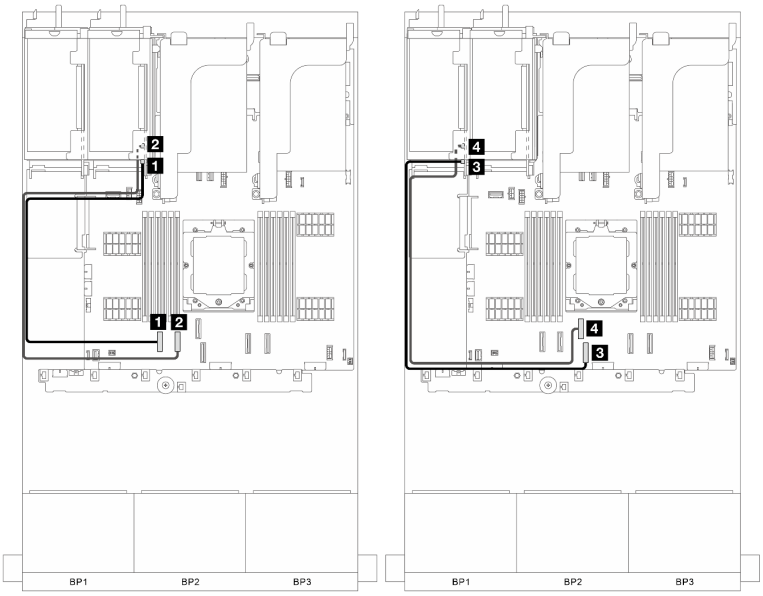


Figure 363. Riser 3/4 signal connection

From	To
1 Riser 3: J2	1 Onboard: PCIe 1
2 Riser 3: J4	2 Onboard: PCIe 2
3 Riser 4: J2	3 Onboard: PCIe 3
4 Riser 4: J4	4 Onboard: PCIe 4

Riser 5

This topic provides cable routing information for the riser 5.



Figure 364. Cable routing for the riser 5

From	To
1 Riser 5: RAID PWR	1 Onboard: RAID PWR
2 Riser 5: EXP PWR	2 Onboard: EXP PWR
3 Riser 5: MCIO 3	3 Onboard: PCIe 8
4 Riser 5: MCIO 4	4 Onboard: PCIe 7
5 Riser 5: MCIO 1	5 Onboard: PCIe 4
6 Riser 5: MCIO 2	6 Onboard: PCIe 3

Connections between the processor board and fan board

This section provides connection information for the processor board and fan board.

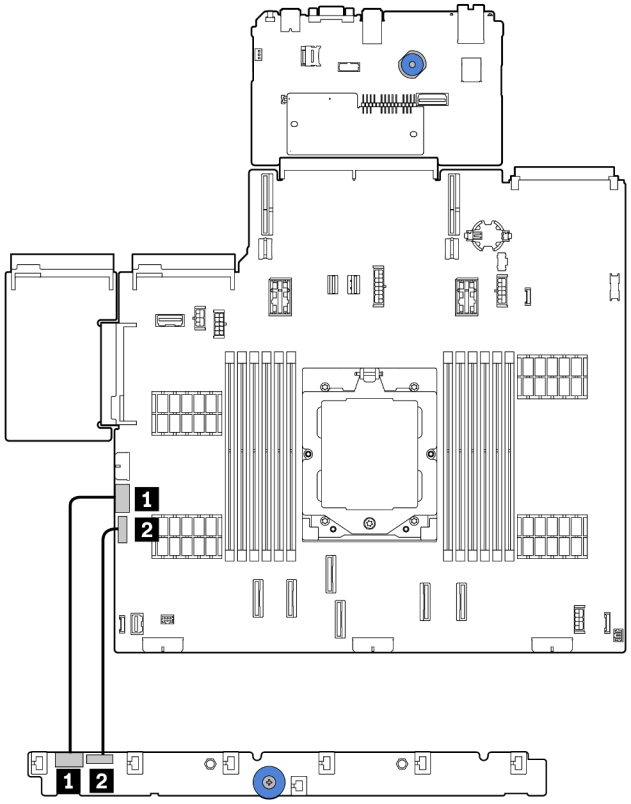


Figure 365. Connections between the processor board and fan board

From	To
1 Fan power connector on the fan board	1 Fan power connector on the processor board
2 Sideband connector on the fan board	2 Fan sideband connector on the processor board

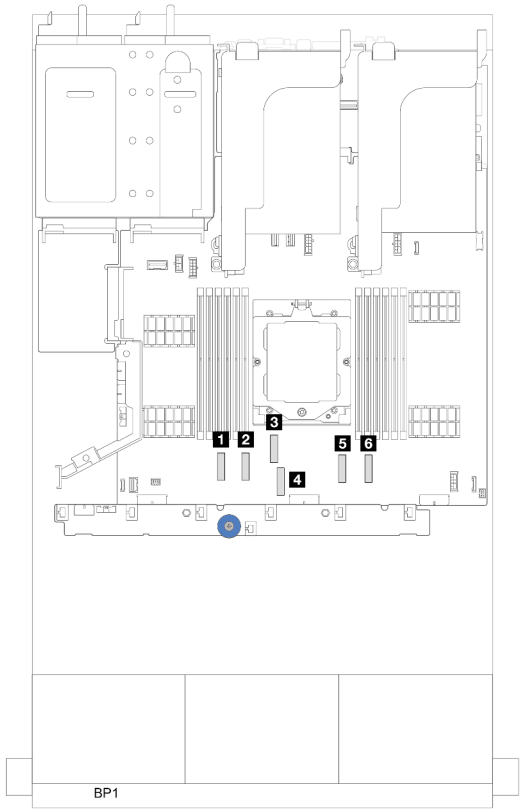
Backplanes: server models with 2.5-inch front drive bays

This section provides backplane cable connection information for server models with 2.5-inch front drive bays.

Ensure below parts are removed before starting cable routing for front backplanes.

- Top cover (see “Remove the top cover” on page 342)
- Air baffle (see “Remove the air baffle” on page 76)
- Fan cage (see “Remove the system fan cage” on page 335)

Notes: For the server with a performance heat sink (T-shape), remove the heat sink first before disconnecting or connecting the cables which connect to PCIe 1, PCIe 2, PCIe 3, PCIe 4, PCIe 7, or PCIe 8 connectors (see the table below). After disconnecting or connecting the cables, install the heat sink back to the server. See “Remove a heat sink” on page 256 and “Install a heat sink” on page 261



- **1 PCIe 1 Connector**
- **2 PCIe 2 Connector**
- **3 PCIe 4 Connector**
- **4 PCIe 3 Connector**
- **5 PCIe 7 Connector**
- **6 PCIe 8 Connector**

Power cable connections

For the 2.5-inch drive bay chassis, the following backplanes are supported and connect the power cables for the supported drive backplanes as illustrated.

Table 27. Supported backplanes

Front drive backplane	Middle drive backplane	Rear drive backplane
• 8 x 2.5-inch SAS/SATA backplane • 8 x 2.5-inch AnyBay backplane • 24 x 2.5-inch SAS/SATA expander backplane	• 4 x 2.5-inch SAS/SATA backplane • 4 x 2.5-inch NVMe backplane	• 4 x 2.5-inch SAS/SATA backplane • 4 x 2.5-inch AnyBay backplane • 8 x 2.5-inch SAS/SATA backplane

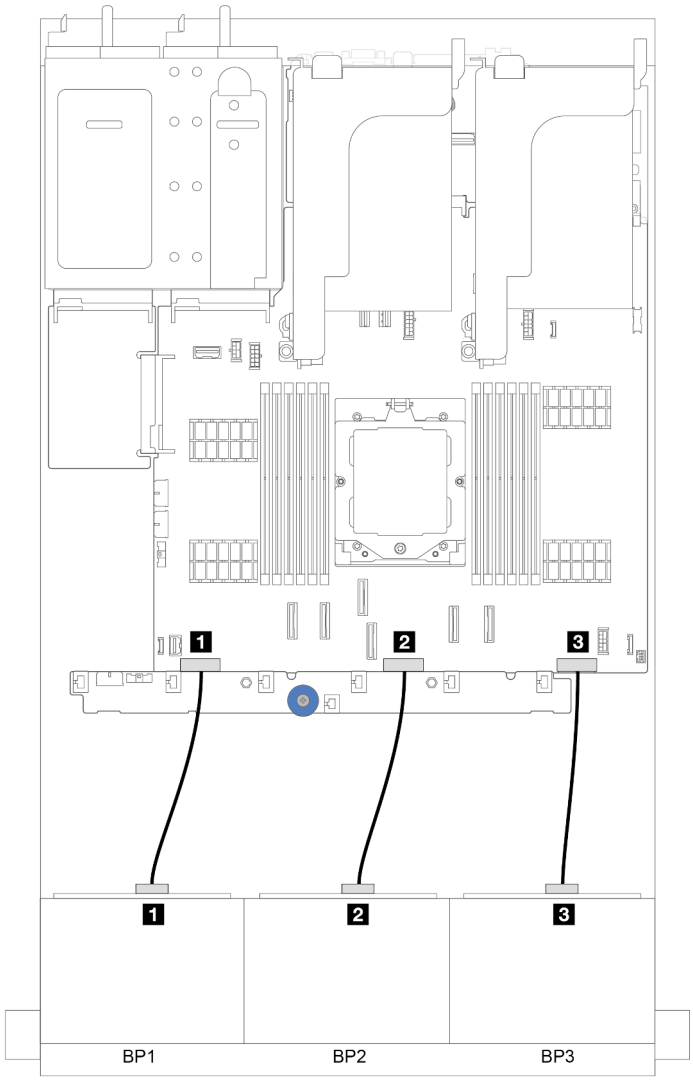


Figure 366. Power cable connections for 8 x 2.5-inch front drive backplanes

From	To
1 Backplane 1: PWR	1 Backplane 1 power connector on the system board assembly
2 Backplane 2: PWR	2 Backplane 2 power connector on the system board assembly
3 Backplane 3: PWR	3 Backplane 3 power connector on the system board assembly

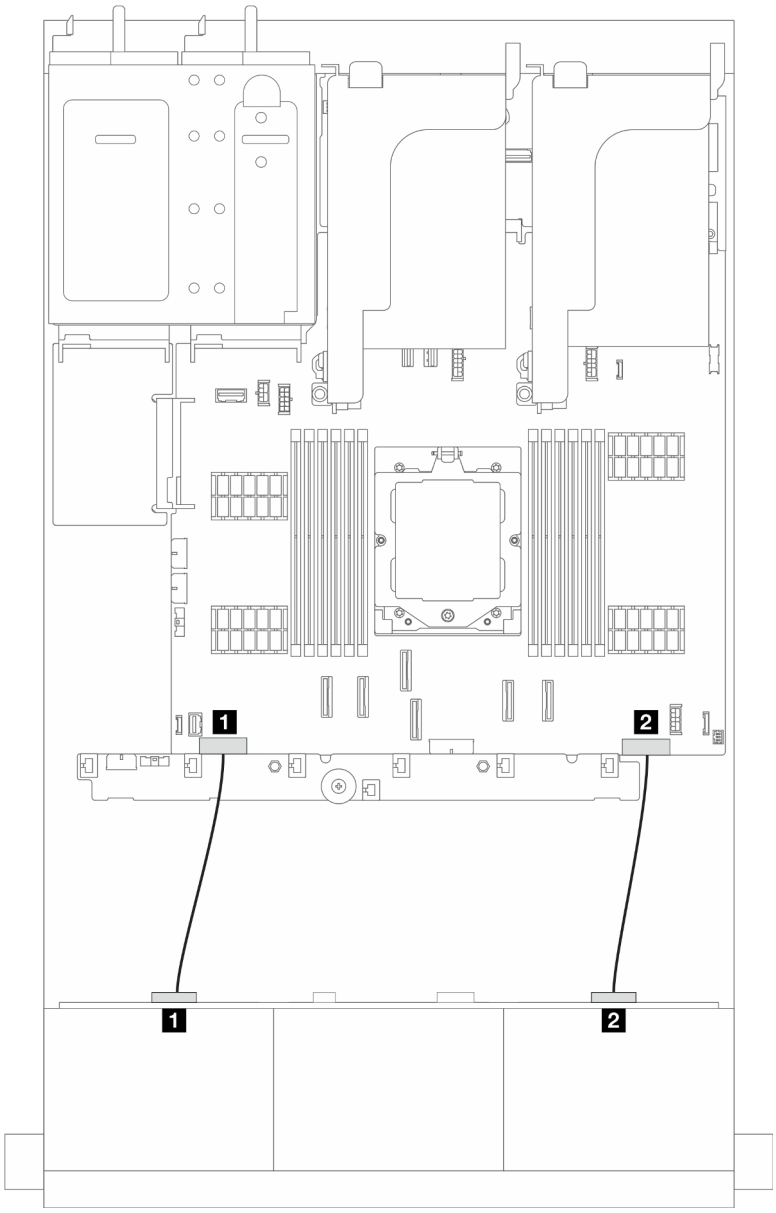


Figure 367. Power cable connections for 24 x 2.5-inch SAS/SATA expander drive backplane

From	To
1 Backplane: PWR 1	1 Backplane 1 power connector on the system board assembly
2 Backplane: PWR 2	2 Backplane 3 power connector on the system board assembly

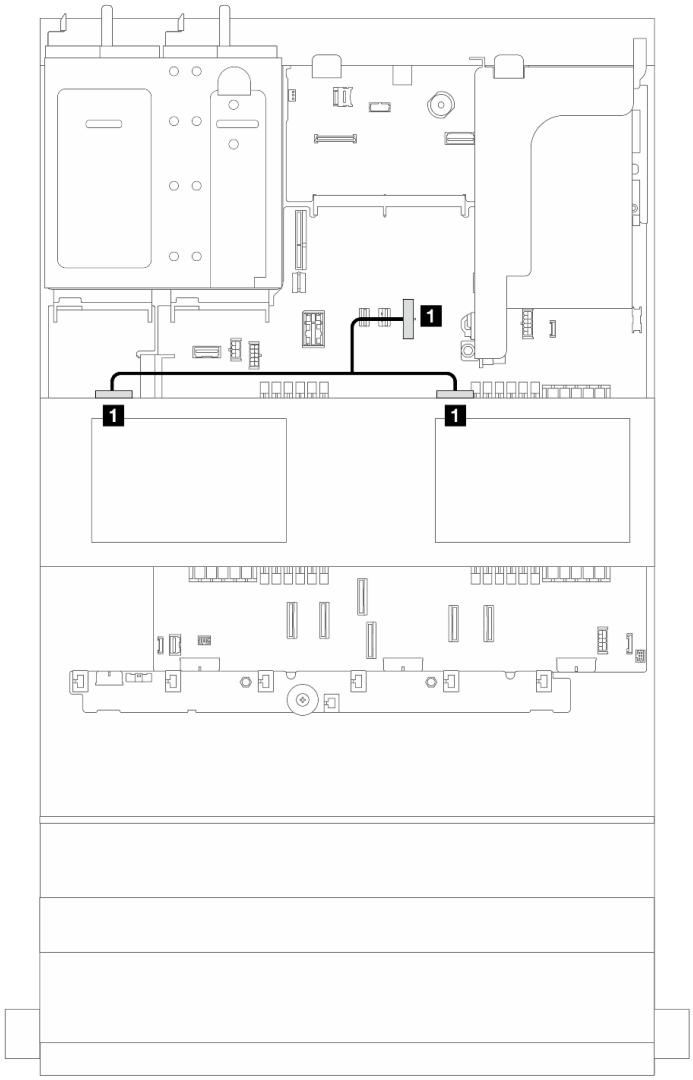


Figure 368. Power cable connection for middle drive backplane

From	To
1 Power connector on the backplane	1 Middle backplane power connector on the system board assembly
Note: The illustration above shows the power cable connection for using two middle drive backplanes. Power cable connection for using one middle drive backplane is similar.	

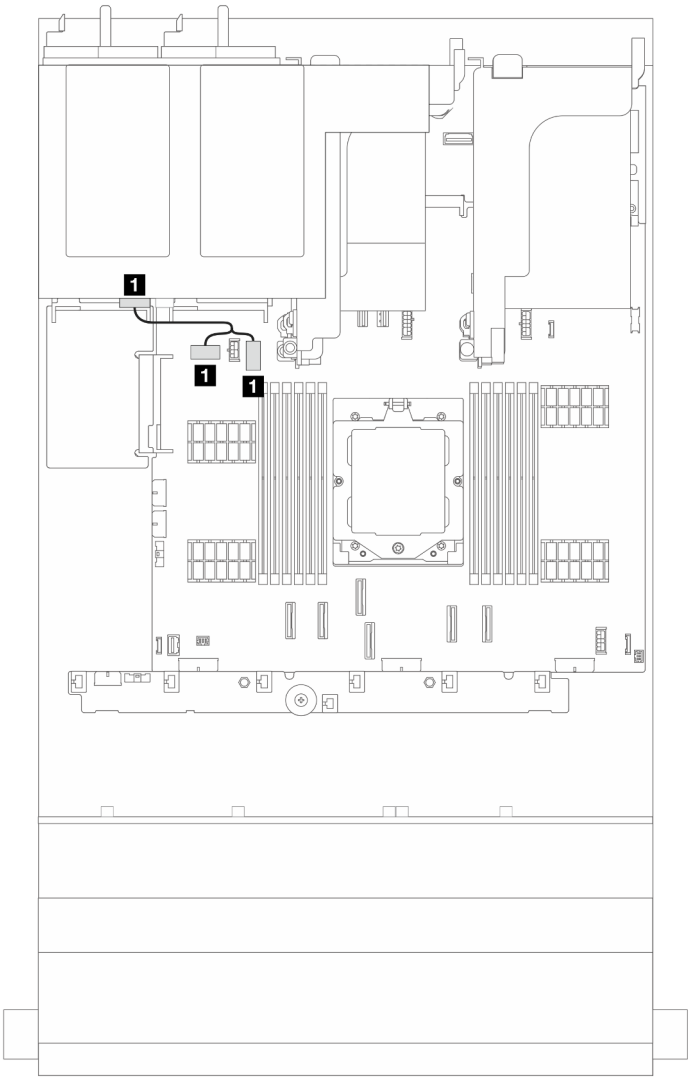


Figure 369. Power cable connection for rear drive backplane

From	To
1 Power connector on the backplane	1 Rear backplane power connector and sideband connector on the system board assembly
Note: The illustration above shows the power cable connection for one 4 x 2.5-inch rear drive backplanes. Power cable connection for using one 8 x 2.5-inch rear drive backplane is similar.	

Signal cable connections

Refer to the specific topic for signal cable connections depending on the backplanes installed.

- “One 8 x SAS/SATA backplane” on page 394
- “One 8 x AnyBay backplane” on page 398
- “Two 8 x SAS/SATA backplanes” on page 407
- “One 8 x SAS/SATA and one 8 x AnyBay backplanes” on page 411
- “Two 8 x AnyBay backplanes” on page 416
- “Two 8 x SAS/SATA + one 8x AnyBay backplanes” on page 420

- “Three 8 x SAS/SATA backplanes” on page 425
- “Three 8 x AnyBay backplanes” on page 448
- “One 24 x2.5-inch SAS/SATA expander backplane” on page 454

One 8 x SAS/SATA backplane

This section provides cable routing information for the server model with one 8 x 2.5-inch SAS/SATA front drive backplane.

To connect power cables for the front backplane(s), refer to “Backplanes: server models with 2.5-inch front drive bays” on page 388.

To connect signal cables for the backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- “Onboard connectors” on page 394
- “8i/16i RAID/HBA adapter” on page 395

Onboard connectors

The following shows the cable connections for the 8 x 2.5-inch SAS/SATA configuration with onboard connectors.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

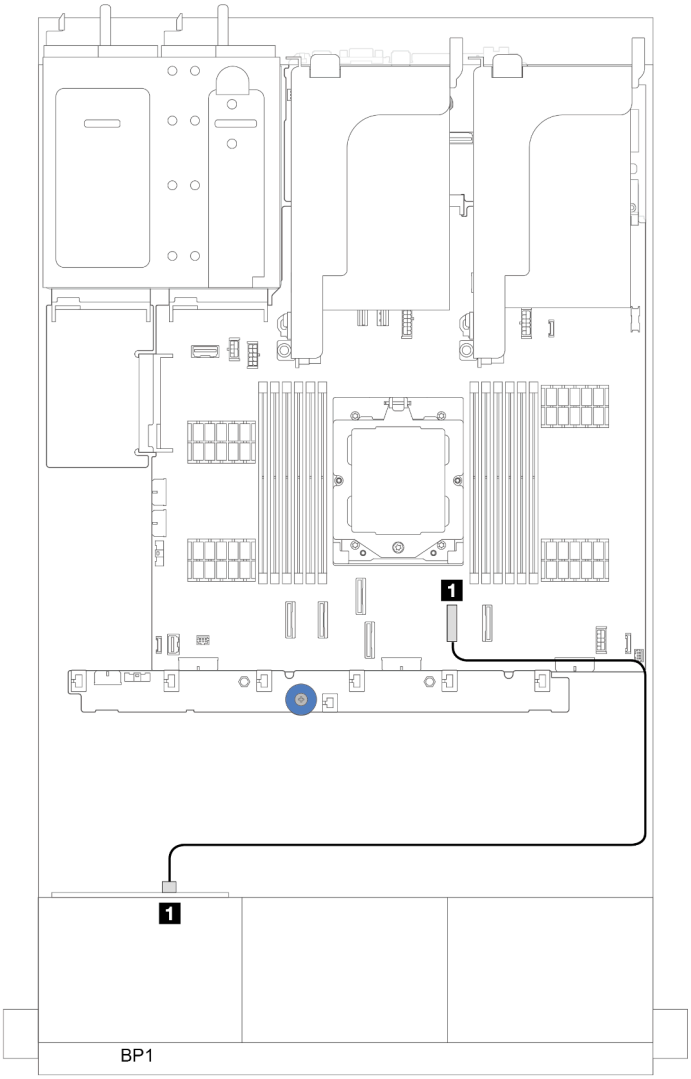


Figure 370. SAS/SATA cable routing to onboard SATA connectors

From	To
1 Backplane 1: SAS	1 Onboard: SATA 0

8i/16i RAID/HBA adapter

The following shows the cable connections for the 8 x 2.5-inch SAS/SATA configuration with one 8i/16i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

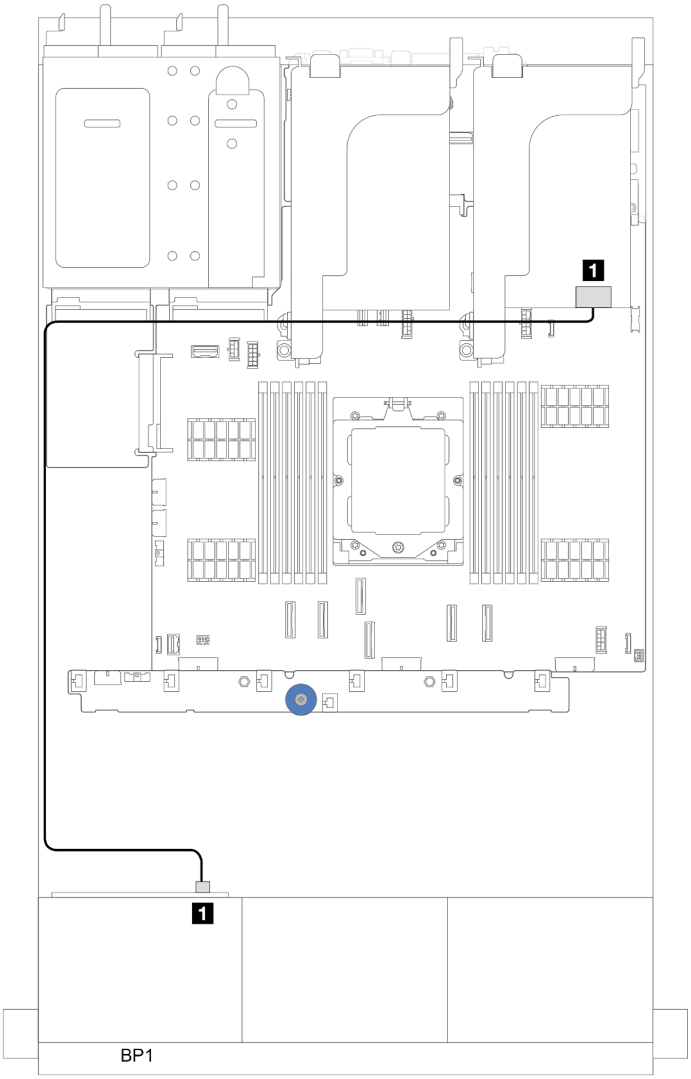


Figure 371. SAS/SATA cable routing to 8i/16i RAID/HBA adapter

From	To
1 Backplane 1: SAS	1 8i/16i adapter • Gen 4: C0 • Gen 3: C0C1

CFF 16i RAID/HBA adapter

This section provides cable routing information for configuration (one 8 x 2.5-inch SAS/SATA front drive backplane) with one CFF 16i RAID/HBA adapter.

CFF 16i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

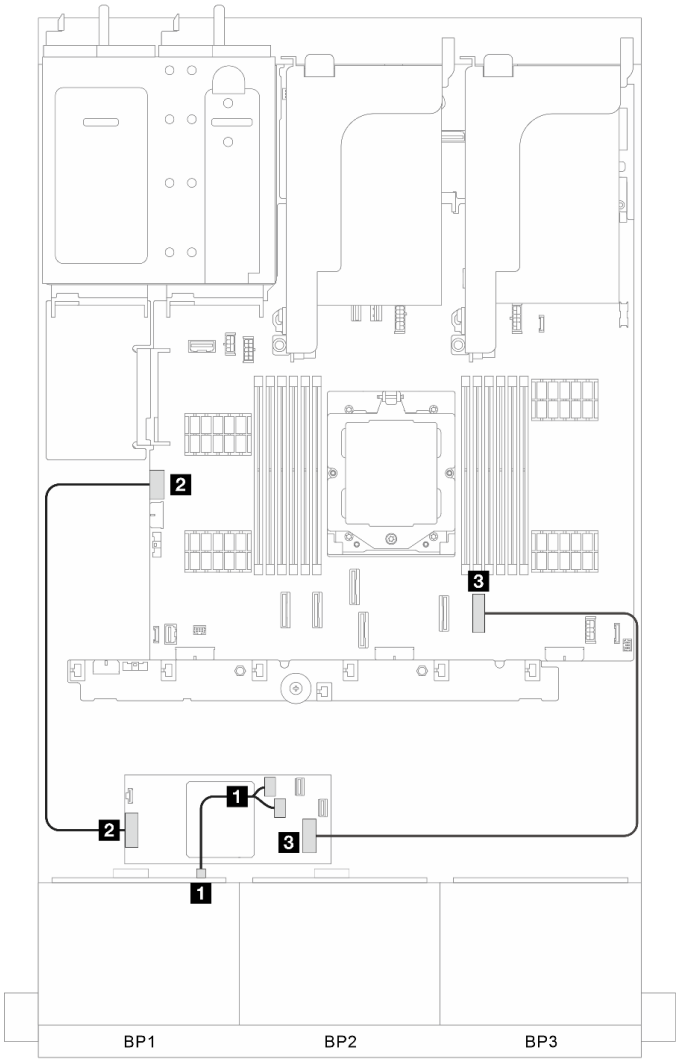


Figure 372. Signal cable routing

From	To
1 BP 1: SAS	1 CFF adapter: C0, C1
2 CFF adapter: power	2 Onboard: CFF RAID PWR
3 CFF adapter: INPUT	3 Onboard: PCIe 8

One 8 x AnyBay backplane

This section provides cable routing information for the server model with one 8 x 2.5-inch AnyBay front drive backplane.

To connect power cables for the front backplane(s), refer to “Backplanes: server models with 2.5-inch front drive bays” on page 388.

To connect signal cables for the backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- “8i/16i RAID/HBA adapter” on page 398
- “6 x SAS/SATA + 2 x NVMe” on page 401
  - “Onboard connector” on page 402
  - “8i/16i RAID/HBA adapter” on page 404

8i/16i RAID/HBA adapter

The following shows the cable connections for the 8 x 2.5-inch AnyBay configuration with one 8i/16i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

SAS/SATA cable routing

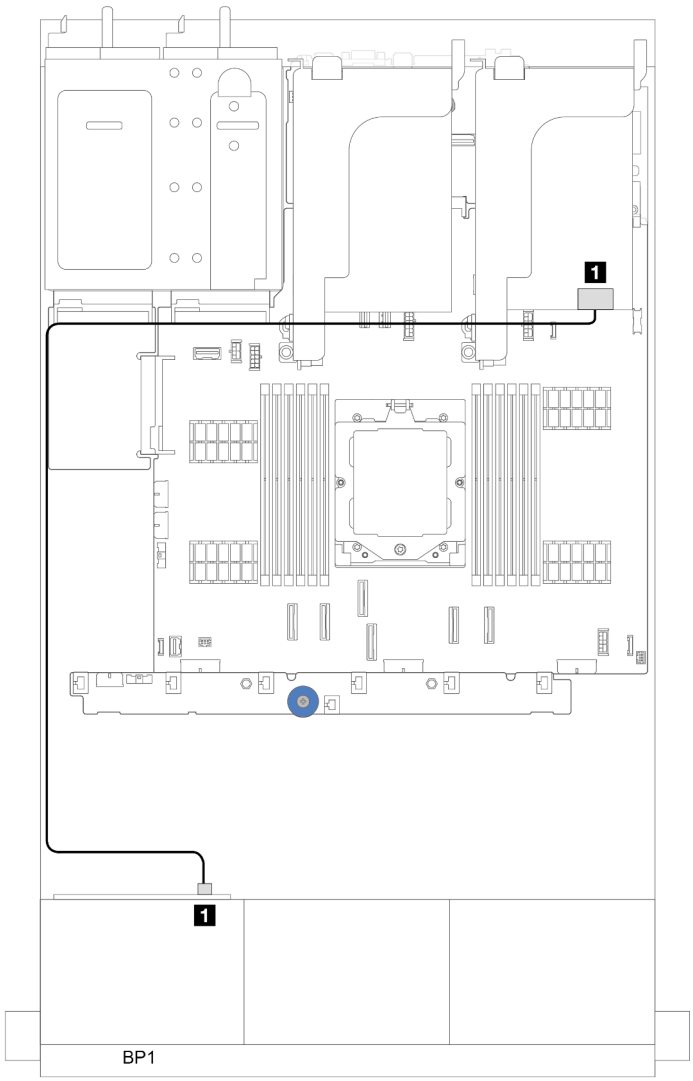


Figure 373. SAS/SATA cable routing to 8i/16i RAID/HBA adapter

From	To
1 Backplane 1: SAS	1 8i/16i adapter • Gen 4: C0 • Gen 3: C0C1

NVMe cable routing

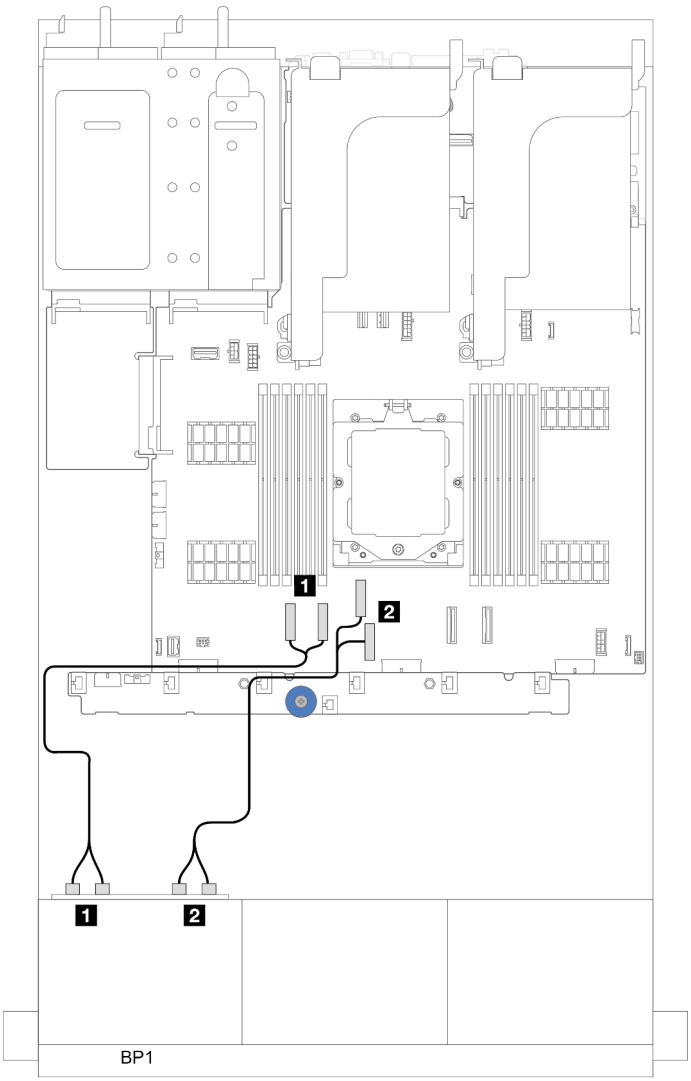


Figure 374. Cable routing when one processor installed

From	To
1 Backplane 1: NVMe 0-1, 2-3	1 Onboard: PCIe 1, 2
2 Backplane 1: NVMe 4-5, 6-7	2 Onboard: PCIe 3, 4

32i RAID adapter

The following shows the cable connections for the 8 x 2.5-inch AnyBay configuration with one 32i RAID adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

Cable routing

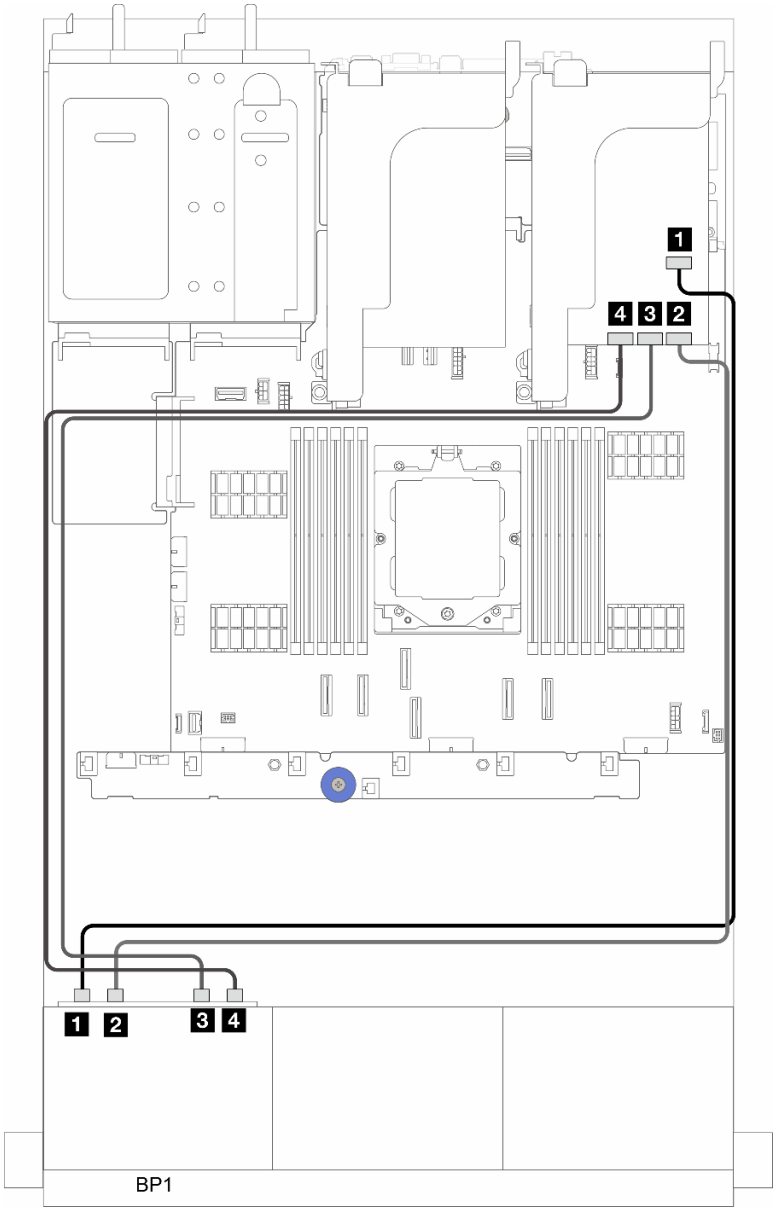


Figure 375. Cable routing to 32i RAID adapter

From	To
1 Backplane 1: NVMe 0-1	1 32i RAID adapter: C0
2 Backplane 1: NVMe 2-3	2 32i RAID adapter: C1
3 Backplane 1: NVMe 4-5	2 32i RAID adapter: C1
4 Backplane 1: NVMe 6-7	2 32i RAID adapter: C3

6 x SAS/SATA + 2 x NVMe

This topic provides cable routing information for the configuration with 6 SAS/SATA + 2 x NVMe front drive bays.

To connect power cables for the front backplane(s), refer to “Backplanes: server models with 2.5-inch front drive bays” on page 388.

To connect signal cables for the backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- “8i/16i RAID/HBA adapter” on page 404
- “Onboard connector” on page 402

Onboard connector

The following shows the cable connections for the 6 x 2.5-inch SAS/SATA + 2 x 2.5 NVMe configuration with onboard connectors.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

SAS/SATA cable routing

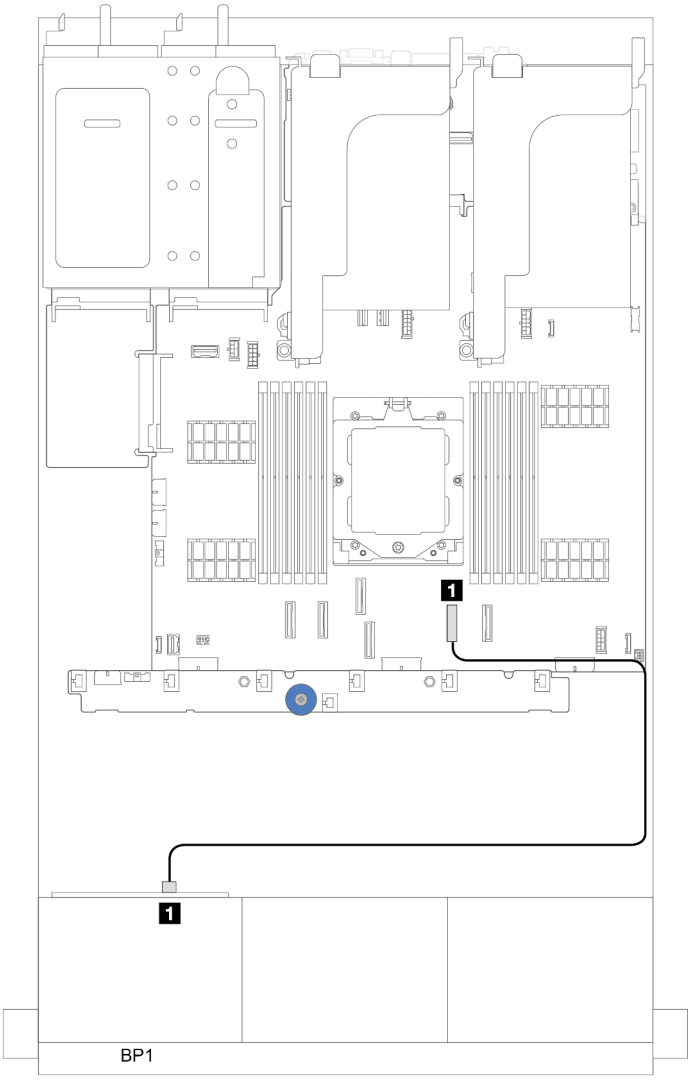


Figure 376. SAS/SATA cable routing to onboard SATA connector

From	To
1 Backplane 1: SAS	1 Onboard: SATA 0

NVMe cable routing

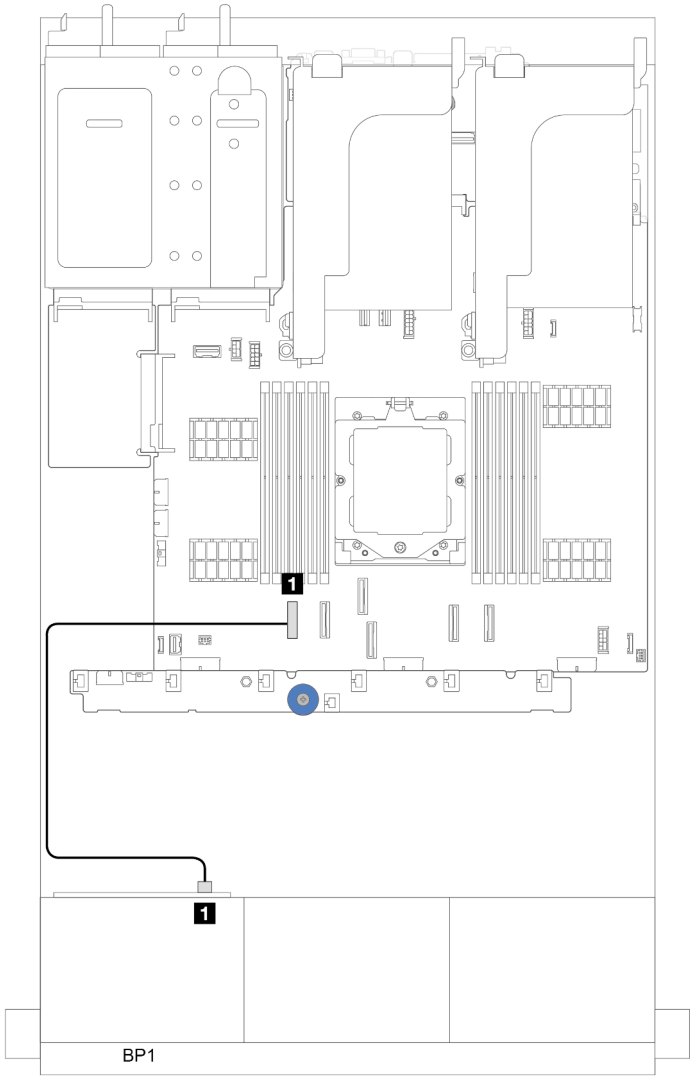


Figure 377. Cable routing when one processor installed

From	To
1 Backplane 1: NVMe 6-7	1 Onboard: PCIe 1

Onboard connectors (support riser 3)

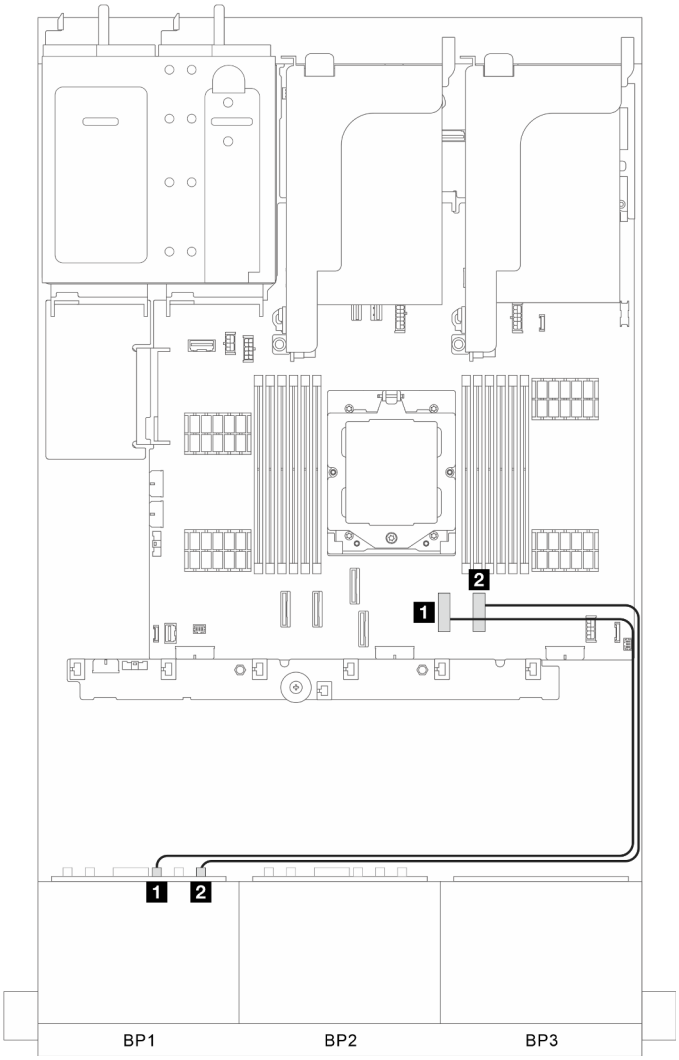


Figure 378. Onboard connectors (support riser 3)

From	To
1 Front backplane: SAS	1 Onboard: PCIe 7
2 Front backplane: NVMe 6-7	2 Onboard: PCIe 8

8i/16i RAID/HBA adapter

The following shows the cable connections for the 6 x 2.5-inch SAS/SATA + 2 x 2.5 NVMe configuration with one 8i/16i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

SAS/SATA cable routing

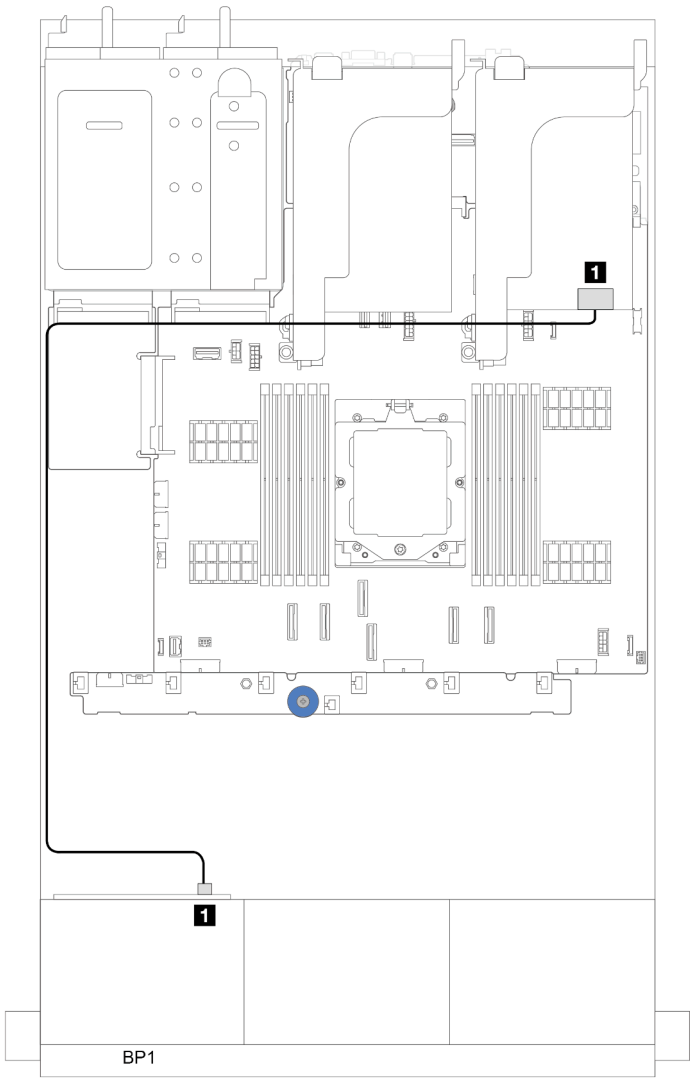


Figure 379. SAS/SATA cable routing to 8i/16i RAID/HBA adapter

From	To
1 Backplane 1: SAS	1 8i/16i adapter • Gen 4: C0 • Gen 3: C0C1

NVMe cable routing

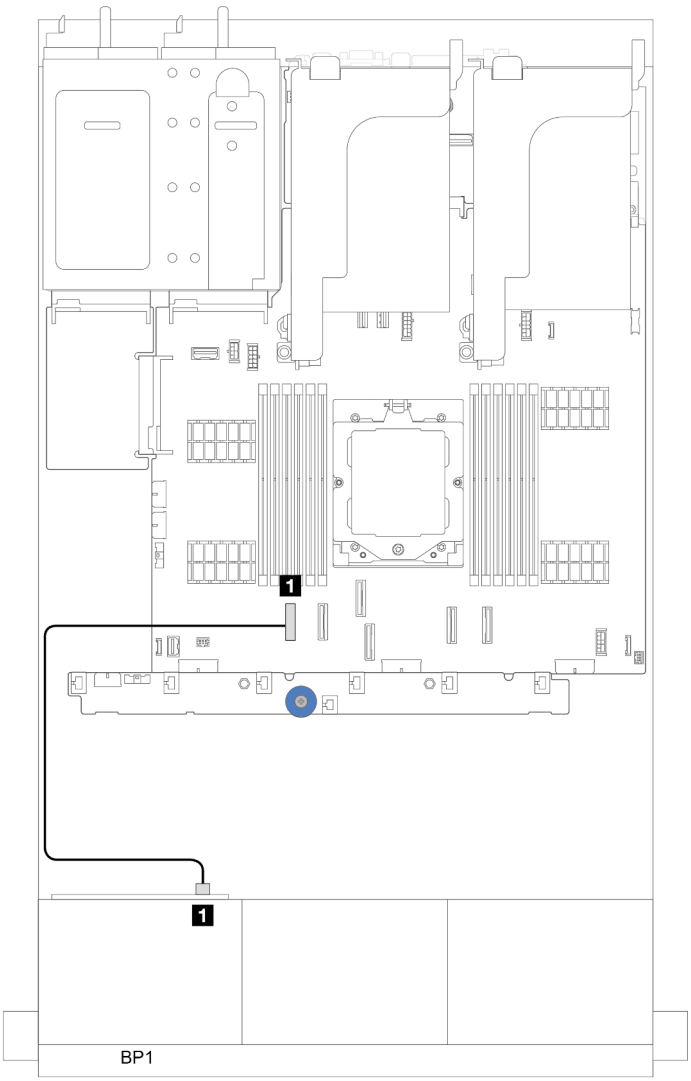


Figure 380. Cable routing when one processor installed

From	To
1 Backplane 1: NVMe 6-7	1 Onboard: PCIe 1

Two 8 x SAS/SATA backplanes

This section provides cable routing information for the server model with two 8 x 2.5-inch SAS/SATA front drive backplanes.

To connect power cables for the front backplane(s), refer to “Backplanes: server models with 2.5-inch front drive bays” on page 388.

To connect signal cables for the backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- “16 x SAS/SATA” on page 407
  - “Onboard connectors” on page 407
  - “16i RAID/HBA adapter” on page 408

16 x SAS/SATA

This topic provides cable routing information for the configuration with 16 SAS/SATA front drive bays.

To connect power cables for the front backplane(s), refer to “Backplanes: server models with 2.5-inch front drive bays” on page 388.

To connect signal cables for the backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- “Onboard connectors” on page 407
- “16i RAID/HBA adapter” on page 408

Onboard connectors

The following shows the cable connections for the 16 x 2.5-inch SAS/SATA configuration with onboard connectors.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

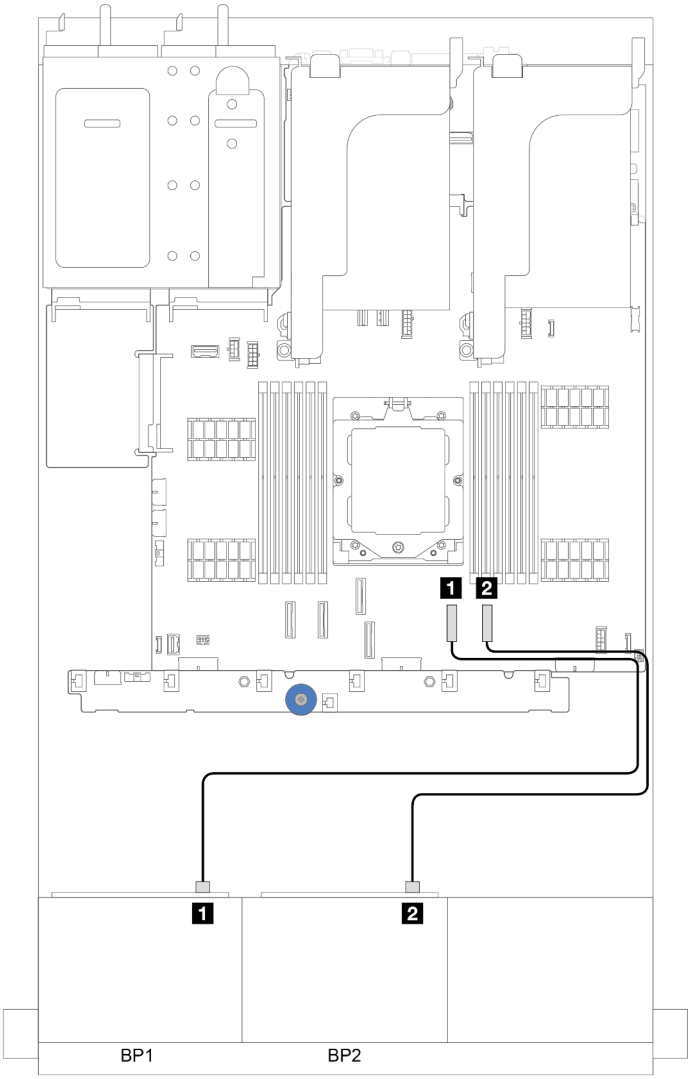


Figure 381. SAS/SATA cable routing to onboard SATA connectors

From	To
1 Backplane 1: SAS	1 Onboard: SATA 0
2 Backplane 2: SAS	2 Onboard: SATA 1

16i RAID/HBA adapter

The following shows the cable connections for the 16 x 2.5-inch SAS/SATA configuration with one 16i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

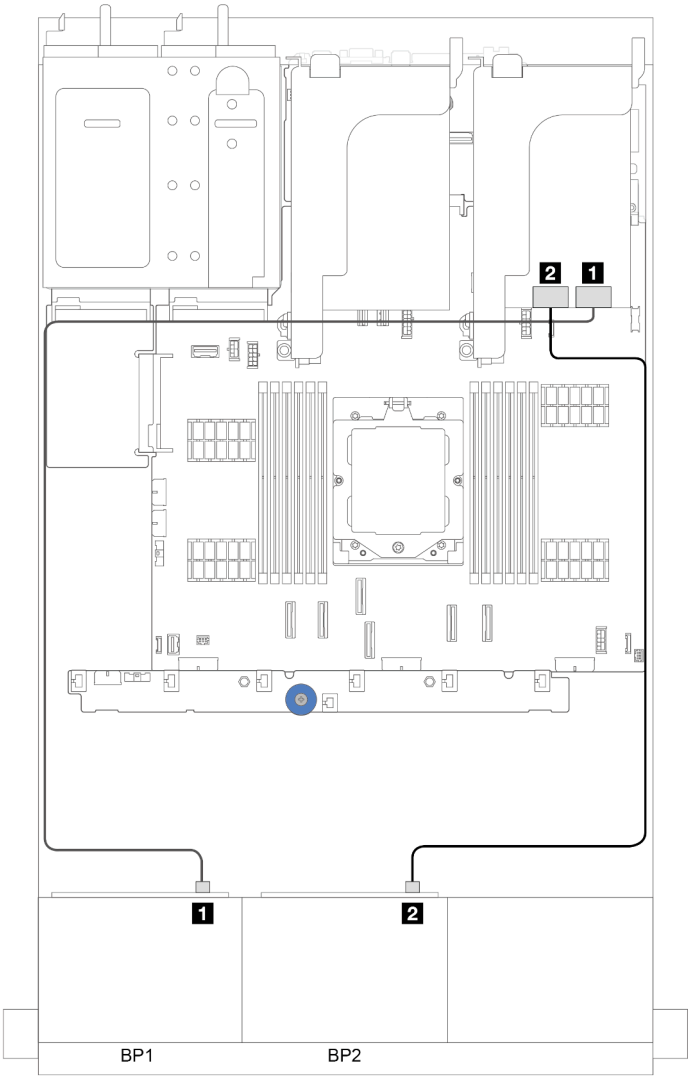


Figure 382. SAS/SATA cable routing to 16i RAID/HBA adapter

From	To
1 Backplane 1: SAS	1 16i adapter • Gen 4: C0 • Gen 3: C0C1
2 Backplane 2: SAS	2 16i adapter • Gen 4: C1 • Gen 3: C2C3

CFF 16i RAID/HBA adapter

This section provides cable routing information for configuration (two 8 x 2.5-inch SAS/SATA front drive backplanes) with one CFF 16i RAID/HBA adapter.

CFF 16i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

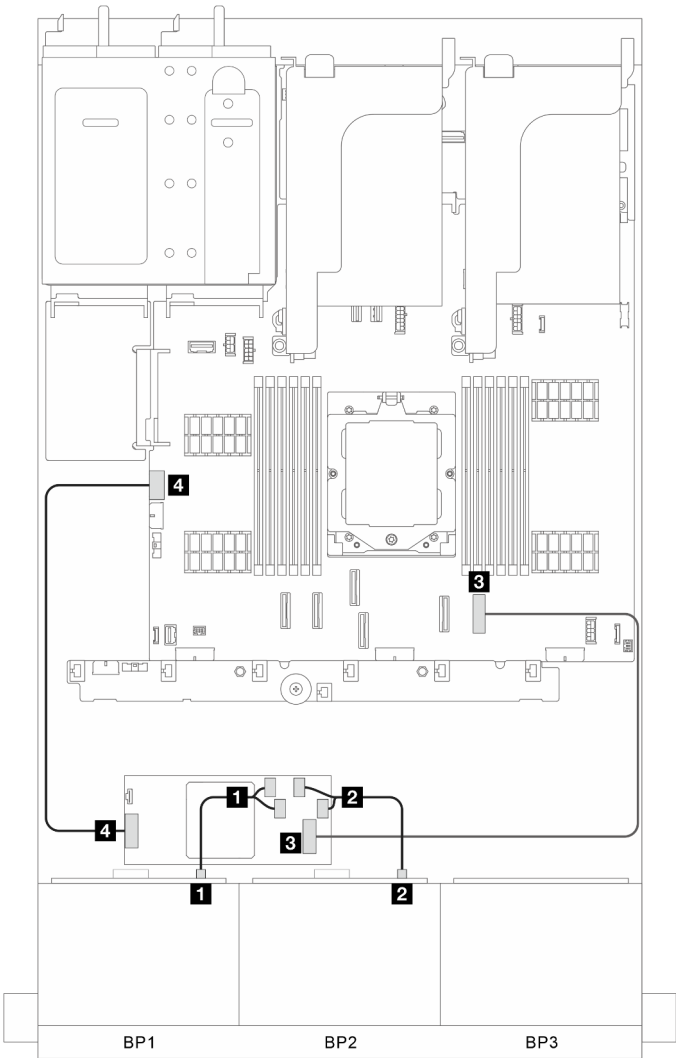


Figure 383. Signal cable routing

From	To
1 BP 1: SAS	1 CFF adapter: C0, C1
2 BP 2: SAS	2 CFF adapter: C2, C3
3 CFF adapter: INPUT	3 Onboard: PCIe 8
4 CFF adapter: power	4 Onboard: CFF RAID PWR

One 8 x SAS/SATA and one 8 x AnyBay backplanes

This section provides cable routing information for the server model with one 8 x SAS/SATA and one 8 x AnyBay backplanes.

To connect power cables for the front backplane(s), refer to “Backplanes: server models with 2.5-inch front drive bays” on page 388.

To connect signal cables for the backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- “Onboard connectors” on page 411
- “Onboard connectors + 16i RAID/HBA adapter” on page 413

Onboard connectors

The following shows the cable connections for the 8 SAS/SATA + 8 AnyBay configuration with onboard connectors.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

SAS/SATA cable routing

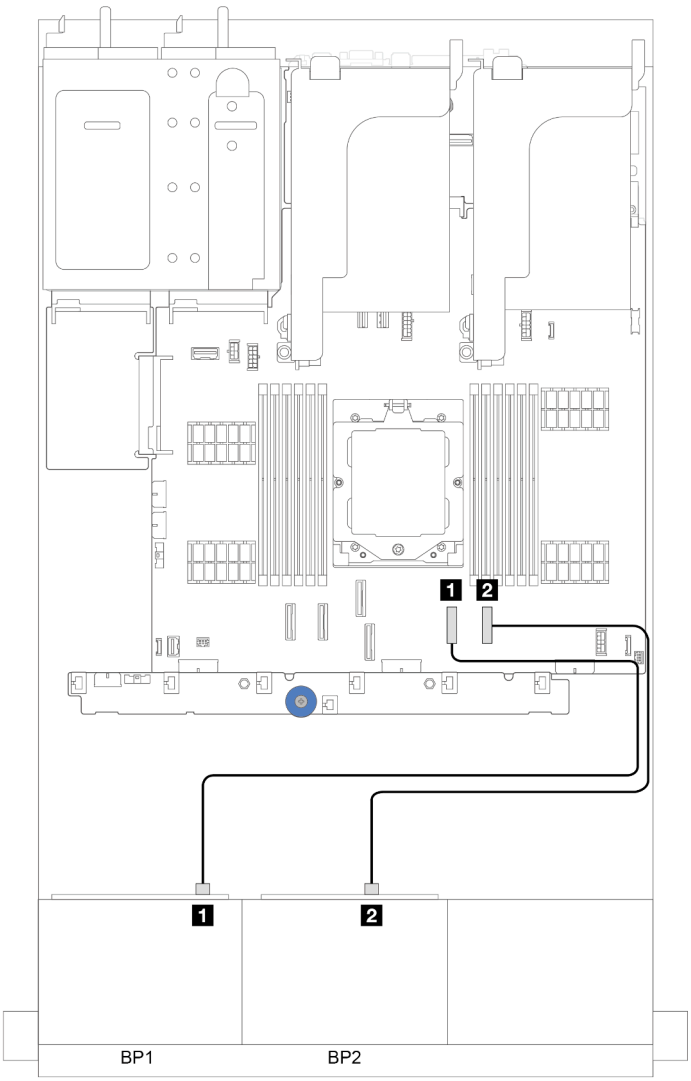


Figure 384. SAS/SATA cable routing to onboard connectors

From	To
1 Backplane 1: SAS	1 Onboard: SATA 0
2 Backplane 2: SAS	2 Onboard: SATA 1

NVMe cable routing

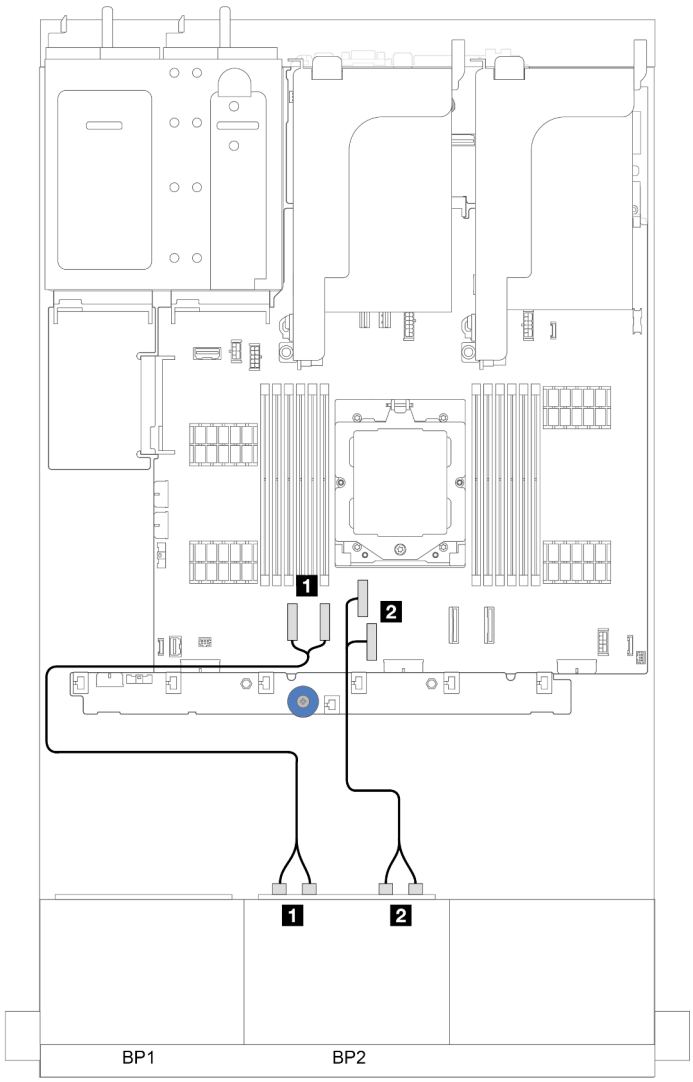


Figure 385. NVMe cable routing to onboard connectors

From	To
1 Backplane 2: NVMe 0-1, 2-3	1 Onboard: PCIe 1, 2
2 Backplane 2: NVMe 4-5, 6-7	2 Onboard: PCIe 3, 4

Onboard connectors + 16i RAID/HBA adapter

The following shows the cable connections for the 8 SAS/SATA + 8 AnyBay configuration with onboard connectors and one 16i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

SAS/SATA cable routing

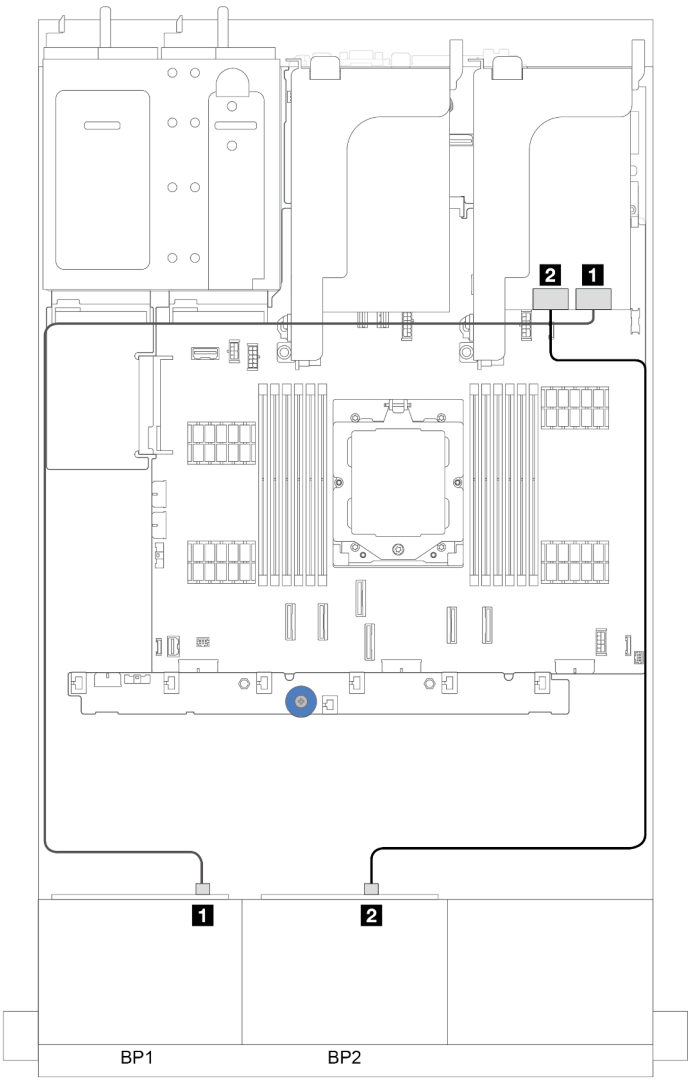


Figure 386. SAS/SATA cable routing to 16i adapter

From	To
1 Backplane 1: SAS	1 16i adapter • Gen 4: C0 • Gen 3: C0C1
2 Backplane 2: SAS	2 16i adapter • Gen 4: C1 • Gen 3: C2C3

NVMe cable routing

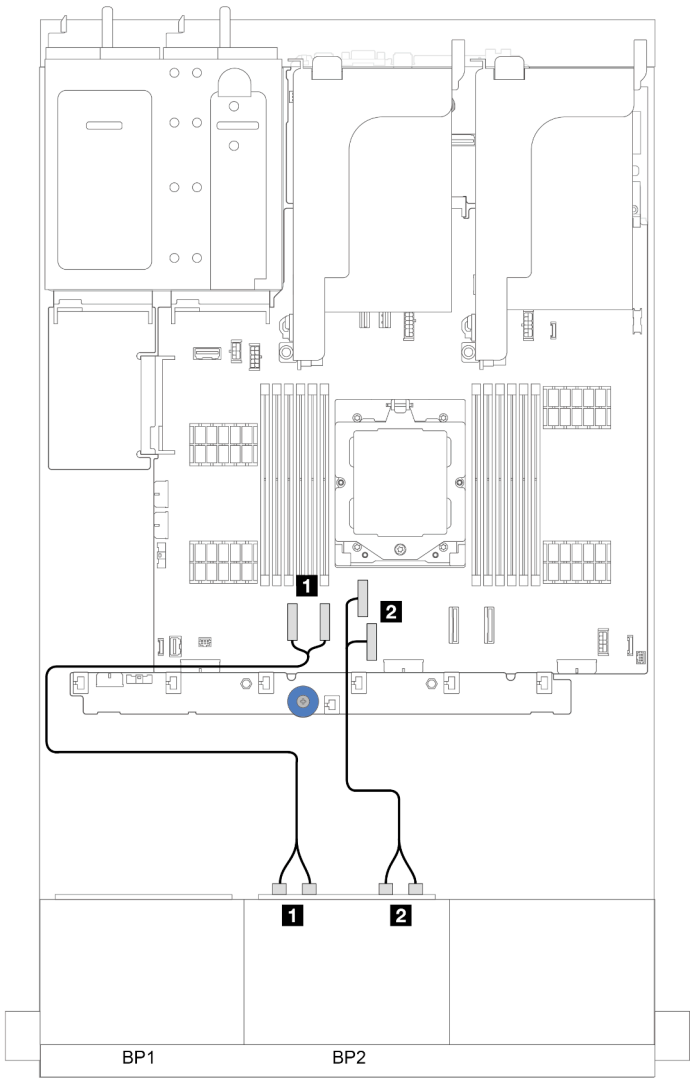


Figure 387. NVMe cable routing to onboard connectors

From	To
1 Backplane 2: NVMe 0-1, 2-3	1 Onboard: PCIe 1, 2
2 Backplane 2: NVMe 4-5, 6-7	2 Onboard: PCIe 3, 4

Two 8 x AnyBay backplanes

This section provides cable routing information for the server model with two 8 x 2.5-inch AnyBay front drive backplanes.

To connect power cables for the front backplane(s), refer to “Backplanes: server models with 2.5-inch front drive bays” on page 388.

To connect signal cables for the backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- “8i/16i RAID/HBA adapter (support Tri-mode)” on page 416
- “Onboard connectors + Retimer card” on page 417
- “Onboard connectors + 8i RAID/HBA adapter + Retimer card” on page 418

8i/16i RAID/HBA adapter (support Tri-mode)

This section provides cable routing information for configuration (two 8 x 2.5-inch AnyBay front drive backplanes) with one 16i RAID/HBA adapter or two 8i RAID/HBA adapters.

One 16i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

Note: The illustration below uses one 16i RAID/HBA adapter as an example, and cable routing for using two 8i RAID/HBA adapters is similar.

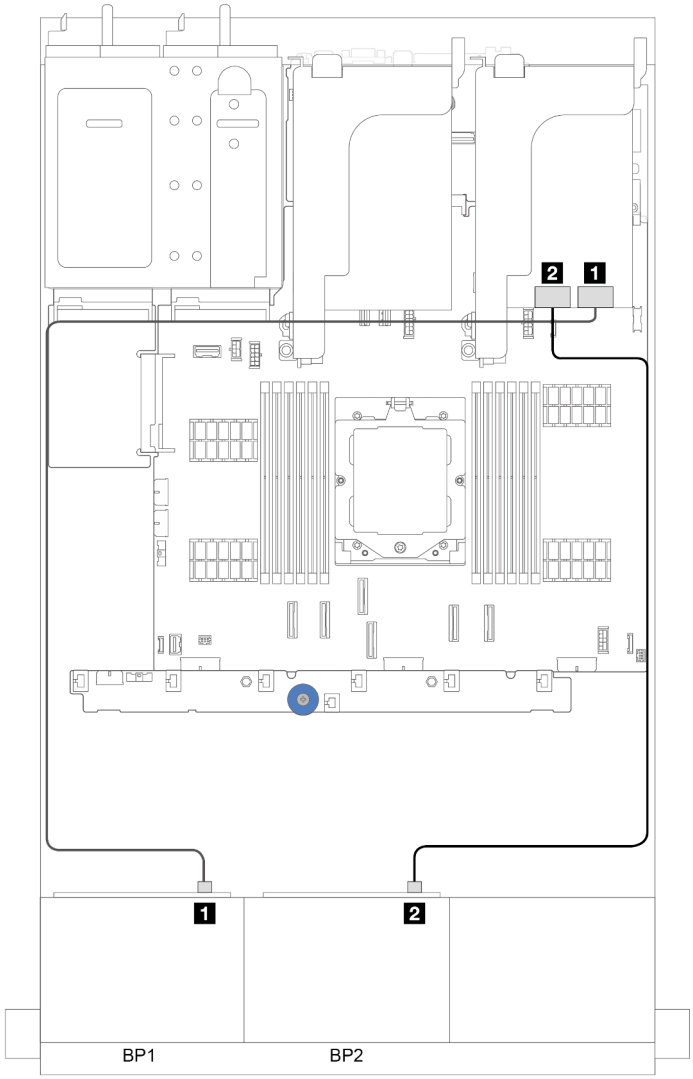


Figure 388. Signal cable routing

From	To
1 BP 1: SAS	1 • Gen 4 16i adapter: C0 • Gen 4 8i adapter: C0
2 BP 2: SAS	2 • Gen 4 16i adapter: C1 • Gen 4 8i adapter: C0

Onboard connectors + Retimer card

This section provides cable routing information for configuration (two 8 x 2.5-inch AnyBay front drive backplanes) with onboard connectors and one retimer card.

Onboard connectors and one retimer card

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

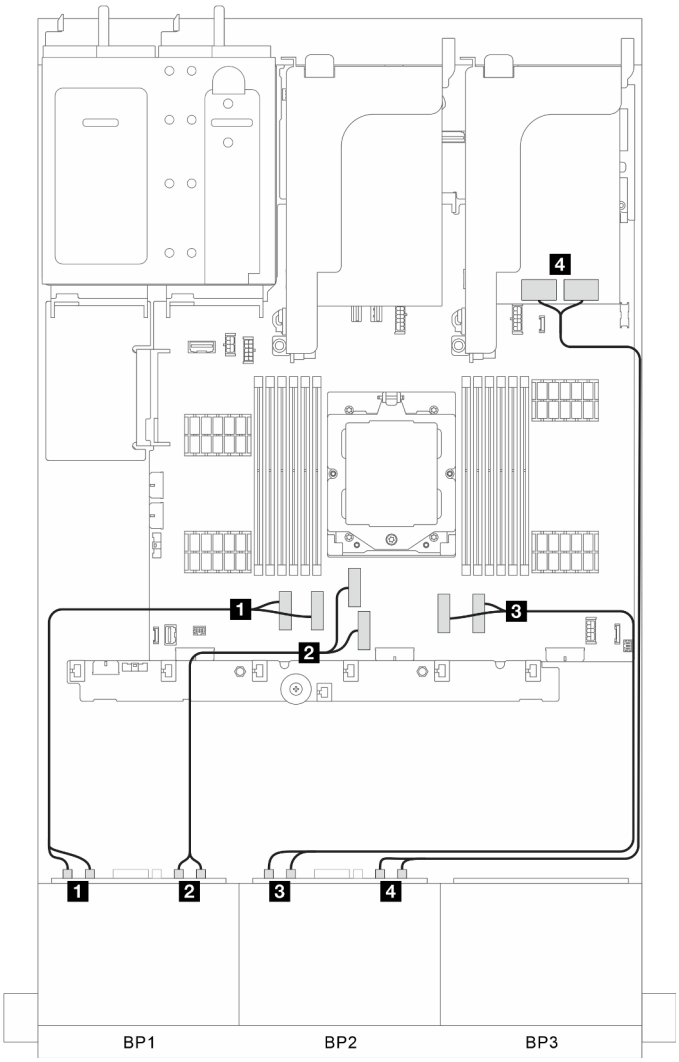


Figure 389. Signal cable routing

From	To
1 BP 1: NVMe 0-1, 2-3	1 Onboard: PCIe 1, 2
2 BP 1: NVMe 4-5, 6-7	2 Onboard: PCIe 3, 4
3 BP 2: NVMe 0-1, 2-3	3 Onboard: PCIe 7, 8
4 BP 2: NVMe 4-5, 6-7	4 Retimer card: C0C1

Onboard connectors + 8i RAID/HBA adapter + Retimer card

This section provides cable routing information for configuration (two 8 x 2.5-inch AnyBay front drive backplanes) with onboard connectors, one 8i RAID/HBA adapter and one retimer card.

Onboard connectors, one 8i RAID/HBA adapter and one retimer card

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

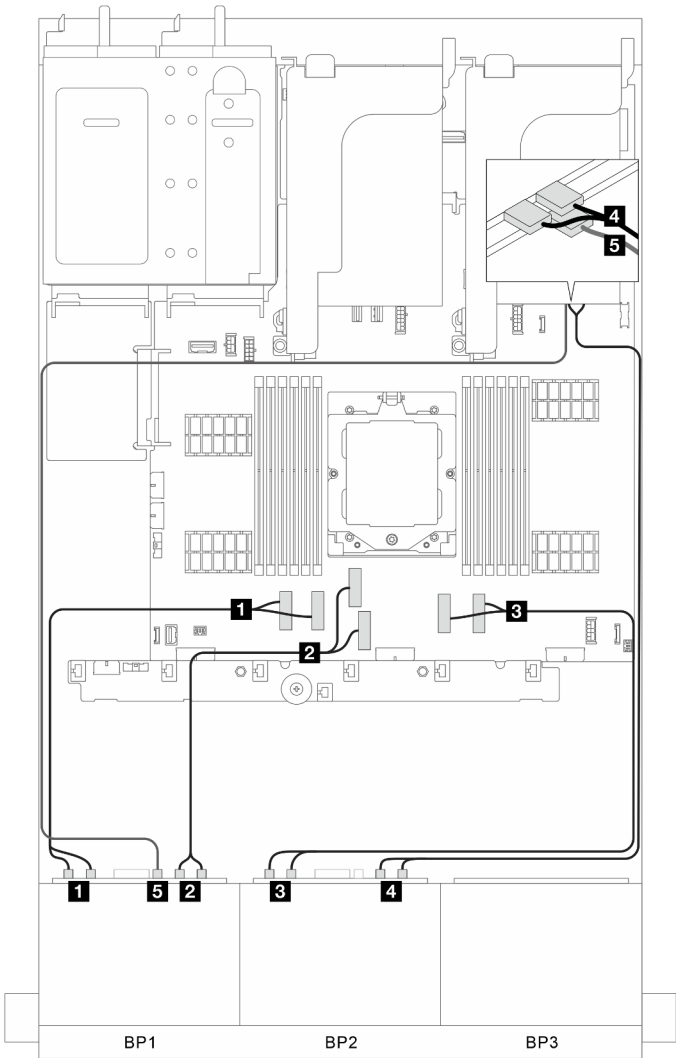


Figure 390. Signal cable routing

From	To
1 BP 1: NVMe 0-1, 2-3	1 Onboard: PCIe 1, 2
2 BP 1: NVMe 4-5, 6-7	2 Onboard: PCIe 3, 4
3 BP 2: NVMe 0-1, 2-3	3 Onboard: PCIe 7, 8
4 BP 2: NVMe 4-5, 6-7	4 Retimer card: C0C1
5 BP 1: SAS	5 8i adapter: • Gen 4: C0 • Gen 3: C0C1

Two 8 x SAS/SATA + one 8x AnyBay backplanes

This section provides cable routing information for the server model with two 8 x 2.5-inch SAS/SATA and one 8 x 2.5-inch AnyBay front drive backplanes.

To connect power cables for the front backplane(s), refer to “Backplanes: server models with 2.5-inch front drive bays” on page 388.

To connect signal cables for the backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- “Onboard connectors + 32i RAID/HBA adapter” on page 420
- “Onboard connectors + CFF 16i RAID/HBA adapter” on page 421
- “Onboard connectors + 16i RAID/HBA adapter” on page 421
- “Onboard connectors + three 8i RAID/HBA adapters” on page 422
- “Onboard connectors + two 16i RAID/HBA adapters” on page 423

Onboard connectors + 32i RAID/HBA adapter

This section provides cable routing information for configuration (two 8 x 2.5-inch SAS/SATA and one 8 x 2.5-inch AnyBay front drive backplanes) with onboard connectors and one 32i RAID/HBA adapter.

Onboard connectors and one 32i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

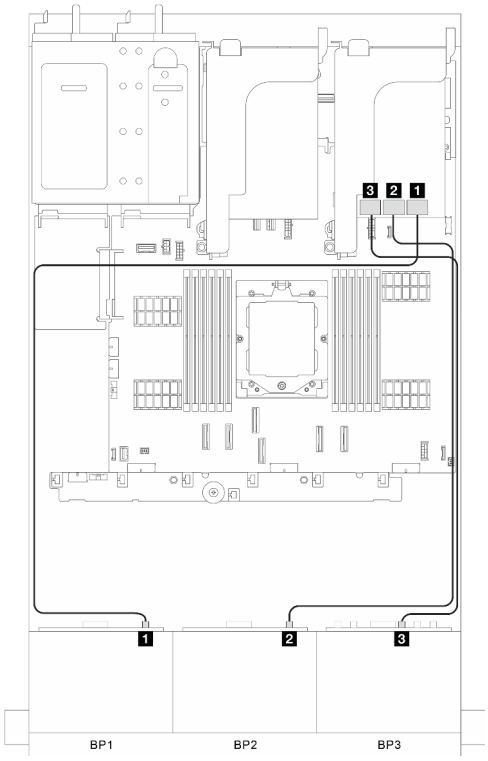


Figure 391. Signal cable routing part 1

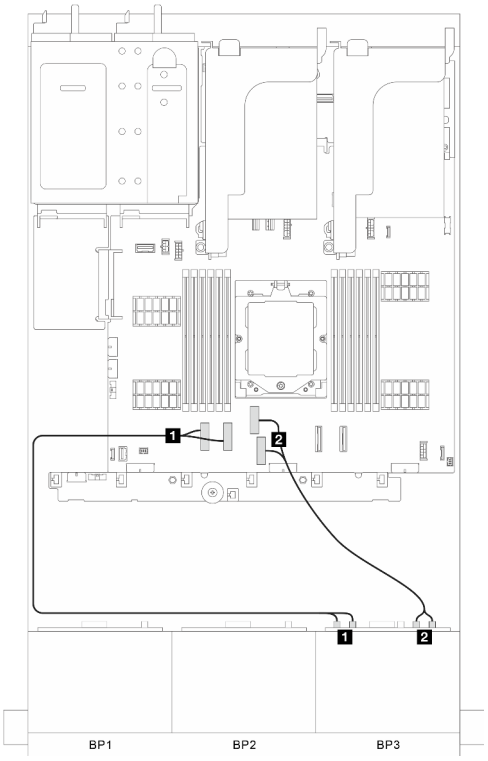


Figure 392. Signal cable routing part 2

From	To	From	To
1 BP 1: SAS	1 32i adapter: C0	1 BP 3: NVMe 0-1, 2-3	1 Onboard: PCIe 1, 2

2 BP 2: SAS	2 32i adapter: C1	2 BP 3: NVMe 4-5, 6-7	2 Onboard: PCIe 3, 4
3 BP 3: SAS	3 32i adapter: C2		

Onboard connectors + CFF 16i RAID/HBA adapter

This section provides cable routing information for configuration (two 8 x 2.5-inch SAS/SATA and one 8 x 2.5-inch AnyBay front drive backplanes) with onboard connectors and one CFF 16i RAID/HBA adapter.

Onboard connectors and one CFF 16i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

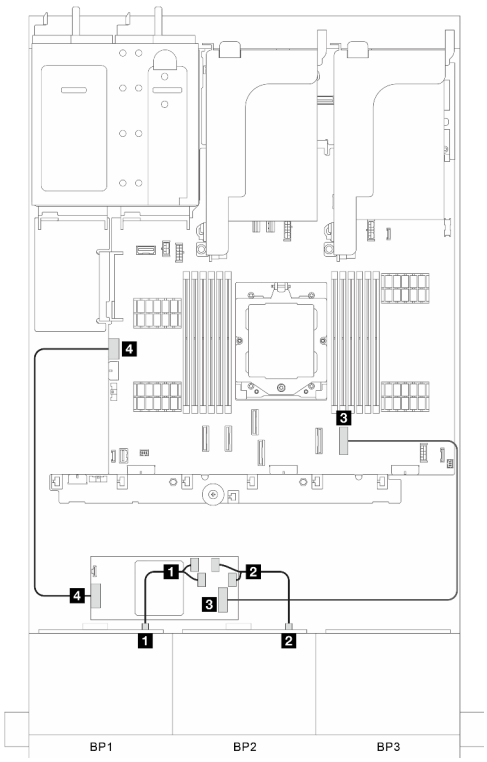


Figure 393. Signal cable routing part 1

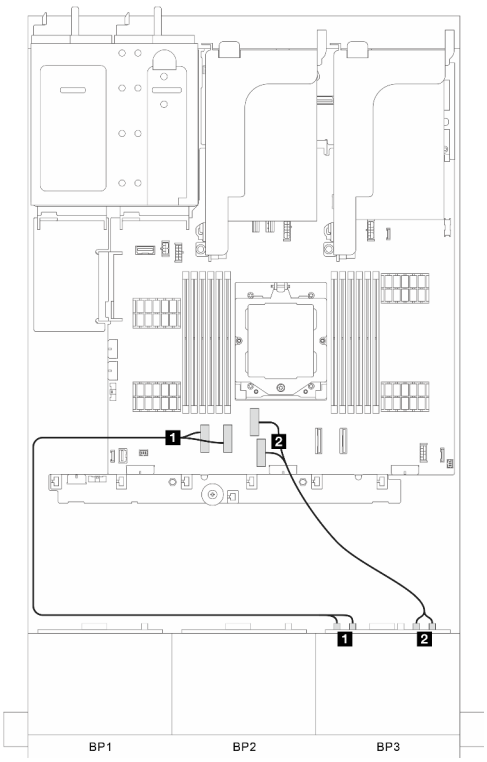


Figure 394. Signal cable routing part 2

From	To	From	To
1 BP 1: SAS	1 CFF adapter: C0C1	1 BP 3: NVMe 0-1, 2-3	1 Onboard: PCIe 1, 2
2 BP 2: SAS	2 CFF adapter: C2C3	2 BP 3: NVMe 4-5, 6-7	2 Onboard: PCIe 3, 4
3 CFF adapter: INPUT	3 Onboard: PCIe 8		
4 CFF adapter: power	4 Onboard: CFF RAID PWR		

Onboard connectors + 16i RAID/HBA adapter

This section provides cable routing information for configuration (two 8 x 2.5-inch SAS/SATA and one 8 x 2.5-inch AnyBay front drive backplanes) with onboard connectors and one 16i RAID/HBA adapter.

Onboard connectors and one 16i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

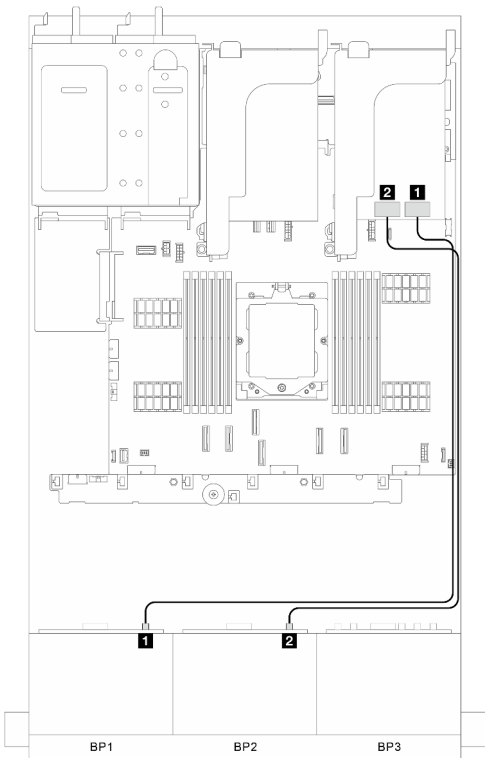


Figure 395. Signal cable routing part 1

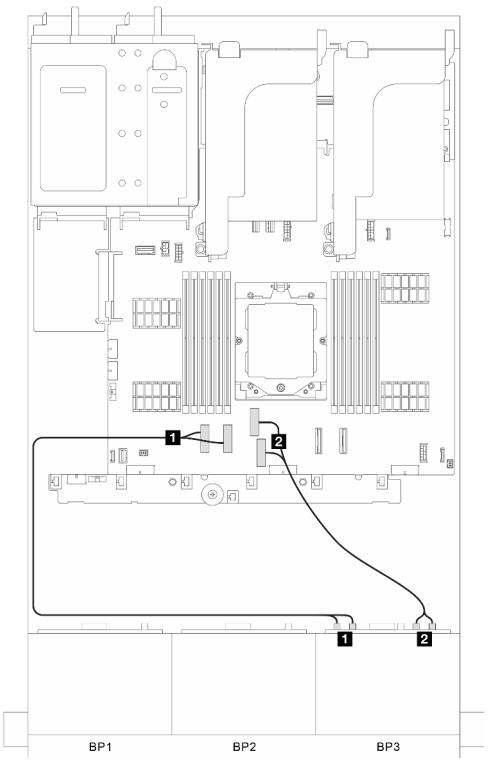


Figure 396. Signal cable routing part 2

From	To
1 BP 1: SAS	1 16i adapter: • Gen 4: C0 • Gen 3: C0C1
2 BP 2: SAS	2 16i adapter: • Gen 4: C1 • Gen 3: C2C3

From	To
1 BP 3: NVMe 0-1, 2-3	1 Onboard: PCIe 1, 2
2 BP 3: NVMe 4-5, 6-7	2 Onboard: PCIe 3, 4

Onboard connectors + three 8i RAID/HBA adapters

This section provides cable routing information for configuration (two 8 x 2.5-inch SAS/SATA and one 8 x 2.5-inch AnyBay front drive backplanes) with onboard connectors and three 8i RAID/HBA adapters.

Onboard connectors and three 8i RAID/HBA adapters

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

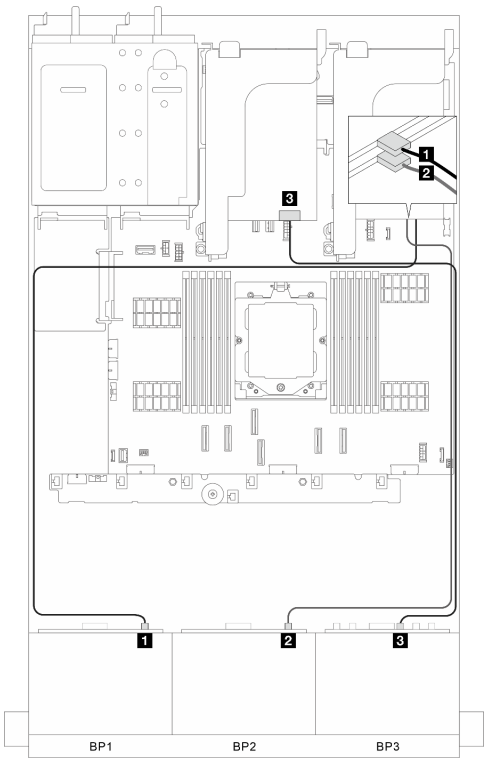


Figure 397. Signal cable routing part 1

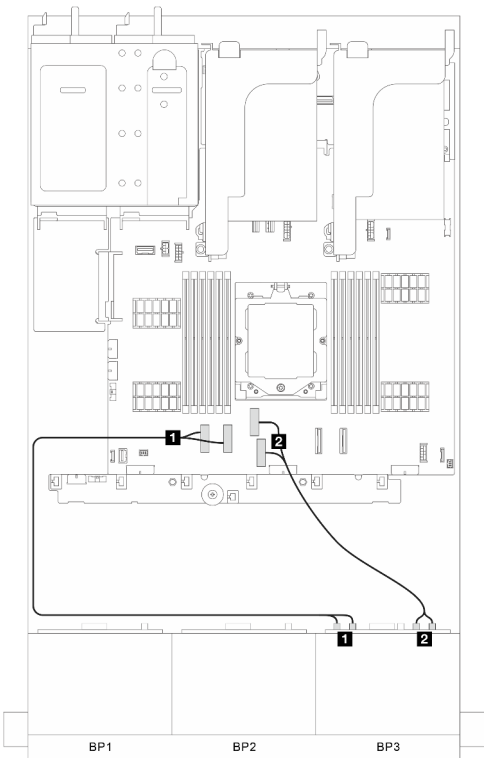


Figure 398. Signal cable routing part 2

From	To
1 BP 1: SAS	1 8i adapter: • Gen 4: C0 • Gen 3: C0C1
2 BP 2: SAS	2 8i adapter: • Gen 4: C0 • Gen 3: C0C1
3 BP 3: SAS	3 8i adapter: • Gen 4: C0 • Gen 3: C0C1

From	To
1 BP 3: NVMe 0-1, 2-3	1 Onboard: PCIe 1, 2
2 BP 3: NVMe 4-5, 6-7	2 Onboard: PCIe 3, 4

Onboard connectors + two 16i RAID/HBA adapters

This section provides cable routing information for configuration (two 8 x 2.5-inch SAS/SATA and one 8 x 2.5-inch AnyBay front drive backplanes) with onboard connectors and two 16i RAID/HBA adapters.

Onboard connectors and two 16i RAID/HBA adapters

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

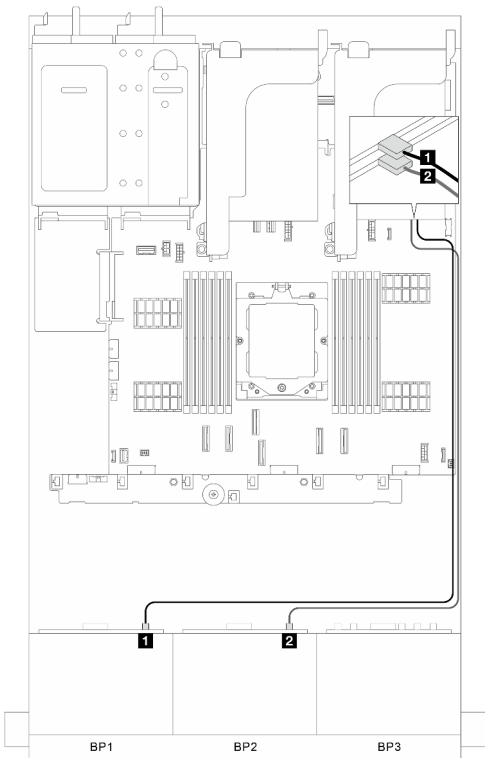


Figure 399. Signal cable routing part 1

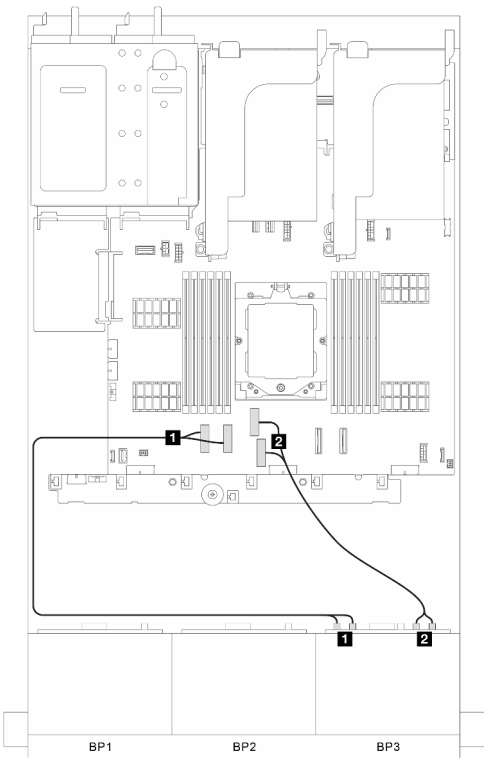


Figure 400. Signal cable routing part 2

From	To	From	To
1 BP 1: SAS	1 16i adapter: • Gen 4: C0 • Gen 3: C0C1	1 BP 3: NVMe 0-1, 2-3	1 Onboard: PCIe 1, 2
2 BP 2: SAS	2 16i adapter: • Gen 4: C0 • Gen 3: C0C1	2 BP 3: NVMe 4-5, 6-7	2 Onboard: PCIe 3, 4

Three 8 x SAS/SATA backplanes

This section provides cable routing information for the server model with three 8 x 2.5-inch SAS/SATA front drive backplanes.

To connect power cables for the front backplane(s), refer to “Backplanes: server models with 2.5-inch front drive bays” on page 388.

To connect signal cables for the backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- “Front backplanes: three 8 x SAS/SATA” on page 425
- “Front + rear backplanes: three 8 x SAS/SATA + one 4 x 2.5 SAS/SATA” on page 428
- “Front + rear backplanes: three 8 x SAS/SATA + one 4 x 2.5 AnyBay” on page 431
- “Front + rear backplanes: three 8 x SAS/SATA + one 8 x 2.5 SAS/SATA” on page 435
- “Front + middle backplanes: three 8 x SAS/SATA + one 4x2.5 SAS/SATA” on page 439
- “Front + middle backplanes: three 8 x SAS/SATA + two 4x2.5 SAS/SATA” on page 441
- “Front + middle + rear backplanes: three 8 x SAS/SATA + two 4 x 2.5 SAS/SATA + one 4 x 2.5 SAS/SATA” on page 443
- “Front + middle + rear backplanes: three 8 x SAS/SATA + two 4 x 2.5 SAS/SATA + one 8 x 2.5 SAS/SATA” on page 445

Front backplanes: three 8 x SAS/SATA

This section provides cable routing information for the server model with three 8 x 2.5-inch SAS/SATA front drive backplanes.

- “32i RAID/HBA adapter” on page 425
- “16i and 8i RAID/HBA adapters” on page 426
- “Three 8i RAID/HBA adapters” on page 427

32i RAID/HBA adapter

This section provides cable routing information for configuration (three 8 x 2.5-inch SAS/SATA front drive backplanes) with one 32i RAID/HBA adapter.

32i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

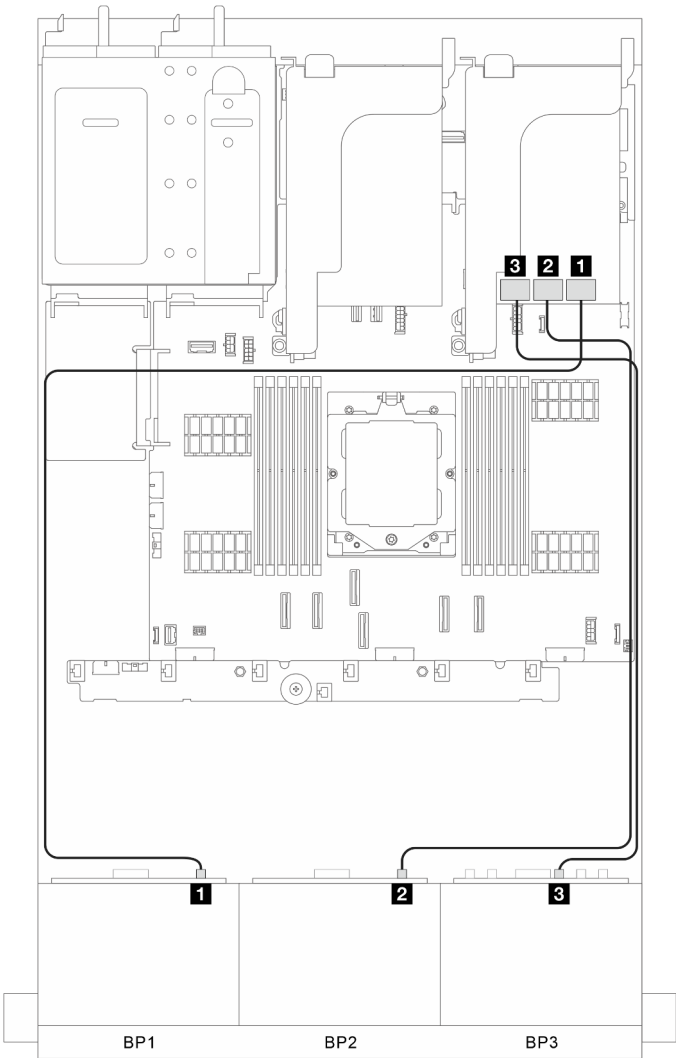


Figure 401. Signal cable routing

From	To
1 BP 1: SAS	1 32i adapter: C0
2 BP 2: SAS	2 32i adapter: C1
3 BP 3: SAS	3 32i adapter: C2

16i and 8i RAID/HBA adapters

This section provides cable routing information for configuration (three 8 x 2.5-inch SAS/SATA front drive backplanes) with one 16i and one 8i RAID/HBA adapter.

16i and 8i RAID/HBA adapters

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

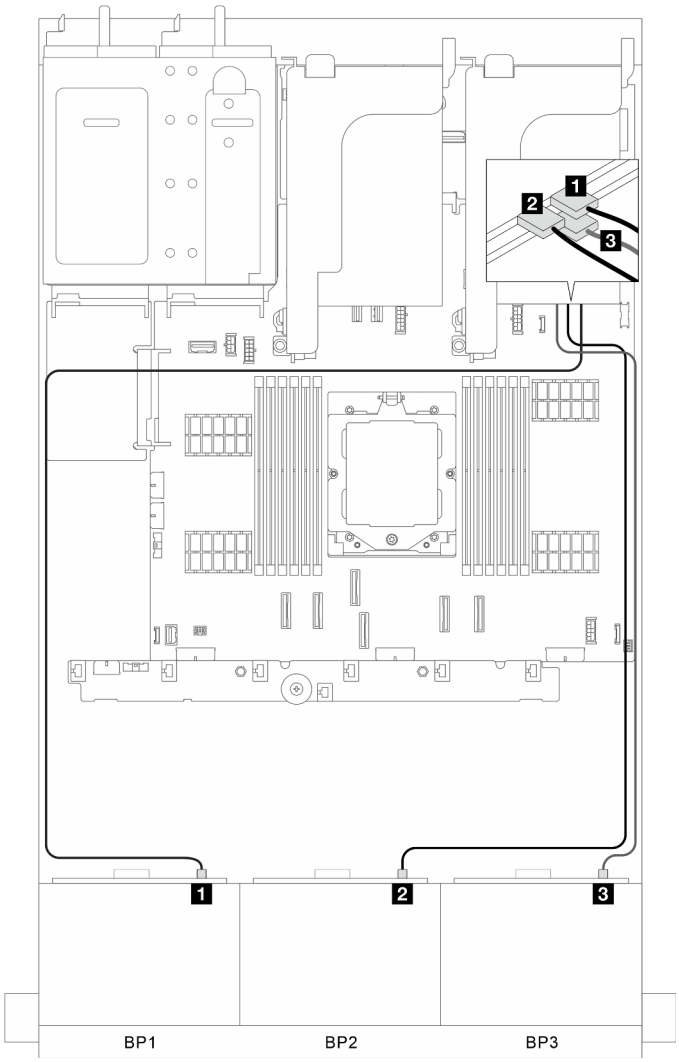


Figure 402. Signal cable routing

From	To
1 BP 1: SAS	1 16i adapter: • Gen 4: C0 • Gen 3: C0C1
2 BP 2: SAS	2 16i adapter: • Gen 4: C1 • Gen 3: C2C3
3 BP 3: SAS	3 8i adapter: • Gen 4: C0 • Gen 3: C0C1

Three 8i RAID/HBA adapters

This section provides cable routing information for configuration (three 8 x 2.5-inch SAS/SATA front drive backplanes) with three 8i RAID/HBA adapters.

Three 8i RAID/HBA adapters

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

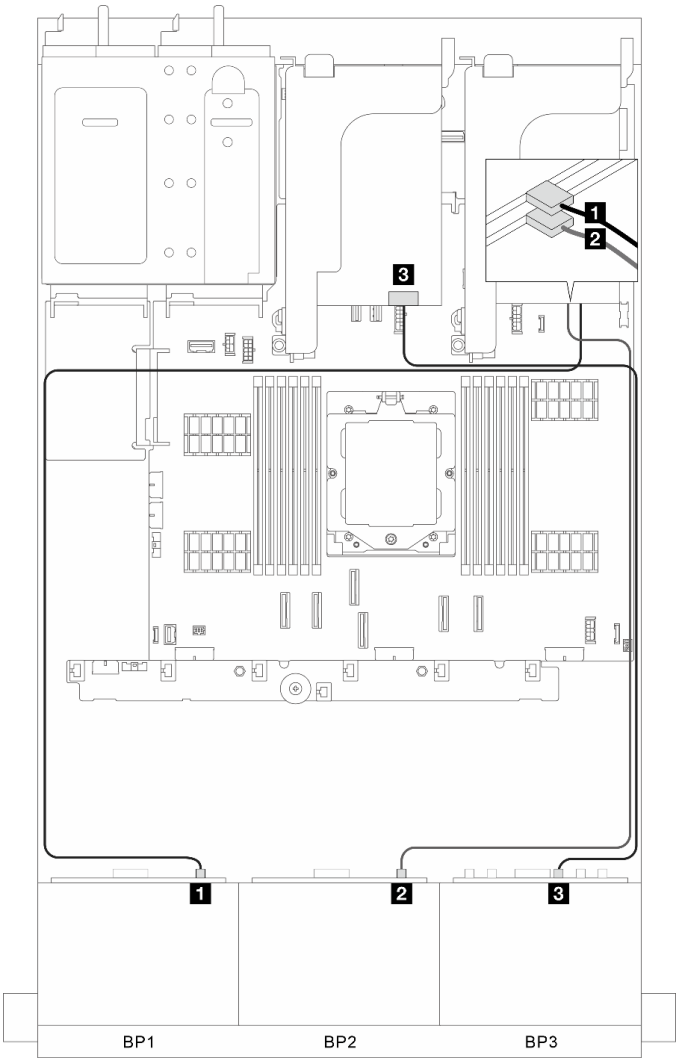


Figure 403. Signal cable routing

From	To
1 BP 1: SAS	1 8i adapter: • Gen 4: C0 • Gen 3: C0C1
2 BP 2: SAS	2 8i adapter: • Gen 4: C0 • Gen 3: C0C1
3 BP 3: SAS	3 8i adapter: • Gen 4: C0 • Gen 3: C0C1

Front + rear backplanes: three 8 x SAS/SATA + one 4 x 2.5 SAS/SATA

This section provides cable routing information for the server model with three 8 x 2.5-inch SAS/SATA front drive backplanes and one 4 x 2.5-inch SAS/SATA rear drive backplane.

- "32i RAID/HBA adapter" on page 429
- "CFF 16i RAID/HBA adapter + CFF expander" on page 429

- “8i/16i RAID/HBA adapter + CFF expander” on page 430

32i RAID/HBA adapter

This section provides cable routing information for configuration (three 8 x 2.5-inch SAS/SATA front drive backplanes and one 4 x 2.5-inch SAS/SATA rear drive backplane) with one 32i RAID/HBA adapter.

32i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

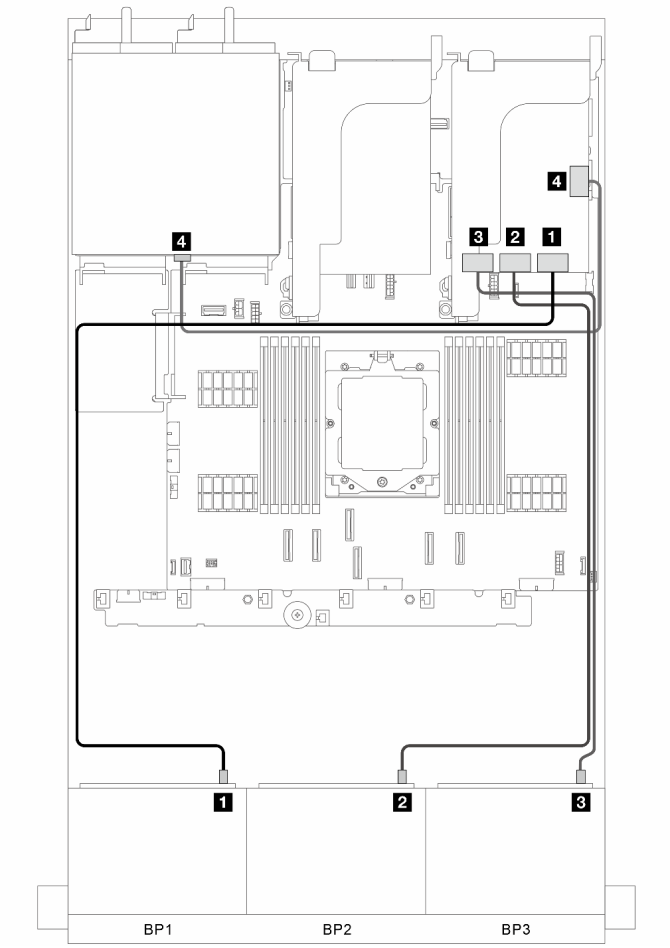


Figure 404. Signal cable routing

From	To
1 BP 1: SAS	1 32i adapter: C0
2 BP 2: SAS	2 32i adapter: C1
3 BP 3: SAS	3 32i adapter: C2
4 Rear backplane: SAS	4 32i adapter: C3

CFF 16i RAID/HBA adapter + CFF expander

This section provides cable routing information for configuration (three 8 x 2.5-inch SAS/SATA front drive backplanes and one 4 x 2.5-inch SAS/SATA rear drive backplane) with one CFF 16i RAID/HBA adapter and one CFF expander.

CFF 16i RAID/HBA adapter and CFF expander

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

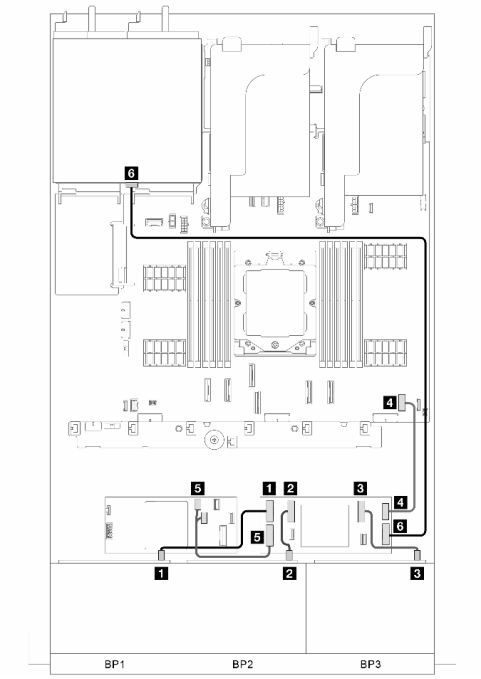


Figure 405. Signal cable routing part 1

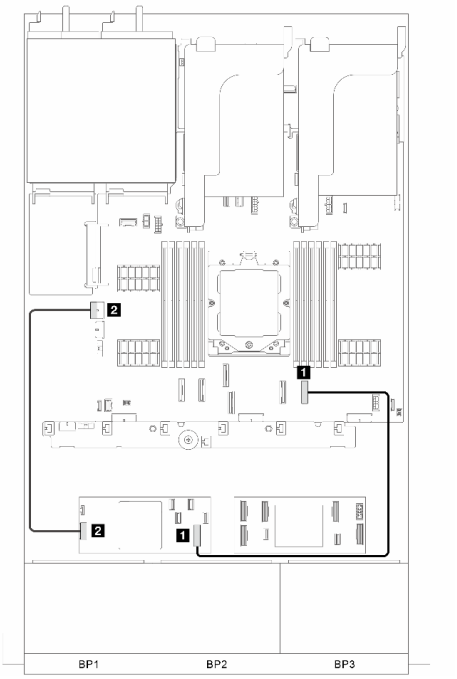


Figure 406. Signal cable routing part 2

From	To
1 BP 1: SAS	1 CFF expander: C0
2 BP 2: SAS	2 CFF expander: C1
3 BP 3: SAS	3 CFF expander: C2
4 Onboard: CFF EXP PWR	4 CFF expander: PWR
5 CFF adapter: C0C1	5 CFF expander: INPUT
6 Rear backplane: SAS	6 CFF expander: C3

From	To
1 CFF adapter: INPUT	1 Onboard: PCIe 8
2 CFF adapter: PWR	2 Onboard: CFF RAID PWR

8i/16i RAID/HBA adapter + CFF expander

This section provides cable routing information for configuration (three 8 x 2.5-inch SAS/SATA front drive backplanes and one 4 x 2.5-inch SAS/SATA rear drive backplane) with one 8i/16i RAID/HBA adapter and one CFF expander.

8i/16i RAID/HBA adapter and CFF expander

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

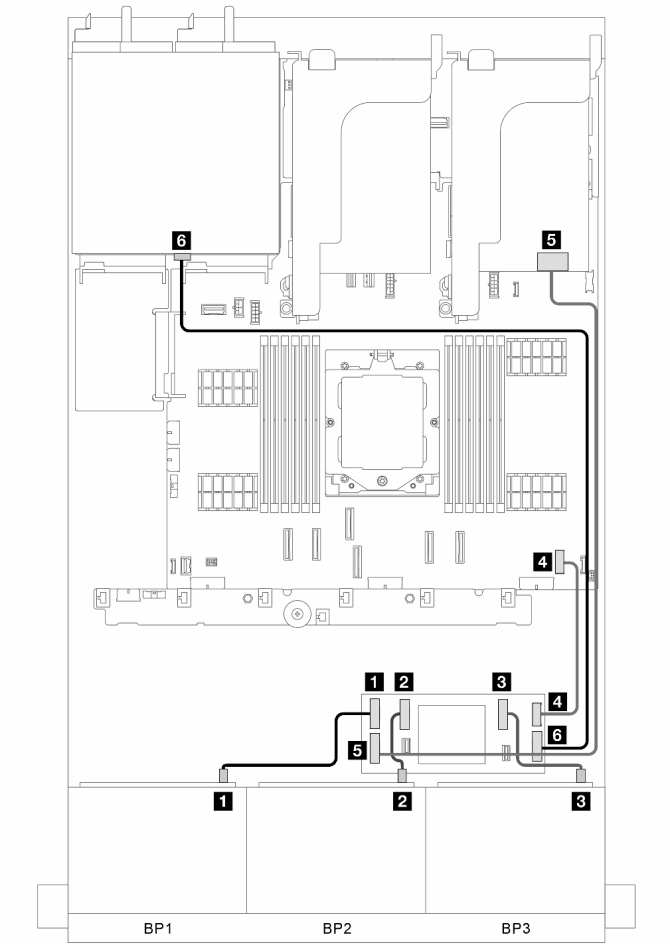


Figure 407. Signal cable routing

From	To
1 BP 1: SAS	1 CFF expander: C0
2 BP 2: SAS	2 CFF expander: C1
3 BP 3: SAS	3 CFF expander: C2
4 Onboard: CFF EXP PWR	4 CFF expander: PWR
5 8i/16i adapter: • Gen 4: C0 • Gen 3: C0C1	5 CFF expander: INPUT
6 Rear backplane: SAS	6 CFF expander: C3

Front + rear backplanes: three 8 x SAS/SATA + one 4 x 2.5 AnyBay

This section provides cable routing information for the server model with three 8 x 2.5-inch SAS/SATA front drive backplanes and one 4 x 2.5-inch AnyBay rear drive backplane.

- "Onboard connectors + 32i RAID/HBA adapter" on page 432
- "Onboard connectors + CFF 16i RAID/HBA adapter + CFF expander" on page 432
- "Onboard connectors + 8i/16i RAID/HBA adapter + CFF expander" on page 434

Onboard connectors + 32i RAID/HBA adapter

This section provides cable routing information for configuration (three 8 x 2.5-inch SAS/SATA front drive backplanes and one 4 x 2.5-inch AnyBay rear drive backplane) with onboard connectors and one 32i RAID/HBA adapter.

Onboard connectors and 32i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

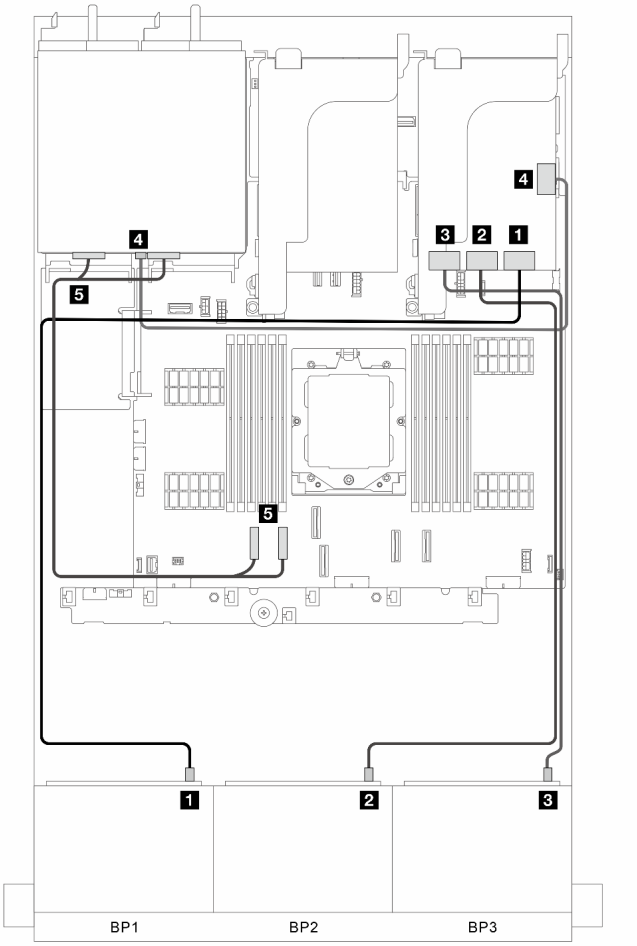


Figure 408. Signal cable routing

From	To
1 BP 1: SAS	1 32i adapter: C0
2 BP 2: SAS	2 32i adapter: C1
3 BP 3: SAS	3 32i adapter: C2
4 Rear backplane: SAS	4 32i adapter: C3
5 Rear backplane: NVMe 0-1, 2-3	5 Onboard: PCIe 1, 2

Onboard connectors + CFF 16i RAID/HBA adapter + CFF expander

This section provides cable routing information for configuration (three 8 x 2.5-inch SAS/SATA front drive backplanes and one 4 x 2.5-inch AnyBay rear drive backplane) with onboard connectors, one CFF 16i RAID/HBA adapter and one CFF expander.

Onboard connectors, one CFF 16i RAID/HBA adapter and one CFF expander

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

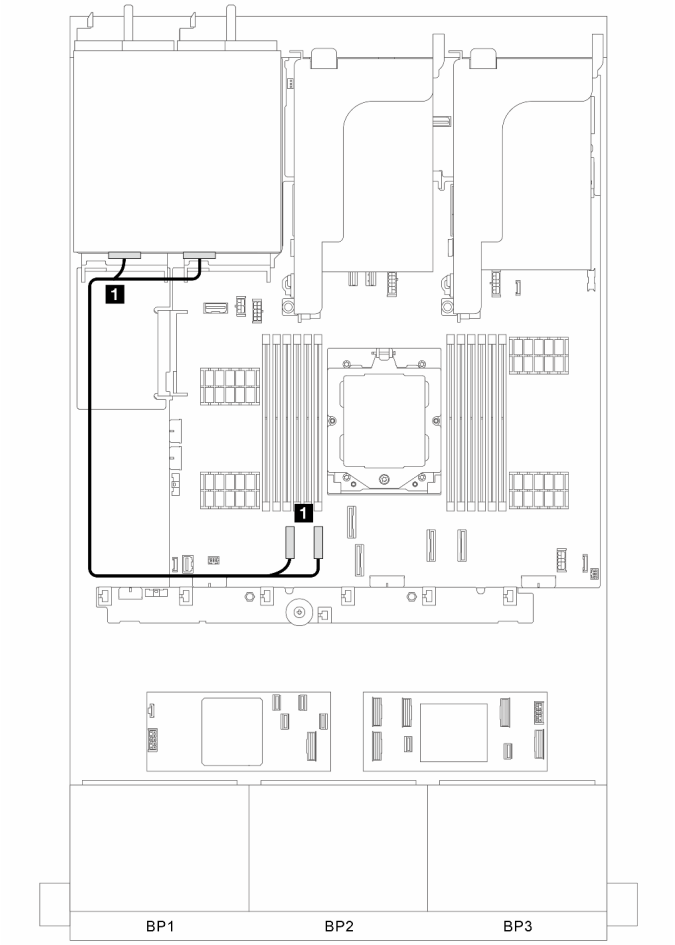


Figure 409. Signal cable routing for onboard connectors

From	To
1 Rear backplane: NVMe 0-1 and NVMe 2-3	1 Onboard: PCIe 1 and PCIe 2

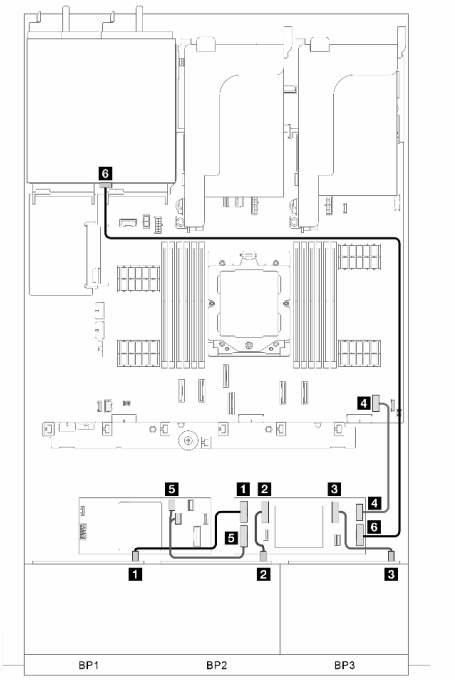


Figure 410. Signal cable routing for CFF expander

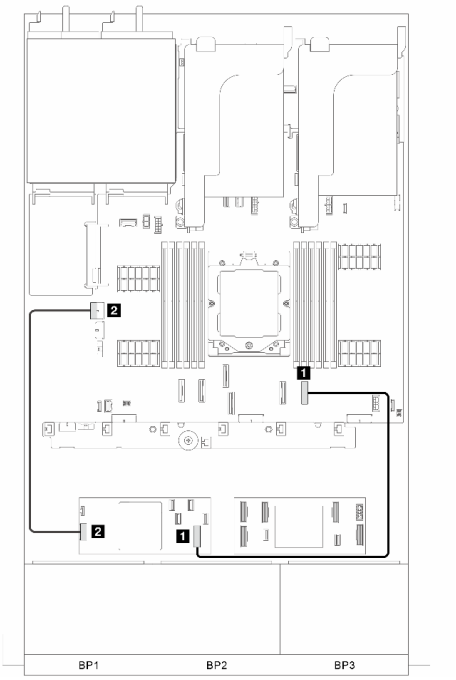


Figure 411. Signal cable routing for CFF adapter

From	To
1 BP 1: SAS	1 CFF expander: C0
2 BP 2: SAS	2 CFF expander: C1
3 BP 3: SAS	3 CFF expander: C2
4 Onboard: CFF EXP PWR	4 CFF expander: PWR
5 CFF adapter: C0C1	5 CFF expander: INPUT
6 Rear backplane: SAS	6 CFF expander: C3

From	To
1 CFF adapter: INPUT	1 Onboard: PCIe 8
2 CFF adapter: PWR	2 Onboard: CFF RAID PWR

Onboard connectors + 8i/16i RAID/HBA adapter + CFF expander

This section provides cable routing information for configuration (three 8 x 2.5-inch SAS/SATA front drive backplanes and one 4 x 2.5-inch AnyBay rear drive backplane) with onboard connectors, one 8i/16i RAID/HBA adapter and one CFF expander.

Onboard connectors, 8i/16i RAID/HBA adapter and CFF expander

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

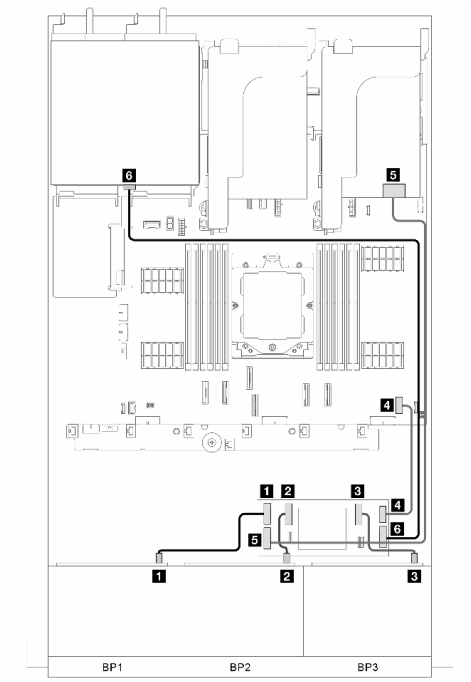


Figure 412. Signal cable routing part 1

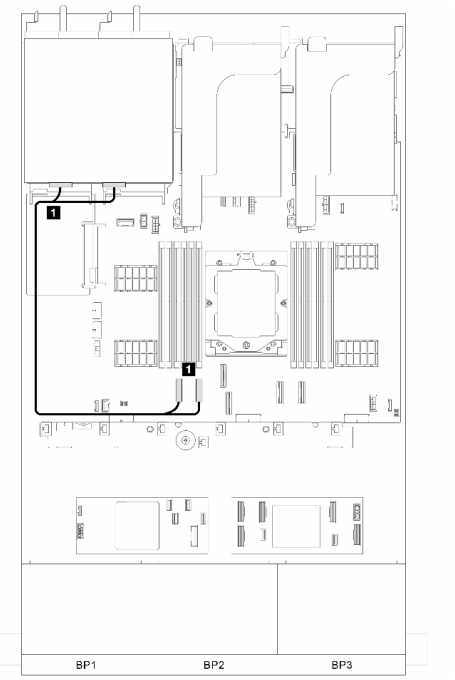


Figure 413. Signal cable routing part 2

From	To
1 BP 1: SAS	1 CFF expander: C0
2 BP 2: SAS	2 CFF expander: C1
3 BP 3: SAS	3 CFF expander: C2
4 Onboard: CFF EXP PWR	4 CFF expander: PWR
5 8i/16i adapter: • Gen 4: C0 • Gen 3: C0C1	5 CFF expander: INPUT
6 Rear backplane: SAS	6 CFF expander: C3

From	To
1 Rear backplane: NVMe 0-1, 2-3	1 Onboard: PCIe 1, 2

Front + rear backplanes: three 8 x SAS/SATA + one 8 x 2.5 SAS/SATA

This section provides cable routing information for the server model with three 8 x 2.5-inch SAS/SATA front drive backplanes and one 8 x 2.5-inch SAS/SATA rear drive backplane.

- "32i RAID/HBA adapter" on page 435
- "Two 16i RAID/HBA adapters" on page 436
- "CFF 16i RAID/HBA adapter + CFF expander" on page 437
- "8i/16i RAID/HBA adapter + CFF expander" on page 438

32i RAID/HBA adapter

This section provides cable routing information for configuration (three 8 x 2.5-inch SAS/SATA front drive backplanes and one 8 x 2.5-inch SAS/SATA rear drive backplane) with one 32i RAID/HBA adapter.

32i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

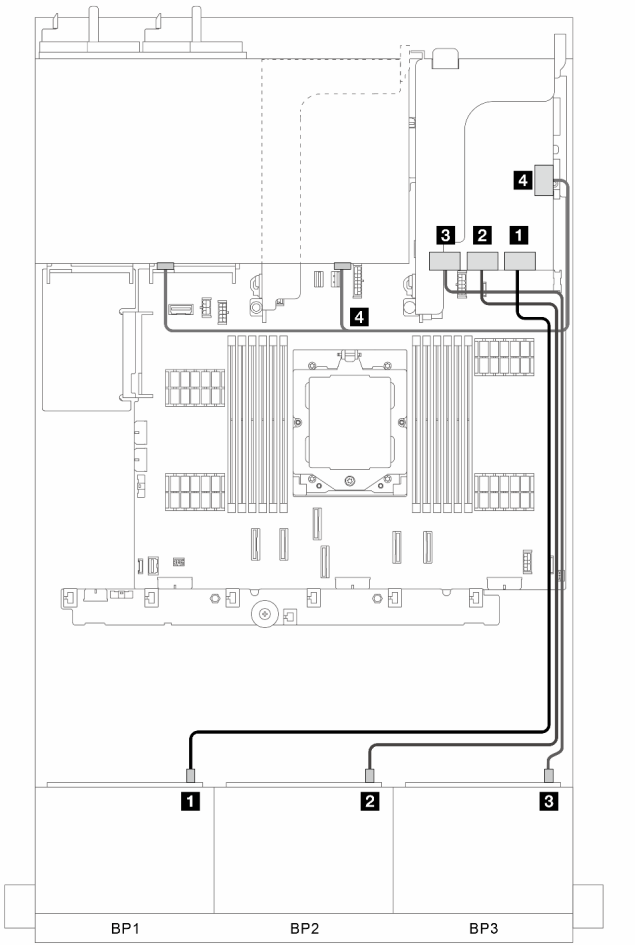


Figure 414. Signal cable routing

From	To
1 BP 1: SAS	1 32i adapter: C0
2 BP 2: SAS	2 32i adapter: C1
3 BP 3: SAS	3 32i adapter: C2
4 Rear backplane: SAS 0, SAS 1	4 32i adapter: C3

Two 16i RAID/HBA adapters

This section provides cable routing information for configuration (three 8 x 2.5-inch SAS/SATA front drive backplanes and one 8 x 2.5-inch SAS/SATA rear drive backplane) with two 16i RAID/HBA adapters.

Two 16i RAID/HBA adapters

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

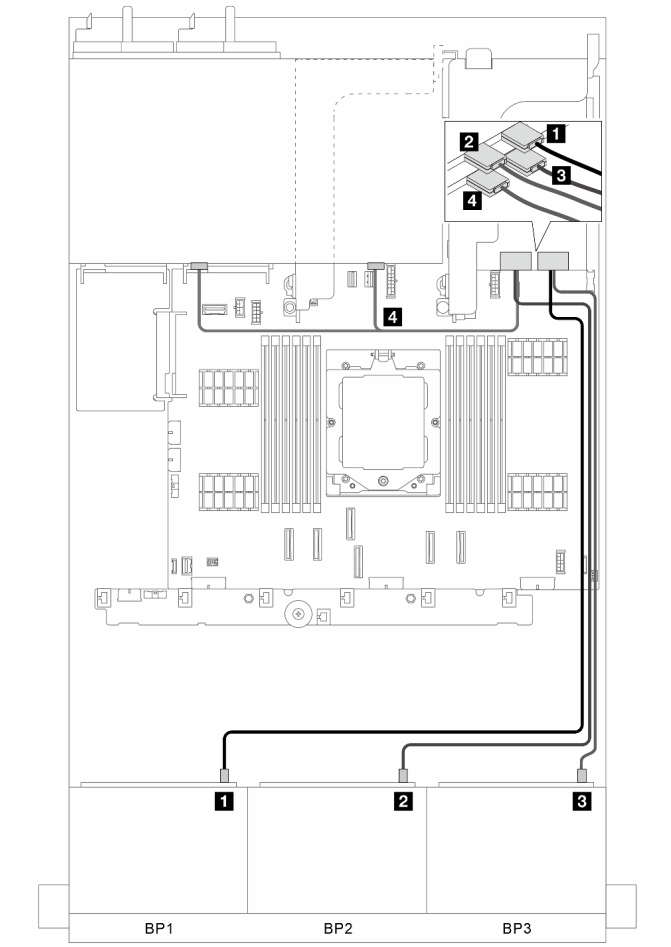


Figure 415. Signal cable routing

From	To
1 BP 1: SAS	1 16i adapter: • Gen 4: C0 • Gen 3: C0C1
2 BP 2: SAS	2 16i adapter: • Gen 4: C1 • Gen 3: C2C3
3 BP 3: SAS	3 16i adapter: • Gen 4: C0 • Gen 3: C0C1
4 Rear backplane: SAS 0, SAS 1	4 16i adapter: • Gen 4: C1 • Gen 3: C2C3

CFF 16i RAID/HBA adapter + CFF expander

This section provides cable routing information for configuration (three 8 x 2.5-inch SAS/SATA front drive backplanes and one 8 x 2.5-inch SAS/SATA rear drive backplane) with one CFF 16i RAID/HBA adapter and one CFF expander.

CFF 16i RAID/HBA adapter and CFF expander

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

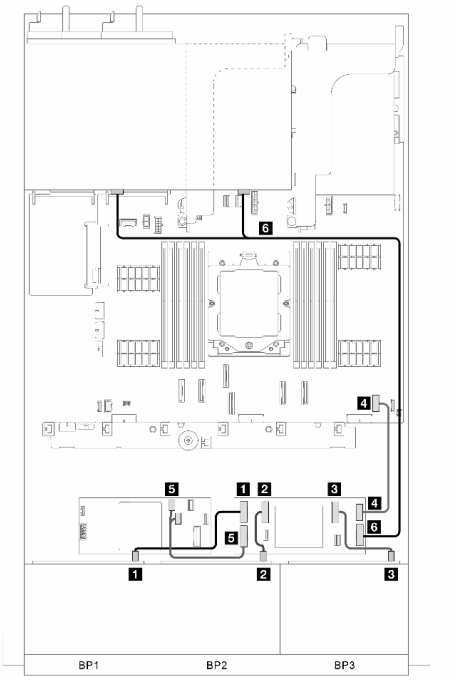


Figure 416. Signal cable routing part 1

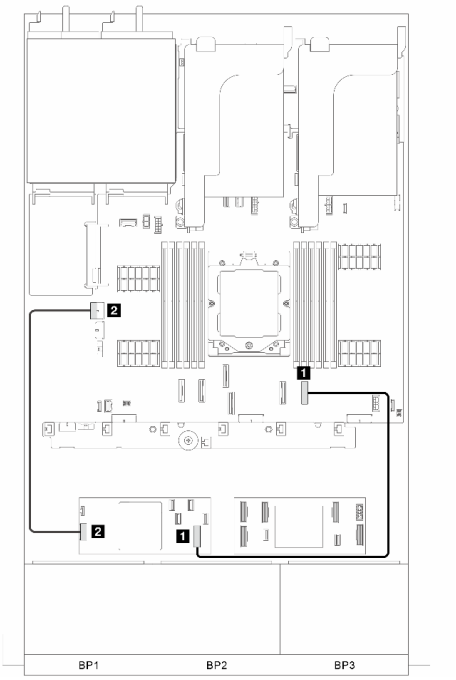


Figure 417. Signal cable routing part 2

From	To
1 BP 1: SAS	1 CFF expander: C0
2 BP 2: SAS	2 CFF expander: C1
3 BP 3: SAS	3 CFF expander: C2
4 Onboard: CFF EXP PWR	4 CFF expander: PWR
5 CFF adapter: C0C1	5 CFF expander: INPUT
6 Rear backplane: SAS 0, SAS 1	6 CFF expander: C3

From	To
1 CFF adapter: INPUT	1 Onboard: PCIe 8
2 CFF adapter: PWR	2 Onboard: CFF RAID PWR

8i/16i RAID/HBA adapter + CFF expander

This section provides cable routing information for configuration (three 8 x 2.5-inch SAS/SATA front drive backplanes and one 8 x 2.5-inch SAS/SATA rear drive backplane) with one 8i/16i RAID/HBA adapter and one CFF expander.

8i/16i RAID/HBA adapter and CFF expander

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

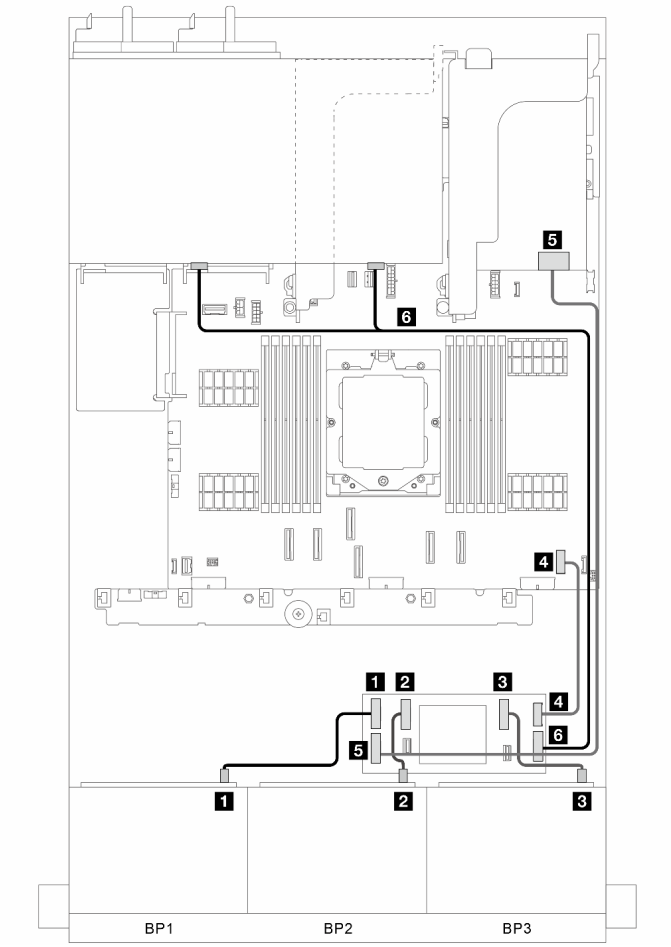


Figure 418. Signal cable routing

From	To
1 BP 1: SAS	1 CFF expander: C0
2 BP 2: SAS	2 CFF expander: C1
3 BP 3: SAS	3 CFF expander: C2
4 Onboard: CFF EXP PWR	4 CFF expander: PWR
5 8i/16i adapter: • Gen 4: C0 • Gen 3: C0C1	5 CFF expander: INPUT
6 Rear backplane: SAS 0,SAS 1	6 CFF expander: C3

Front + middle backplanes: three 8 x SAS/SATA + one 4x2.5 SAS/SATA

This section provides cable routing information for configuration (three 8 x 2.5-inch SAS/SATA front drive backplanes and one 4x 2.5-inch SAS/SATA middle drive backplane) with one 32i RAID/HBA adapter or two 16i RAID/HBA adapters.

32i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

Note: The illustration below uses one 32i RAID/HBA adapter as an example, and cable routing for using two 16i RAID/HBA adapters is similar.

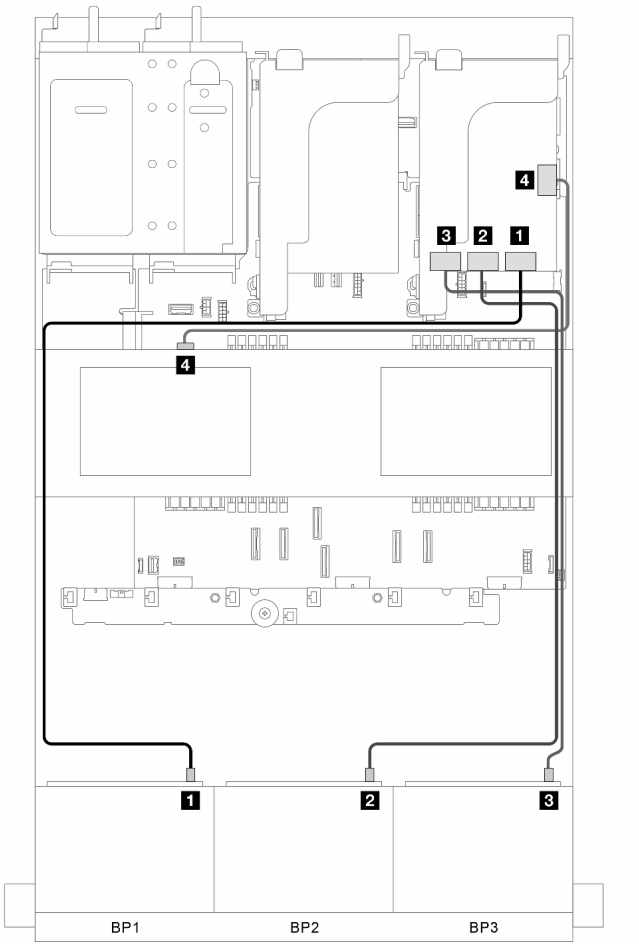


Figure 419. Signal cable routing

From	To
1 BP 1: SAS	1 • 32i adapter: C0 • Gen 3 16i adapter: C0C1 • Gen 4 16i adapter: C0
2 BP 2: SAS	2 • 32i adapter: C1 • Gen 3 16i adapter: C2C3 • Gen 4 16i adapter: C1

From	To
3 BP 3: SAS	3 • 32i adapter: C2 • Gen 3 16i adapter: C0C1 • Gen 4 16i adapter: C0
4 Middle backplane: SAS	4 • 32i adapter: C3 • Gen 3 16i adapter: C2C3 • Gen 4 16i adapter: C1

Front + middle backplanes: three 8 x SAS/SATA + two 4x2.5 SAS/SATA

This section provides cable routing information for configuration (three 8 x 2.5-inch SAS/SATA front drive backplanes and two 4 x 2.5-inch SAS/SATA middle drive backplanes) with one 32i RAID/HBA adapter or two 16i RAID/HBA adapters.

32i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

Note: The illustration below uses one 32i RAID/HBA adapter as an example, and cable routing for using two 16i RAID/HBA adapters is similar.

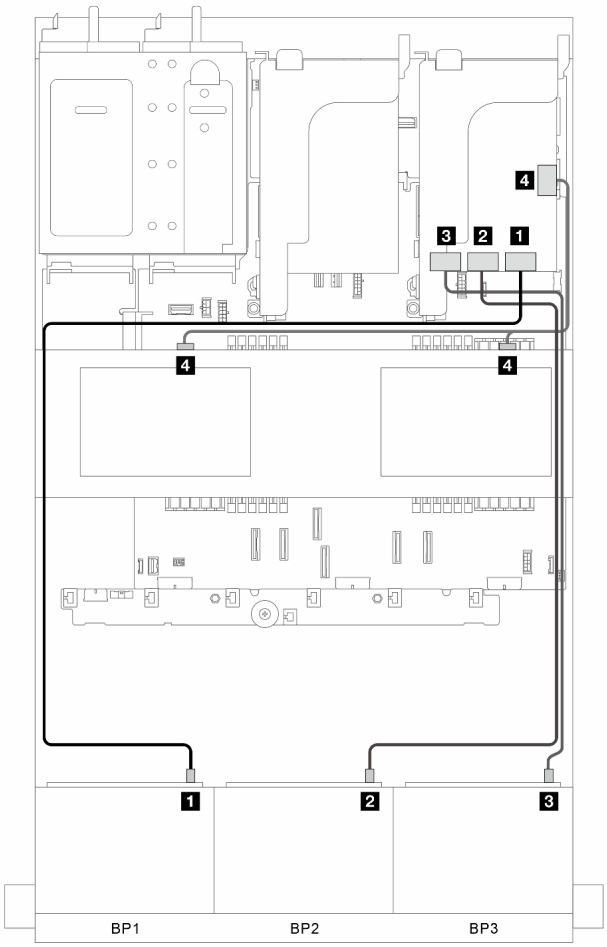


Figure 420. Signal cable routing

From	To
1 BP 1: SAS	1 • 32i adapter: C0 • Gen 3 16i adapter: C0C1 • Gen 4 16i adapter: C0
2 BP 2: SAS	2 • 32i adapter: C1 • Gen 3 16i adapter: C2C3 • Gen 4 16i adapter: C1
3 BP 3: SAS	3 • 32i adapter: C2 • Gen 3 16i adapter: C0C1 • Gen 4 16i adapter: C0
4 Middle backplanes: SAS	4 • 32i adapter: C3 • Gen 3 16i adapter: C2C3 • Gen 4 16i adapter: C1

Front + middle + rear backplanes: three 8 x SAS/SATA + two 4 x 2.5 SAS/SATA + one 4 x 2.5 SAS/SATA

This section provides cable routing information for the server model with three 8 x 2.5-inch SAS/SATA front drive backplanes, two 4 x 2.5-inch SAS/SATA middle drive backplanes and one 4 x 2.5-inch SAS/SATA rear drive backplane.

- “32i and 8i RAID/HBA adapters” on page 443
- “CFF 8i/16i RAID/HBA adapter + CFF expander” on page 444
- “8i/16i RAID/HBA adapter + CFF expander” on page 444

32i and 8i RAID/HBA adapters

This section provides cable routing information for configuration (three 8 x 2.5-inch SAS/SATA front drive backplanes, two 4 x 2.5-inch SAS/SATA middle drive backplanes and one 4 x 2.5-inch SAS/SATA rear drive backplane) with one 32i RAID/HBA adapter and one 8i RAID/HBA adapter.

32i and 8i RAID/HBA adapters

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

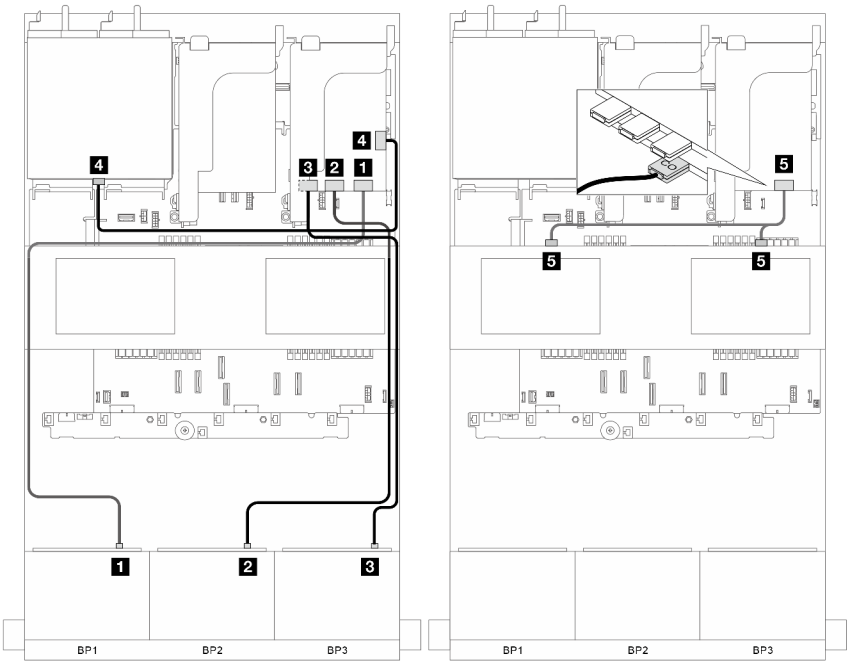


Figure 421. Signal cable routing

From	To
1 BP 1: SAS	1 32i adapter: C0
2 BP 2: SAS	2 32i adapter: C1
3 BP 3: SAS	3 32i adapter: C2
4 Rear backplane: SAS	4 32i adapter: C3
5 Middle backplanes: SAS	5 8i adapter: C0

CFF 8i/16i RAID/HBA adapter + CFF expander

This section provides cable routing information for configuration (three 8 x 2.5-inch SAS/SATA front drive backplanes, two 4 x 2.5-inch SAS/SATA middle drive backplanes and one 4 x 2.5-inch SAS/SATA rear drive backplane) with one CFF 8i/16i RAID/HBA adapter and one CFF expander.

CFF 8i/16i RAID/HBA adapter and CFF expander

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

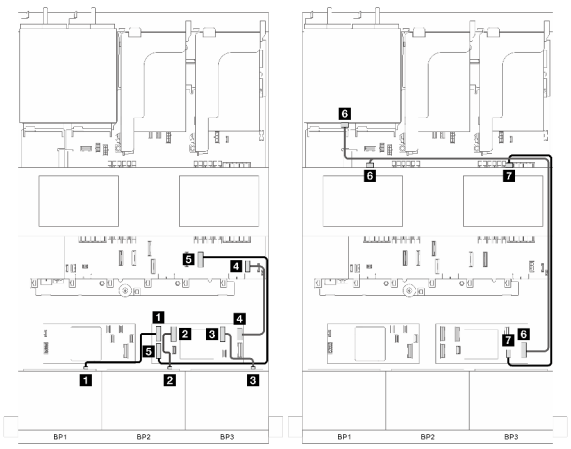


Figure 422. Signal cable routing part 1

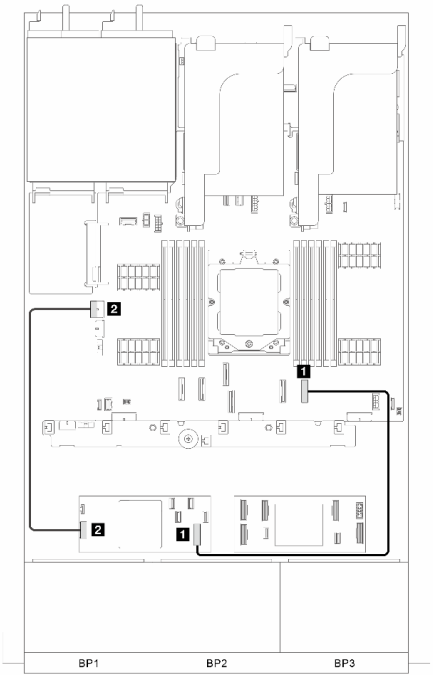


Figure 423. Signal cable routing part 2

From	To	From	To
1 BP 1: SAS	1 CFF expander: C0	1 CFF adapter: INPUT	1 Onboard: PCIe 8
2 BP 2: SAS	2 CFF expander: C1	2 CFF adapter: PWR	2 Onboard: CFF RAID PWR
3 BP 3: SAS	3 CFF expander: C2		
4 Onboard: CFF EXP PWR	4 CFF expander: PWR		
5 Onboard: PCIe 8	5 CFF expander: INPUT		
6 BP 4 and BP 5: SAS	6 CFF expander: C3		
7 BP 6: SAS	7 CFF expander: C4		

8i/16i RAID/HBA adapter + CFF expander

This section provides cable routing information for configuration (three 8 x 2.5-inch SAS/SATA front drive backplanes, two 4 x 2.5-inch SAS/SATA middle drive backplanes and one 4 x 2.5-inch SAS/SATA rear drive backplane) with one 8i/16i RAID/HBA adapter and one CFF expander.

8i/16i RAID/HBA adapter and CFF expander

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n



Figure 424. Signal cable routing

From	To
1 BP 1: SAS	1 CFF expander: C0
2 BP 2: SAS	2 CFF expander: C1
3 BP 3: SAS	3 CFF expander: C2
4 Onboard: CFF EXP PWR	4 CFF expander: PWR
5 8i/16i adapter: • Gen 4: C0 • Gen 3: C0C1	5 CFF expander: INPUT
6 BP 4 and BP 5: SAS	6 CFF expander: C3
7 BP 6: SAS	7 CFF expander: C4

Front + middle + rear backplanes: three 8 x SAS/SATA + two 4 x 2.5 SAS/SATA + one 8 x 2.5 SAS/SATA

This section provides cable routing information for the server model with three 8 x 2.5-inch SAS/SATA front drive backplanes, two 4 x 2.5-inch SAS/SATA middle drive backplanes and one 8 x 2.5-inch SAS/SATA rear drive backplane.

- "CFF 16i RAID adapter + CFF expander" on page 445
- "16i RAID adapter + CFF expander" on page 446

CFF 16i RAID adapter + CFF expander

This section provides cable routing information for configuration (three 8 x 2.5-inch SAS/SATA front drive backplanes, two 4 x 2.5-inch SAS/SATA middle drive backplanes and one 8 x 2.5-inch SAS/SATA rear drive backplane) with one CFF 16i RAID adapter and one CFF expander.

CFF 16i RAID adapter and CFF expander

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

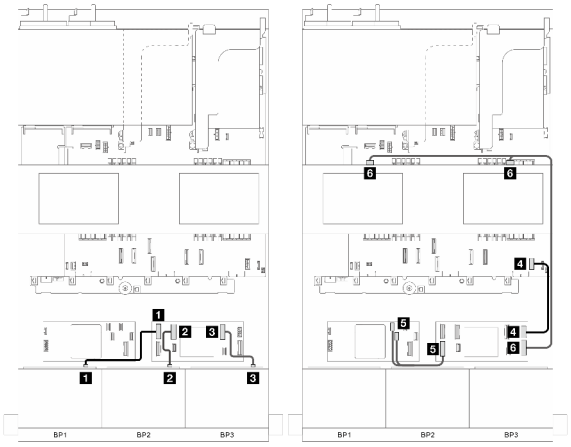


Figure 425. Signal cable routing part 1

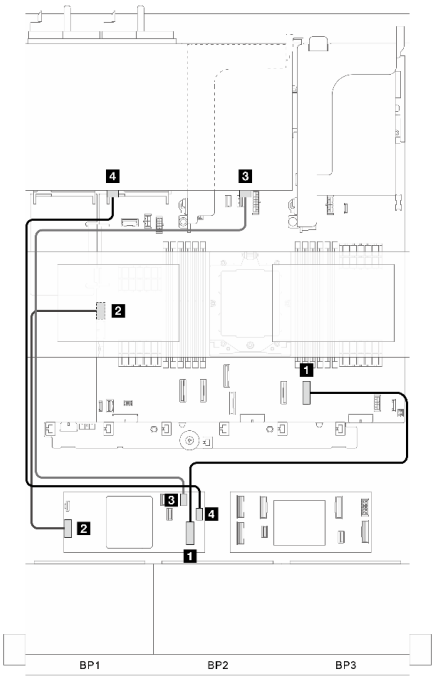


Figure 426. Signal cable routing part 2

From	To	From	To
1 BP 1: SAS	1 CFF expander: C0	1 CFF adapter: INPUT	1 Onboard: PCIe 8
2 BP 2: SAS	2 CFF expander: C1	2 CFF adapter: PWR	2 Onboard: CFF RAID PWR
3 BP 3: SAS	3 CFF expander: C2	3 BP 4: SAS 0	3 CFF adapter: C2
4 Onboard: CFF EXP PWR	4 CFF expander: PWR	4 BP 4: SAS 1	4 CFF adapter: C3
5 CFF adapter: C0, C1	5 CFF expander: INPUT		
6 BP 5 and BP 6: SAS	6 CFF expander: C3		

16i RAID adapter + CFF expander

This section provides cable routing information for configuration three 8 x 2.5-inch SAS/SATA front drive backplanes, two 4 x 2.5-inch SAS/SATA middle drive backplanes and one 8 x 2.5-inch SAS/SATA rear drive backplane) with one 16i RAID adapter and one CFF expander.

16i RAID adapter and CFF expander

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n



Figure 427. Signal cable routing

From	To
1 BP 1: SAS	1 CFF expander: C0
2 BP 2: SAS	2 CFF expander: C1
3 BP 3: SAS	3 CFF expander: C2
4 Onboard: CFF EXP PWR	4 CFF expander: PWR
5 16i adapter: • Gen 4: C0 • Gen 3: C0C1	5 CFF expander: INPUT
6 BP 5 and BP 6: SAS	6 CFF expander: C3
7 BP 4: SAS 0, SAS 1	7 16i adapter: • Gen 4: C1 • Gen 3: C2C3

Three 8 x AnyBay backplanes

This section provides cable routing information for the server model with three 8 x 2.5-inch AnyBay front drive backplanes.

To connect power cables for the front backplane(s), refer to “Backplanes: server models with 2.5-inch front drive bays” on page 388.

To connect signal cables for the backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- “Front backplanes: three 8 x AnyBay” on page 448
- “Front + middle backplanes: three 8 x AnyBay + two 4 x 2.5 NVMe” on page 452

Front backplanes: three 8 x AnyBay

This section provides cable routing information for the server model with three 8 x 2.5-inch AnyBay front drive backplanes.

- “16i and 8i RAID adapters (support Tri-mode)” on page 448
- “Three 8i RAID adapters (support Tri-mode)” on page 449
- “Onboard connectors + three Retimer cards” on page 450
- “Onboard connectors + three Retimer cards + 8i RAID/HBA adapter” on page 451

16i and 8i RAID adapters (support Tri-mode)

This section provides cable routing information for configuration (three 8 x 2.5-inch AnyBay front drive backplanes) with one 16i and one 8i RAID adapters.

16i and 8i RAID adapters

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

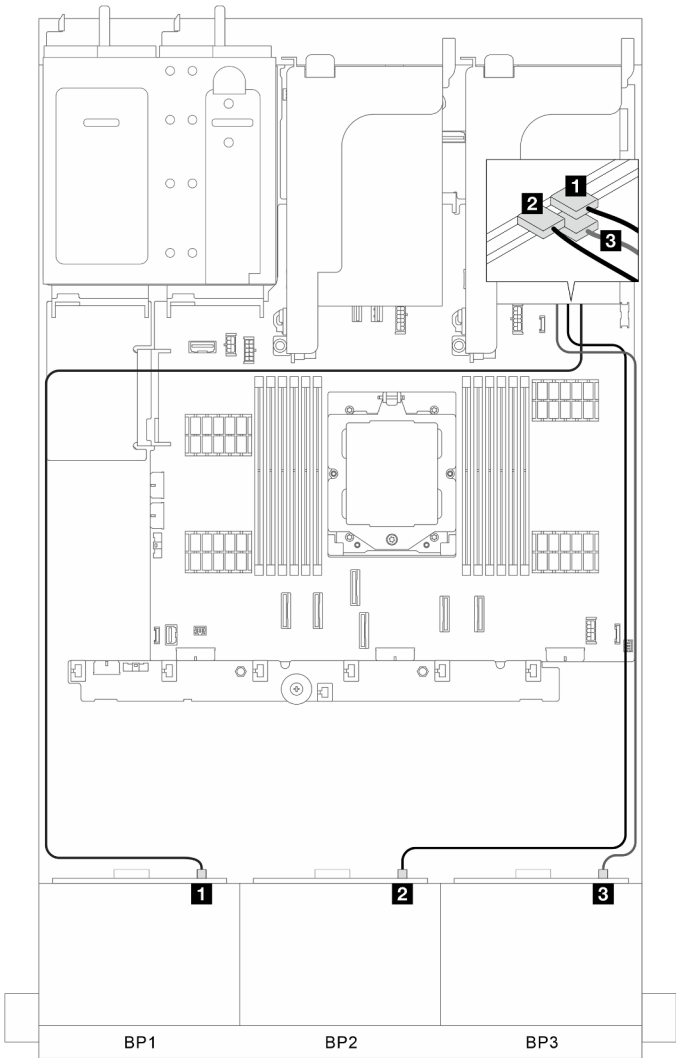


Figure 428. Signal cable routing

From	To
1 BP 1: SAS	1 16i adapter: C0
2 BP 2: SAS	2 16i adapter: C1
3 BP 3: SAS	3 8i adapter: C0

Three 8i RAID adapters (support Tri-mode)

This section provides cable routing information for configuration (three 8 x 2.5-inch AnyBay front drive backplanes) with three 8i RAID adapters.

Three 8i RAID adapters

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

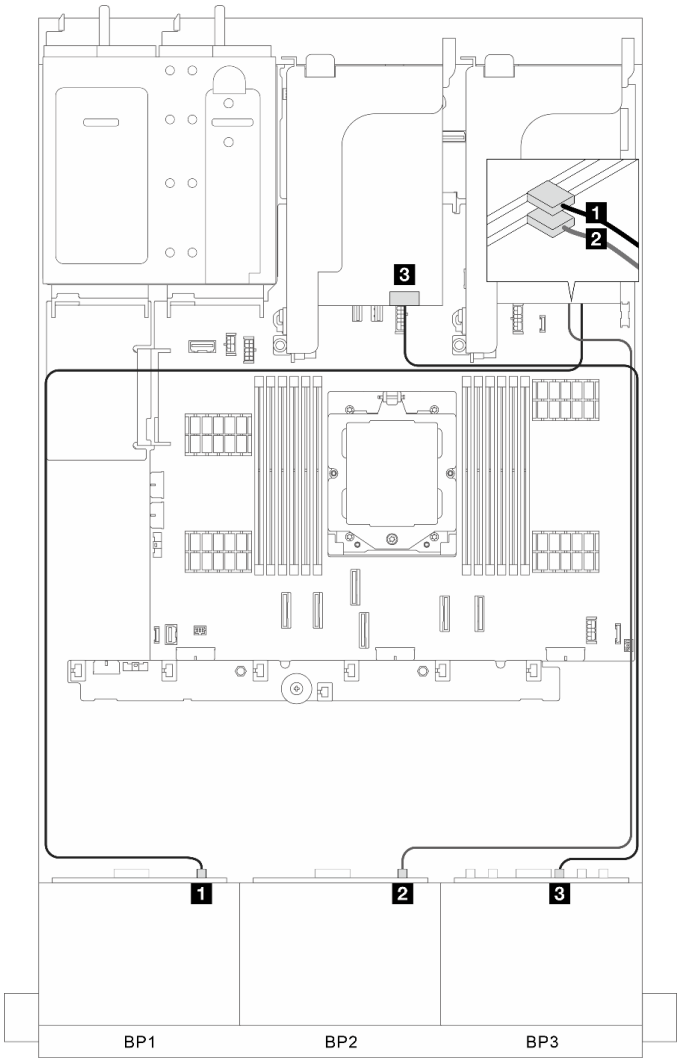


Figure 429. Signal cable routing

From	To
1 BP 1: SAS	1 8i adapter: C0
2 BP 2: SAS	2 8i adapter: C0
3 BP 3: SAS	3 8i adapter: C0

Onboard connectors + three Retimer cards

This section provides cable routing information for configuration (three 8 x 2.5-inch AnyBay front drive backplanes) with onboard connectors and three retimer cards.

Onboard connectors and three retimer cards

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

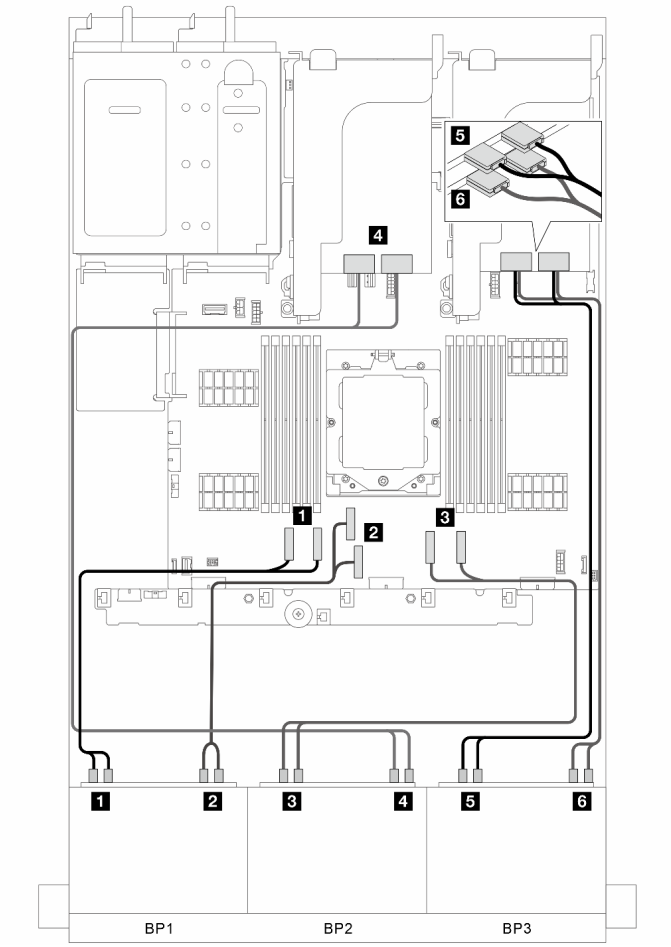


Figure 430. Signal cable routing

From	To
1 BP 1: NVMe 0-1, 2-3	1 Onbard: PCIe 1, 2
2 BP 1: NVMe 4-5, 6-7	2 Onbard: PCIe 3, 4
3 BP 2: NVMe 0-1, 2-3	3 Onbard: PCIe 7, 8
4 BP 2: NVMe 4-5, 6-7	4 Retimer card: C0C1 (slot 4)
5 BP 3: NVMe 0-1, 2-3	5 Retimer card: C0C1 (slot 1)
6 BP 3: NVMe 4-5, 6-7	6 Retimer card: C0C1 (slot 2)

Onboard connectors + three Retimer cards + 8i RAID/HBA adapter

This section provides cable routing information for configuration (three 8 x 2.5-inch AnyBay front drive backplanes) with onboard connectors, three retimer cards and one 8i RAID/HBA adapter.

Onboard connectors, three Retimer cards and one 8i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

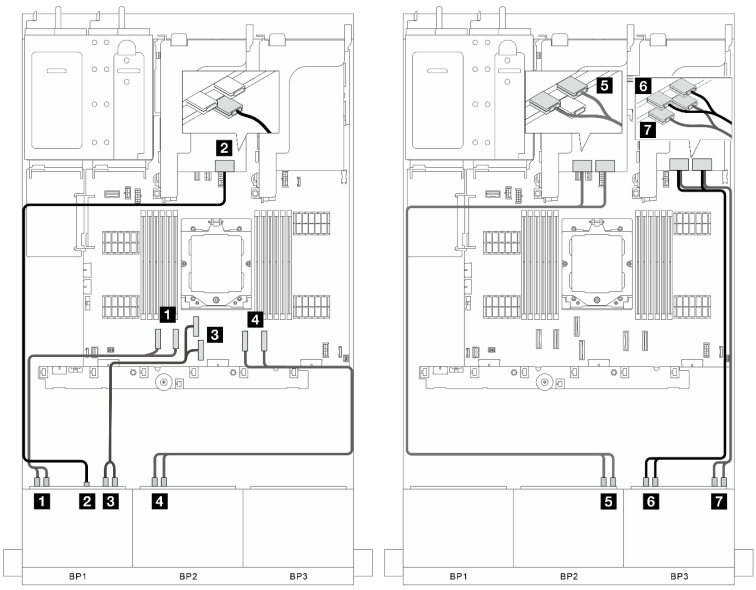


Figure 431. Signal cable routing

From	To
1 BP 1: NVMe 0-1, 2-3	1 Onboard: PCIe 1, 2
2 BP 1: SAS	2 8i adapter: • Gen 4: C0 • Gen 3: C0C1
3 BP 1: NVMe 4-5, 6-7	3 Onboard: PCIe 3, 4
4 BP 2: NVMe 0-1, 2-3	4 Onboard: PCIe 7, 8
5 BP 2: NVMe 4-5, 6-7	5 Retimer card: C0C1 (slot 4)
6 BP 3: NVMe 0-1, 2-3	6 Retimer card: C0C1 (slot 1)
7 BP 3: NVMe 4-5, 6-7	7 Retimer card: C0C1 (slot 2)

Front + middle backplanes: three 8 x AnyBay + two 4 x 2.5 NVMe

This section provides cable routing information for configuration (three 8 x 2.5-inch AnyBay front drive backplanes and two 4 x 2.5-inch NVMe middle drive backplanes) with one retimer card and two switch cards.

One retimer card and two switch cards

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

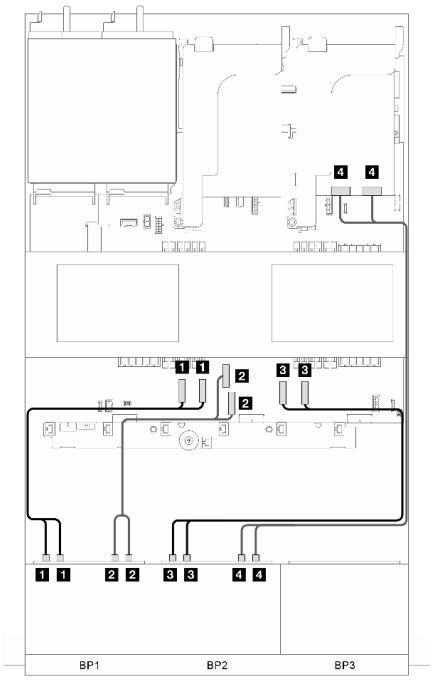


Figure 432. Signal cable routing part 1

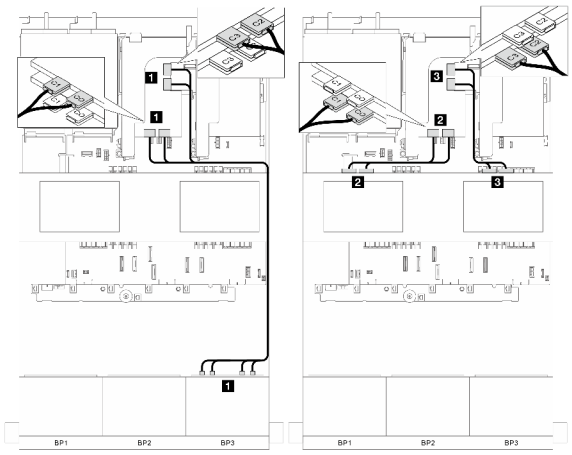


Figure 433. Signal cable routing part 2

From	To	From	From
1 BP 1: NVMe 0-1, 2-3	1 Onboard: PCIe 1, 2	1 BP 3: NVMe 0-1, 2-3, 4-5, 6-7	1 Switch card: C0, C1, C2, C3 (slot 4)
2 BP 1: NVMe 4-5, 6-7	2 Onboard: PCIe 3, 4	2 BP 5: NVMe 0-1, 2-3	2 Switch card: C0C1 (slot 5)
3 BP 2: NVMe 0-1, 2-3	2 Onboard: PCIe 7, 8	3 BP 6: NVMe 0-1, 2-3	3 Switch card: C2C3 (slot 5)
4 BP 2: NVMe 4-5, 6-7	4 Retimer card: C0C1		

One 24 x2.5-inch SAS/SATA expander backplane

This section provides cable routing information for the server model with one 24 x2.5-inch SAS/SATA expander front drive backplane.

To connect power cables for the front backplane(s), refer to “Backplanes: server models with 2.5-inch front drive bays” on page 388.

To connect signal cables for the backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- “Front backplane: One 24 x2.5 SAS/SATA expander” on page 454
- “Front + rear backplanes: One 24 x2.5 SAS/SATA expander + one 4 x2.5 SAS/SATA” on page 455
- “Front + rear backplanes: One 24 x 2.5 SAS/SATA expander + one 4 x 2.5 AnyBay” on page 456
- “Front + rear backplanes: One 24 x2.5 SAS/SATA expander + one 8x2.5 SAS/SATA” on page 457

Front backplane: One 24 x2.5 SAS/SATA expander

This section provides cable routing information for configuration (one 24 x2.5-inch SAS/SATA expander front drive backplane) with one 8i RAID/HBA adapter.

8i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

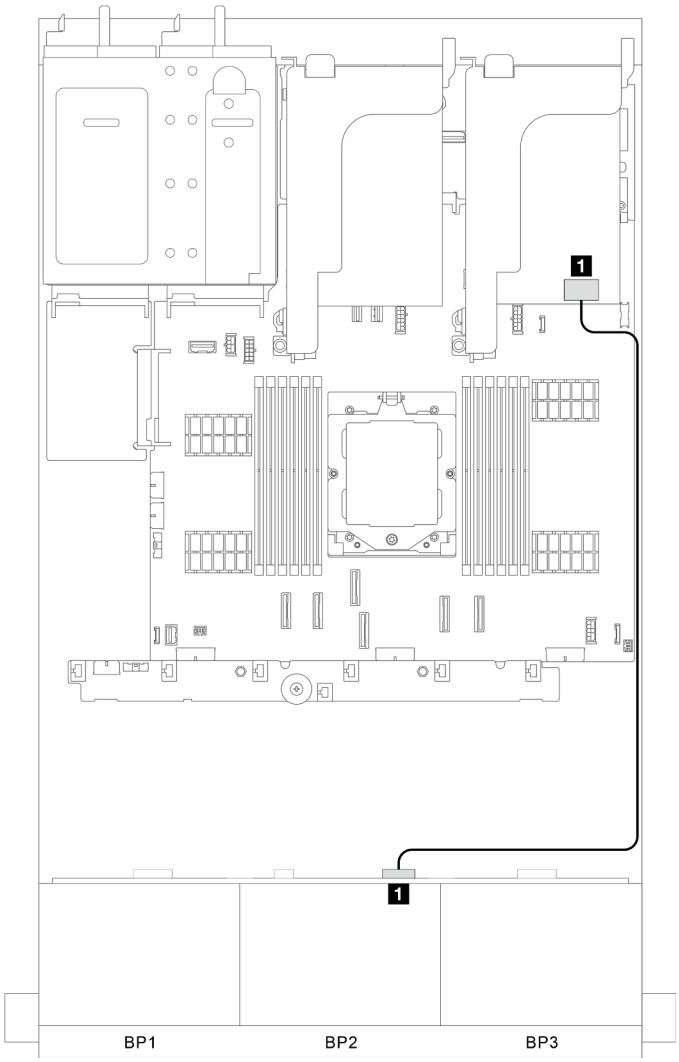


Figure 434. Signal cable routing

From	To
1 Front backplane: SAS 0	1 8i adapter: • Gen 4: C0 • Cen 3: C0C1

Front + rear backplanes: One 24 x2.5 SAS/SATA expander + one 4 x2.5 SAS/SATA

This section provides cable routing information for configuration (one 24 x2.5-inch SAS/SATA expander front drive backplane and one 4 x2.5-inch SAS/SATA rear drive backplane) with one 8i RAID/HBA adapter.

8i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

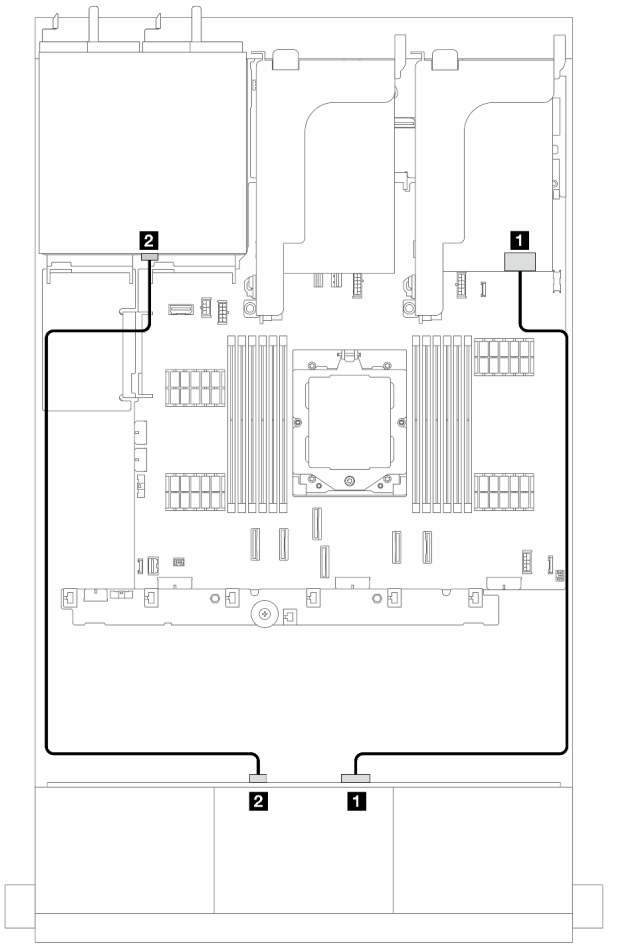


Figure 435. Signal cable routing

From	To
1 Front backplane: SAS 0	1 8i adapter: • Gen 4: C0 • Cen 3: C0C1
2 Front backplane: SAS 1	2 Rear backplane: SAS

Front + rear backplanes: One 24 x 2.5 SAS/SATA expander + one 4 x 2.5 AnyBay

This section provides cable routing information for configuration (one 24 x 2.5-inch SAS/SATA expander front drive backplane and one 4 x 2.5-inch AnyBay rear drive backplane) with one 8i RAID/HBA adapter.

8i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

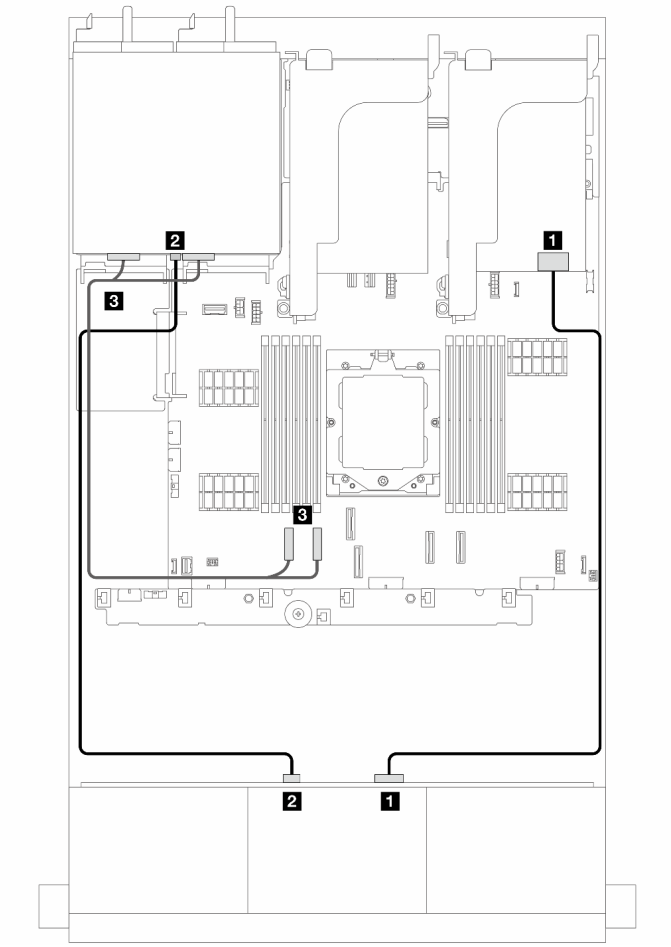


Figure 436. Signal cable routing

From	To
1 Front backplane: SAS 0	1 8i adapter: • Gen 4: C0 • Cen 3: C0C1
2 Front backplane: SAS 1	2 Rear backplane: SAS
3 Onboard: PCIe 7, 8	3 Rear backplane: NVMe 0-1, 2-3

Front + rear backplanes: One 24 x2.5 SAS/SATA expander + one 8x2.5 SAS/SATA

This section provides cable routing information for configuration (one 24 x2.5-inch SAS/SATA expander front drive backplane and one 8 x2.5-inch SAS/SATA rear drive backplane) with one 16i RAID/HBA adapter.

16i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

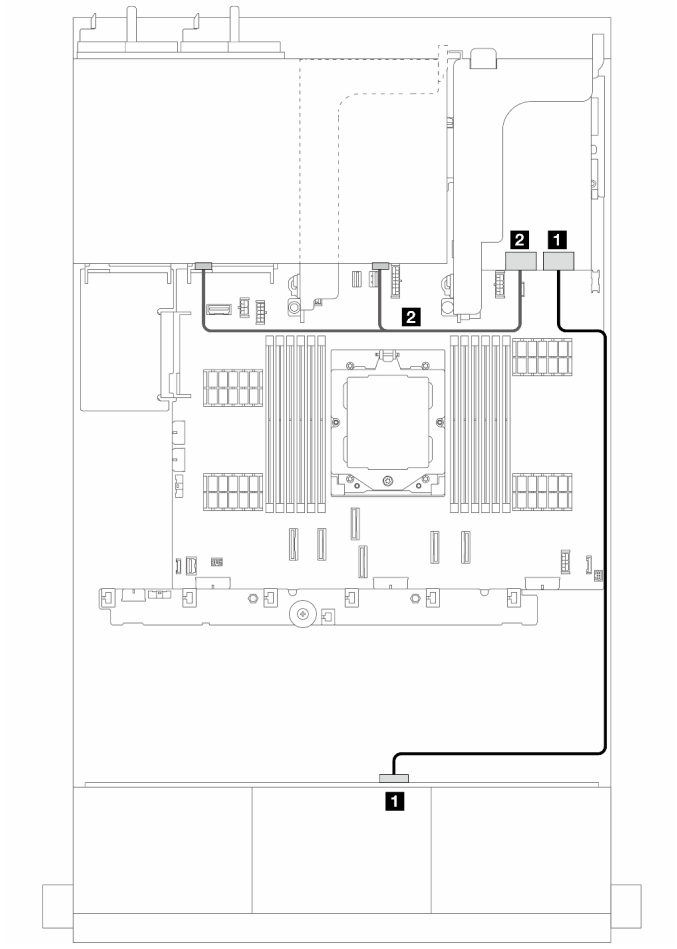


Figure 437. Signal cable routing

From	To
1 Front backplane: SAS 0	1 16i adapter: • Gen 4: C0 • Cen 3: C0C1
2 Rear backplane: SAS 0 and SAS 1	2 16i adapter: • Gen 4: C1 • Cen 3: C2C3

Backplanes: server models with 3.5-inch front drive bays

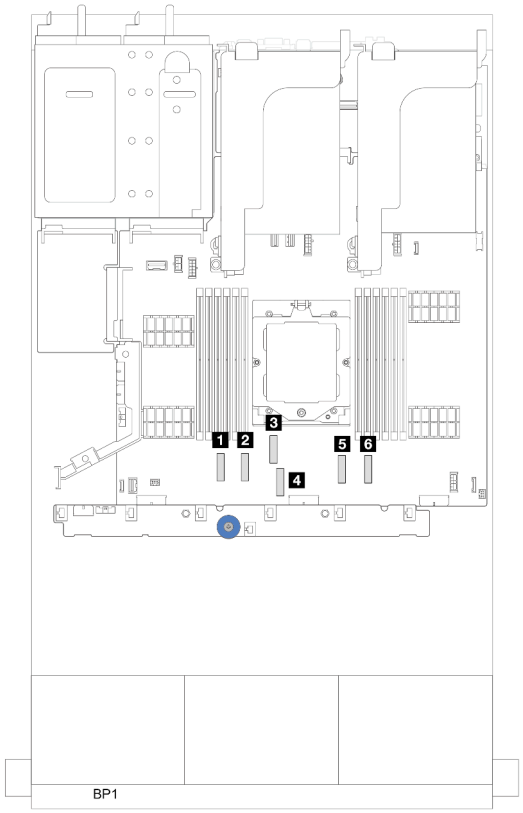
This section provides backplane cable connection information for server models with 3.5-inch front drive bays.

Before you start

Ensure below parts are removed before starting cable routing for front backplanes.

- Top cover (see “Remove the top cover” on page 342)
- Air baffle (see “Remove the air baffle” on page 76)
- Fan cage (see “Remove the system fan cage” on page 335)

Notes: For the server with a performance heat sink (T-shape), remove the heat sink first before disconnecting or connecting the cables which connect to PCIe 1, PCIe 2, PCIe 3, PCIe 4, PCIe 7, or PCIe 8 connectors (see the table below). After disconnecting or connecting the cables, install the heat sink back to the server. See “Remove a heat sink” on page 256 and “Install a heat sink” on page 261



- **1 PCIe 1 Connector**
- **2 PCIe 2 Connector**
- **3 PCIe 4 Connector**
- **4 PCIe 3 Connector**
- **5 PCIe 7 Connector**
- **6 PCIe 8 Connector**

Power cable connections

For the 3.5-inch drive bay chassis, the following backplanes are supported and connect the power cables for the supported drive backplanes as illustrated.

Table 28. Supported backplanes

Front drive backplane	Middle drive backplane	Rear drive backplane
• 8 x 3.5-inch SAS/SATA backplane • 12 x 3.5-inch SAS/SATA backplane • 12 x 3.5-inch AnyBay backplane • 12 x 3.5-inch SAS/SATA expander backplane	• 4 x 2.5-inch SAS/SATA backplane • 4 x 2.5-inch NVMe backplane • 4 x 2.5-inch AnyBay backplane • 4 x 3.5-inch SAS/SATA backplane	• 2 x 3.5-inch SAS/SATA backplane • 4 x 3.5-inch SAS/SATA backplane • 4 x 2.5-inch AnyBay backplane

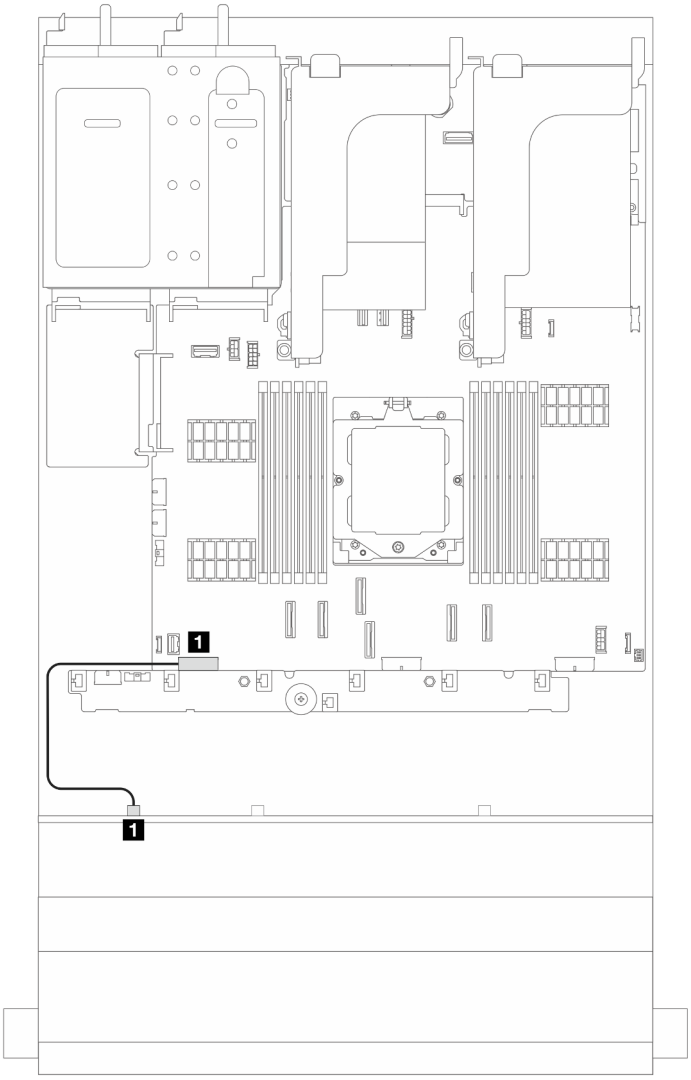


Figure 438. Power cable routing for the 8 x 3.5-inch SAS/SATA drive backplane

From	To
1 Power connector on the backplane	1 Backplane 1 power connector on the system board assembly

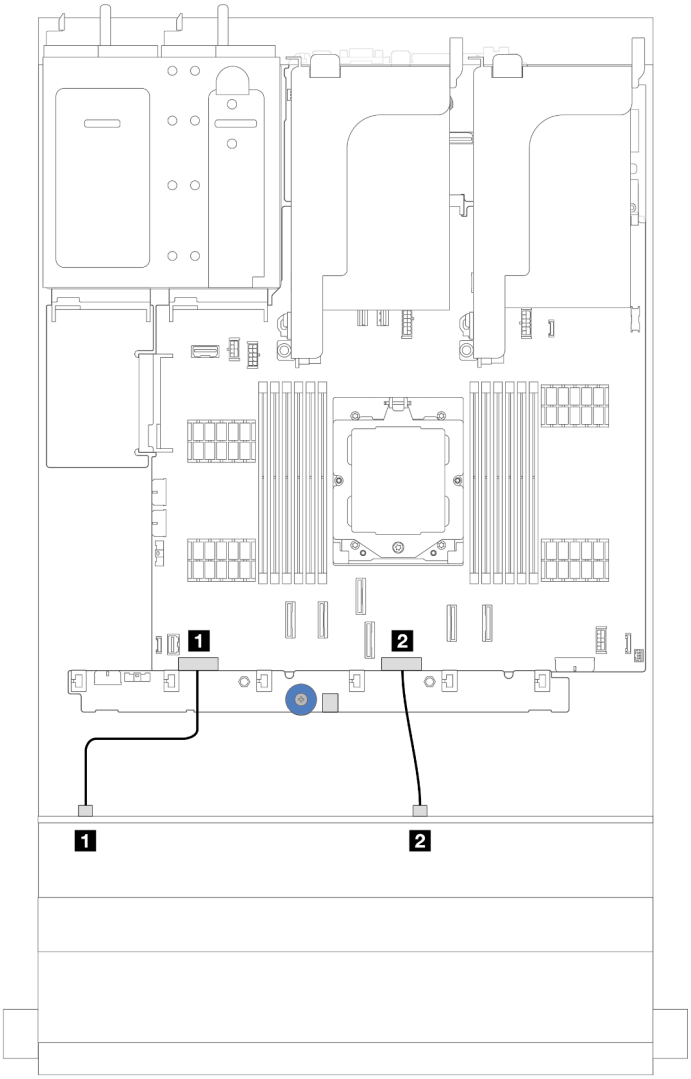


Figure 439. Power cable routing for the 12 x 3.5-inch SAS/SATA and AnyBay drive backplane

From	To
1 Power connector 1 on the backplane	1 Backplane 1 power connector on the system board assembly
2 Power connector 2 on the backplane	2 Backplane 2 power connector on the system board assembly

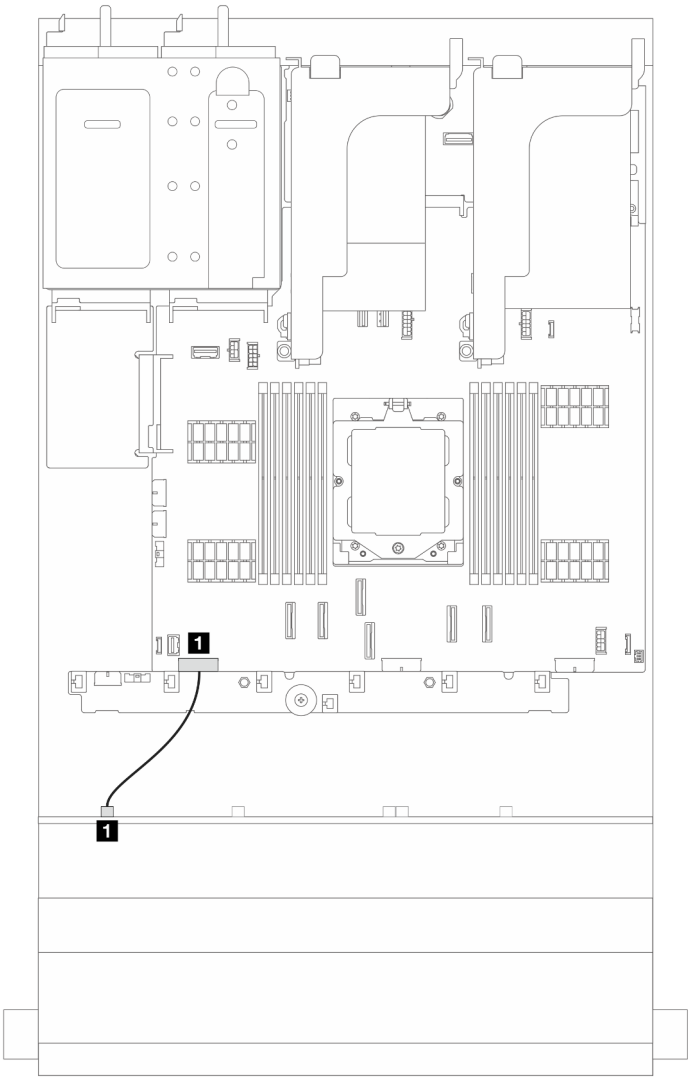


Figure 440. Power cable routing for the 12 x 3.5-inch SAS/SATA expander front drive backplane

From	To
1 Power connector on the backplane	1 Backplane 1 power connector on the system board assembly

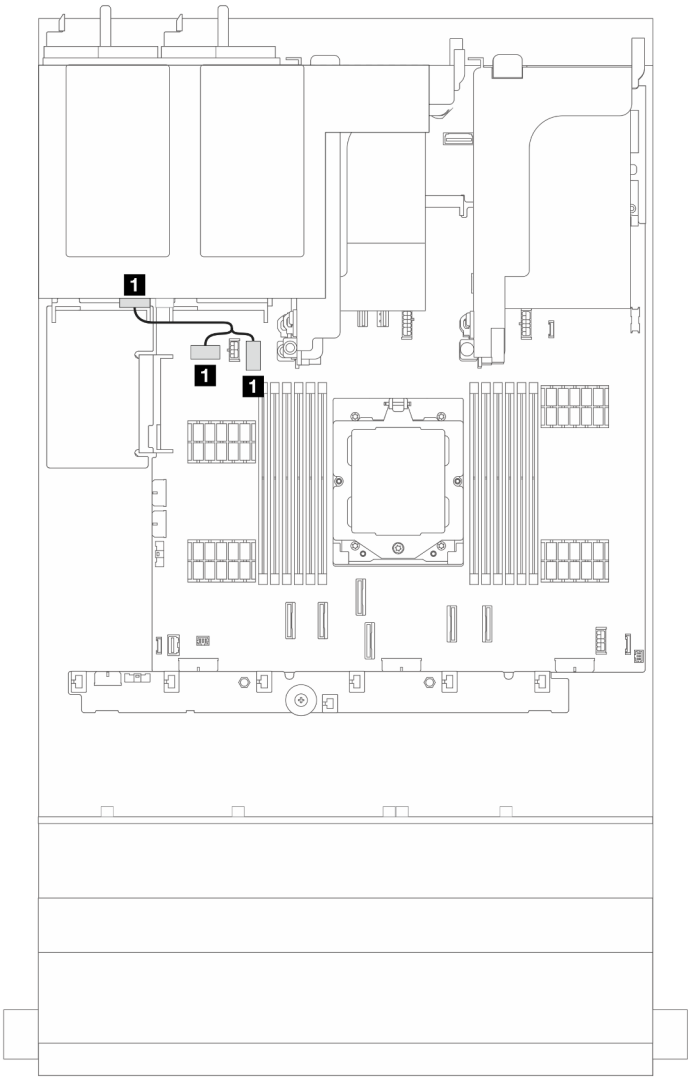


Figure 441. Power cable routing for the 2 x 3.5-inch and 4 x 2.5-inch rear drive backplane

From	To
1 Power connector on the backplane	1 Rear backplane power connector and sideband connector on the system board assembly

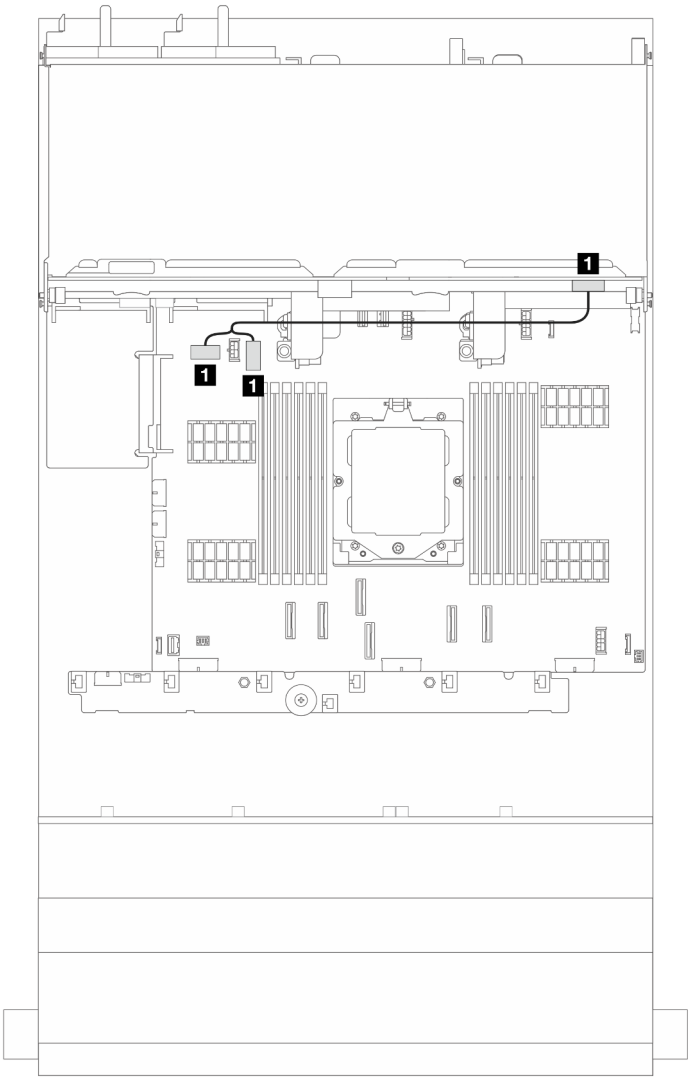


Figure 442. Power cable routing for the 4 x 3.5-inch rear drive backplane

From	To
1 Power connector on the backplane	1 Rear backplane power connector and sideband connector on the system board assembly

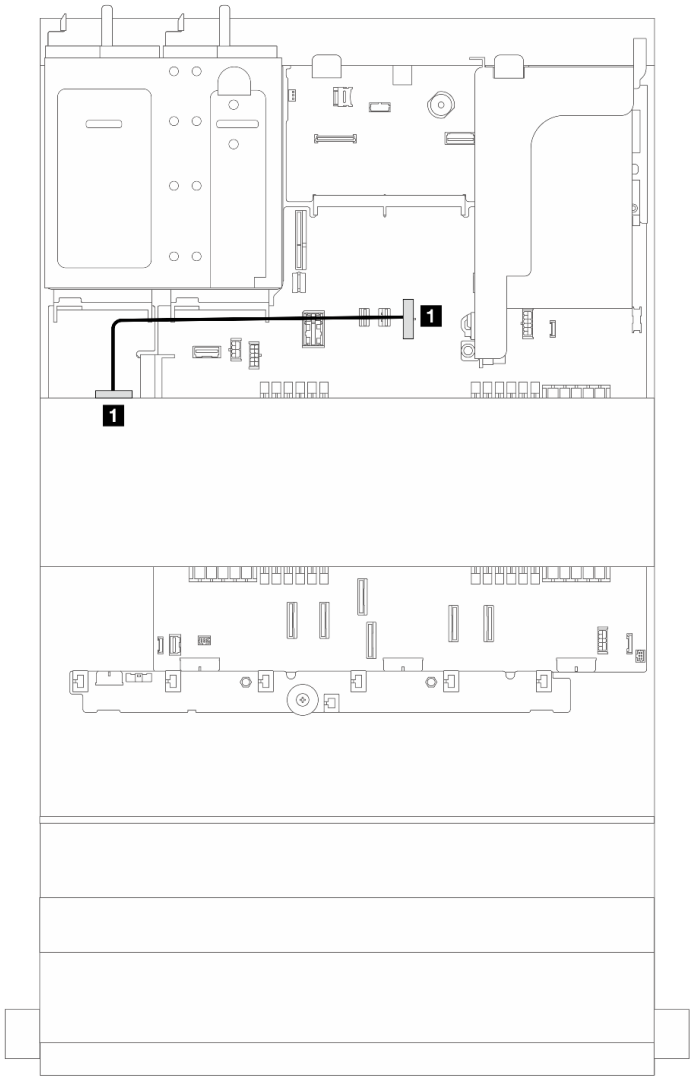


Figure 443. Power cable routing for one 4 x 2.5-inch or 4 x 3.5-inch middle drive backplane

From	To
1 Power connector on the backplane	1 Middle backplane power connector on the system board assembly

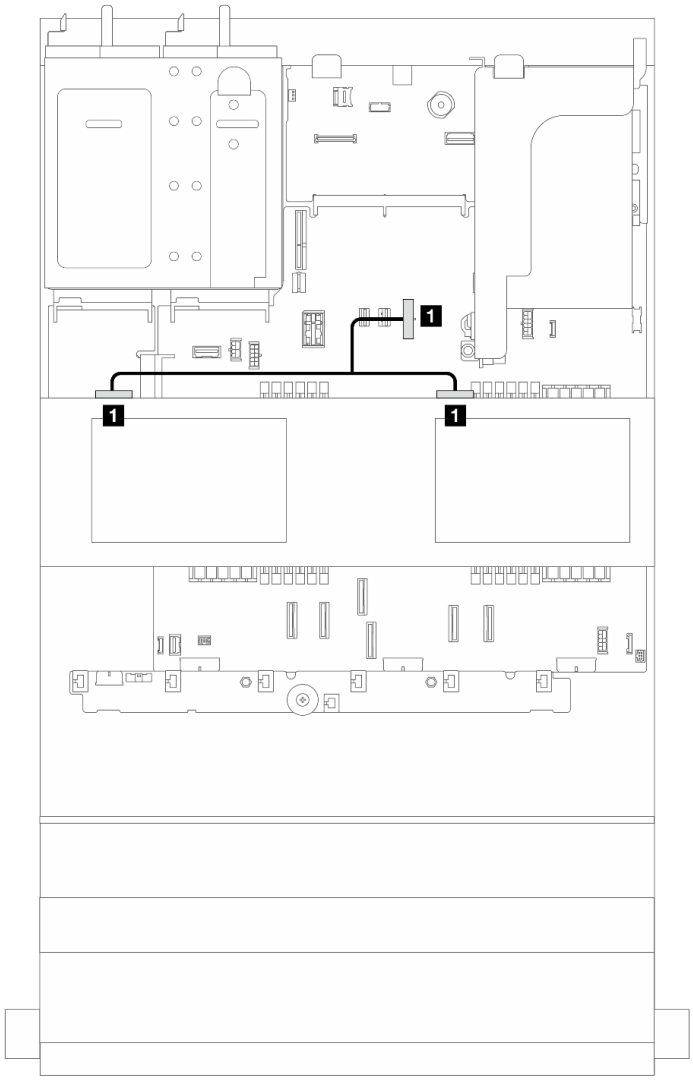


Figure 444. Power cable routing two 4 x 2.5-inch middle drive backplanes

From	To
1 Power connectors on the backplanes	1 Middle backplane power connector on the system board assembly

Signal cable connections

Refer to the specific topic for signal cable connections depending on the backplane installed.

- “8 x 3.5-inch SAS/SATA backplane” on page 467
- “12 x 3.5-inch AnyBay backplane” on page 470
- “12 x 3.5-inch SAS/SATA backplane” on page 474
- “12 x 3.5-inch SAS/SATA expander backplane” on page 486

8 x 3.5-inch SAS/SATA backplane

This section provides cable routing information for the server model with the 8 x 3.5-inch SAS/SATA front drive backplane.

To connect power cables for the front backplane(s), refer to “Backplanes: server models with 3.5-inch front drive bays” on page 459.

To connect signal cables for the backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- “Onboard connectors” on page 467
- “8i RAID/HBA adapter” on page 468

Onboard connectors

This section provides cable routing information for configuration (8 x 3.5-inch SAS/SATA front drive backplane) with onboard connectors.

Onboard connectors

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

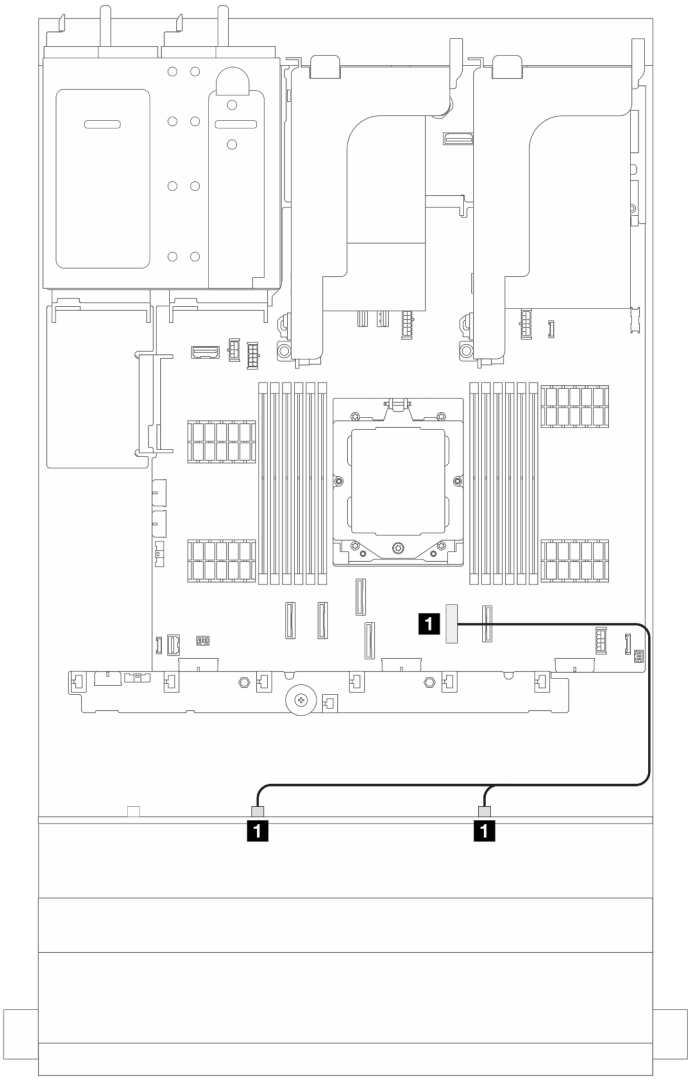


Figure 445. Signal cable routing

From	To
1 Front backplane: SAS 0 and SAS 1	1 Onboard: PCIe 7

8i RAID/HBA adapter

This section provides cable routing information for configuration (8 x 3.5-inch SAS/SATA front drive backplane) with one 8i RAID/HBA adapter.

8i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

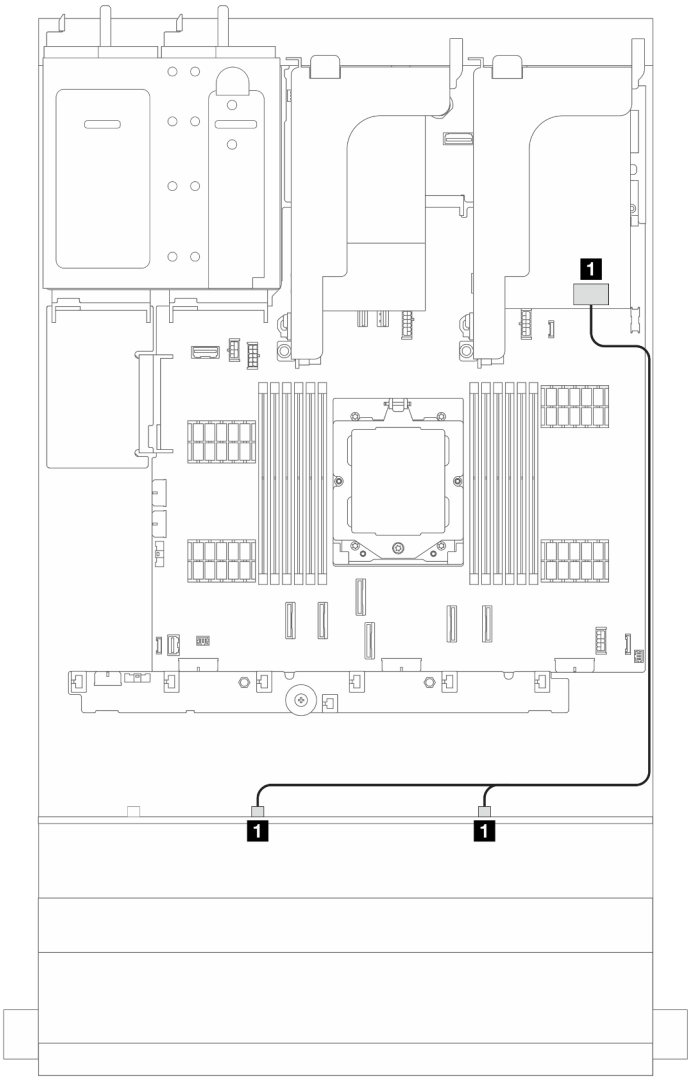


Figure 446. Signal cable routing

From	To
1 Front backplane: SAS 0 and SAS 1	1 8i adapter: • Gen 4: C0 • Gen 3: C0C1

12 x 3.5-inch AnyBay backplane

This section provides cable routing information for the server model with the 12 x 3.5-inch AnyBay front drive backplane.

To connect power cables for the front backplane(s), refer to “Backplanes: server models with 3.5-inch front drive bays” on page 459.

To connect signal cables for the backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- “Onboard connectors” on page 470
- “Onboard connectors + 8i RAID/HBA adapter” on page 471
- “Onboard connectors + 16i RAID/HBA adapter” on page 472

Onboard connectors

This section provides cable routing information for configuration (12 x 3.5-inch AnyBay front drive backplane) with onboard connectors.

Onboard connectors

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

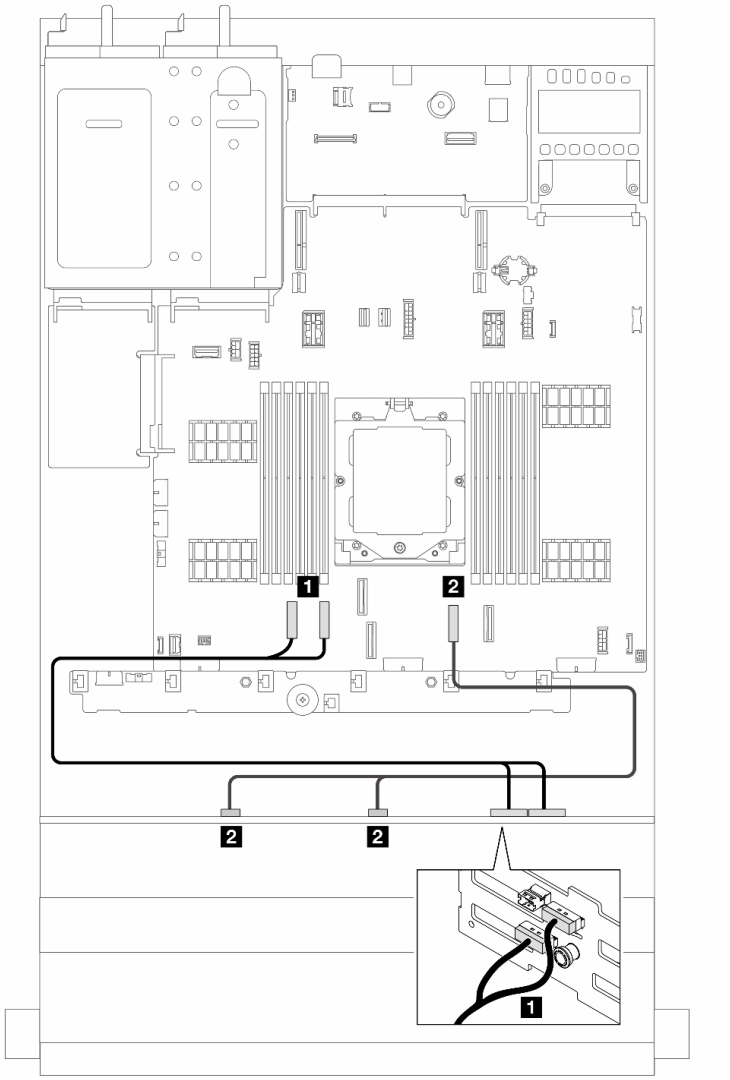


Figure 447. Signal cable routing

From	To
1 Front backplane: NVMe 8-9, 10-11	1 Onboard: PCIe 1, 2
2 Front backplane: SAS 0, SAS 1	2 Onboard: PCIe 7

Onboard connectors + 8i RAID/HBA adapter

This section provides cable routing information for configuration (12 x 3.5-inch AnyBay front drive backplane) with onboard connectors and one 8i RAID/HBA adapter.

Onboard connectors and one 8i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

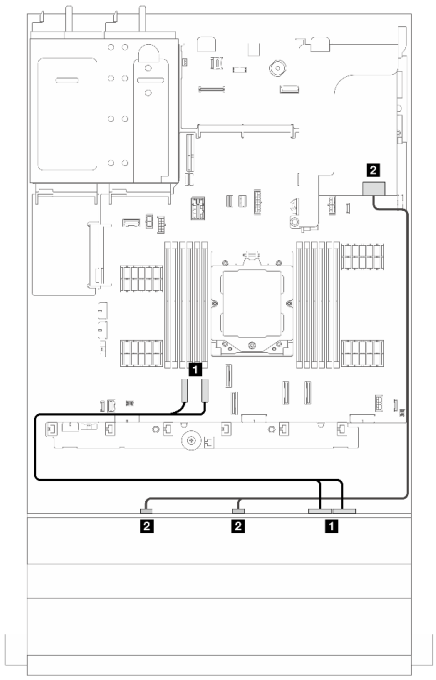


Figure 448. Signal cable routing

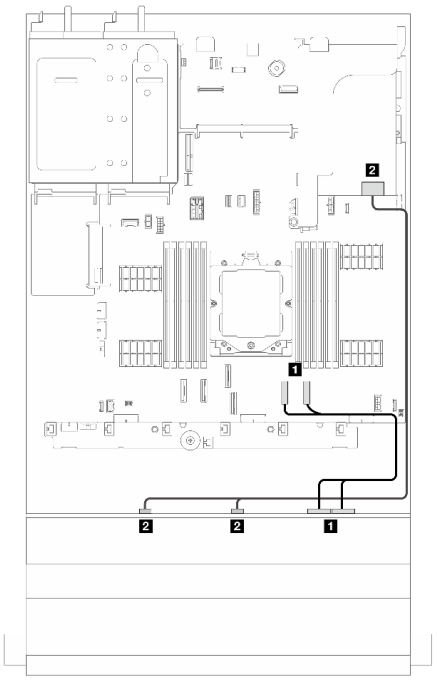


Figure 449. Signal cable routing (support riser 3)

From	To
1 Front backplane: NVMe 8-9, 10-11	1 Onboard: PCIe 1, 2
2 Front backplane: SAS 0, SAS 1	2 8i adapter: • Gen 4: C0 • Gen 3: C0C1

From	To
1 Front backplane: NVMe 8-9, 10-11	1 Onboard: PCIe 7, 8
2 Front backplane: SAS 0, SAS 1	2 8i adapter: • Gen 4: C0 • Gen 3: C0C1

Onboard connectors + 16i RAID/HBA adapter

This section provides cable routing information for configuration (12 x 3.5-inch AnyBay front drive backplane) with onboard connectors and one 16i RAID/HBA adapter.

Onboard connectors and one 16i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

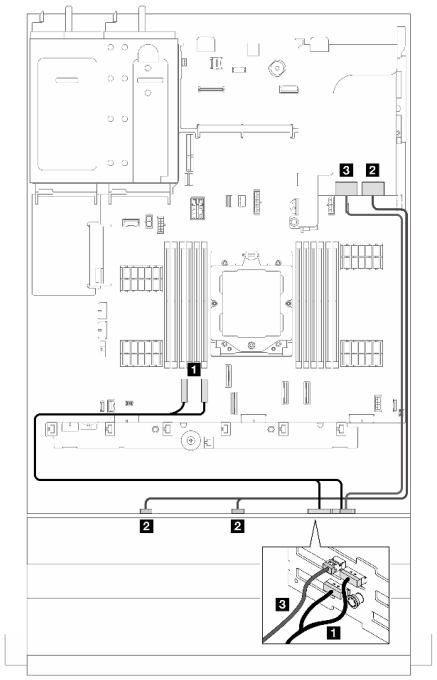


Figure 450. Signal cable routing

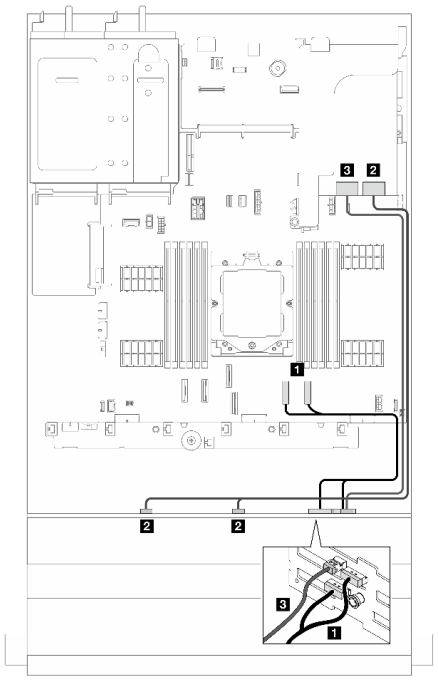


Figure 451. Signal cable routing (support riser 3)

From	To
1 Front backplane: NVMe 8-9, 10-11	1 Onboard: PCIe 1, 2
2 Front backplane: SAS 0, SAS 1	2 16i adapter: • Gen 4: C0 • Gen 3: C0C1
3 Front back plane: SAS 2	3 16i adapter: • Gen 4: C1 • Gen 3: C2

From	To
1 Front backplane: NVMe 8-9, 10-11	1 Onboard: PCIe 7, 8
2 Front backplane: SAS 0, 1	2 16i adapter: • Gen 4: C0 • Gen 3: C0C1
3 Front back plane: SAS 2	3 16i adapter: • Gen 4: C1 • Gen 3: C2

12 x 3.5-inch SAS/SATA backplane

This section provides cable routing information for the server model with the 12 x 3.5-inch SAS/SATA front drive backplane.

To connect power cables for the front backplane(s), refer to “Backplanes: server models with 3.5-inch front drive bays” on page 459.

To connect signal cables for the backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- “Front backplane: 12 x 3.5" SAS/SATA” on page 474
- “Front + rear backplanes: 12 x 3.5-inch SAS/SATA + 2 x 3.5-inch SAS/SATA” on page 476
- “Front + rear backplanes: 12 x 3.5-inch SAS/SATA + 4 x 3.5-inch SAS/SATA” on page 478
- “Front + rear backplanes: 12 x 3.5-inch SAS/SATA + 4 x 2.5-inch AnyBay” on page 481
- “Front + middle backplanes: 12 x 3.5-inch SAS/SATA + 4 x 2.5/4 x 3.5-inch SAS/SATA” on page 482
- “Front + middle backplanes: 12 x 3.5-inch SAS/SATA + two 4x 2.5-inch NVMe/AnyBay” on page 483
- “Front + middle + rear backplanes: 12 x 3.5-inch SAS/SATA + 4 x 3.5-inch SAS/SATA + 4 x 3.5-inch SAS/SATA” on page 484

Front backplane: 12 x 3.5" SAS/SATA

This topic provides cable routing information for the server model with the 12 x 3.5-inch SAS/SATA front drive backplane.

- “Onboard connectors” on page 474
- “16i RAID/HBA adapter” on page 475

Onboard connectors

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

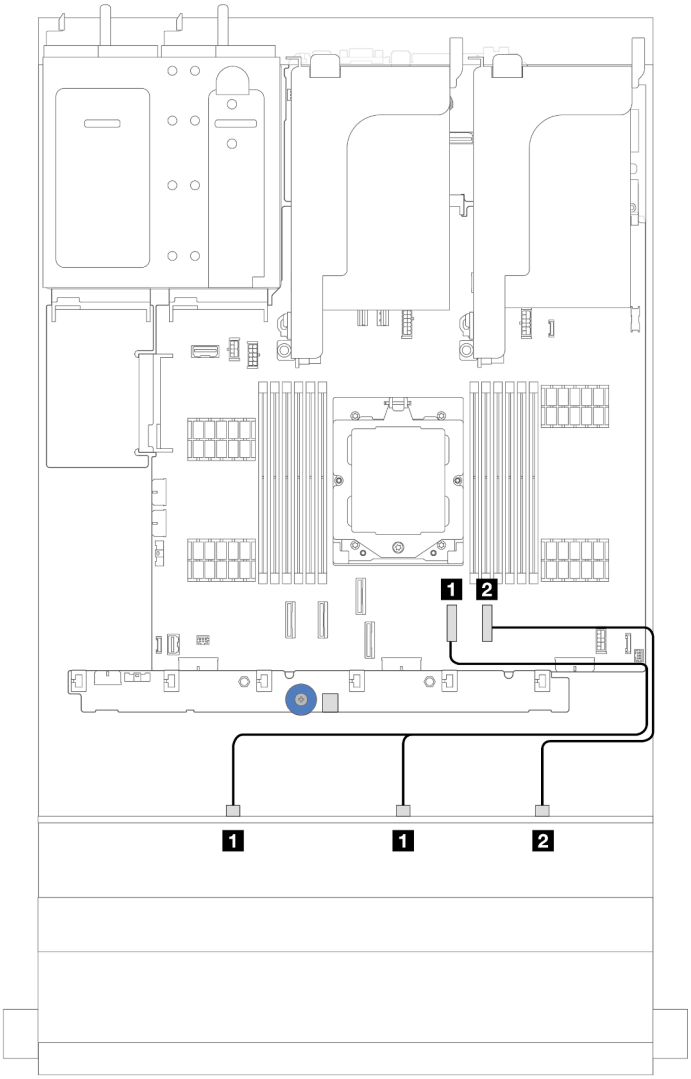


Figure 452. Cable routing for the 12 x 3.5-inch SAS/SATA configuration with onboard connectors

From	To
1 Backplane 1: SAS 0, SAS 1	1 Onboard: SATA 0
2 Backplane 1: SAS 2	2 Onboard: SATA 1

16i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

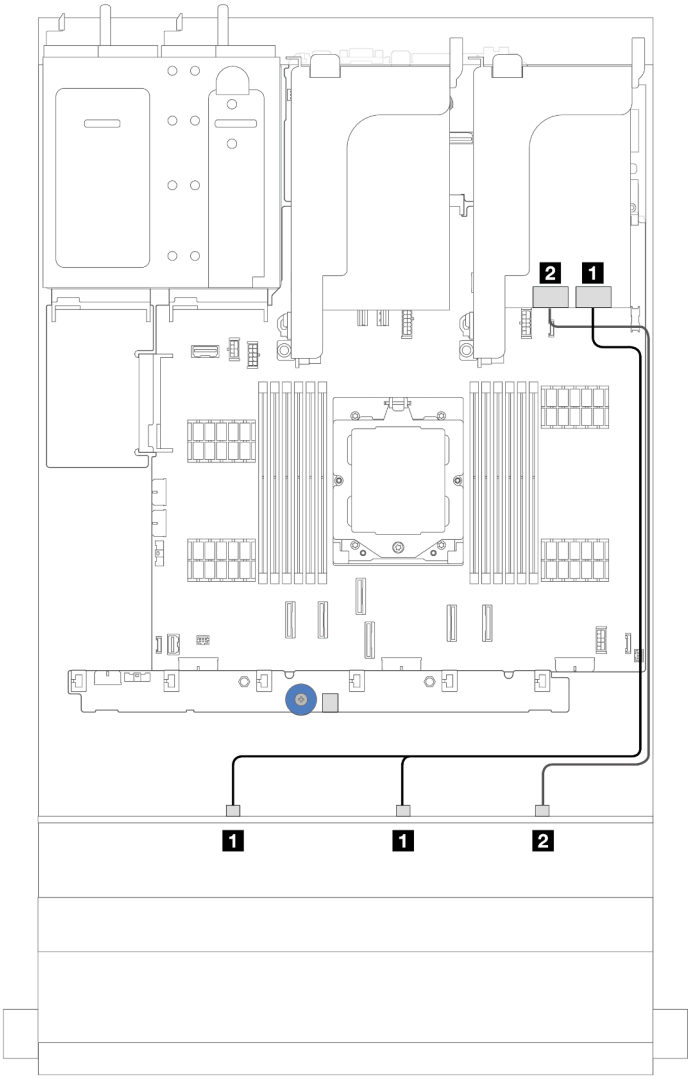


Figure 453. Cable routing for the 12 x 3.5-inch SAS/SATA configuration with one 16i RAID/HBA adapter

From	To
1 Backplane 1: SAS 0, SAS 1	1 16i adapter • Gen 4: C0 • Gen 3: C0C1
2 Backplane 1: SAS 2	2 16i adapter • Gen 4: C1 • Gen 3: C2

Front + rear backplanes: 12 x 3.5-inch SAS/SATA + 2 x 3.5-inch SAS/SATA

This section provides cable routing information for the server model with one 12 x 3.5-inch SAS/SATA front drive backplane and one 2 x 3.5-inch SAS/SATA rear drive backplane.

- "Onboard connectors" on page 477
- "16i RAID/HBA adapter" on page 477

Onboard connectors

This section provides cable routing information for configuration (12 x 3.5-inch SAS/SATA expander front drive backplane and 2 x 3.5-inch SAS/SATA rear drive backplane) with onboard connectors.

Onboard connectors

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

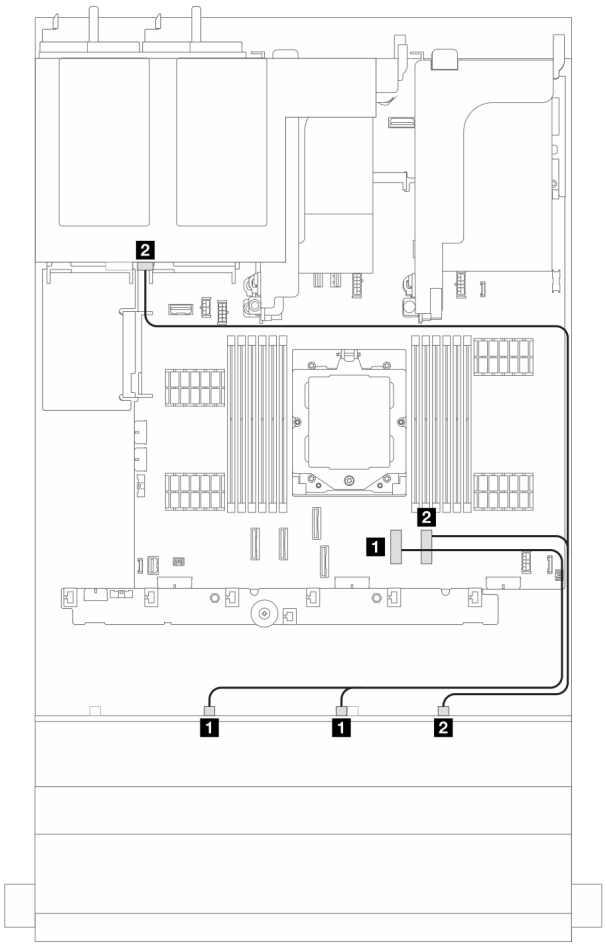


Figure 454. signal cable routing

From	To
1 Front backplane: SAS 0, SAS 1	1 Onboard: PCIe 7
2 Front backplane SAS 2 and rear backplane SAS	2 Onboard: PCIe 8

16i RAID/HBA adapter

This section provides cable routing information for configuration (12 x 3.5-inch SAS/SATA expander front drive backplane and 2 x 3.5-inch SAS/SATA rear drive backplane) with one 16i RAID/HBA adapter.

16i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

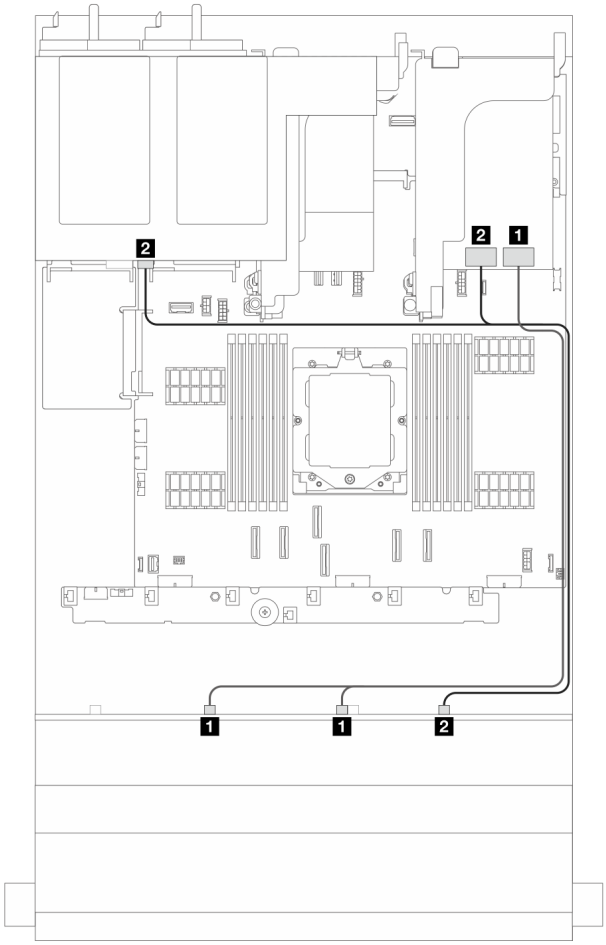


Figure 455. Signal cable routing

From	To
1 Front backplane: SAS 0, SAS 1	1 16i adapter: • Gen 4: C0 • Gen 3: C0C1
2 Front backplane: SAS 2 and rear backplane SAS	2 16i adapter: • Gen 4: C1 • Gen 3: C2C3

Front + rear backplanes: 12 x 3.5-inch SAS/SATA + 4 x 3.5-inch SAS/SATA

This section provides cable routing information for the server model with one 12 x 3.5-inch SAS/SATA front drive backplane and one 4 x 3.5-inch SAS/SATA rear drive backplane.

- "Onboard connectors" on page 478
- "Onboard connectors + 940-8i adapter" on page 479
- "16i RAID/HBA adapter" on page 480

Onboard connectors

This section provides cable routing information for configuration (12 x 3.5-inch SAS/SATA front drive backplane and 4 x 3.5-inch SAS/SATA rear drive backplane) with onboard connectors.

Onboard connectors

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

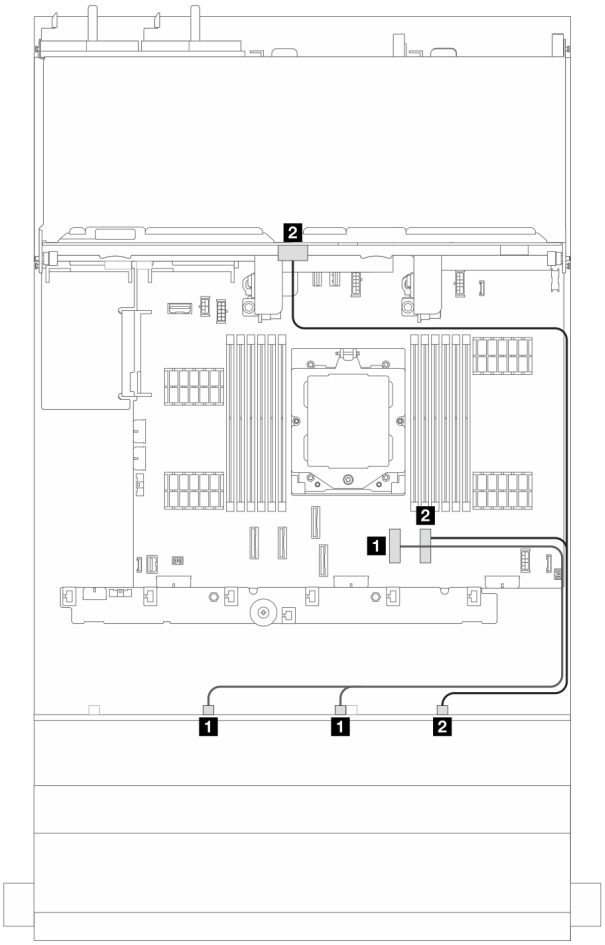


Figure 456. Signal cable routing

From	To
1 Front backplane: SAS 0, SAS 1	1 Onboard: PCIe 7
2 Front backplane SAS 2 and rear backplane SAS	2 Onboard: PCIe 8

Onboard connectors + 940-8i adapter

This section provides cable routing information for configuration (12 x 3.5-inch SAS/SATA front drive backplane and 4 x 3.5-inch SAS/SATA rear drive backplane) with onboard connectors and one 940-8i adapter.

Onboard connectors + 940-8i adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

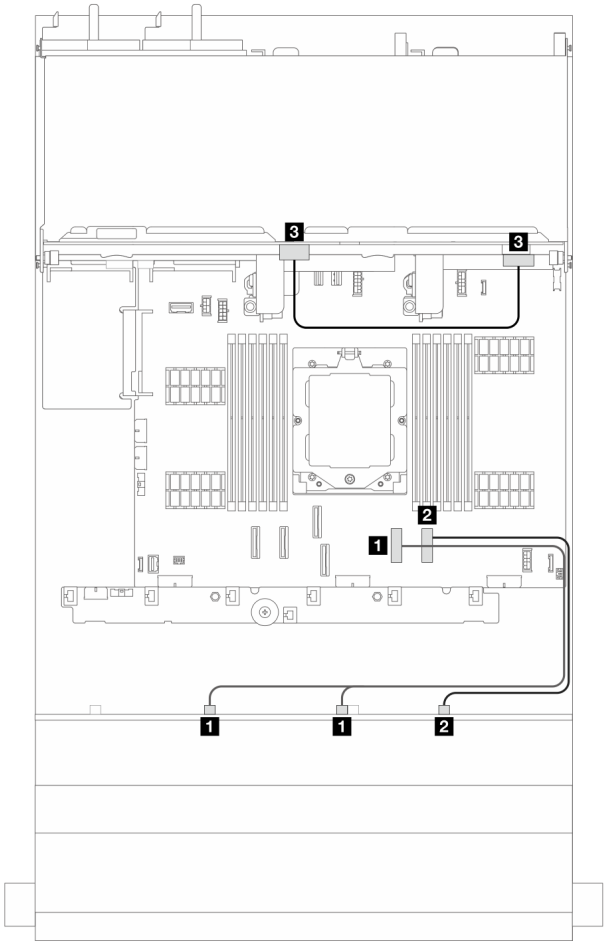


Figure 457. Signal cable routing

From	To
1 Front backplane: SAS 0, SAS 1	1 Onboard: PCIe 7
2 Front backplane: SAS 2	2 Onboard: PCIe 8
3 Rear backplane: SAS	3 8i adapter: C0

16i RAID/HBA adapter

This section provides cable routing information for configuration (12 x 3.5-inch SAS/SATA front drive backplane and 4 x 3.5-inch SAS/SATA rear drive backplane) with one 16i RAID/HBA adapter.

16i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

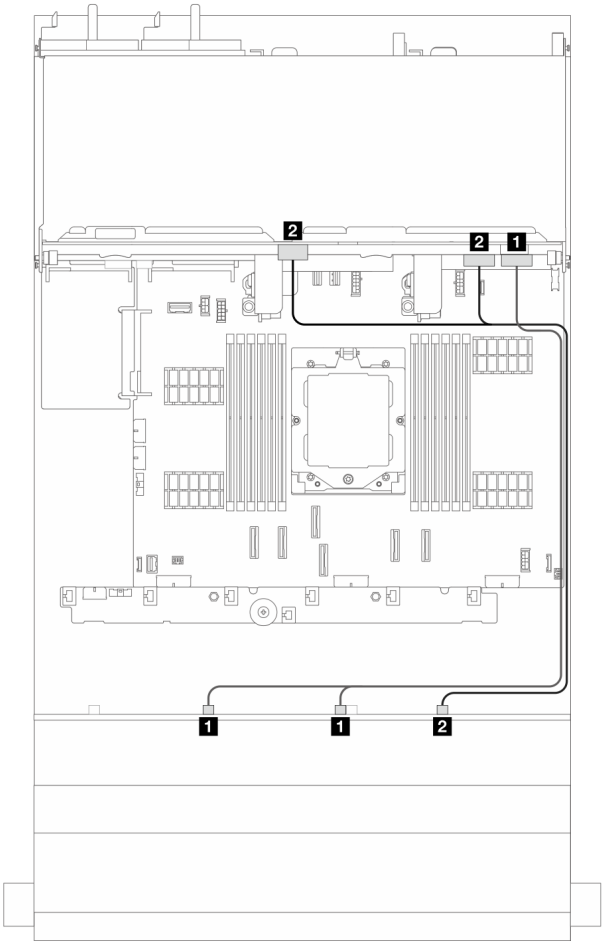


Figure 458. Signal cable routing

From	To
1 Front backplane: SAS 0, SAS 1	1 16i adapter: • Gen 4: C0 • Gen 3: C0C1
2 Front backplane SAS 2 and rear backplane SAS	2 16i adapter: • Gen 4: C1 • Gen 3: C2C3

Front + rear backplanes: 12 x 3.5-inch SAS/SATA + 4 x 2.5-inch AnyBay

This section provides cable routing information for configuration (12 x 3.5-inch SAS/SATA front drive backplane and 4 x 2.5-inch AnyBay rear drive backplane) with onboard connectors and one 16i RAID/HBA adapter.

Onboard connectors and one 16i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

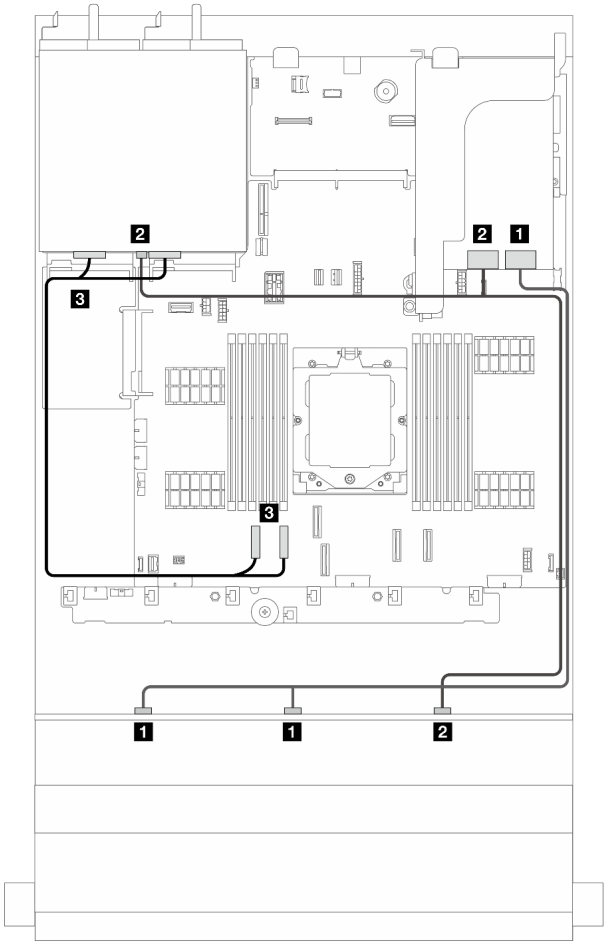


Figure 459. Signal cable routing

From	To
1 Front backplane: SAS 0, SAS 1	1 16i adapter: • Gen 4: C0 • Gen 3: C0C1
2 Front backplane SAS 2 and rear backplane SAS	2 16i adapter: • Gen 4: C1 • Gen 3: C2C3
3 Onboard: PCIe 1, 2	3 Rear backplane: NVMe 0-1, 2-3

Front + middle backplanes: 12 x 3.5-inch SAS/SATA + 4 x 2.5/4 x 3.5-inch SAS/SATA

This section provides cable routing information for configuration (12 x 3.5-inch SAS/SATA front drive backplane and 4 x 2.5-inch or 4 x 3.5-inch SAS/SATA middle drive backplane) with one 16i RAID/HBA adapter.

16i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

Note: The illustration below uses the 4 x 3.5-inch SAS/SATA rear drive backplane as an example, and cable routing for the 4 x 2.5-inch SAS/SATA rear drive backplane is similar.

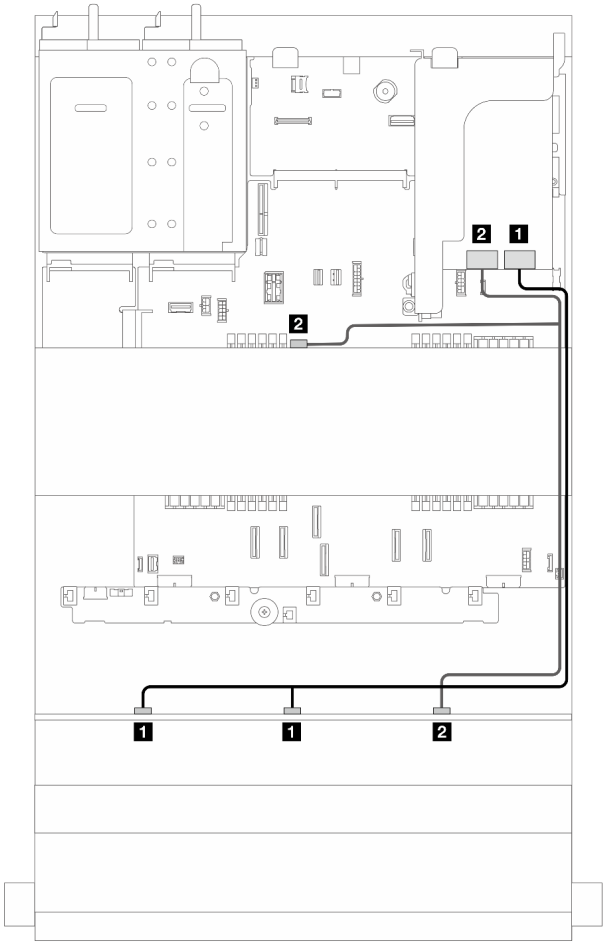


Figure 460. Signal cable routing

From	To
1 Front backplane: SAS 0, SAS 1	1 16i adapter: • Gen 4: C0 • Gen 3: C0C1
2 Front backplane SAS 2 and middle backplane SAS	2 16i adapter: • Gen 4: C1 • Gen 3: C2C3

Front + middle backplanes: 12 x 3.5-inch SAS/SATA + two 4x 2.5-inch NVMe/AnyBay

This section provides cable routing information for configuration (one 12 x 3.5-inch SAS/SATA front drive backplane and two 4 x 2.5-inch NVMe/AnyBay rear drive backplanes) with onboard connectors and one 16i RAID/HBA adapter.

Onboard connectors and 16i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

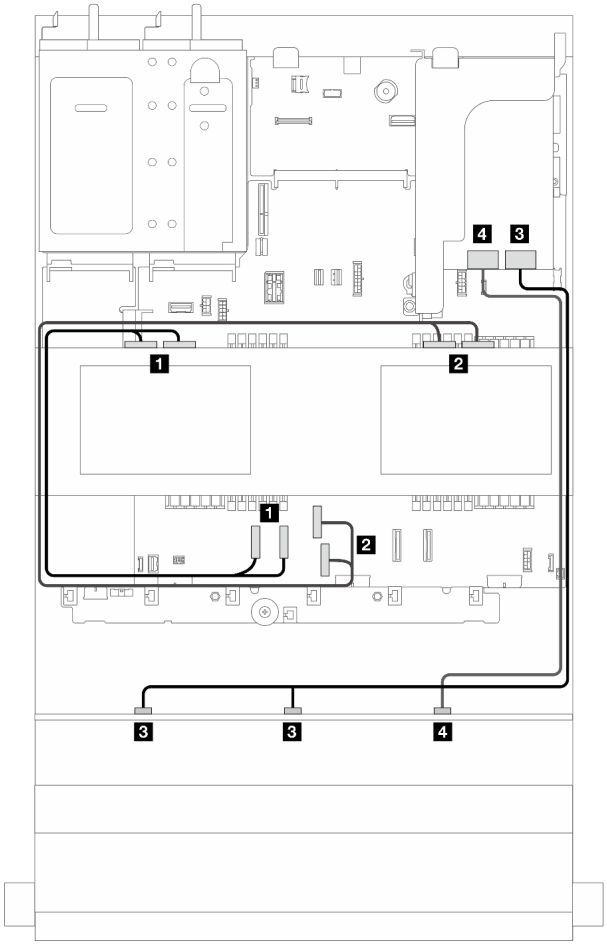


Figure 461. Signal cable routing

From	To
1 Backplane 5: NVMe 0-1, 2-3	1 Onboard: PCIe 1, 2
2 Backplane 6: NVMe 0-1, 2-3	2 Onboard: PCIe 3, 4
3 Front backplane: SAS 0, SAS 1	3 16i adapter: • Gen 4: C0 • Gen 3: C0C1
4 Front backplane: SAS 2	4 16i adapter: • Gen 4: C1 • Gen 3: C2

Front + middle + rear backplanes: 12 x 3.5-inch SAS/SATA + 4 x 3.5-inch SAS/SATA + 4 x 3.5-inch SAS/SATA

This section provides cable routing information for configuration (one 12 x 3.5-inch SAS/SATA front drive backplane, one 4 x 3.5-inch SAS/SATA middle drive backplane, and one 4 x 3.5-inch SAS/SATA rear drive backplane) with one 32i RAID/RAID adapter.

32i RAID/RAID adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

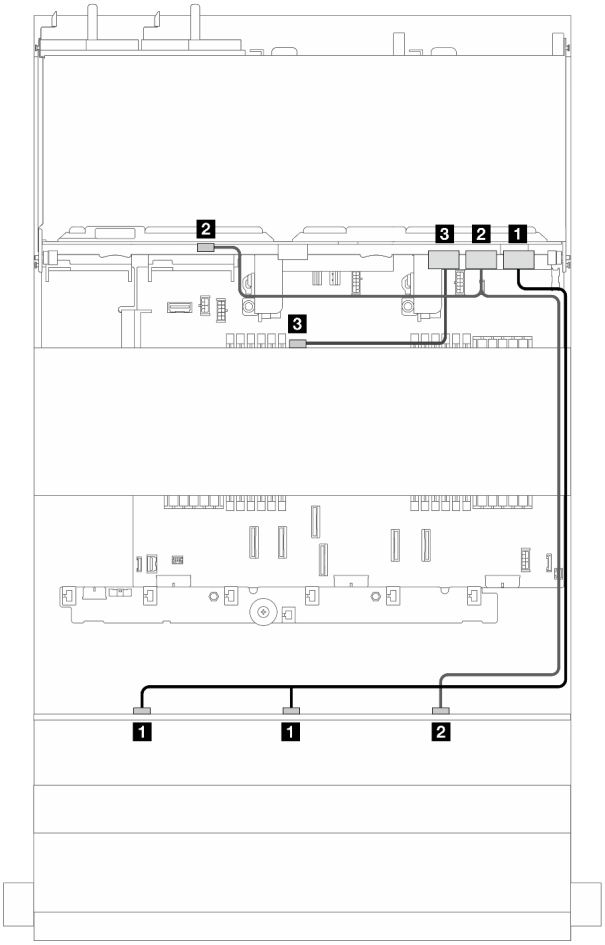


Figure 462. Signal cable routing

From	To
1 Front backplane: SAS 0, SAS 1	1 32i adapter: C0
2 Front backplane SAS 2 and rear backplane SAS	2 32i adapter: C1
3 Middle backplane: SAS	3 32i adapter: C2

12 x 3.5-inch SAS/SATA expander backplane

This section provides cable routing information for the server model with the 12 x 3.5-inch SAS/SATA expander front drive backplane.

To connect power cables for the front backplane(s), refer to “Backplanes: server models with 3.5-inch front drive bays” on page 459.

To connect signal cables for the backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- “Front backplane: 12 x 3.5-inch SAS/SATA expander” on page 486
- “Front + rear backplanes: 12 x 3.5-inch SAS/SATA expander + 2 x 3.5-inch SAS/SATA” on page 487
- “Front + rear backplanes: 12 x 3.5-inch SAS/SATA expander + 4 x 2.5-inch AnyBay” on page 488
- “Front + rear backplanes: 12 x 3.5-inch SAS/SATA expander + 4 x 3.5-inch SAS/SATA” on page 489
- “Front + middle + rear backplanes: 12 x 3.5-inch SAS/SATA expander + 4 x 3.5-inch SAS/SATA + 4 x 3.5-inch SAS/SATA” on page 490

Front backplane: 12 x 3.5-inch SAS/SATA expander

This section provides cable routing information for configuration (one 12 x 3.5-inch SAS/SATA expander front drive backplane) with one 8i RAID/HBA adapter.

8i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

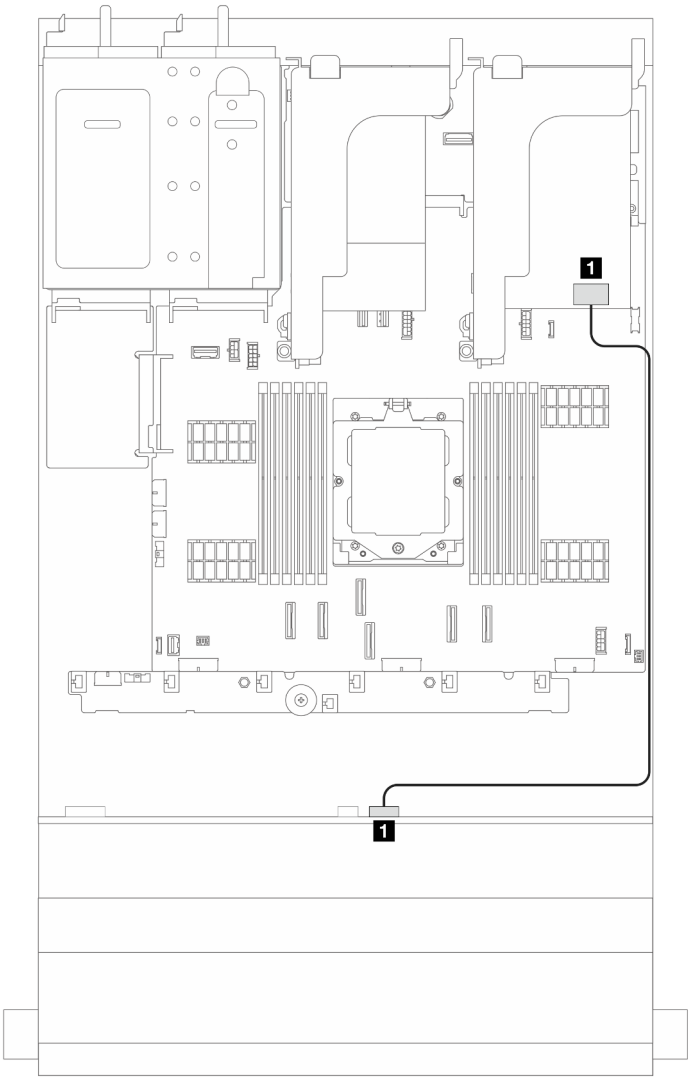


Figure 463. Signal cable routing

From	To
1 Front backplane: SAS 0	1 8i adapter: • Gen 4: C0 • Gen 3: C0C1

Front + rear backplanes: 12 x 3.5-inch SAS/SATA expander + 2 x 3.5-inch SAS/SATA

This section provides cable routing information for configuration (one 12 x 3.5-inch SAS/SATA expander front drive backplane and one 2 x 3.5-inch SAS/SATA rear drive backplane) with one 8i RAID/HBA adapter.

8i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

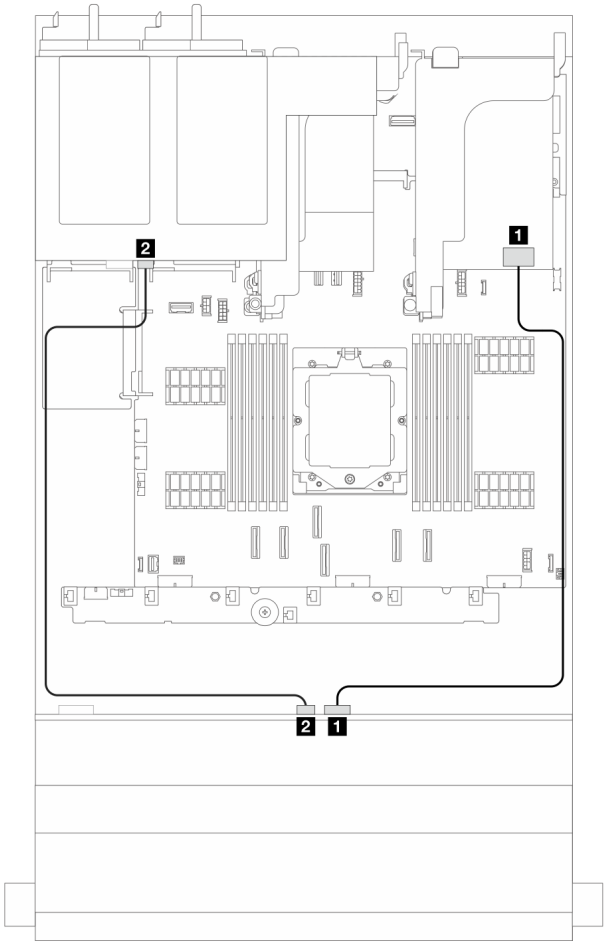


Figure 464. Signal cable routing

From	To
1 Front backplane: SAS 0	1 8i adapter: • Gen 4: C0 • Gen 3: C0C1
2 Front backplane: SAS 1	2 Rear backplane: SAS

Front + rear backplanes: 12 x 3.5-inch SAS/SATA expander + 4 x 2.5-inch AnyBay

This section provides cable routing information for configuration (one 12 x 3.5-inch SAS/SATA expander front drive backplane and one 4 x 2.5-inch AnyBay rear drive backplane) with one 8i RAID/HBA adapter.

8i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

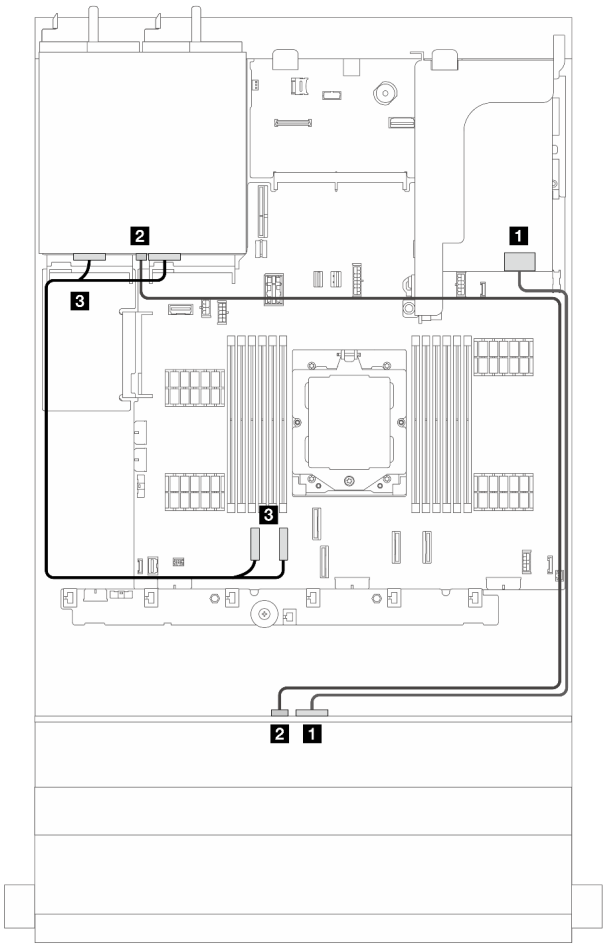


Figure 465. Signal cable routing

From	To
1 Front backplane: SAS 0	1 8i adapter: • Gen 4: C0 • Gen 3: C0C1
2 Front backplane: SAS 1	2 Rear backplane: SAS
3 Onboard: PCIe 1, 2	3 Rear backplane: NVMe 0-1, 2-3

Front + rear backplanes: 12 x 3.5-inch SAS/SATA expander + 4 x 3.5-inch SAS/SATA

This section provides cable routing information for configuration (one 12 x 3.5-inch SAS/SATA expander front drive backplane and one 4 x 3.5-inch SAS/SATA rear drive backplane) with one 8i RAID/HBA adapter.

8i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

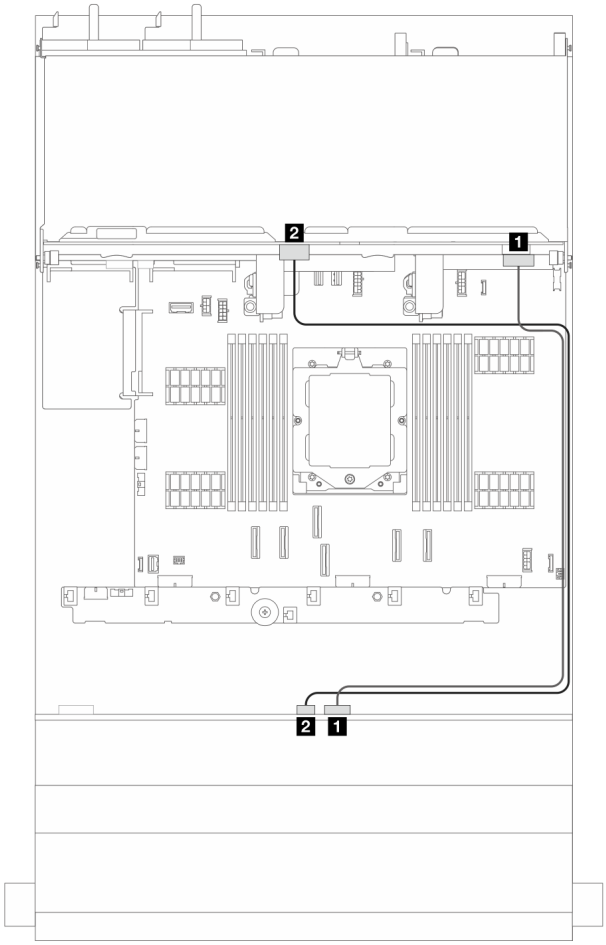


Figure 466. Signal cable routing

From	To
1 Front backplane: SAS 0	1 8i adapter: • Gen 4: C0 • Gen 3: C0C1
2 Front backplane: SAS 1	2 Rear backplane: SAS

Front + middle + rear backplanes: 12 x 3.5-inch SAS/SATA expander + 4 x 3.5-inch SAS/SATA + 4 x 3.5-inch SAS/SATA

This section provides cable routing information for configuration (one 12 x 3.5-inch SAS/SATA expander front drive backplane, one 4 x 3.5-inch SAS/SATA middle drive backplane, and one 4 x 3.5-inch SAS/SATA rear drive backplane) with one 16i RAID/HBA adapter.

16i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

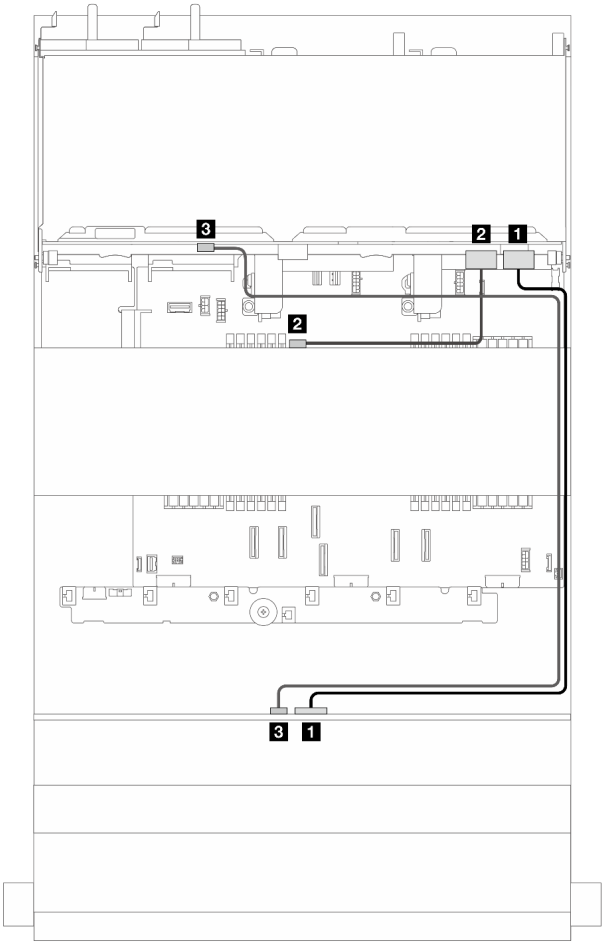


Figure 467. Signal cable routing

From	To
1 Front backplane: SAS 0	1 16i adapter: • Gen 4: C0 • Gen 3: C0C1
2 Middle backplane: SAS	2 16i adapter: • Gen 4: C1 • Gen 3: C2
3 Rear backplane: SAS	3 Front backplane: SAS 1

Chapter 7. 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 is attached to the server, you can set the network connection through the Lenovo XClarity Controller interface. Connect an Ethernet cable from your laptop to XCC system management port (10/100/1000 Mbps RJ-45) on your server. For the location of the XCC system management port (10/100/1000 Mbps RJ-45), see Chapter 2 “Server components” on page 17.

  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. See “Identify the server and access the Lenovo XClarity Controller” on page 45.
- 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 server. For the location of the Lenovo XClarity Controller USB connector, see Chapter 2 “Server components” on page 17.

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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 ID button on the server for at least 3 seconds until its LED flashes slowly (once every couple of seconds). See Chapter 2 “Server components” on page 17 for the location of the ID button.

To connect using the Lenovo XClarity Administrator Mobile app:

1. Connect the USB cable of your mobile device to the Lenovo XClarity Controller USB connector on the server.
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:

https://pubs.lenovo.com/lxca/lxca_usemobileapp

Set USB port for Lenovo XClarity Controller connection

Before you can access the Lenovo XClarity Controller through the 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 USB port, check one of the following:

- Refer to Chapter 2 “Server components” on page 17.
-  If there is a wrench icon on the USB port of your server, you can set the management USB port to connect to Lenovo XClarity Controller. It is also the only USB port that supports USB automation update of the system I/O board (or firmware and RoT security module).

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 seconds until its LED flashes slowly (once every couple of seconds). See Chapter 2 “Server components” on page 17 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 → USB Management Port Assignment**. 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 → USB Management Port Assignment**). 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:
  - https://lenovopress.lenovo.com/lp0656-lenovo-thinksystem-firmware-and-driver-update-best-practices
- The latest firmware can be found at the following site:
  - https://datacentersupport.lenovo.com/products/servers/thinksystem/sr655v3/7d9e/downloads/driver-list/
- You can subscribe to product notification to stay up to date on firmware updates:
  - https://datacentersupport.lenovo.com/solutions/ht509500

Update Bundles (Service Packs)

Lenovo typically releases firmware in bundles called Update Bundles (Service Packs). 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.
- **Update Bundles (Service Packs)**. Update Bundles (Service Packs) are bundled updates designed and tested to provide the interdependent level of functionality, performance, and compatibility. Update Bundles (Service Packs) 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 Update Bundles (Service Packs) 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	Drive Firmware Updates	Graphical user interface	Command line interface	Supports Update Bundles (Service Packs)
Lenovo XClarity Provisioning Manager (LXPM)	In-band[2] On-Target	√			√		
Lenovo XClarity Controller (XCC)	In-band[4] Out-of-band Off-Target	√	Selected I/O devices	√[3]	√		√
Lenovo XClarity Essentials OneCLI (OneCLI)	In-band Out-of-band On-Target Off-Target	√	All I/O devices	√[3]		√	√
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		√		

Tool	Update Methods Supported	Core System Firmware Updates	I/O Devices Firmware Updates	Drive Firmware Updates	Graphical user interface	Command line interface	Supports Update Bundles (Service Packs)
Lenovo XClarity Integrator (LXCI) for Microsoft Windows Admin Center	In-band Out-of-band On-Target Off-Target	√	All I/O devices		√		√

Notes:

1. For I/O firmware updates.
2. For BMC and UEFI firmware updates.
3. Drive firmware update is only supported by the tools and methods below:
   - XCC Bare Metal Update (BMU): In-band, and requires system reboot.
   - Lenovo XClarity Essentials OneCLI:
     - For OneCLI version earlier than 5.0.0:
       - For drives supported by ThinkSystem V2 and V3 products (legacy drives): In-band, and does not require system reboot.
       - For drives supported only by ThinkSystem V3 products (new drives): Staging to XCC and complete the update with XCC BMU (In-band, and requires system reboot.).
     - For OneCLI 5.0.0 and later versions: In-band, and does not require system reboot.
4. Bare Metal Update (BMU) only.

- **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 Update Bundles (Service Packs) update packages and individual updates. Update Bundles (Service 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:

  https://pubs.lenovo.com/lxca/update_fw

- **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.

Note: UEFI **Legacy Mode** is not supported by ThinkSystem V4 products.

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

  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:

  - Search for the LXPM documentation version compatible with your server at https://pubs.lenovo.com/lxpm-overview/
  - *UEFI User Guide* at 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 configuring the server using Lenovo XClarity Administrator are available at:

  https://pubs.lenovo.com/lxca/server_configuring

- **Lenovo XClarity Controller**

  You can configure the management processor for the server through the Lenovo XClarity Controller Web interface, the command-line interface, or Redfish API.

  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.lenovo.com/servers/options/memory

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

https://dcsc.lenovo.com/#/memory_configuration

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.lenovo.com/lp0578-lenovo-raid-introduction

Detailed information about RAID management tools and resources is available at the following Lenovo Press website:

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

Deploy the operating system

Several options are available to deploy an operating system on the server.

Available operating systems

- Microsoft Windows Server
- Microsoft Windows
- VMware ESXi
- Red Hat Enterprise Linux
- SUSE Linux Enterprise Server
- Canonical Ubuntu

Complete list of available operating systems: https://lenovopress.lenovo.com/osig.

Tool-based deployment

- **Multi-server**

  Available tools:

  – Lenovo XClarity Administrator

    https://pubs.lenovo.com/lxca/compute_node_image_deployment

  – Lenovo XClarity Essentials OneCLI

    https://pubs.lenovo.com/lxce-onecli/onecli_r_uxspi_proxy_tool

- **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

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.

Chapter 8. Problem determination

Use the information in this section to isolate and resolve issues that you might encounter while using your server.

Lenovo servers can be configured to automatically notify Lenovo Support if certain events are generated. You can configure automatic notification, also known as Call Home, from management applications, such as the Lenovo XClarity Administrator. If you configure automatic problem notification, Lenovo Support is automatically alerted whenever a server encounters a potentially significant event.

To isolate a problem, you should typically begin with the event log of the application that is managing the server:

- If you are managing the server from the Lenovo XClarity Administrator, begin with the Lenovo XClarity Administrator event log.
- If you are using some other management application, begin with the Lenovo XClarity Controller event log.

Web resources

- **Tech tips**

  Lenovo continually updates the support website with the latest tips and techniques that you can use to solve issues that your server might encounter. These Tech Tips (also called retain tips or service bulletins) provide procedures to work around issues or solve problems related to the operation of your server.

  To find the Tech Tips available for your server:

  1. Go to http://datacentersupport.lenovo.com and navigate to the support page for your server.
  2. Click on **How To's** from the navigation pane.
  3. Click **Article Type → Solution** from the drop-down menu.

     Follow the on-screen instructions to choose the category for the problem that you are having.

- **Lenovo Data Center Forum**
  - Check https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv_eg to see if someone else has encountered a similar problem.

Event logs

An *alert* is a message or other indication that signals an event or an impending event. Alerts are generated by the Lenovo XClarity Controller or by UEFI in the servers. These alerts are stored in the Lenovo XClarity Controller Event Log.If the server is managed by the Lenovo XClarity Administrator, alerts are automatically forwarded to this management application.

Note: For a listing of events, including user actions that might need to be performed to recover from an event, see the *Messages and Codes Reference*, which is available at https://thinksystem.lenovofiles.com/help/topic/sr655-v3/7d9e/pdf_files.html.

Lenovo XClarity Controller event log

The Lenovo XClarity Controller monitors the physical state of the server and its components using sensors that measure internal physical variables such as temperature, power-supply voltages, fan speeds, and component status. The Lenovo XClarity Controller provides various interfaces to systems management software and to system administrators and users to enable remote management and control of a server.

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The Lenovo XClarity Controller monitors all components of the server and posts events in the Lenovo XClarity Controller event log.

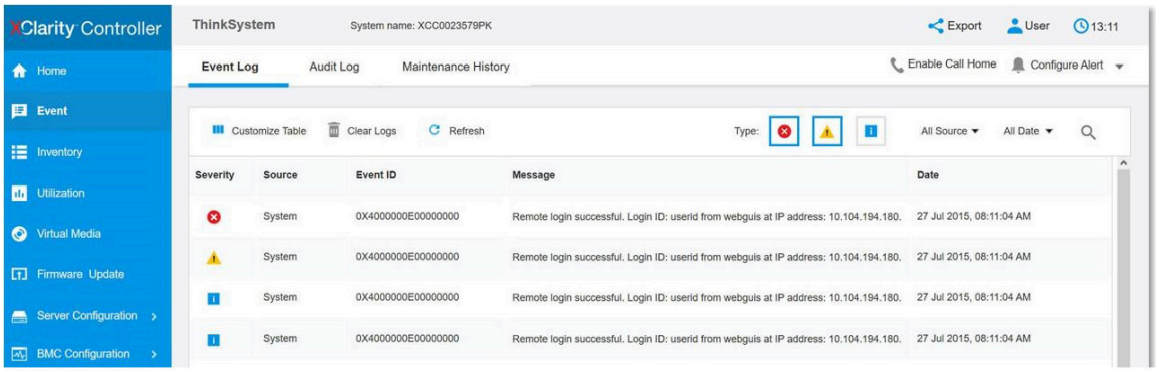


Figure 468. Lenovo XClarity Controller event log

For more information about accessing the Lenovo XClarity Controller event log, see:

"Viewing Event Logs" section in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/

Lenovo XClarity Administrator event log

If you are using Lenovo XClarity Administrator to manage server, network, and storage hardware, you can view the events from all managed devices through the XClarity Administrator.

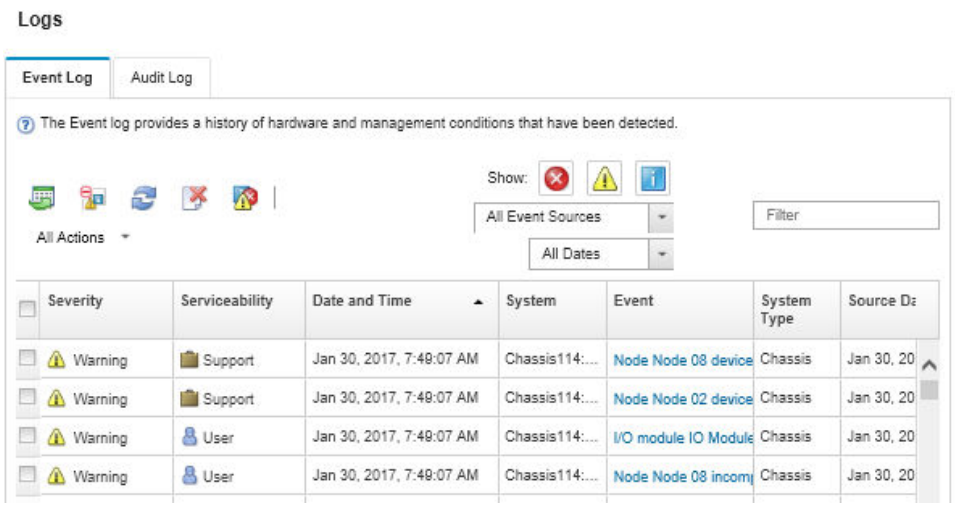


Figure 469. Lenovo XClarity Administrator event log

For more information about working with events from XClarity Administrator, see:

https://pubs.lenovo.com/lxca/events_vieweventlog

Troubleshooting by system LEDs and diagnostics display

See the following section for information on available system LEDs and diagnostics display.

- "Drive LEDs" on page 505

- “Front operator panel LEDs” on page 505
- “External diagnostics handset” on page 512
- “XCC system management port LEDs” on page 518
- “Power supply LEDs” on page 519
- “System-board-assembly LEDs” on page 521
- “LEDs on the firmware and RoT security module” on page 523

Drive LEDs

This topic provides information on drive LEDs.

Each hot-swap drive comes with an activity LED and status LED and the signals are controlled by the backplanes. Different colors and speeds indicate different activities or status of the drive. The following illustration shows the LEDs on a hard disk drive or solid-state drive.

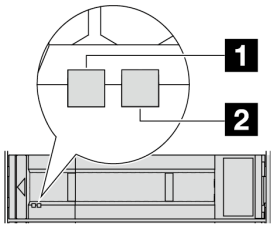


Figure 470. Drive LEDs

Drive LED	Status	Description
1 Drive activity LED (left)	Solid green	The drive is powered but not active.
	Blinking green	The drive is active.
2 Drive status LED (right)	Solid yellow	The drive has an error.
	Blinking yellow (blinking slowly, about one flash per second)	The drive is being rebuilt.
	Blinking yellow (blinking rapidly, about four flashes per second)	The drive is being identified.

Front operator panel LEDs

This topic provides information on the front operator panel LEDs.

Depending on the server model, the server comes with the front operator panel without LCD display or front operator with LCD display (integrated diagnostics panel). For information about the integrated diagnostics panel with LCD display, see “Integrated diagnostics panel” on page 507.

The following illustration shows the front operator panel on the media bay. For some server models, the front operator panel is integrated on the rack latch. See “Front I/O module” on page 22.

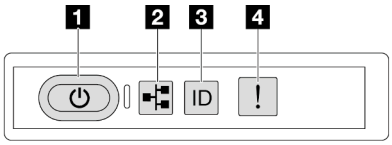


Figure 471. Front operator panel LEDs

1 Power button with power status LED (green)	2 Network activity LED (green)
3 System ID button with system ID LED (blue)	4 System error LED (yellow)

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	Power is not present, or the power supply has failed.
Fast blinking (about four flashes per second)	Green	The server is off, but the XClarity Controller is initializing, and the server is not ready to be powered on.
Slow blinking (about one flash per second)	Green	The server is off and is ready to be powered on (standby state).
Solid on	Green	The server is on and running.

2 Network activity LED (green)

Compatibility of the NIC adapter and the network activity LED:

NIC adapter	Network activity LED
OCP module	Support
PCIe NIC adapter	Not support

When an OCP module is installed, the network activity LED on the front I/O assembly helps you identify the network connectivity and activity. If no OCP module is installed, this LED is off.

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. **Note:** If the network activity LED is off when an OCP module is installed, check the network ports in the rear of your server to determine which port is disconnected.

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 LED changes. The LED 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 LED to assist in visually locating the server among other servers.

If the XClarity Controller USB connector is set to have both the USB 2.0 function and XClarity Controller management function, you can press the system ID button for three seconds to switch between the two functions.

4 System error LED (yellow)

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

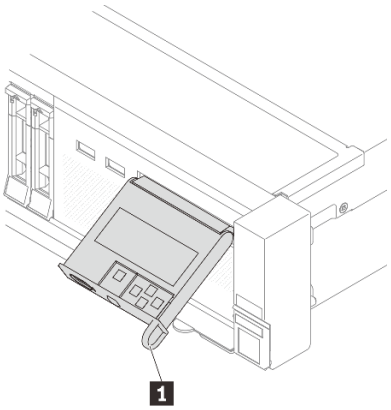
Status	Color	Description	Action
On	Yellow	An error has been detected on the server. Causes might include but are not limited to the following errors: • A fan failure • A memory error • A storage failure • A PCIe device failure • A power supply failure • A processor error • A system I/O board or processor board error	• Check the Lenovo XClarity Controller event log and the system event log to determine the exact cause of the error. • Check if additional LEDs elsewhere in the server are also lit that will direct you to the source of the error. See “Troubleshooting by system LEDs and diagnostics display” on page 504. • Save the log if necessary.
Off	None	The server is off, or the server is on and is working correctly.	None.

Integrated diagnostics panel

The integrated diagnostics panel is attached to the front of the server, while it allows quick access to system information such as errors, system status, firmware, network, and health information.

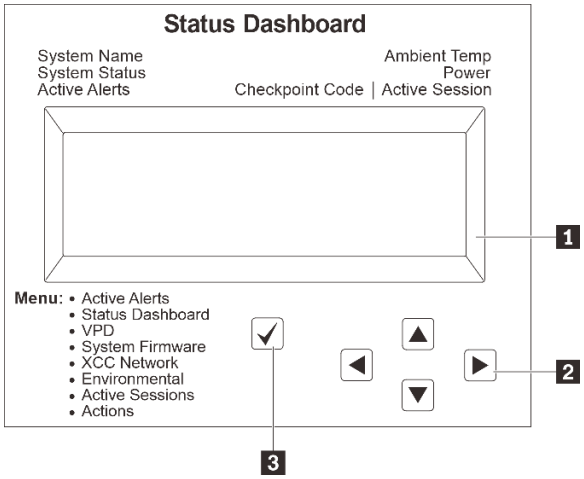
- “Diagnostics panel location” on page 508
- “Diagnostics panel overview” on page 508
- “Options flow diagram” on page 508
- “Full menu list” on page 509

Diagnostics panel location

	1 The handle with which the panel can be pulled out and inserted into the server. **Notes:** • The panel can be inserted or pulled out regardless of the system status. • When pulling out the panel, carefully hold it by the handle and avoid any hard pulling.

Diagnostics panel overview

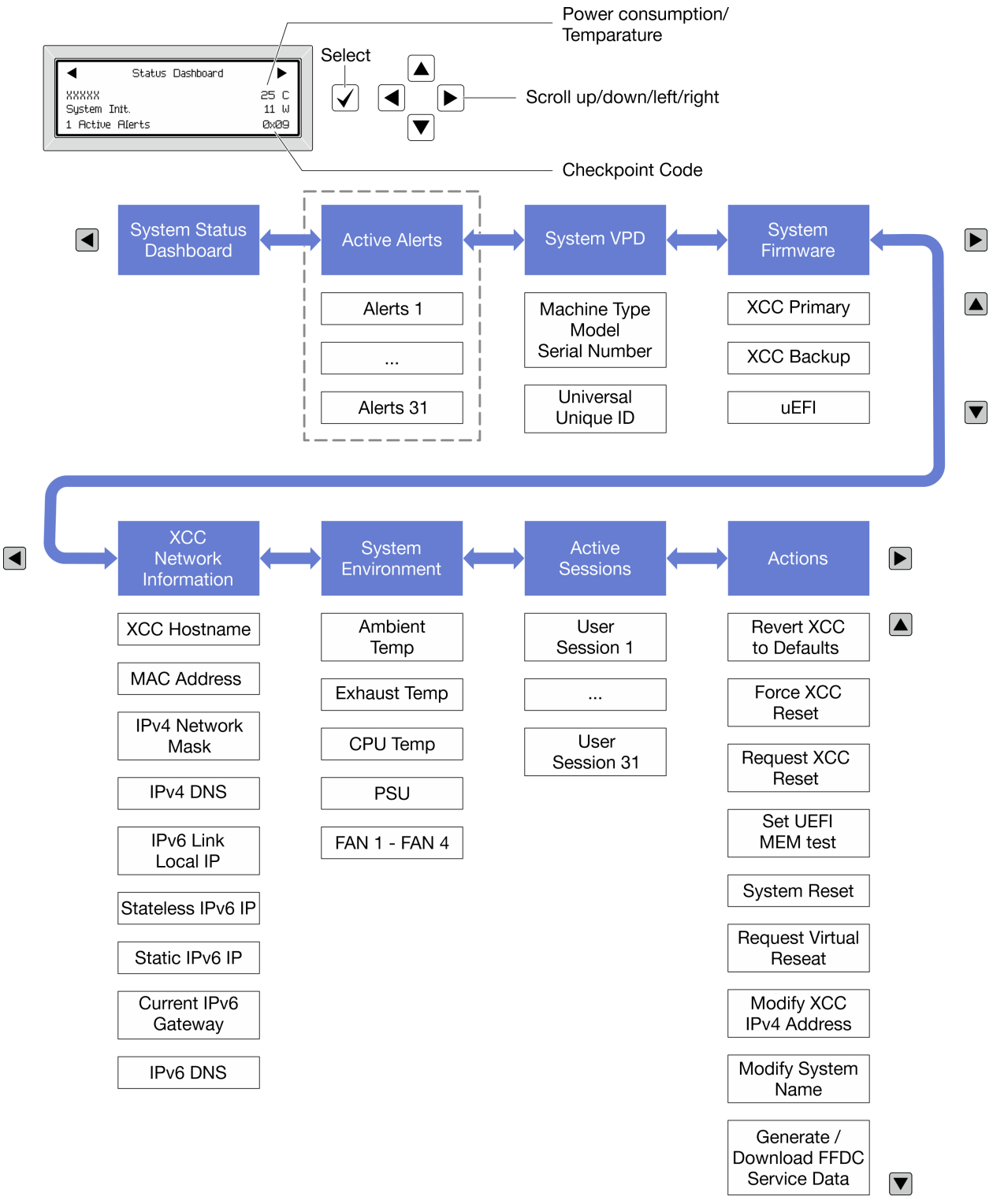
The diagnostics device consists of an LCD display and 5 navigation buttons.

	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.

Options 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.

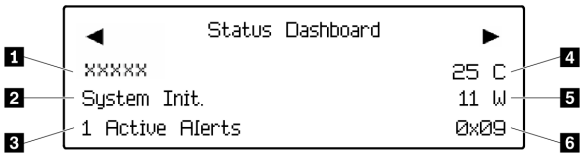


Full menu list

Following is the list of options available on the diagnostics panel/handset. 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	

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: xxxxxxxxxxxxxxxxxxxxxxxxxxxx

System Firmware

Sub Menu	Example
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
UEFI • Firmware level (status) • Build ID • Version number • Release date	UEFI (Inactive) Build: D0E101P Version: 1.00 Date: 2019-12-26

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 • CPU temperature • PSU status • Spinning speed of fans by RPM	Ambient Temp: 24 C Exhaust Temp: 30 C CPU1 Temp: 50 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 supported for users • Revert XCC to Defaults • Force XCC Reset • Request XCC Reset • Set UEFI Memory Test • Request Virtual Reset • 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

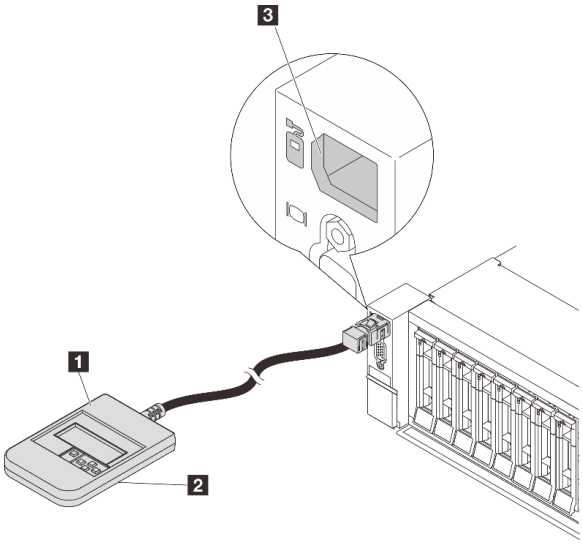
External diagnostics handset

The external diagnostics handset is an external device that can be 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.

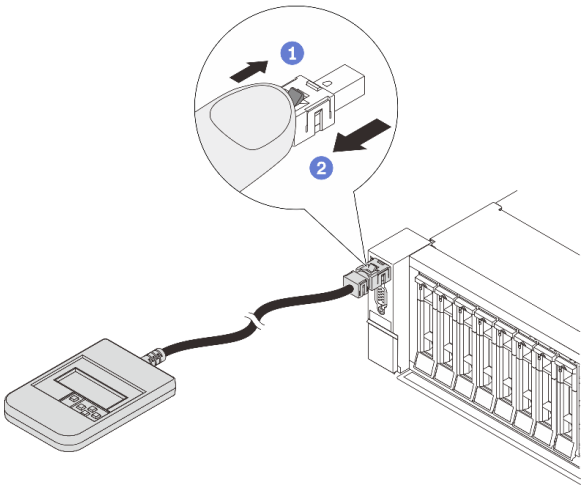
Note: The external diagnostics handset is an optional part that needs to be purchased separately.

- "Location of the external diagnostics handset" on page 513
- "Diagnostics panel overview" on page 513
- "Options flow diagram" on page 515
- "Full menu list" on page 516

Location of the external diagnostics handset

Location	Description
The external diagnostics handset is connected to the server with an external cable.  	1 External diagnostics handset
	2 Magnetic bottom With this component, the diagnostics 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 diagnostics handset.

Note: Pay attention to the following steps when unplugging the external diagnostics handset:

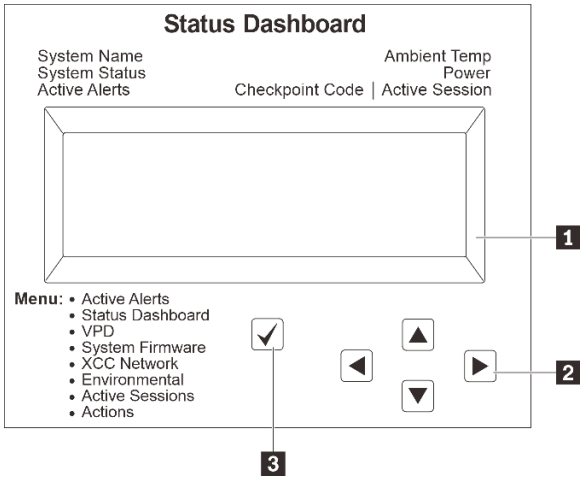


Step 1. Press the plastic clip on the plug in the shown direction.

Step 2. Gently pull out the cable from the connector while keeping the clip pressed down.

Diagnostics panel overview

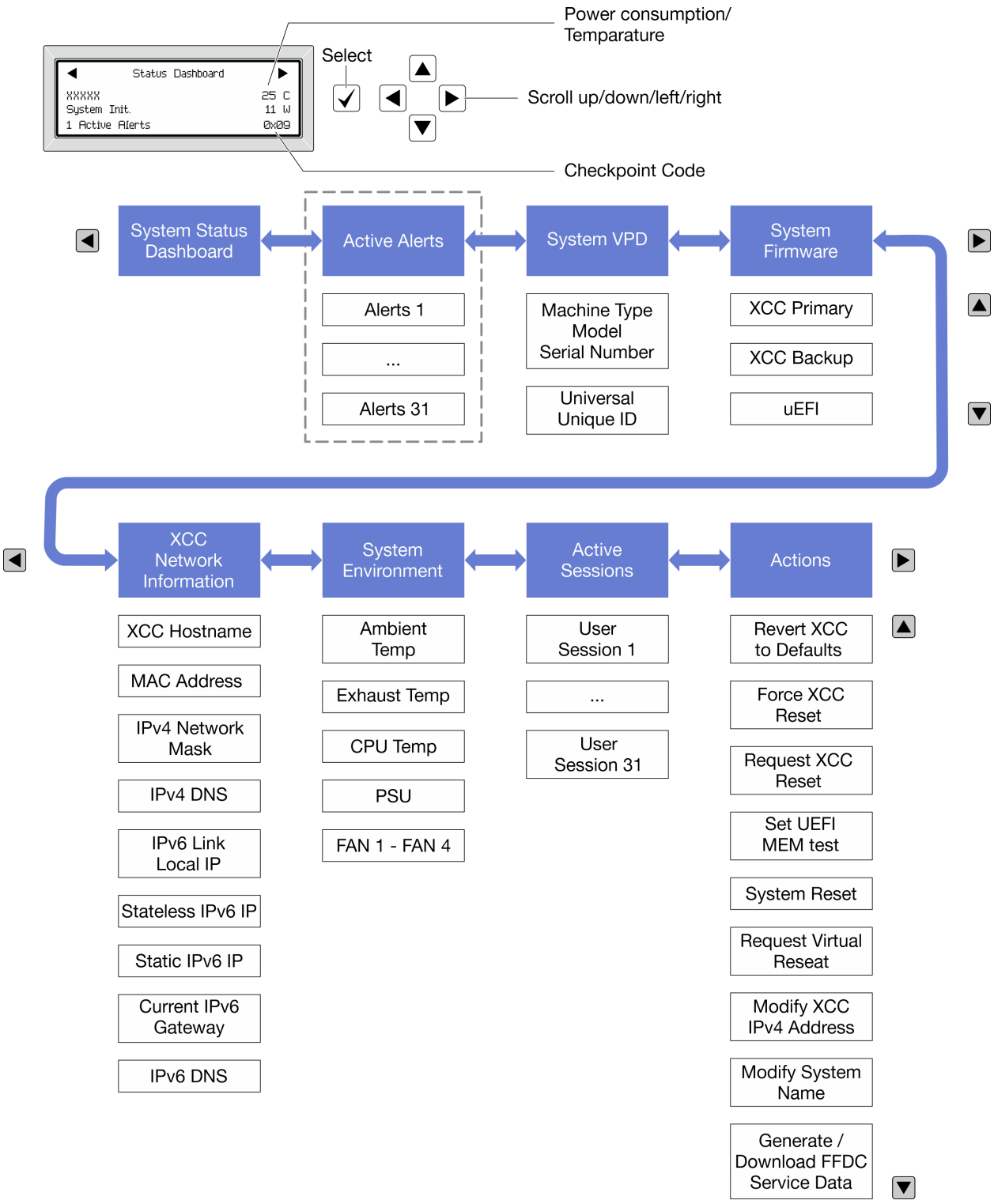
The diagnostics device consists of an LCD display and 5 navigation buttons.

<table>
<tr>
<td rowspan="3"> 
</td>
<td>1 LCD display</td>
</tr>
<tr>
<td>2 Scroll buttons (up/down/left/right)
Press the scroll buttons to locate and select system information.</td>
</tr>
<tr>
<td>3 Select button
Press the select button to select from the options in the menu.</td>
</tr>
</table>

Options 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.

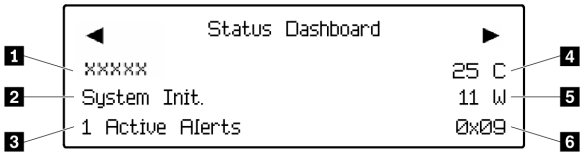


Full menu list

Following is the list of options available on the diagnostics panel/handset. 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	

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: xxxxxxxxxxxxxxxxxxxxxxxxxxxx

System Firmware

Sub Menu	Example
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
UEFI • Firmware level (status) • Build ID • Version number • Release date	UEFI (Inactive) Build: D0E101P Version: 1.00 Date: 2019-12-26

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 • CPU temperature • PSU status • Spinning speed of fans by RPM	Ambient Temp: 24 C Exhaust Temp: 30 C CPU1 Temp: 50 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 supported for users • Revert XCC to Defaults • Force XCC Reset • Request XCC Reset • Set UEFI Memory Test • Request Virtual Reset • 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

XCC system management port LEDs

This topic provides information on LEDs of XCC system management port (10/100/1000 Mbps RJ-45).

The following table describes the problems that are indicated by LEDs on XCC system management port (10/100/1000 Mbps RJ-45).

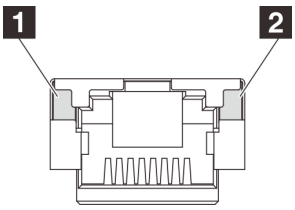


Figure 472. XCC system management port (10/100/1000 Mbps RJ-45) LEDs

LED	Description
1 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 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.

Power supply LEDs

This topic provides information about various power supply LED status and corresponding action suggestions.

The following minimal configuration is required for the server to start:

- One processor
- One memory module in slot 7
- One power supply
- One HDD/SSD drive or one M.2 drive (if OS is needed for debugging)
- Five system fans

The following table describes the problems that are indicated by various combinations of the power-supply LEDs and the power-on LED and suggested actions to correct the detected problems.

Note: Depending on the power supply type, your power supply might look slightly different from the following illustration.

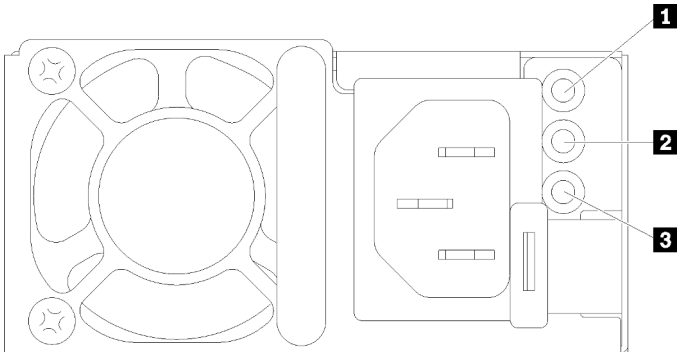


Figure 473. Power supply LEDs

LED	Description
1 Input status	The input status LED can be in one of the following states: • Green: The power supply is connected to the input power source. • Off: The power supply is disconnected from the input 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. Zero-output mode can be disabled via Setup Utility or Lenovo XClarity Controller web interface. If you disable zero-output mode, both power supplies will be in the active state. • Log in to the Lenovo XClarity Controller web interface, choose **Server Configuration** → **Power Policy**, disable **Zero Output Mode**, and then click **Apply**.
3 Power supply error LED	• Off: The power supply is working normally. • Amber: The power supply may have failed. Dump the FFDC log from the system and contact Lenovo back end support team for PSU data log reviewing.

System-board-assembly LEDs

The following illustration shows the light-emitting diodes (LEDs) on the system board assembly that contains the system I/O board and processor board.

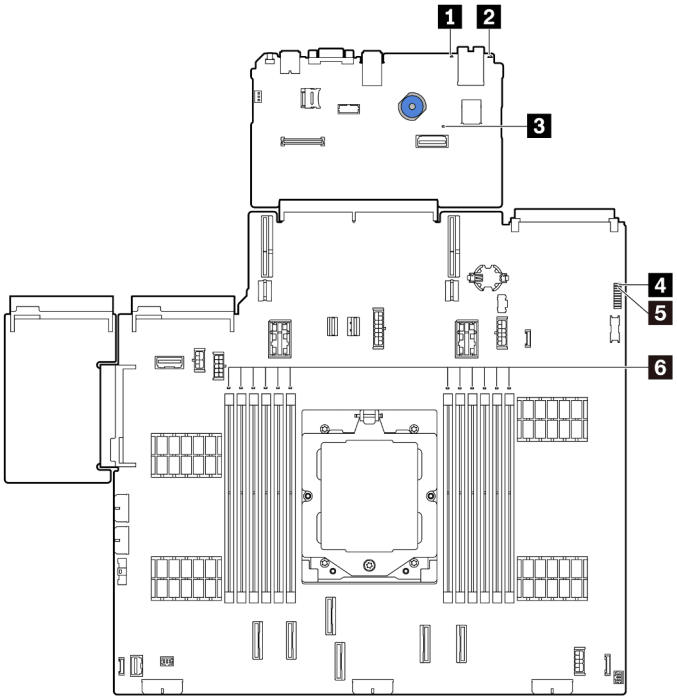


Figure 474. System-board-assembly LEDs

Table 29. System-board-assembly LEDs

LED	Description	Action
1 System error LED (yellow)	LED on: An error has occurred.	Check system logs or internal error LEDs to identify the failed part. For more information, see System error LED.
2 System ID LED (blue)	This LED helps you visually locate the server.	A system ID button with LED is also located on the front of the server. You can press the system ID button to turn on/off or blink the front and rear ID LEDs.

Table 29. System-board-assembly LEDs (continued)

LED	Description	Action
3 XCC heartbeat LED (green)	The XCC heartbeat LED helps you identify the XCC status. • Blinking (1Hz, about one flash per second): XCC is working normally. • Blinking at other speeds or always on: XCC is at the initial phase or is working abnormally. • Off: XCC is not working.	• If the XCC heartbeat LED is always off or always on, do the following: – If XCC cannot be accessed: 1. Re-plug the power cord. 2. Check and ensure that the system I/O board and the firmware and RoT security module are installed correctly. (Trained technician only) Reinstall them if needed. 3. (Trained technician only) Replace the firmware and RoT security module. 4. (Trained technician only) Replace the system I/O board. – If XCC can be accessed, replace the system I/O board. • If the XCC heartbeat LED is blinking fast over 5 minutes, do the following: 1. Re-plug the power cord. 2. Check and ensure that the system I/O board and the firmware and RoT security module are installed correctly. (Trained technician only) Reinstall them if needed. 3. (Trained technician only) Replace the firmware and RoT security module. 4. (Trained technician only) Replace the system I/O board. • If the XCC heartbeat LED is blinking slowly over 5 minutes, do the following: 1. Re-plug the power cord. 2. Check and ensure that the system I/O board and the firmware and RoT security module are installed correctly. (Trained technician only) Reinstall them if needed. 3. If the problem remains, contact Lenovo Support.
4 FPGA heartbeat LED (green)	The FPGA heartbeat LED helps you identify the FPGA status. • Blinking (about one flash per second) : FPGA is working normally. • On or off: FPGA is not working.	If the FPGA heartbeat LED is always off or always on, do the following: 1. Replace the processor board. 2. If the problem remains, contact Lenovo Support.

Table 29. System-board-assembly LEDs (continued)

LED	Description	Action
5 System status LED (green)	The system status LED indicates the working status of the system. • Fast blinking (about four flashes per second): Power fault or waiting for XCC power permission ready • Slow blinking (about one flash per second): Power off and is ready to be powered on (standby state). • ON: Power on Video of LED blinking status is available at: YouTube	• If the system status LED is blinking fast over 5 minutes and cannot power on, check the XCC heartbeat LED and follow the actions for the XCC heartbeat LED. • If the system status LED remains off or is blinking fast (about four flashes per second) and the system error LED on the front panel is on (yellow), the system is in a power fault status. Do the following: 1. Re-plug the power cord. 2. Remove installed adapters/devices, one at a time, until you reach the minimal configuration for debugging. 3. (Trained technician only) If the problem remains, capture FFDC log, and replace the processor board. 4. If the problem still remains, contact Lenovo Support.
6 DIMM error LEDs (Amber)	LED on: an error has occurred to the DIMM the LED represents.	For more information, see "Memory problems" on page 533.

LEDs on the firmware and RoT security module

The following illustrations show the light-emitting diodes (LEDs) on the ThinkSystem V3 Firmware and Root of Trust Security Module (firmware and RoT security module).

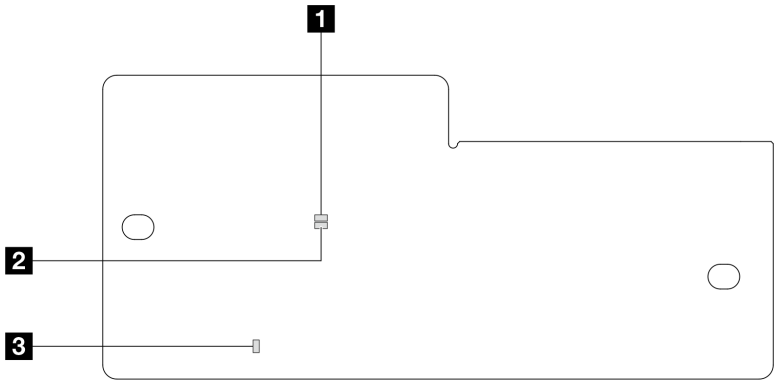


Figure 475. LEDs on the firmware and RoT security module

1 AP0 LED (Green)	2 AP1 LED (Green)	3 Fatal Error LED (Amber)

Table 30. LEDs description

Scenario	AP0 LED	AP1 LED	Fatal Error LED	FPGA heartbeat LED[note]	XCC heartbeat LED[note]	Actions
RoT security module fatal firmware failure	Off	Off	On	N/A	N/A	Replace the firmware and RoT security module.
	Blink	N/A	On	N/A	N/A	Replace the firmware and RoT security module.

Table 30. LEDs description (continued)

Scenario	AP0 LED	AP1 LED	Fatal Error LED	FPGA heartbeat LED[note]	XCC heartbeat LED[note]	Actions
No system power (FPGA heartbeat LED off)	Off	Off	Off	Off	Off	If the AC power is on, but the system board assembly does not have power, then: 1. Check the power supply unit (PSU) or power interposer board (PIB) if any. If the PSU or PIB has any error, replace it. 2. If the PSU or PIB is good, do the following: a. Replace the system I/O board. b. Replace the processor board.
XCC firmware recoverable error	Blink	N/A	Off	N/A	N/A	Information only. No action is required.
XCC firmware is recovered from error	Blink	N/A	Off	N/A	N/A	Information only. No action is required.
UEFI firmware authentication failure	N/A	Blink	Off	N/A	N/A	Information only. No action is required.
UEFI firmware is recovered from authentication failure	N/A	On	Off	N/A	N/A	Information only. No action is required.
System is OK (FPGA heartbeat LED is On)	On	On	Off	On	Blink (1Hz)	Information only. No action is required.

Note: For locations of the FPGA LED and XCC heartbeat LED, see "System-board-assembly LEDs" on page 521.

LED on the liquid detection sensor module

This topic provides information about the LED on the liquid detection sensor module.

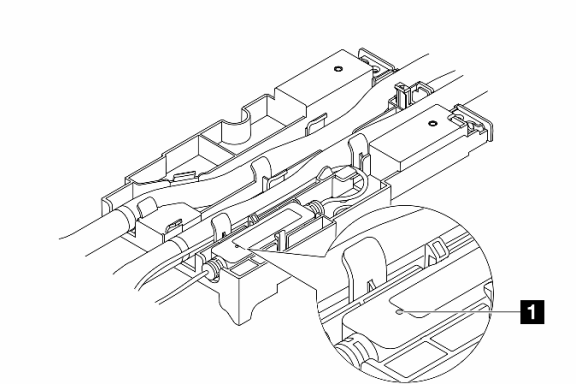


Figure 476. LED on the liquid detection sensor module

1 LED on the liquid detection sensor module	
Description	• Solid green: No coolant leakage detected. • Blinking green: Abnormal status detected.
Action	See “Coolant leak problems (Direct Water Cooling Module)” on page 528.

General problem determination procedures

Use the information in this section to resolve problems if the event log does not contain specific errors or the server is inoperative.

If you are not sure about the cause of a problem and the power supplies are working correctly, complete the following steps to attempt to resolve the problem:

1. Power off the server.
2. Make sure that the server is cabled correctly.
3. Remove or disconnect the following devices if applicable, one at a time, until you find the failure. Power on and configure the server each time you remove or disconnect a device.
   - Any external devices.
   - Surge-suppressor device (on the server).
   - Printer, mouse, and non-Lenovo devices.
   - Each adapter.
   - Hard disk drives.
   - Memory modules until you reach the minimal configuration for debugging that is supported for the server.

     To determine the minimal configuration for your server, see “Minimal configuration for debugging” in “Technical specifications” on page 3.
4. Power on the server.

If the problem is solved when you remove an adapter from the server, but the problem recurs when you install the same adapter again, suspect the adapter. If the problem recurs when you replace the adapter with a different one, try a different PCIe slot.

If the problem appears to be a networking problem and the server passes all system tests, suspect a network cabling problem that is external to the server.

Resolving suspected power problems

Power problems can be difficult to solve. For example, a short circuit can exist anywhere on any of the power distribution buses. Usually, a short circuit will cause the power subsystem to shut down because of an overcurrent condition.

Complete the following steps to diagnose and resolve a suspected power problem.

Step 1. Check the event log and resolve any errors related to the power.

Note: Start with the event log of the application that is managing the server. For more information about event logs, see “Event logs” on page 503.

Step 2. Check for short circuits, for example, if a loose screw is causing a short circuit on a circuit board.

Step 3. Remove the adapters and disconnect the cables and power cords to all internal and external devices until the server is at the minimal configuration for debugging that is required for the server to start. To determine the minimal configuration for your server, see “Minimal configuration for debugging” in “Technical specifications” on page 3.

Step 4. Reconnect all AC power cords and turn on the server. If the server starts successfully, reseat the adapters and devices one at a time until the problem is isolated.

If the server does not start from the minimal configuration, replace the components in the minimal configuration one at a time until the problem is isolated.

Resolving suspected Ethernet controller problems

The method that you use to test the Ethernet controller depends on which operating system you are using. See the operating-system documentation for information about Ethernet controllers, and see the Ethernet controller device-driver readme file.

Complete the following steps to attempt to resolve suspected problems with the Ethernet controller.

Step 1. Make sure that the correct device drivers are installed and that they are at the latest level.

Step 2. Make sure that the Ethernet cable is installed correctly.

- The cable must be securely attached at all connections. If the cable is attached but the problem remains, try a different cable.
- Make sure that the cable rating is applicable for the network speed selected. For example, an SFP+ cable is only suitable for 10G operation. An SFP25 cable is needed for 25G operation. Likewise for Base-T operation, a CAT5 cable is required for 1G Base-T operation while a CAT6 cable is required for 10G Base-T operation.

Step 3. Set both the adapter port and the switch port to auto-negotiation. If auto-negotiation is not supported on one of the ports, try configuring both ports manually to match each other.

Step 4. Check the Ethernet controller LEDs on the server. These LEDs indicate whether there is a problem with the connector, cable, or hub.

Although some adapters may vary, when installed vertically the adapter link LED is typically on the left of the port and the activity LED is typically on the right.

The server front panel LED is described in “Troubleshooting by system LEDs and diagnostics display” on page 504.

- The Ethernet link status LED is lit when the Ethernet controller receives a link indication from the switch. If the LED is off, there might be a defective connector or cable or a problem with the switch.

- The Ethernet transmit/receive activity LED is lit when the Ethernet controller sends or receives data over the Ethernet network. If the Ethernet transmit/receive activity is off, make sure that the hub and network are operating and that the correct device drivers are installed.

Step 5. Check the Network activity LED on the server. The Network activity LED is lit when data is active on the Ethernet network. If the Network activity LED is off, make sure that the hub and network are operating and that the correct device drivers are installed.

Network activity LED location is specified in “Troubleshooting by system LEDs and diagnostics display” on page 504.

Step 6. Check for operating-system-specific causes of the problem, and make sure that the operating system drivers are installed correctly.

Step 7. Make sure that the device drivers on the client and server are using the same protocol.

If the Ethernet controller still cannot connect to the network but the hardware appears to be working, the network administrator must investigate other possible causes of the error.

Troubleshooting by symptom

Use this information to find solutions to problems that have identifiable symptoms.

To use the symptom-based troubleshooting information in this section, complete the following steps:

1. Check the event log of Lenovo XClarity Controller and follow the suggested actions to resolve any event codes.

   For more information about event logs, see “Event logs” on page 503.
2. Review this section to find the symptoms that you are experiencing and follow the suggested actions to resolve the issue.
3. If the problem persists, contact support (see “Contacting Support” on page 553).

Coolant leak problems (Direct Water Cooling Module)

Use this information to resolve coolant leak problems with the Direct Water Cooling Module (DWCM).

See this section to resolve issues related to the DWCM.

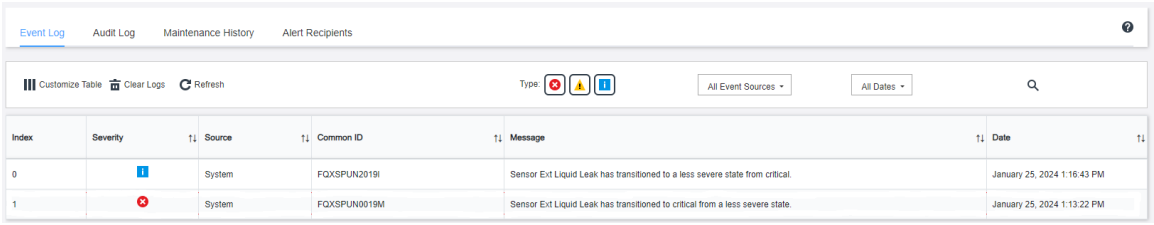
- “Options to identify coolant leaks” on page 528
- “Steps to resolve coolant leaks” on page 529

Options to identify coolant leaks

Coolant leaks can be identified through the following practices:

- If the server is on remote maintenance,
  - A Lenovo XClarity Controller event shows:

    FQXSPUN0019M: Sensor Ext Liquid Leak has transitioned to critical from a less severe state.





  - Lenovo XClarity Controller has defined lots of system conditions as IPMI sensors. Users can use IPMI commands to check system running status. Here are examples of executing ipmitool, an open-source common tool which follows Intel’s IPMI standard. Check for coolant leakage status with command lines as shown.

```
zuody2@zuody2-07:~$ ipmitool -H 10.245.50.35 -U USERID -P Aa12345678 -I lanplus -C 17 sel elist
   1 | 01/25/2024 | 13:40:30 | Event Logging Disabled SEL Fullness | Log area reset/cleared | Asserted
   2 | 01/25/2024 | 13:41:58 | Cooling Device Ext Liquid Leak | Transition to Critical from less severe | Asserted
   3 | 01/25/2024 | 13:42:01 | Cooling Device Ext Liquid Leak | Transition to Critical from less severe | Deasserted
```

The event logs shown with the parameter `sel elist`.

- ```
  zuody2@zuody2-07:~$ ipmitool -H 10.245.50.35 -U USERID -P Aa12345678 -I lanplus -C 17 sdr elist | grep "Ext Liquid Leak"
  Ext Liquid Leak  | FDh | ok  | 30.1 | Transition to Critical from less severe
  ```

  `Ext Liquid Leak | FDh | ok | 30.1 | Transition to Critical from less severe`

  The status of all sensors can be fetched with the parameter `sdr elist`. If coolant leakage happens, the log above will show up.

- If the server is within reach, and the amber LED is lit on the front operator panel, potential coolant leaks may have occurred. It is required to open the top cover to check the LED status of the liquid detection sensor module. See "Front operator panel LEDs" on page 505 and "LED on the liquid detection sensor module" on page 524 for more details.

Steps to resolve coolant leaks

If the LED on the liquid detection sensor module is blinking green, follow the procedures to get help.

1. Save and back up data and operations.
2. Power off the server and remove the quick connect plugs from the manifolds.
3. Slide the server out or remove the server from the rack. See "Remove the server from rack" on page 68.
4. Remove the top cover. See "Remove the top cover" on page 342.
5. Check for coolant leaks around the outlet and inlet hoses, system board assembly, and under the cold plate covers:

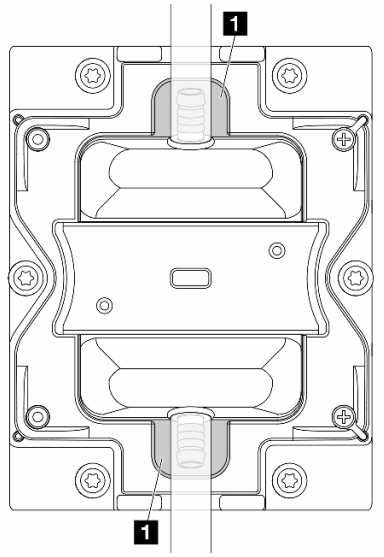


Figure 477. Leak-prone areas

Note: If leak happens, the coolant tends to collect around **1** leak-prone areas.

a. If coolant found around the hoses and system board assembly, clean up the coolant.

b. If coolant found under the cold plate covers:

   1) As illustrated below, remove at least four DIMMs from both sides to get access to the clips on the cold plate covers. To remove memory modules, see "Remove a memory module" on page 215.
  ```

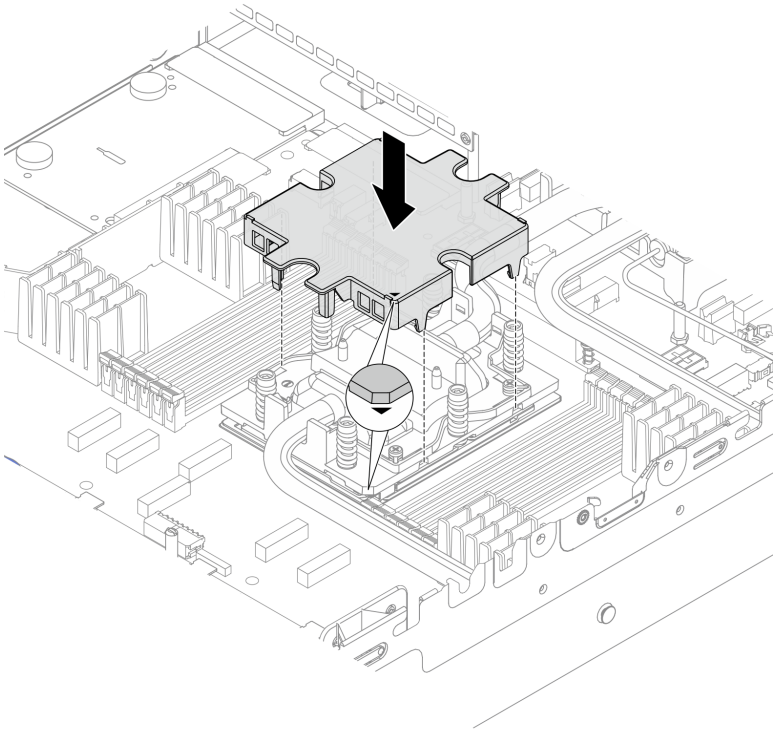


Figure 478. Removing the cold plate cover

a) 1 Open the clips.

b) 2 Remove the cold plate cover.

2) Clean up the coolant on the cold plates.

6. Check for the top cover of the server below to see if dripping happens. If yes, repeat previous steps to servers below.
7. Contact Lenovo Support.

Fan board problems

Use this information to resolve issues related to the fan board.

To resolve the problem, do the following:

1. Make sure that all the cables of the fan board are securely connected to the system board.
2. Make sure that all fans are properly inserted into the fan board.
3. Power on the server and then go to event log to check the fan status.
4. If the fan module in any slots shows error, update the firmware.
5. If the problem persists after firmware update, swap the defective fan with a good one.
6. If the fan error follows with a specific fan module after swapping, replace the fan module.
7. If the fan error follows with a specific fan slot after swapping, replace the fan board.
8. If the fan error follows with a specific fan cable after swapping, replace the fan cable.

Intermittent problems

Use this information to solve intermittent problems.

- “Intermittent external device problems” on page 531
- “Intermittent KVM problems” on page 531
- “Intermittent unexpected reboots” on page 531

Intermittent external device problems

Complete the following steps until the problem is solved.

1. Update the UEFI and XCC firmware to the latest versions.
2. Make sure that the correct device drivers are installed. See the manufacturer's website for documentation.
3. For a USB device:
   a. Make sure that the device is configured correctly.

      Restart the server and press the key according to the on-screen instructions to display the LXPM system setup interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.) Then, click **System Settings → Devices and I/O Ports → USB Configuration**.
   b. Connect the device to another port. If using a USB hub, remove the hub and connect the device directly to the server. Make sure that the device is configured correctly for the port.

Intermittent KVM problems

Complete the following steps until the problem is solved.

Video problems:

1. Make sure that all cables and the console breakout cable are properly connected and secure.
2. Make sure that the monitor is working properly by testing it on another server.
3. Test the console breakout cable on a working server to ensure that it is operating properly. Replace the console breakout cable if it is defective.

Keyboard problems:

Make sure that all cables and the console breakout cable are properly connected and secure.

Mouse problems:

Make sure that all cables and the console breakout cable are properly connected and secure.

Intermittent unexpected reboots

Note: Some uncorrectable errors require that the server reboot so that it can disable a device, such as a memory DIMM or a processor to allow the machine to boot up properly.

1. If the reset occurs during POST and the POST watchdog timer is enabled, make sure that sufficient time is allowed in the watchdog timeout value (POST Watchdog Timer).

   To check the POST watchdog time, restart the server and press the key according to the on-screen instructions to display the LXPM system setup interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.) Then, click **BMC Settings → POST Watchdog Timer**.
2. If the reset occurs after the operating system starts, do one of the followings:

- Enter the operating system when the system operates normally and set up operating system kernel dump process (Windows and Linux base operating systems will be using different method). Enter the UEFI setup menus and disable the feature, or disable it with the following OneCli command.

  ```
  OneCli.exe config set SystemRecovery.RebootSystemOnNMI Disable --bmc XCC_USER:XCC_PASSWORD@XCC_IPAddress
  ```

- Disable any automatic server restart (ASR) utilities, such as the Automatic Server Restart IPMI Application for Windows, or any ASR devices that are installed.

3. See the management controller event log to check for an event code that indicates a reboot. See "Event logs" on page 503 for information about viewing the event log. If you are using Linux base operating system, capture all logs back to Lenovo support for further investigation.

Keyboard, mouse, KVM switch or USB-device problems

Use this information to solve problems related to a keyboard, mouse, KVM switch or USB-device problems.

- "All or some keys on the keyboard do not work" on page 532
- "Mouse does not work" on page 532
- "KVM switch problems" on page 532
- "USB-device does not work" on page 532

All or some keys on the keyboard do not work

1. Make sure that:
   - The keyboard cable is securely connected.
   - The server and the monitor are turned on.
2. If you are using a USB keyboard, run the Setup Utility and enable keyboardless operation.
3. If you are using a USB keyboard and it is connected to a USB hub, disconnect the keyboard from the hub and connect it directly to the server.
4. Replace the keyboard.

Mouse does not work

1. Make sure that:
   - The mouse cable is securely connected to the server.
   - The mouse device drivers are installed correctly.
   - The server and the monitor are turned on.
   - The mouse option is enabled in the Setup Utility.
2. If you are using a USB mouse and it is connected to a USB hub, disconnect the mouse from the hub and connect it directly to the server.
3. Replace the mouse.

KVM switch problems

1. Make sure that the KVM switch is supported by your server.
2. Make sure that the KVM switch is powered on correctly.
3. If the keyboard, mouse or monitor can be operated normally with direct connection to the server, then replace the KVM switch.

USB-device does not work

1. Make sure that:
   - The server is turned on and there is power supplied to the server.
   - The correct USB device driver is installed.

- The operating system supports the USB device.

2. Make sure that the USB configuration options are set correctly in system setup.

   Restart the server and press the key according to the on-screen instructions to display the LXPM system setup interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.) Then, click **System Settings → Devices and I/O Ports → USB Configuration**.
3. If you are using a USB hub, disconnect the USB device from the hub and connect it directly to the server.
4. If the USB device is still not working, try to use a different USB device, or try to connect the USB device that is being tested to another working USB connector.
5. If the USB device works well on another USB connector, the original USB connector may have a problem.
   - If the USB connector is on the front of the server:
     a. Remove and reconnect the USB cable. Ensure that the USB cable is correctly connected to the system board assembly. See Chapter 6 “Internal cable routing” on page 347
     b. Replace the front panel or front I/O assembly.
   - If the USB connector is at the rear of the server:
     a. (Trained technician only) Replace the system I/O board.

Memory problems

See this section to resolve issues related to memory.

Common memory problems

- “Displayed system memory is less than installed physical memory” on page 533
- “Invalid memory population detected” on page 534
- “DIMM PFA issue” on page 534

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.

1. See “Memory module installation rules and order” on page 53 to make sure that the present memory module population sequence is supported and you have installed the correct type of memory module.
2. Check whether any DIMM error LED is lit on the processor board and whether any memory module is not displayed in Setup Utility. If yes, check the customer/L1 actions by following the error event triggered in XCC or UEFI.
3. If the problem persists, replace the failing memory module with one that functions well.
   - If the new memory module still functions well, it indicates that the original memory module is damaged. In this case, replace the memory module with a good one.
   - If the new memory module cannot function well, it indicates that the memory slot is damaged. In this case, replace the processor board (trained technician only).
   - There are few cases in which the memory error is relative to processors. Replace the affected processors if the above actions does not help on customer’s situation (trained technician only).
4. Run the memory module diagnostics. When you start a server and press the key according to the on-screen instructions, the Lenovo XClarity Provisioning Manager interface is displayed by default. From

the Diagnostic page, click **Run Diagnostic → Memory Test → Advanced Memory Test**. If any memory module fails the test, repeat steps 2 and 3.

Invalid memory population detected

If this warning message appears, complete the following steps:

```
Invalid memory population (unsupported DIMM population) detected. Please verify memory configuration is valid.
```

1. See “Memory module installation rules and order” on page 53 to make sure the present memory module population sequence is supported.
2. If the present sequence is indeed supported, see if any of the modules is displayed as “disabled” in Setup Utility.
3. Reseat the module that is displayed as “disabled,” and reboot the system.
4. If the problem persists, replace the memory module.

DIMM PFA issue

1. Update the UEFI and XCC firmware to the latest version.
2. Reseat the failing memory modules.
3. Swap processors and make sure that there are no damages to processor socket pins.
4. (Train service only) Ensure there is no abnormal material in any memory module slot.
5. Run the memory module diagnostics. When you start a server and press the key according to the on-screen instructions, the Lenovo XClarity Provisioning Manager interface is displayed by default. You can perform memory diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → Memory test → Advanced Memory Test**.
6. Replace the memory modules that fail Memory Test.

Monitor and video problems

Use this information to solve problems related to a monitor or video.

- “Incorrect characters are displayed” on page 534
- “Screen is blank” on page 534
- “Screen goes blank when you start some application programs” on page 535
- “The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted” on page 535
- “The wrong characters appear on the screen” on page 535
- “Monitor display fails when connected to the VGA connector of the server” on page 535

Incorrect characters are displayed

Complete the following steps:

1. Verify that the language and locality settings are correct for the keyboard and operating system.
2. If the wrong language is displayed, update the server firmware to the latest level. See “Update the firmware” on page 495.

Screen is blank

Note: Make sure that the expected boot mode has not been changed from the UEFI to Legacy or vice versa.

1. If the server is attached to a KVM switch, bypass the KVM switch to eliminate it as a possible cause of the problem: connect the monitor cable directly to the correct connector on the rear of the server.
2. The management controller remote presence function is disabled if you install an optional video adapter. To use the management controller remote presence function, remove the optional video adapter.

3. If the server is installed with the graphical adapters while turning on the server, the Lenovo logo is displayed on the screen after approximately 3 minutes. This is normal operation while the system loads.
4. Make sure that:
   - The server is turned on and there is power supplied to the server.
   - The monitor cables are connected correctly.
   - The monitor is turned on and the brightness and contrast controls are adjusted correctly.
5. Make sure that the correct server is controlling the monitor, if applicable.
6. Make sure that the video output is not affected by corrupted server firmware; See "Update the firmware" on page 495.
7. If the problem remains, contact Lenovo Support.

Screen goes blank when you start some application programs

1. Make sure that:
   - The application program is not setting a display mode that is higher than the capability of the monitor.
   - You installed the necessary device drivers for the application.

The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted

1. If the monitor self-tests show that the monitor is working correctly, consider the location of the monitor. Magnetic fields around other devices (such as transformers, appliances, fluorescents, and other monitors) can cause screen jitter or wavy, unreadable, rolling, or distorted screen images. If this happens, turn off the monitor.

   Attention: Moving a color monitor while it is turned on might cause screen discoloration.

   Move the device and the monitor at least 305 mm (12 in.) apart, and turn on the monitor.

   Notes:

   a. To prevent diskette drive read/write errors, make sure that the distance between the monitor and any external diskette drive is at least 76 mm (3 in.).

   b. Non-Lenovo monitor cables might cause unpredictable problems.
2. Reseat the monitor cable.
3. Replace the components listed in step 2 one at a time, in the order shown, restarting the server each time:
   a. Monitor cable
   b. Video adapter (if one is installed)
   c. Monitor

The wrong characters appear on the screen

Complete the following steps until the problem is solved:

1. Verify that the language and locality settings are correct for the keyboard and operating system.
2. If the wrong language is displayed, update the server firmware to the latest level. See "Update the firmware" on page 495.

Monitor display fails when connected to the VGA connector of the server

Complete the following steps until the problem is solved:

1. Check and ensure that the server is turned on.
2. If there is a KVM connected between the monitor and server, remove the KVM.
3. Reconnect the monitor cables and ensure that the cables are connected correctly.

4. Try to use a monitor that has been verified without a problem.
5. If the monitor display still fails, do the following:
   - If the VGA connector is on the front of the server:
     a. Remove and reconnect the internal VGA cable. Ensure that the VGA cable is correctly connected to the system board assembly. See Chapter 6 “Internal cable routing” on page 347
     b. Replace the left rack latch with VGA. See “Rack latches replacement” on page 264.
     c. (Trained technician only) Replace the system I/O board.
   - If the VGA connector is on the rear of the server:
     a. (Trained technician only) Replace the system I/O board.

Observable problems

Use this information to solve observable problems.

- “Server hangs during the UEFI boot process” on page 536
- “The server immediately displays the POST Event Viewer when it is turned on” on page 536
- “Server is unresponsive (POST is complete and operating system is running)” on page 537
- “Server is unresponsive (POST failed and cannot start System Setup)” on page 537
- “Voltage planar fault is displayed in the event log” on page 538
- “Unusual smell” on page 538
- “Server seems to be running hot” on page 538
- “Cannot enter legacy mode after installing a new adapter” on page 538
- “Cracked parts or cracked chassis” on page 539

Server hangs during the UEFI boot process

If the system hangs during the UEFI boot process with the message `UEFI: DXE INIT` on the display, make sure that Option ROMs were not configured with a setting of **Legacy**. You can remotely view the current settings for Option ROMs by running the following command using the Lenovo XClarity Essentials OneCLI:

```
onecli config show EnableDisableAdapterOptionROMSupport --bmc xcc_userid:xcc_password@xcc_ipaddress
```

To recover a system that hangs during the boot process with Legacy Option ROM settings, see the following Tech Tip:

https://datacentersupport.lenovo.com/solutions/ht506118

If legacy Option ROMs must be used, do not set slot Option ROMs to **Legacy** on the Devices and I/O Ports menu. Instead, set slot Option ROMs to **Auto** (the default setting), and set the System Boot Mode to **Legacy Mode**. Legacy option ROMs will be invoked shortly before the system boots.

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 system LEDs and diagnostics display.
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

Server is unresponsive (POST is complete and operating system is running)

Complete the following steps until the problem is solved.

- If you are in the same location as the server, complete the following steps:
  1. If you are using a KVM connection, make sure that the connection is operating correctly. Otherwise, make sure that the keyboard and mouse are operating correctly.
  2. If possible, log in to the server and verify that all applications are running (no applications are hung).
  3. Restart the server.
  4. If the problem remains, make sure that any new software has been installed and configured correctly.
  5. Contact your place of purchase of the software or your software provider.
- If you are accessing the server from a remote location, complete the following steps:
  1. Make sure that all applications are running (no applications are hung).
  2. Attempt to log out of the system and log back in.
  3. Validate the network access by pinging or running a trace route to the server from a command line.
     a. If you are unable to get a response during a ping test, attempt to ping another server in the chassis to determine whether it is a connection problem or server problem.
     b. Run a trace route to determine where the connection breaks down. Attempt to resolve a connection issue with either the VPN or the point at which the connection breaks down.
  4. Restart the server remotely through the management interface.
  5. If the problem remains, verify that any new software has been installed and configured correctly.
  6. Contact your place of purchase of the software or your software provider.

Server is unresponsive (POST failed and cannot start System Setup)

Configuration changes, such as added devices or adapter firmware updates, and firmware or application code problems can cause the server to fail POST (the power-on self-test).

If this occurs, the server responds in either of the following ways:

- The server restarts automatically and attempts POST again.
- The server hangs, and you must manually restart the server for the server to attempt POST again.

After a specified number of consecutive attempts (automatic or manual), the server reverts to the default UEFI configuration and starts System Setup so that you can make the necessary corrections to the configuration and restart the server. If the server is unable to successfully complete POST with the default configuration, there might be a problem with the processor board or system I/O board. Do the following:

1. Remove any newly added devices and revert the system to the default hardware configuration.
2. Try to restart the system and check if it can boot to the System Setup successfully.
   - If no, do the following:
     a. Replace the processor board.
     b. Replace the system I/O board.

- If yes, try to move the suspected device to another system under test (SUT).
  - If the SUT system works normally, the issue maybe is caused by the processor board or system I/O board.
  - If the SUT system works abnormally, there might be a problem with the suspected device.

3. If all the suspected parts are isolated and the issue still remains unchanged, please run the affected system to be minimum configuration for further detail issue isolation and add them back step by step.

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 processor board first and then the system I/O board.

Unusual smell

Complete the following steps until the problem is solved.

1. An unusual smell might be coming from newly installed equipment.
2. If the problem remains, contact Lenovo Support.

Server seems to be running hot

Complete the following steps until the problem is solved.

Multiple servers or chassis:

1. Make sure that the room temperature is within the specified range (see "Specifications" on page 3).
2. Make sure that the fans are installed correctly.
3. Update the UEFI and XCC to the latest versions.
4. Make sure that the fillers in the server are installed correctly (see Chapter 5 "Hardware replacement procedures" on page 49 for detailed installation procedures).
5. Use the IPMI command to ramp up the fan speed to the full fan speed to see whether the issue can be resolved.

   Note: The IPMI raw command should only be used by trained technician and the system has its own specific IPMI raw command.
6. Check the management processor event log for rising temperature events. If there are no events, the server is running within normal operating temperatures. Note that you can expect some variation in temperature.

Cannot enter legacy mode after installing a new adapter

Complete the following procedure to solve the problem.

1. Go to **UEFI Setup → Devices and I/O Ports → Set Option ROM Execution Order**.
2. Move the RAID adapter with operation system installed to the top of the list.
3. Select **Save**.
4. Reboot the system and auto boot to operation system.

Cracked parts or cracked chassis

Contact Lenovo Support.

Optional-device problems

Use this information to solve problems related to optional devices.

- "External USB device is not recognized" on page 539
- "PCIe adapter is not recognized or is not functioning" on page 539
- "Insufficient PCIe resources are detected." on page 539
- "A Lenovo optional device that was just installed does not work." on page 540
- "A Lenovo optional device that worked previously does not work now" on page 540

External USB device is not recognized

Complete the following steps until the problem is resolved:

1. Update the UEFI firmware to the latest version.
2. Make sure that the proper drivers are installed on the server. See the product documentation for the USB device for information about device drivers.
3. Use the Setup Utility to make sure that the device is configured correctly.
4. If the USB device is plugged into a hub or the console breakout cable, unplug the device and plug it directly into the USB port on the front of the server.

PCIe adapter is not recognized or is not functioning

Complete the following steps until the problem is resolved:

1. Update the UEFI firmware to the latest version.
2. Check the event log and resolve any issues related to the device.
3. Validate that the device is supported for the server (see https://serverproven.lenovo.com). Make sure that the firmware level on the device is at the latest supported level and update the firmware if applicable.
4. Make sure that the adapter is installed in a correct slot.
5. Make sure that the proper device drivers are installed for the device.
6. Resolve any resource conflicts if running legacy mode (UEFI). Check legacy ROM boot orders and modify the UEFI setting for MM config base.

   Note: Ensure that you modify the ROM boot order associated with the PCIe adapter to the first execution order.
7. Check http://datacentersupport.lenovo.com for any tech tips (also known as retain tips or service bulletins) that might be related to the adapter.
8. Ensure any adapter external connections are correct and that the connectors are not physically damaged.
9. Make sure that the PCIe adapter is installed with the supported operating system.

Insufficient PCIe resources are detected.

If you see an error message stating "Insufficient PCI Resources Detected," complete the following steps until the problem is resolved:

1. Press Enter to access System Setup Utility.
2. Select **System Settings → Devices and I/O Ports → PCI 64–Bit Resource Allocation**, then; modify the setting from **Auto** to **Enable**.

3. If the Boot Device does not support MMIO above 4GB for Legacy Boot, use UEFI Boot Mode or remove/disable some PCIe devices.
4. DC cycle the system and ensure the system is enter UEFI boot menu or the operating system; then, capture the FFDC log.
5. Contact Lenovo technical support.

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 damage, then replace the cable.

A Lenovo optional device that worked previously does not work now

1. Make sure that all of the cable connections for the device are secure.
2. If the device comes with test instructions, use those instructions to test the device.
3. Reseat the cable connection and check if any physical parts have been damaged.
4. Replace the cable.
5. Reseat the failing device.
6. Replace the failing device.

Performance problems

Use this information to solve performance problems.

- "Network performance" on page 540
- "Operating system performance" on page 541

Network performance

Complete the following steps until the problem is solved:

1. Isolate which network is operating slowly (such as storage, data, and management). You might find it helpful to use ping tools or operating-system tools such as ethtool, task manager, or resource manager.
2. Check for traffic congestion on the network.
3. Utilize flow control settings to avoid overloading a port.
4. Update the NIC device driver, or the storage device controller device driver.
5. Use any traffic-diagnostic tools provided by the adapter manufacturer.
6. Balance the workload across multiple processor cores by using functions such as Receive Side Scaling (RSS).

7. Limit the inter-processor communication by using parameters such as interrupt affinity and NUMA settings.
8. Follow the instructions of adapter-specific tuning guides provided by the adapter manufacturer.

Operating system performance

Complete the following steps until the problem is solved:

1. If you have recently made changes to the server (for example, updated device drivers or installed software applications), remove the changes.
2. Check for any networking issues.
3. Check the operating system logs for performance related errors.
4. Check for events related to high temperatures and power issues as the server might be throttled to help with cooling. If it is throttled, reduce the workload on the server to help improve performance.
5. Check for events related to disabled DIMMs. If you do not have enough memory for the application workload, your operating system will have poor performance.
6. Ensure that the workload is not too high for the configuration.

Power on and power off problems

Use this information to resolve issues when powering on or powering off the server.

- "The power button does not work (server does not start)" on page 541
- "Server does not power on" on page 542
- "Server does not power off" on page 542

The power button does not work (server does not start)

Note: The power button will not function until approximately 1 to 3 minutes after the server has been connected to ac power to allow time for BMC to initialize.

Complete the following steps until the problem is resolved:

1. Make sure that the power button on the server is working correctly:
   a. Disconnect the server power cords.
   b. Reconnect the server power cords.
   c. Reseat the front operator panel cable, and then repeat steps 3a and 3b.
      - If the server starts, reseat the front operator panel.
      - If the problem remains, replace the front operator panel.
2. Make sure that:
   - The power cords are correctly connected to the server and to a working electrical outlet.
   - The LEDs on the power supply do not indicate a problem.
   - The Power button LED is lit on and is flashing slowly.
   - The push force is enough and with button force response.
3. If the power button LED is not lit on or is not flashing correctly, reseat all the power supplies and make sure AC LED on PSU rear side are lit on.
4. If you have just installed an optional device, remove it, and restart the server.
5. If the issue is still observed or without power button LED lit on, implement the minimum configuration to check whether any specific components lock the power permission. Replace the each power supply and check the power button function after installing the each one.

6. If everything is still done and the issue cannot be resolved, please collect the failure information with system logs captured to Lenovo support.

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 LEDs on the system board assembly. See “System-board-assembly LEDs” on page 521.
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 (see “Technical specifications” on page 3).
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, please call service to review the issue symptom and see whether the system I/O board or processor board replacement is necessary.

Server does not power off

Complete the following steps until the problem is resolved:

1. Determine whether you are using an Advanced Configuration and Power Interface (ACPI) or a non-ACPI operating system. If you are using a non-ACPI operating system, complete the following steps:
   a. Press `Ctrl+Alt+Delete`.
   b. Turn off the server by pressing the power-control button and holding it down for 5 seconds.
   c. Restart the server.
   d. If the server fails POST and the power-control button does not work, disconnect the power cord for 20 seconds; then, reconnect the power cord and restart the server.
2. If the problem remains or if you are using an ACPI-aware operating system, suspect the system board.

Power supply and PIB problems

Use this information to resolve issues related to power supply and PIB.

- “System error LED is on and event log "Power supply 1 has lost input" is displayed” on page 542
- “System error LED is on and event log "Power supply 2 has lost input" is displayed” on page 543

System error LED is on and event log "Power supply 1 has lost input" is displayed

To resolve the problem, do the following:

1. Make sure that the power supply is properly connected to a power cord.
2. The power cord is connected to a properly grounded electrical outlet for the server.
3. Make sure that the power supply AC source is stable within the supported range.
4. Swap power supplies to see if the issue follows with power supply 1. If it follows with power supply 1, then replace the failing one.
5. Review the event log and if the event log "Power supply 1 has lost input" persists, then replace the PIB.

System error LED is on and event log "Power supply 2 has lost input" is displayed

To resolve the problem, ensure that:

1. The power supply is properly connected to a power cord.
2. The power cord is connected to a properly grounded electrical outlet for the server.
3. Make sure that the power supply AC source is stable within the supported range.
4. Swap power supplies to see if the issue follows with power supply 2. If it follows with power supply 2, then replace the failing one.
5. Review the event log and see how the problem is to follow the event log actions to resolve the problem.

Serial-device problems

Use this information to solve problems with serial ports or devices.

- "Number of displayed serial ports is less than the number of installed serial ports" on page 543
- "Serial device does not work" on page 543

Number of displayed serial ports is less than the number of installed serial ports

Complete the following steps until the problem is solved.

1. Make sure that:
   - Each port is assigned a unique address in the Setup Utility and none of the serial ports is disabled.
   - The serial-port adapter (if one is present) is seated correctly.
2. Reseat the serial port adapter.
3. Replace the serial port adapter.

Serial device does not work

1. Make sure that:
   - The device is compatible with the server.
   - The serial port is enabled and is assigned a unique address.
   - The device is connected to the correct connector (see "System-board-assembly connectors" on page 33).
2. Reseat the following components:
   a. Failing serial device.
   b. Serial cable.
3. Replace the following components:
   a. Failing serial device.
   b. Serial cable.
4. If the problem remains, contact Lenovo Support.

Software problems

Use this information to solve software problems.

1. To determine whether the problem is caused by the software, make sure that:
   - The server has the minimum memory that is needed to use the software. For memory requirements, see the information that comes with the software.

Note: If you have just installed an adapter or memory, the server might have a memory-address conflict.

- The software is designed to operate on the server.
- Other software works on the server.
- The software works on another server.

2. If you receive any error messages while you use the software, see the information that comes with the software for a description of the messages and suggested solutions to the problem.
3. Contact your place of purchase of the software.

Storage drive problems

Use this information to resolve issues related to the storage drives.

- "Server cannot recognize a drive" on page 544
- "Multiple drives fail" on page 545
- "Multiple drives are offline" on page 545
- "A replacement drive does not rebuild" on page 545
- "Green drive activity LED does not represent actual state of associated drive" on page 545
- "Yellow drive status LED does not represent actual state of associated drive" on page 545
- "U.3 NVMe drive can be detected in NVMe connection, but cannot be detected in Tri-mode" on page 546

Server cannot recognize a drive

Complete the following steps until the problem is solved.

1. Observe the associated yellow 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 drive backplane.
3. Observe the associated green 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 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 drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → 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 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.
4. Make sure that the 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 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 drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → 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.

Multiple drives fail

Complete the following steps until the problem is solved:

- View the Lenovo XClarity Controller event log for events related to power supplies or vibration issues and resolve those events.
- Make sure that the device drivers and firmware for the drive and server are at the latest level.

Important: Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

Multiple drives are offline

Complete the following steps until the problem is solved:

- View the Lenovo XClarity Controller event log for events related to power supplies or vibration issues and resolve those events.
- View the storage subsystem log for events related to the storage subsystem and resolve those events.

A replacement drive does not rebuild

Complete the following steps until the problem is solved:

1. Make sure that the drive is recognized by the adapter (the green drive activity LED is flashing).
2. Review the SAS/SATA RAID adapter documentation to determine the correct configuration parameters and settings.

Green drive activity LED does not represent actual state of associated drive

Complete the following steps until the problem is solved:

1. If the green drive activity LED does not flash when the drive is in use, run the diagnostics tests for the 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 drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → Disk Drive Test**
2. If the drive passes the test, replace the backplane.
3. If the drive fails the test, replace the drive.

Yellow drive status LED does not represent actual state of associated drive

Complete the following steps until the problem is solved:

1. Turn off the server.
2. Reseat the SAS/SATA adapter.
3. Reseat the backplane signal cable and backplane power cable.
4. Reseat the drive.
5. Power on the server and observe the activity of the drive LEDs.

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.

Appendix A. Hardware disassembling for recycle

Follow the instructions in this section to recycle components with compliance with local laws or regulations.

Disassemble the system board assembly for recycle

Follow the instructions in this section to disassemble the system board assembly before recycling.

About this task

The system board assembly contains the system I/O board and processor board. Before recycling each unit, you need to disassemble the system board assembly.

Procedure

Step 1. Remove the system board assembly from the server. See “Remove the processor board” on page 324.

Step 2. Remove the firmware and RoT security module from the system I/O board. See “Remove the firmware and RoT security module” on page 312.

Step 3. Separate the system I/O board from the processor board.

Note: To prevent the contact of the system I/O board from damage, pinch and lift the plunger on the system I/O board upward a little and pull out the system I/O board outward. During the entire pulling action, ensure that the system I/O board remains as horizontal as possible.

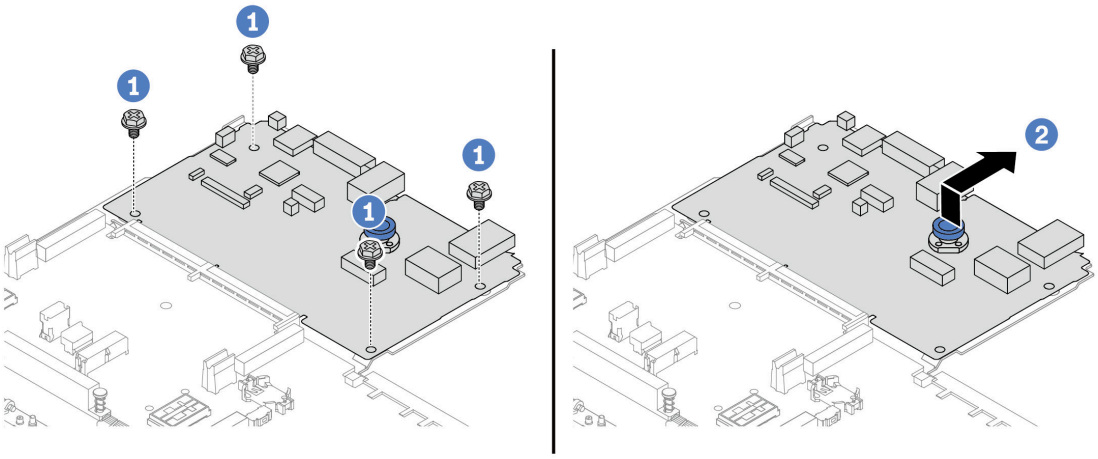


Figure 479. Separating the system I/O board from the processor board

a. 1 Remove the screws that secure the system I/O board.

b. 2 Lift and hold the rear lift handle and slide the system I/O board towards the rear to disengage it from the processor board.

Step 4. Remove the screws from the processor board as illustrated.

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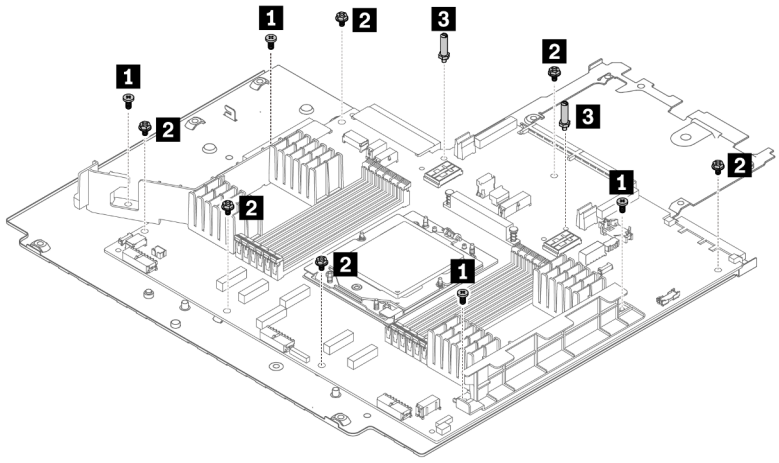


Figure 480. Removing screws from the processor board

Screw	Quantity	Tools
1	4	PH2 screwdriver
2	6	PH2 screwdriver
3	2	Hex wrench

Step 5. Remove the following components from the processor board.

- Cable wall brackets

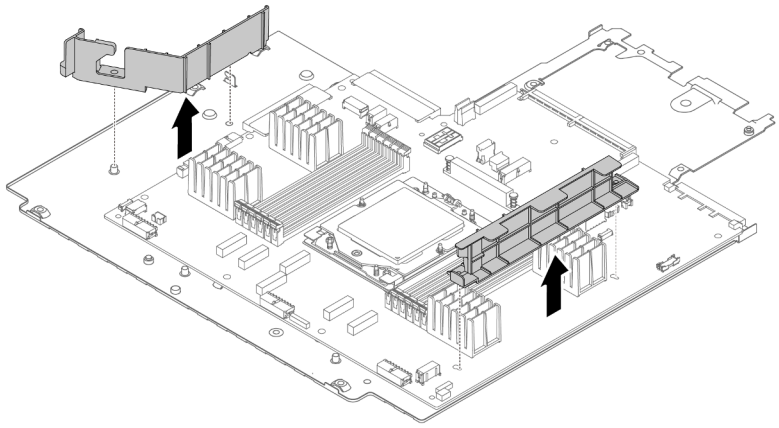


Figure 481. Removing components from the processor board

Step 6. Separate the processor board from the supporting sheet metal.

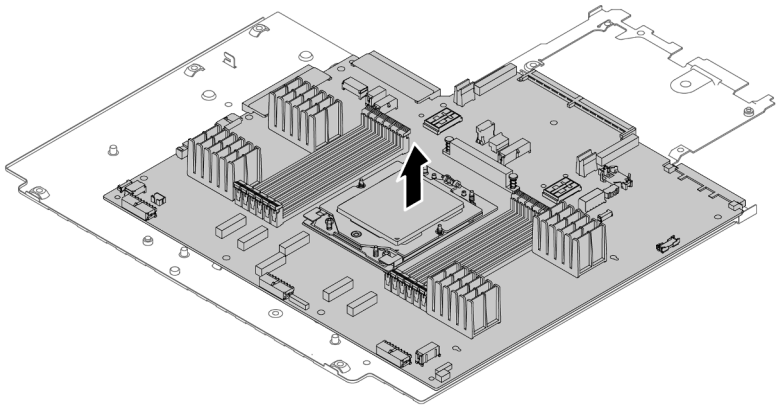


Figure 482. Separating the processor board from the supporting sheet metal

After you finish

After disassembling the system board assembly, recycle the units in compliance with local regulations.

Appendix B. 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 online help 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 the following location:

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. (See the following links) 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.
  - Drivers and software downloads
    - https://datacentersupport.lenovo.com/products/servers/thinksystem/sr655v3/7d9e/downloads/driver-list/
  - Operating system support center
    - https://datacentersupport.lenovo.com/solutions/server-os
  - Operating system installing instructions
    - https://pubs.lenovo.com/thinksystem#os-installation
- 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.
- Refer to Chapter 8 “Problem determination” on page 503 for instructions on isolating and solving issues.

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- Go to http://datacentersupport.lenovo.com and check for information to help you solve the problem.

  To find the Tech Tips available for your server:

  1. Go to http://datacentersupport.lenovo.com and navigate to the support page for your server.
  2. Click on **How To's** from the navigation pane.
  3. Click **Article Type → Solution** from the drop-down menu.

     Follow the on-screen instructions to choose the category for the problem that you are having.
- Check Lenovo Data Center Forum 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). Machine type number can be found on the ID label, see "Identify the server and access the Lenovo XClarity Controller" on page 45.
- 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 "Backing up the BMC configuration" section in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/.

  - For more information about using the CLI to collect service data, see the “XCC `ffdc` command” section in the XCC documentation 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.

  You can find more information about setting up automatic problem notification within the Lenovo XClarity Administrator at https://pubs.lenovo.com/lxca/admin_setupcallhome.

- **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.

Appendix C. Documents and supports

This section provides handy documents, driver and firmware downloads, and support resources.

Documents download

This section provides introduction and download link for handy documents.

Documents

Download the following product documentations at:

https://thinksystem.lenovofiles.com/help/topic/sr655-v3/7d9e/pdf_files.html

- ***Rail Installation Guides***
  - Rail installation in a rack
- ***User Guide***
  - Complete overview, system configuration, hardware components replacing, and troubleshooting.

    Selected chapters from *User Guide*:
    - ***System Configuration Guide*** **:** Server overview, components identification, system LEDs and diagnostics display, product unboxing, setting up and configuring the server.
    - ***Hardware Maintenance Guide*** **:** Installing hardware components, cable routing, and troubleshooting.
- ***Messages and Codes Reference***
  - XClarity Controller, LXPM, and uEFI events
- ***UEFI Manual***
  - UEFI setting introduction

Note: SR655 V3 configured with Direct Water Cooling Module (DWCM) can be installed in the ThinkSystem Heavy Duty Full Depth Rack Cabinets. For ThinkSystem Heavy Duty Full Depth Rack Cabinets User Guide, see ThinkSystem Heavy Duty Full Depth Rack Cabinets User Guide.

Support websites

This section provides driver and firmware downloads and support resources.

Support and downloads

- Drivers and Software download website for ThinkSystem SR655 V3
  - https://datacentersupport.lenovo.com/products/servers/thinksystem/sr655v3/7d9e/downloads/driver-list/
- Lenovo Data Center Forum
  - https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv_eg
- Lenovo Data Center Support for ThinkSystem SR655 V3
  - https://datacentersupport.lenovo.com/products/servers/thinksystem/sr655v3/7d9e
- Lenovo License Information Documents
  - https://datacentersupport.lenovo.com/documents/lnvo-eula

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- Lenovo Press website (Product Guides/Datasheets/White papers)
  - https://lenovopress.lenovo.com/
- Lenovo Privacy Statement
  - https://www.lenovo.com/privacy
- Lenovo Product Security Advisories
  - https://datacentersupport.lenovo.com/product_security/home
- Lenovo Product Warranty Plans
  - http://datacentersupport.lenovo.com/warrantylookup
- Lenovo Server Operating Systems Support Center website
  - https://datacentersupport.lenovo.com/solutions/server-os
- Lenovo ServerProven website (Options compatibility lookup)
  - https://serverproven.lenovo.com
- Operating System Installation Instructions
  - https://pubs.lenovo.com/thinksystem#os-installation
- Submit an eTicket (service request)
  - https://support.lenovo.com/servicerequest
- Subscribe to Lenovo Data Center Group product notifications (Stay up to date on firmware updates)
  - https://datacentersupport.lenovo.com/solutions/ht509500

Appendix D. Notices

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Important notes

Processor speed indicates the internal clock speed of the processor; other factors also affect application performance.

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1 024 bytes, MB stands for 1 048 576 bytes, and GB stands for 1 073 741 824 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1 000 000 bytes, and GB stands for 1 000 000 000 bytes. Total user-accessible capacity can vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard-disk-drive bays with the largest currently supported drives that are available from Lenovo.

Maximum memory might require replacement of the standard memory with an optional memory module.

Each solid-state memory cell has an intrinsic, finite number of write cycles that the cell can incur. Therefore, a solid-state device has a maximum number of write cycles that it can be subjected to, expressed as `total bytes written` (TBW). A device that has exceeded this limit might fail to respond to system-generated commands or might be incapable of being written to. Lenovo is not responsible for replacement of a device that has exceeded its maximum guaranteed number of program/erase cycles, as documented in the Official Published Specifications for the device.

Lenovo makes no representations or warranties with respect to non-Lenovo products. Support (if any) for the non-Lenovo products is provided by the third party, not Lenovo.

Some software might differ from its retail version (if available) and might not include user manuals or all program functionality.

Electronic emission notices

When you attach a monitor to the equipment, you must use the designated monitor cable and any interference suppression devices that are supplied with the monitor.

Additional electronic emissions notices are available at:

https://pubs.lenovo.com/important_notices/

Taiwan Region BSMI RoHS declaration

單元 Unit	限用物質及其化學符號 Restricted substances and its chemical symbols					
	鉛Lead (PB)	汞Mercury (Hg)	鎘Cadmium (Cd)	六價鉻 Hexavalent chromium (Cr^{+6})	多溴聯苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
機架	○	○	○	○	○	○
外部蓋板	○	○	○	○	○	○
機械組合件	–	○	○	○	○	○
空氣傳動設備	–	○	○	○	○	○
冷卻組合件	–	○	○	○	○	○
內存模組	–	○	○	○	○	○
處理器模組	–	○	○	○	○	○
電纜組合件	–	○	○	○	○	○
電源供應器	–	○	○	○	○	○
儲備設備	–	○	○	○	○	○
印刷電路板	–	○	○	○	○	○

備考1. 〝超出0.1 wt %〞及〝超出0.01 wt %〞係指限用物質之百分比含量超出百分比含量基準值。

Note1 : “exceeding 0.1wt%” and “exceeding 0.01 wt%” indicate that the percentage content of the restricted substance exceeds the reference percentage value of presence condition.

備考2. 〝○〞係指該項限用物質之百分比含量未超出百分比含量基準值。

Note2 : “○”indicates that the percentage content of the restricted substance does not exceed the percentage of reference value of presence.

備考3. 〝-〞係指該項限用物質為排除項目。

Note3 : The “-“ indicates that the restricted substance corresponds to the exemption.

Taiwan Region import and export contact information

Contacts are available for Taiwan Region import and export information.

委製商/進口商名稱: 台灣聯想環球科技股份有限公司
進口商地址: 台北市南港區三重路 66 號 8 樓
進口商電話: 0800-000-702