



ThinkSystem SR635 V3 User Guide



Machine Type: 7D9G, 7D9H

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 الأمنية

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 ασφαλείας (safety information).

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

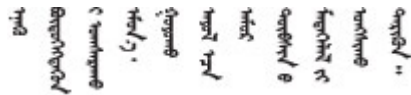
A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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.

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítajte 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་ཇུས་འདི་བདེ་སྤྱོད་མ་བྱས་གོང་། སྐྱོར་གྱི་ཡིད་གཟབ་
བྱ་འདྲ་མིན་ཡིད་པའི་འོད་ཟེར་བལྟ་དགོས།

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

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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.

Chapter 1. Introduction

The ThinkSystem SR635 V3 Server (Types 7D9G and 7D9H) is a 1-socket 1U rack server that features the 4th generation EPYC processor family of AMD. It is designed to be highly flexible to support many kinds of Information Technology (IT) workloads. This high-performance, multi-core server is ideally suited for IT environments that require superior processor performance, input/output (I/O) flexibility, and flexible manageability.

Figure 1. ThinkSystem SR635 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 (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 DOS (Disk Operating System).

- **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](#).

- **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 [“System LEDs and diagnostics display” on page 36](#).

- **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 the documentation icon  from the navigation pane.
3. Click **Documentation 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.

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

Specification category	Technical specifications	Mechanical specifications	Environmental specifications
Content	<ul style="list-style-type: none">• Processor• Memory• M.2 Drive• Storage expansion• Expansion slots• Integrated functions and I/O connectors• Network• RAID adapter• Host bus adapter• System fan• Electrical input• Minimal configuration for debugging• Operating systems	<ul style="list-style-type: none">• Dimension• Weight	<ul style="list-style-type: none">• Acoustical noise emissions• Ambient temperature management• Environmental

Technical specifications

Summary of the technical 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/>.

Processor
Supports fourth-generation AMD® EPYC™ processors, with 5nm process technology. <ul style="list-style-type: none">• One processor with the new LGA 6096 (SP5) socket• Up to 96 Zen4 cores (192 threads)• 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 49 for detailed information about memory configuration and setup.

- Slots: 12 memory module (DIMM) slots
- Memory module type:
 - TruDDR5 4800MHz RDIMM: 16 GB (1Rx8), 32 GB (2Rx8), 48 GB (2Rx8), 96 GB (2Rx4)
 - TruDDR5 4800MHz 10x4 RDIMM: 32 GB (1Rx4), 64 GB (2Rx4)
 - TruDDR5 4800MHz 9x4 RDIMM: 32 GB (1Rx4), 64 GB (2Rx4)
 - TruDDR5 4800MHz 3DS RDIMM: 128 GB (4Rx4), 256 GB (8Rx4)
- Capacity:
 - Minimum: 16 GB (1 x 16 GB RDIMM)
 - Maximum: 3 TB (12 x 256 GB 3DS RDIMMs)
- Speed:
 - The operating speed varies with specific processor models and UEFI settings.
 - Maximum speed: 4800 MT/s

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

Internal drives

- **Front:**
 - Up to four 2.5-inch hot-swap SAS/SATA drives
 - Up to four 2.5-inch hot-swap NVMe drives
 - Up to four 2.5-inch hot-swap AnyBay drives
 - Up to eight 2.5-inch hot-swap SAS/SATA drives
 - Up to six 2.5-inch hot-swap SAS/SATA and four 2.5-inch hot-swap AnyBay (SAS/SATA/NVMe) drives
 - Up to six 2.5-inch hot-swap SAS/SATA and two 2.5-inch hot-swap AnyBay (SAS/SATA/NVMe) and two 2.5-inch hot-swap NVMe drives
 - Up to ten 2.5-inch hot-swap NVMe drives
 - Up to ten 2.5-inch hot-swap SAS/SATA drives
 - Up to ten 2.5-inch hot-swap AnyBay (SAS/SATA/NVMe) drives
 - Up to 16 hot-swap EDSFF drives
- **Internal:**
 - Up to two internal SATA or NVMe M.2 drives
- **Rear:**
 - Up to two 2.5-inch hot-swap SAS/SATA drives
 - Up to two 2.5-inch hot-swap NVMe drives
 - Up to two 7mm hot-swap SATA or NVMe drives

Expansion slots

Depending on the model, your server supports up to three PCIe slots in the rear and up to two PCIe slots in the front.

Note: The two PCIe slots in the front are only supported when 4 x 2.5" chassis is used. They are not supported for 10 x 2.5" chassis.

- PCIe x16, low-profile
- PCIe x16/x16, low-profile + low-profile
- PCIe x16/x16, low profile + full-height
- PCIe x16, full-height

PCIe slot availability is based on riser selection. See [“Rear view” on page 24](#) and [“PCIe slots and adapters” on page 50](#).

Storage controller

- SAS/SATA HBA adapters
 - ThinkSystem 440-8i SAS/SATA PCIe Gen4 12Gb HBA
 - ThinkSystem 440-16i SAS/SATA PCIe Gen4 12Gb HBA
 - ThinkSystem 4350-8i SAS/SATA 12Gb HBA
 - ThinkSystem 4350-16i SAS/SATA 12Gb HBA
 - ThinkSystem 440-16i SAS/SATA PCIe Gen4 12Gb Internal HBA
 - ThinkSystem 440-8e SAS/SATA PCIe Gen4 12Gb HBA
 - ThinkSystem 440-16e SAS/SATA PCIe Gen4 12Gb HBA
- SAS/SATA RAID adapters
 - ThinkSystem RAID 540-8i PCIe Gen4 12Gb Adapter
 - ThinkSystem RAID 540-16i PCIe Gen4 12Gb Adapter
 - ThinkSystem RAID 940-8i 4GB Flash PCIe Gen4 12Gb Adapter
 - ThinkSystem RAID 940-16i 4GB Flash PCIe Gen4 12Gb Adapter
 - ThinkSystem RAID 940-16i 8GB Flash PCIe Gen4 12Gb Adapter
 - ThinkSystem RAID 940-16i 8GB Flash PCIe Gen4 12Gb Internal Adapter
 - ThinkSystem RAID 940-8e 4GB Flash PCIe Gen4 12Gb Adapter
 - ThinkSystem RAID 5350-8i PCIe 12Gb Adapter
 - ThinkSystem RAID 5350-8i PCIe 12Gb Internal Adapter
 - ThinkSystem RAID 9350-8i 2GB Flash PCIe 12Gb Adapter
 - ThinkSystem RAID 9350-8i 2GB Flash PCIe 12Gb Internal Adapter
 - ThinkSystem RAID 9350-16i 4GB Flash PCIe 12Gb Adapter
 - ThinkSystem RAID 9350-16i 4GB Flash PCIe 12Gb Internal Adapter

Notes:

Categorization of Gen 3 and Gen 4 RAID/HBA adapters:

- Gen 4: 440, 540 and 940 series
- Gen 3: 4350, 5350 and 9350 series

Note:

For more information about the RAID/HBA adapters, see [Lenovo ThinkSystem RAID Adapter and HBA Reference](#).

Graphics processing unit (GPU)

The server supports the following GPUs:

- Low-profile, half-length, single-wide:
 - NVIDIA® A2
 - NVIDIA® L4

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:
 - (Optional) One VGA connector
 - (Optional) One USB 3.1 Gen 1 (5 Gbps) connector
 - (Optional) One USB 2.0 connector
 - (Optional) One external diagnostics connector

Note: These connectors are available only when the front I/O module is installed in the server.

- Rear connectors:
 - One VGA connector
 - Three USB 3.1 Gen 1 (5 Gbps) connectors
 - One XCC system management port to connect to a systems-management network. This RJ-45 connector is dedicated to the Lenovo XClarity Controller functions and runs at 1 Gb speed.
 - Two or four Ethernet connectors on the OCP module (optional)
 - (Optional) One serial port connector

Note: This connector is available when the serial port cable is installed in the server.

Network

- OCP module

Notes:

- The OCP module is an optional part. It is default to be installed on the rear and optional in the front of the server.
- If the 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.

Rear button

Rear button

- NMI button

System fan

- Supports up to seven dual-rotor hot-swap fans (including one redundant fan rotor)
- Supports the following two fan types:
 - Standard fan 4056 (speed: 21000 RPM)
 - Performance fan 4056 (speed: 28000 RPM)

Note: 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.

The server supports up to two power supplies for redundancy.

Table 1. Electrical input for power supply units

Power supply	100-127 V ac	200-240 V ac	240 V dc	-48 V dc
750-watt 80 PLUS Platinum	√	√	√	
750-watt 80 PLUS Titanium		√	√	
1100-watt 80 PLUS Titanium	√	√	√	
1100-watt 80 PLUS Platinum		√	√	
1800-watt 80 PLUS Platinum		√	√	
1800-watt 80 PLUS Titanium		√	√	
1100-watt -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, 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
- VMware ESXi
- Microsoft Windows
- 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 322.

Mechanical specifications

Summary of the mechanical specifications of the server. Depending on the model, some features might not be available, or some specifications might not apply.

Dimension
1U server
<ul style="list-style-type: none">• Height: 43 mm (1.69 inches)• Width (with EIA flange): 482 mm (18.97 inches)• Depth (with EIA flange and PSU handle): 787.6 mm (31 inches)

Weight
Up to 20.2 kg (44.56 lb)

Environmental specifications

Summary of the environmental specifications of the server. Depending on the model, some features might not be available, or some specifications might not apply.

Acoustical noise emissions

The server has the following acoustic noise emissions declaration.

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

	Typical	GPU rich	Storage rich
Sound power levels (L _{WA} d)			
Idling	6.7 Bel	6.7 Bel	7.4 Bel
Operating	8.4 Bel	8.3 Bel	7.9 Bel
Sound pressure level (L _{pAm})			
Idling	52.3 dBA	52.3 dBA	59.9 dBA
Operating	68.7 dBA	67.7 dBA	64.1 dBA

Notes:

- These sound levels were measured in controlled acoustical environments according to procedures specified by ISO7779 and are reported in accordance with ISO 9296.
- The declared acoustic sound levels are based on the following configurations, which may change depending on configuration/conditions:

Components	Typical configuration	GPU rich configuration	Storage rich configuration
Processor	One 300 W processor	One 300 W processor	One 240 W processor
Memory	Twelve 64 GB RDIMMs	Twelve 64 GB RDIMMs	Twelve 64 GB RDIMMs
Drive	Ten SAS hard disk drives	Ten SAS hard disk drives	Twelve SAS hard disk drives
RAID adapter	One 440-16i CFF RAID adapter	One 440-16i CFF RAID adapter	One 440-16i CFF RAID adapter
OCP adapter	One Broadcom 5719 1GbE RJ45 4-port OCP Ethernet adapter	One Broadcom 5719 1GbE RJ45 4-port OCP Ethernet adapter	One Broadcom 5719 1GbE RJ45 4-port OCP Ethernet adapter
GPU adapter	None	One A2 GPU adapter	None
Power supply unit	Two 1100 W power supply units	Two 1100 W power supply units	Two 750 W power supply units

- 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.

Ambient temperature management

The server is supported in the following environment:

- Air temperature:
 - Operating:
 - ASHRAE class H1: 5–25°C (41–77°F); when the altitude exceeds 900 m (2953 ft), the maximum ambient temperature value decreases by 1°C (1.8°F) with every 500 m (1640 ft) of altitude increase.
 - ASHRAE class A2: 10–35°C (50–95°F); when the altitude exceeds 900 m (2953 ft), the maximum ambient temperature value decreases by 1°C (1.8°F) with every 300 m (984 ft) of altitude increase.
 - ASHRAE class A3: 5–40°C (41–104°F); when the altitude exceeds 900 m (2953 ft), the maximum ambient temperature value decreases by 1°C (1.8°F) with every 175 m (574 ft) of altitude increase.
 - ASHRAE class A4: 5–45°C (41–113°F); when the altitude exceeds 900 m (2953 ft), the maximum ambient temperature value decreases by 1°C (1.8°F) with every 125 m (410 ft) of altitude increase.
 - Server off: 5–45°C (41–113°F)
 - Shipping or storage: -40–60°C (-40–140°F)
- Maximum altitude: 3050 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 or storage: 8%–90%
- Particulate contamination

Attention: Airborne particulates and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the server. For information about the limits for particulates and gases, see [“Particulate contamination” on page 11](#).

Environment

ThinkSystem SR635 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 the operating temperature is outside ASHRAE A2 specification.

Depending on the hardware configuration, SR635 V3 server also complies with ASHRAE Class H1 specification. System performance may be impacted when the operating temperature is outside ASHRAE H1 specification.

The restrictions to ASHRAE support are as follows:

- The ambient temperature must be limited to 45°C or lower (TDP < 240W) if the server meets the following conditions:
 - Installed with any TruDDR5 memory DIMM (64 GB or below)
 - Without 2.5" NVMe, NVMe M.2 or NVMe AIC drives
 - Without rear drives or 7mm drives
 - Without GPU adapters
 - Without any PCIe network interface cards (NICs) at a rate equal to or above 25 GB
 - Without any parts with AOC and at a rate equal to or above 25 GB
 - Without closed loop heat sink
- The ambient temperature must be limited to 40°C or lower (TDP < 300 W) if the server meets the following conditions:
 - Installed with any TruDDR5 memory DIMM (64 GB or below)
 - Without 2.5" NVMe, NVMe M.2 or NVMe AIC drives
 - Without rear drives or 7mm drives
 - Without GPU adapters
 - Without any PCIe network interface cards (NICs) at a rate equal to or above 25 GB
 - Without any parts with AOC and at a rate equal to or above 25 GB
 - Without closed loop heat sink
- The ambient temperature must be limited to 35°C or lower ($320\text{ W} \leq \text{TDP} \leq 400\text{ W}$) if the server has any of the following components:
 - TruDDR5 memory 128 GB DIMM
 - ThinkSystem 256GB TruDDR5 4800MHz (8Rx4) 3DS RDIMM-A v2
 - NVMe, NVMe M.2 or NVMe AIC drives
 - Broadcom 57416 10GBASE-T 2-port OCP
 - Broadcom 57454 10GBASE-T 4-port OCP
 - PCIe network interface cards (NICs) at a rate of 25 GB
 - Parts with AOC and at a rate of 25 GB
 - GPU adapters
- The ambient temperature must be limited to 30°C or lower if the server has any of the following components:
 - Rear drives
 - EDSFF drives
 - Parts with AOC and at a rate higher than 25 GB
 - PCIe network interface cards (NICs) at a rate higher than 25 GB
 - ThinkSystem 256GB TruDDR5 4800MHz (8Rx4) 3DS RDIMM-A v1

For detailed thermal information, see [“Thermal rules” on page 55](#).

Note: When the ambient temperature is greater than the supported max temperature (ASHARE A4 45°C), the server will shut down. The server will not power on again until the ambient temperature falls within the supported temperature range.

Particulate contamination

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

Risks that are posed by the presence of excessive particulate levels or concentrations of harmful gases include damage that might cause the device to malfunction or cease functioning altogether. This

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

Table 2. Limits for particulates and gases

Contaminant	Limits
Reactive gases	Severity level G1 as per ANSI/ISA 71.04-1985 ¹ : <ul style="list-style-type: none"> • The copper reactivity level shall be less than 200 Angstroms per month ($\text{\AA}/\text{month} \approx 0.0035 \mu\text{g}/\text{cm}^2\text{-hour}$ weight gain).² • The silver reactivity level shall be less than 200 Angstroms per month ($\text{\AA}/\text{month} \approx 0.0035 \mu\text{g}/\text{cm}^2\text{-hour}$ 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: <ul style="list-style-type: none"> • 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. <ul style="list-style-type: none"> • The deliquescent relative humidity of the particulate contamination should be more than 60% RH.⁴ • Data centers must be free of zinc whiskers.⁵
<p>¹ ANSI/ISA-71.04-1985. <i>Environmental conditions for process measurement and control systems: Airborne contaminants</i>. Instrument Society of America, Research Triangle Park, North Carolina, U.S.A.</p> <p>² The derivation of the equivalence between the rate of copper corrosion growth in the thickness of the corrosion product in $\text{\AA}/\text{month}$ and the rate of weight gain assumes that Cu_2S and Cu_2O grow in equal proportions.</p> <p>³ The derivation of the equivalence between the rate of silver corrosion growth in the thickness of the corrosion product in $\text{\AA}/\text{month}$ and the rate of weight gain assumes that Ag_2S is the only corrosion product.</p> <p>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.</p> <p>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.</p>	

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	<p>Baseboard management controller (BMC)</p> <p>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).</p> <p>Interface</p> <ul style="list-style-type: none"> • CLI application • Web GUI interface • Mobile application • Redfish API <p>Usage and downloads</p> <p>https://pubs.lenovo.com/lxcc-overview/</p>
Lenovo XCC Logger Utility	<p>Application that reports the XCC events to local OS system log.</p> <p>Interface</p> <ul style="list-style-type: none"> • CLI application <p>Usage and downloads</p> <ul style="list-style-type: none"> • https://pubs.lenovo.com/lxcc-logger-linux/ • https://pubs.lenovo.com/lxcc-logger-windows/
Lenovo XClarity Administrator	<p>Centralized interface for multi-server management.</p> <p>Interface</p> <ul style="list-style-type: none"> • Web GUI interface • Mobile application • REST API <p>Usage and downloads</p> <p>https://pubs.lenovo.com/lxca/</p>
Lenovo XClarity Essentials toolset	<p>Portable and light toolset for server configuration, data collection, and firmware updates. Suitable both for single-server or multi-server management contexts.</p> <p>Interface</p> <ul style="list-style-type: none"> • OneCLI: CLI application • Bootable Media Creator: CLI application, GUI application • UpdateXpress: GUI application <p>Usage and downloads</p> <p>https://pubs.lenovo.com/lxce-overview/</p>

Options	Description
Lenovo XClarity Provisioning Manager	<p>UEFI-based embedded GUI tool on a single server that can simplify management tasks.</p> <p>Interface</p> <ul style="list-style-type: none"> • Web interface (BMC remote access) • GUI application <p>Usage and downloads</p> <p>https://pubs.lenovo.com/lxpm-overview/</p> <p>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/.</p>
Lenovo XClarity Integrator	<p>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.</p> <p>Interface</p> <ul style="list-style-type: none"> • GUI application <p>Usage and downloads</p> <p>https://pubs.lenovo.com/lxci-overview/</p>
Lenovo XClarity Energy Manager	<p>Application that can manage and monitor server power and temperature.</p> <p>Interface</p> <ul style="list-style-type: none"> • Web GUI Interface <p>Usage and downloads</p> <p>https://datacentersupport.lenovo.com/solutions/Invo-lxem</p>
Lenovo Capacity Planner	<p>Application that supports power consumption planning for a server or rack.</p> <p>Interface</p> <ul style="list-style-type: none"> • Web GUI Interface <p>Usage and downloads</p> <p>https://datacentersupport.lenovo.com/solutions/Invo-lcp</p>

Functions

Options		Functions							
		Multi-system mgmt	OS deployment	System configuration	Firmware updates ¹	Event/alert monitoring	Inventory/logs	Power mgmt	Power planning
Lenovo XClarity Controller				√	√ ²	√	√ ⁴		
Lenovo XCC Logger Utility						√			
Lenovo XClarity Administrator		√	√	√	√ ²	√	√ ⁴		
Lenovo XClarity Essentials toolset	OneCLI	√		√	√ ²	√	√		
	Bootable Media Creator			√	√ ²		√ ⁴		
	UpdateXpress			√	√ ²				
Lenovo XClarity Provisioning Manager			√	√	√ ³		√ ⁵		
Lenovo XClarity Integrator		√	√ ⁶	√	√	√	√	√ ⁷	
Lenovo XClarity Energy Manager		√				√		√	
Lenovo Capacity Planner									√ ⁸

Notes:

1. Most options can be updated through the Lenovo tools. Some options, such as GPU firmware or Omni-Path firmware require the use of supplier tools.
2. The server UEFI settings for option ROM must be set to **Auto** or **UEFI** to update firmware using Lenovo XClarity Administrator, Lenovo XClarity Essentials, or Lenovo XClarity Controller.
3. Firmware updates are limited to Lenovo XClarity Provisioning Manager, Lenovo XClarity Controller, and UEFI updates only. Firmware updates for optional devices, such as adapters, are not supported.
4. The server UEFI settings for option ROM must be set to **Auto** or **UEFI** for detailed adapter card information, such as model name and firmware levels, to be displayed in Lenovo XClarity Administrator, Lenovo XClarity Controller, or Lenovo XClarity Essentials.
5. Limited inventory.
6. The Lenovo XClarity Integrator deployment check for System Center Configuration Manager (SCCM) supports Windows operating system deployment.
7. Power management function is supported only by Lenovo XClarity Integrator for VMware vCenter.
8. It is highly recommended that you check the power summary data for your server using Lenovo Capacity Planner before purchasing any new parts.

Chapter 2. Server components

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

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 view for different server models:

- “Server model with four 2.5-inch drive bays” on page 17
- “Server model with four 2.5-inch drive bays and a front adapter assembly” on page 18
- “Server model with eight 2.5-inch drive bays” on page 19
- “Server model with ten 2.5-inch drive bays” on page 19
- “Server model with 16 EDSFF drives” on page 20
- “Server model with 2.5-inch drive bays (backplane-less)” on page 21
- “Server model with eight 2.5-inch drive bays (with LCD diagnostics panel assembly)” on page 21
- “Server model with 16 EDSFF drives and an M.2 cage” on page 23
- “Server model with 16 EDSFF drives (with LCD diagnostics panel assembly)” on page 22

Server model with four 2.5-inch drive bays

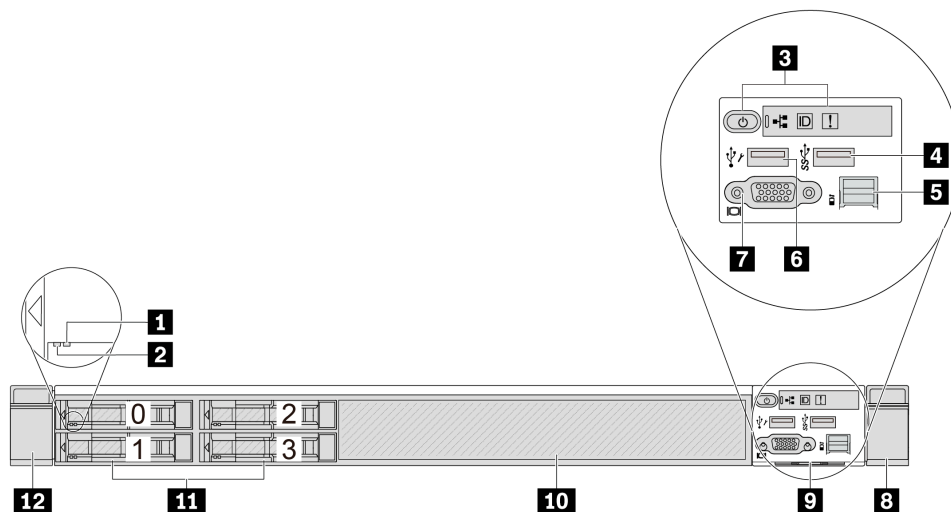


Table 3. Components on the front of the server

Callout	Callout
1 Drive status LED	2 Drive activity LED
3 Diagnostics panel	4 USB 3.1 Gen 1 (5Gbps) connector
5 External LCD connector	6 XClarity Controller USB connector

Table 3. Components on the front of the server (continued)

Callout	Callout
7 VGA connector (optional)	8 Rack latch (right)
9 Pull-out information tab	10 Drive filler (1)
11 Drive bays (4)	12 Rack latch (left)

Note: For more information about each component, see [“Front components overview”](#) on page 23.

Server model with four 2.5-inch drive bays and a front adapter assembly

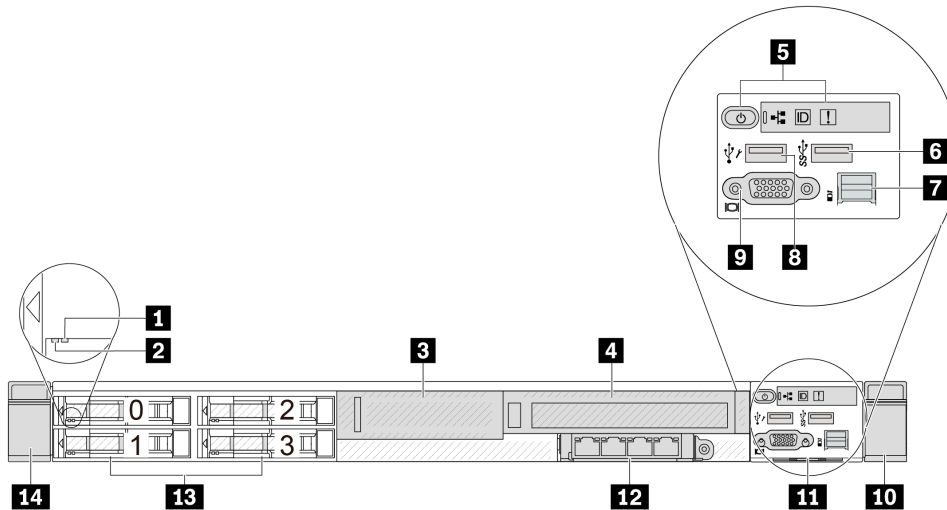


Table 4. Components on the front of the server

Callout	Callout
1 Drive status LED	2 Drive activity LED
3 Low-profile PCIe (riser 3, slot 4)	4 Full-Height PCIe (riser 4, slot 5)
5 Diagnostics panel	6 USB 3.1 Gen 1 (5Gbps) connector
7 External LCD connector	8 XClarity Controller USB connector
9 VGA connector (optional)	10 Rack latch (right)
11 Pull-out information tab	12 OCP 3.0 connectors
13 Drive bays (4)	14 Rack latch (left)

Note: For more information about each component, see [“Front components overview”](#) on page 23.

Server model with eight 2.5-inch drive bays

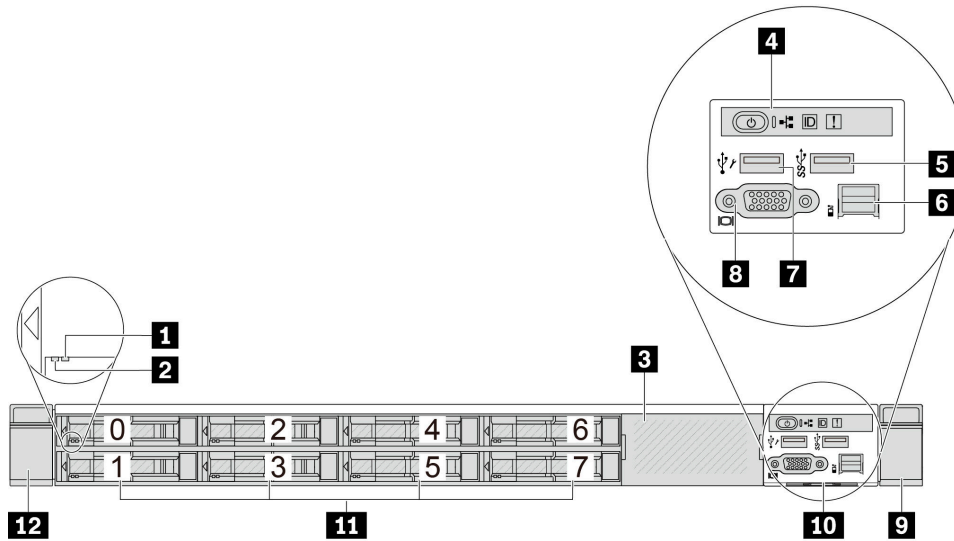


Table 5. Components on the front of the server

Callout	Callout
1 Drive status LED	2 Drive activity LED
3 Drive filler (1)	4 Diagnostics panel
5 USB 3.1 Gen 1 (5Gbps) connector	6 External LCD connector
7 XClarity Controller USB connector	8 VGA connector (optional)
9 Rack latch (right)	10 Pull-out information tab
11 Drive bays (8)	12 Rack latch (left)

Note: For more information about each component, see [“Front components overview”](#) on page 23.

Server model with ten 2.5-inch drive bays

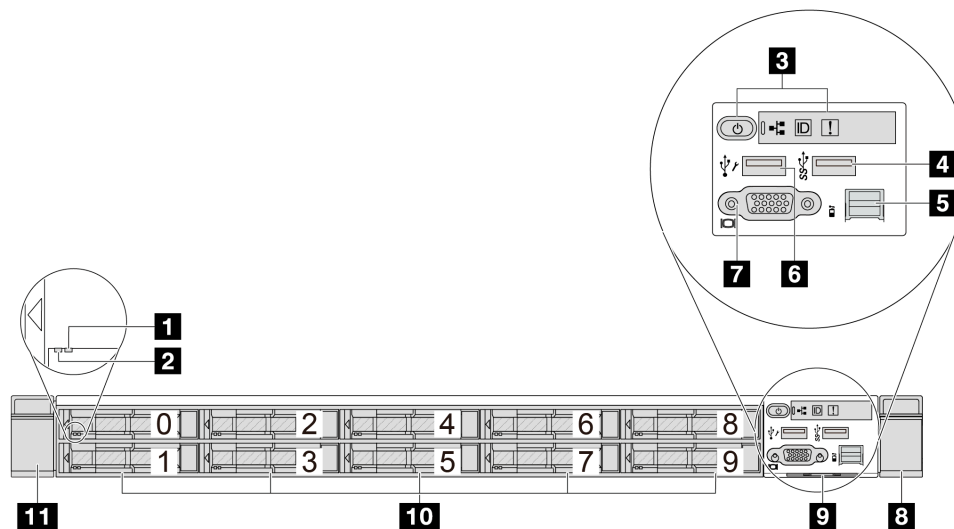


Table 6. Components on the front of the server

Callout	Callout
1 Drive status LED	2 Drive activity LED
3 Diagnostics panel	4 USB 3.1 Gen 1 (5Gbps) connector
5 External LCD connector	6 XClarity Controller USB connector
7 VGA connector (optional)	8 Rack latch (right)
9 Pull-out information tab	10 Drive bays (10)
11 Rack latch (left)	

Note: For more information about each component, see [“Front components overview”](#) on page 23.

Server model with 16 EDSFF drives

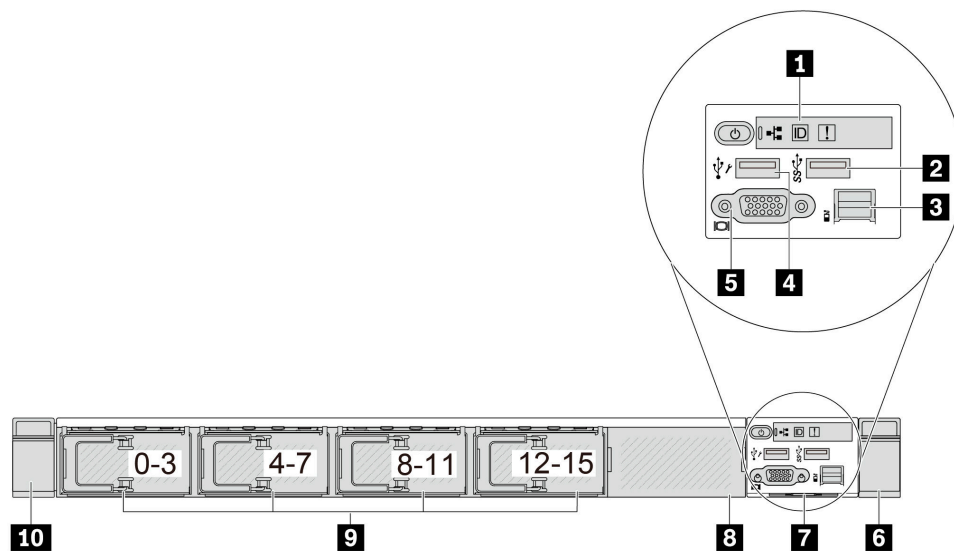


Table 7. Components on the front of the server

Callout	Callout
1 Diagnostics panel	2 USB 3.1 Gen 1 (5Gbps) connector
3 External LCD connector	4 XClarity Controller USB connector
5 VGA connector (optional)	6 Rack latch (right)
7 Pull-out information tab	8 Drive filler (1)
9 Drive bays (16)	10 Rack latch (left)

Note: For more information about each component, see [“Front components overview”](#) on page 23.

Server model with 2.5-inch drive bays (backplane-less)

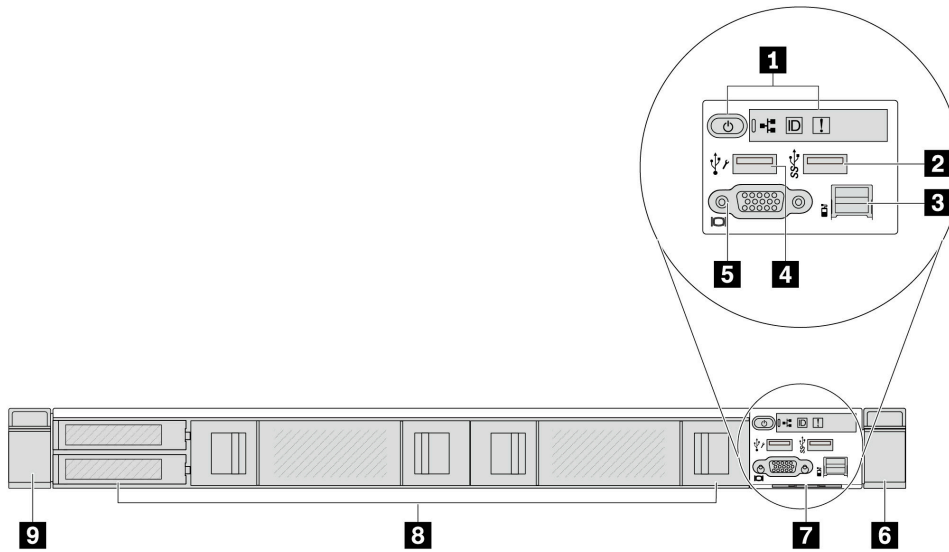


Table 8. Components on the front of the server

Callout	Callout
1 Diagnostics panel	2 USB 3.1 Gen 1 (5Gbps) connector
3 External LCD connector (reserved)	4 XClarity Controller USB connector
5 VGA connector (optional)	6 Rack latch (right)
7 Pull-out information tab	8 Drive fillers (4)
9 Rack latch (left)	

Note: For more information about each component, see [“Front components overview”](#) on page 23.

Server model with eight 2.5-inch drive bays (with LCD diagnostics panel assembly)

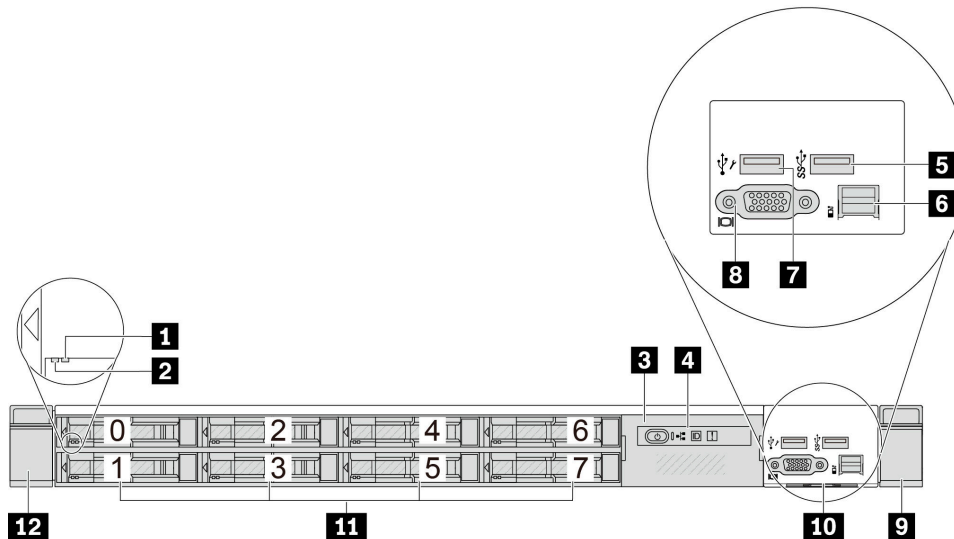


Table 9. Components on the front of the server

Callout	Callout
1 Drive status LED	2 Drive activity LED
3 LCD diagnostics panel assembly	4 LCD diagnostics panel
5 USB 3.1 Gen 1 (5Gbps) connector	6 External LCD connector
7 XClarity Controller USB connector	8 VGA connector (optional)
9 Rack latch (right)	10 Pull-out information tab
11 Drive bays (8)	12 Rack latch (left)

Note: For more information about each component, see [“Front components overview”](#) on page 23.

Server model with 16 EDSFF drives (with LCD diagnostics panel assembly)

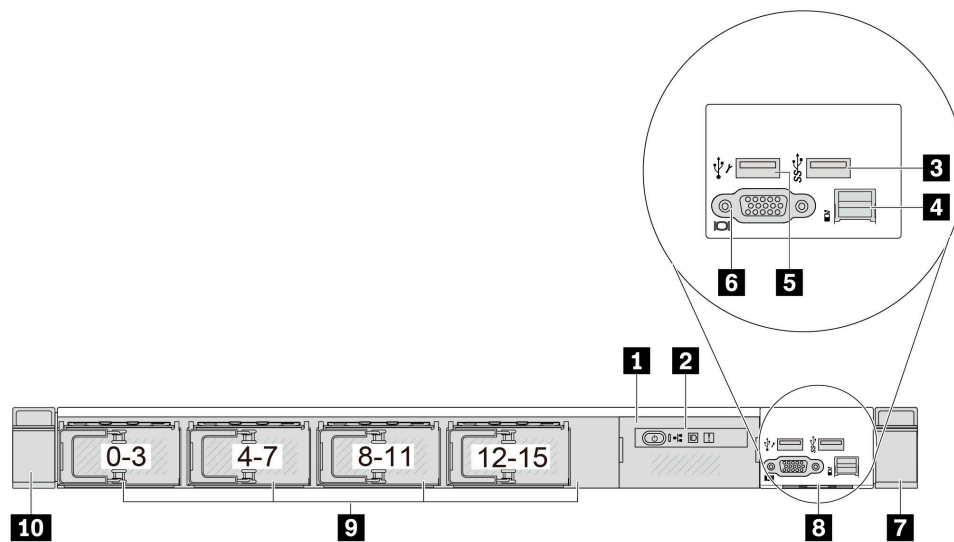


Table 10. Components on the front of the server

Callout	Callout
1 LCD diagnostics panel assembly	2 LCD diagnostics panel
3 USB 3.1 Gen 1 (5Gbps) connector	4 External LCD connector
5 XClarity Controller USB connector	6 VGA connector (optional)
7 Rack latch (right)	8 Pull-out information tab
9 Drive bays (16)	10 Rack latch (left)

Note: For more information about each component, see [“Front components overview”](#) on page 23.

Server model with 16 EDSFF drives and an M.2 cage

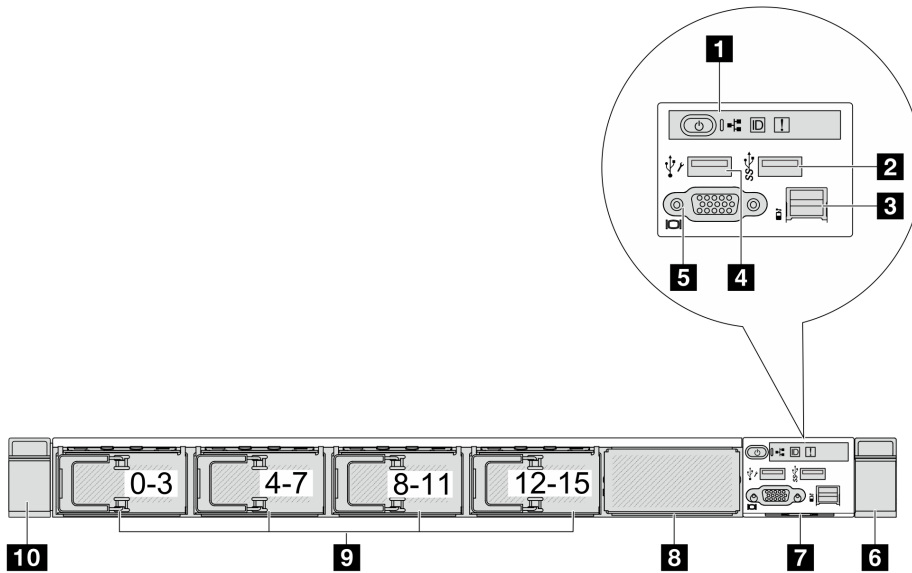


Table 11. Components on the front of the server

Callout	Callout
1 Diagnostics panel	2 USB 3.1 Gen 1 (5Gbps) connector
3 External LCD connector	4 XClarity Controller USB connector
5 VGA connector (optional)	6 Rack latch (right)
7 Pull-out information tab	8 M.2 cage
9 Drive bays (16)	10 Rack latch (left)

Note: For more information about each component, see [“Front components overview”](#) on page 23.

Front components overview

Integrated diagnostics panel

The diagnostics panel is integrated in front I/O module on some models. For information about the controls and status LEDs on the diagnostics panel, see [“Integrated diagnostics panel”](#) on page 341.

External LCD connector

The connector is for connecting an external diagnostics handset. For more about its functions, see [“External LCD diagnostics handset”](#) on page 334.

Front operator panel

The assembly comes with an integrated LCD diagnostics panel that can be used to quickly obtain system status, firmware levels, network information, and health information about the system. For more about the panel functions, see [“Front operator panel”](#) on page 328.

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.

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.

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. For more information, refer to the *Rack Installation Guide* that comes with your rail kit.

USB 3.1 Gen 1 (5Gbps) connectors

The USB 3.1 Gen 1 (5Gbps) connectors 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.

XClarity Controller USB connector

The XClarity Controller USB connector can function as a regular USB 2.0 connector to the host OS. In addition, it can also 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.

Note: This is the only USB port that supports USB automation update of the firmware and RoT security module.

For details about using the Lenovo XClarity Mobile app, refer to https://pubs.lenovo.com/lxca/lxca_usemobileapp.

Rear view

The rear 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 rear view for different server models:

- “[Server model with three PCIe slots](#)” on page 24
- “[Server model with two PCIe slots](#)” on page 25
- “[Server model with two 2.5-inch hot-swap rear drive bays and one PCIe slot](#)” on page 26
- “[Server model with two 7mm hot-swap rear drive bays and two PCIe slots](#)” on page 27
- “[Server model with two 7mm hot-swap rear drive bays and one PCIe slot](#)” on page 27

Server model with three PCIe slots

The following illustration shows the rear view of server model with three PCIe slots. Depending on the model, your server might look slightly different from the illustration below.

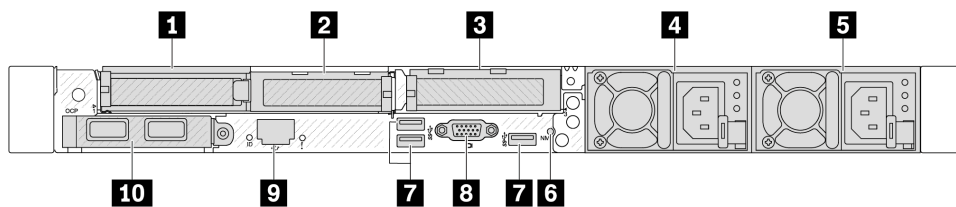


Figure 2. Rear view with 3 low profile PCIe adapters

Table 12. Components on the rear of the server

Callout	Callout
1 PCIe slot 1 on riser 1 assembly	2 PCIe slot 2 on riser 1 assembly
3 PCIe slot 3 on riser 2 assembly	4 Power supply 2 (optional)
5 Power supply 1	6 NMI button
7 USB 3.1 Gen 1 (5Gbps) connectors (3 DCIs)	8 VGA connector
9 XClarity Controller network connector	10 Ethernet connectors of the OCP module on the rear (optional, two or four connectors may be available)

Note: For more information about each component, see [“Rear components overview”](#) on page 28.

Server model with two PCIe slots

The following illustration shows the rear views of the server model with two PCIe slots. Depending on the model, your server might look slightly different from the illustration below.

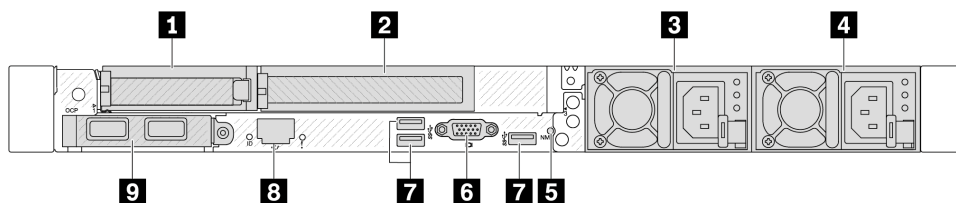


Figure 3. Rear view with 1 low profile PCIe adapter, 1 full height PCIe adapter, and 1 filler

Table 13. Components on the rear of the server

Callout	Callout
1 PCIe slot 1 on riser 1 assembly	2 PCIe slot 2 on riser 1 assembly
3 Power supply 2 (optional)	4 Power supply 1
5 NMI button	6 VGA connector
7 USB 3.1 Gen 1 (5Gbps) connectors (3 DCIs)	8 XClarity Controller network connector
9 Ethernet connectors of the OCP module on the rear (optional, two or four connectors may be available)	

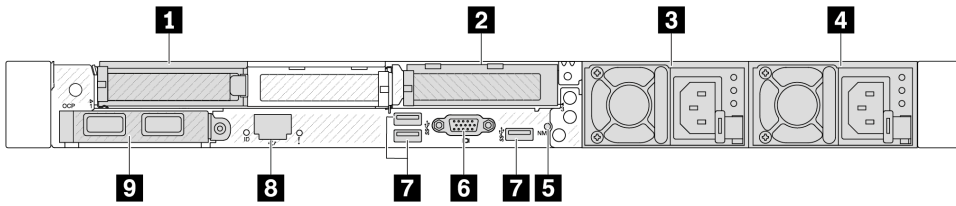


Figure 4. Rear view with 2 low profile PCIe adapters

Table 14. Components on the rear of the server

Callout	Callout
1 PCIe slot 1 on riser 1 assembly	2 PCIe slot 3 on riser 2 assembly
3 Power supply 2 (optional)	4 Power supply 1
5 NMI button	6 VGA connector
7 USB 3.1 Gen 1 (5Gbps) connectors (3 DCIs)	8 XClarity Controller network connector
9 Ethernet connectors of the OCP module on the rear (optional, two or four connectors may be available)	

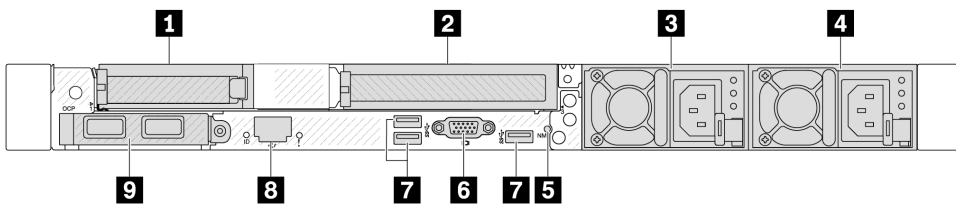


Figure 5. Rear view with 1 low profile PCIe adapter, 1 filler, and 1 full height PCIe adapter

Table 15. Components on the rear of the server

Callout	Callout
1 PCIe slot 1 on riser 1 assembly	2 PCIe slot 3 on riser 2 assembly
3 Power supply 2 (optional)	4 Power supply 1
5 NMI button	6 VGA connector
7 USB 3.1 Gen 1 (5Gbps) connectors (3 DCIs)	8 XClarity Controller network connector
9 Ethernet connectors of the OCP module on the rear (optional, two or four connectors may be available)	

Note: For more information about each component, see [“Rear components overview”](#) on page 28.

Server model with two 2.5-inch hot-swap rear drive bays and one PCIe slot

The following illustration shows the rear view of the server model with two hot-swap drive bays and one PCIe slot. Depending on the model, your server might look slightly different from the illustration below.

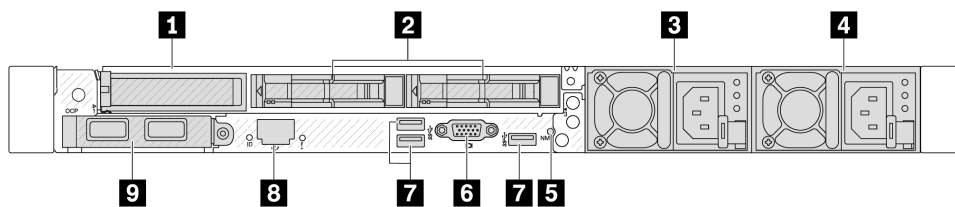


Table 16. Components on the rear of the server

1 PCIe slot 1 on riser 1 assembly	2 Rear 2.5-inch drive bays (2)
3 Power supply 2 (optional)	4 Power supply 1
5 NMI button	6 VGA connector
7 USB 3.1 Gen 1 (5Gbps) connectors (3 DCIs)	8 XClarity Controller network connector
9 Ethernet connectors of the OCP module on the rear (optional, two or four connectors may be available)	

Note: For more information about each component, see [“Rear components overview”](#) on page 28.

Server model with two 7mm hot-swap rear drive bays and two PCIe slots

The following illustration shows the rear view of the server model with two 7mm hot-swap rear drive bays and two PCIe slots. Depending on the model, your server might look slightly different from the illustration below.

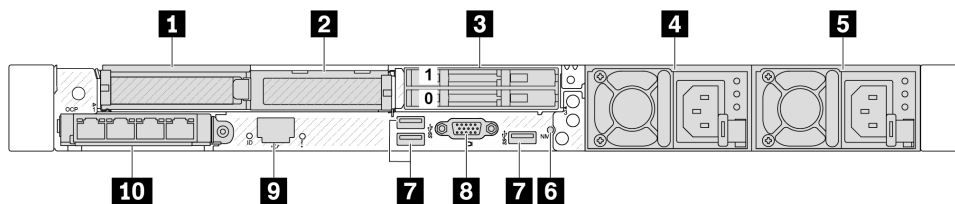


Table 17. Components on the rear of the server

1 PCIe slot 1 on riser 1 assembly	2 PCIe slot 2 on riser 1 assembly
3 Rear 7mm drive bays (2)	4 Power supply 2 (optional)
5 Power supply 1	6 NMI button
7 USB 3.1 Gen 1 (5Gbps) connectors (3 DCIs)	8 VGA connector
9 XClarity Controller network connector	10 Ethernet connectors of the OCP module on the rear (optional, two or four connectors may be available)

Note: For more information about each component, see [“Rear components overview”](#) on page 28.

Server model with two 7mm hot-swap rear drive bays and one PCIe slot

The following illustration shows the rear view of the server model with two 7mm hot-swap rear drive bays and one PCIe slots. Depending on the model, your server might look slightly different from the illustration below.

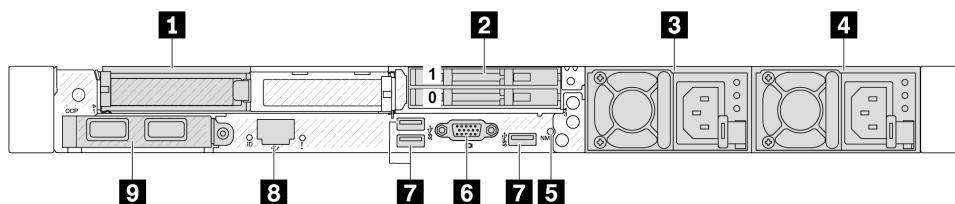


Table 18. Components on the rear of the server

1 PCIe slot 1 on riser 1 assembly	2 Rear 7mm drive bays (2)
3 Power supply 2 (optional)	4 Power supply 1
5 NMI button	6 VGA connector
7 USB 3.1 Gen 1 (5Gbps) connectors (3 DCIs)	8 XClarity Controller network connector
9 Ethernet connectors of the OCP module on the rear (optional, two or four connectors may be available)	

Note: For more information about each component, see [“Rear components overview”](#) on page 28.

Rear components overview

Ethernet connectors

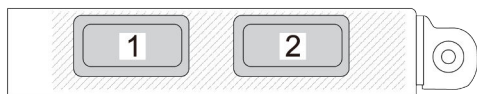


Figure 6. OCP module (two connectors, seen from the rear)

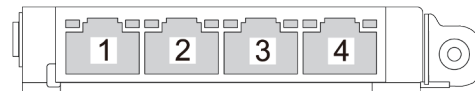


Figure 7. OCP module (four connectors, seen from the rear)

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 a shared management connector.

Notes:

- The OCP module is an optional part. It is default to be installed on the rear and optional in the front of the server.
- If the 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.

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.

NMI button

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.

PCIe slots

The PCIe slots are on the rear of the server and your server supports up to three PCIe slots on riser 1 and 2 assemblies.

Power supply units

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

On each power supply, there are three status LEDs near the power cord connector. For information about the LEDs, see [“Power supply LEDs” on page 330](#).

USB 3.1 Gen 1 (5Gbps) connectors

The USB 3.1 Gen 1 (5Gbps) 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.

XClarity Controller network connector

The XClarity Controller network connector can be used to attach an Ethernet cable to manage the baseboard management controller (BMC).

Top view

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

The following illustrations show the top view of the server.

Note: Depending on the configuration, your server might be slightly different from the image.

Top view for standard configurations

The following top view is based on typical 2.5" drive configurations.

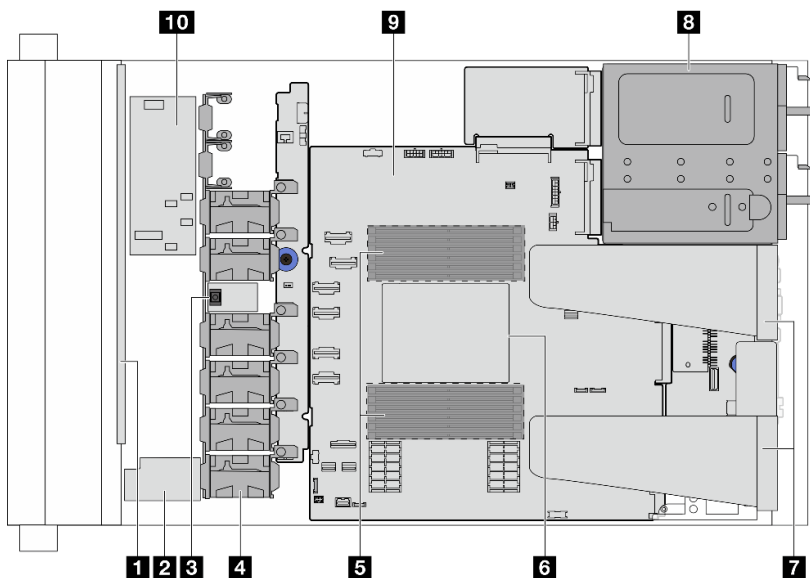


Figure 8. Server top view for standard configurations

Table 19. Component identification (Top view)

1 Front backplane	2 RAID flash power module
3 Intrusion switch	4 Fan modules
5 Memory modules	6 Processor and heat sink
7 Riser assemblies ^{note 1}	8 Power supply units
9 System board (system board assembly)	10 Internal CFF HBA/RAID module

Notes:

1. The illustration shows the server rear configuration with 2 riser assemblies. The server rear configurations vary by server model. For details, see [“Rear view” on page 24.](#)

Top view for the liquid cooling configuration

The following top view is based on liquid cooling configuration.

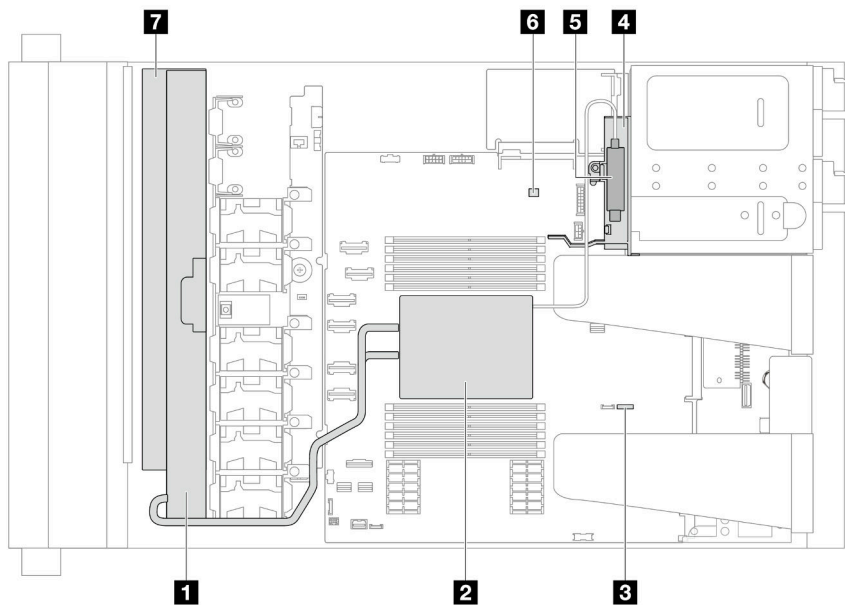


Table 20. Component identification (Top view)

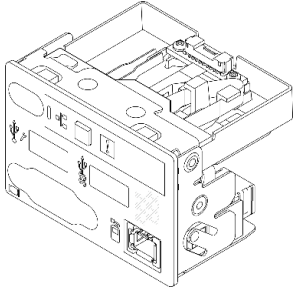
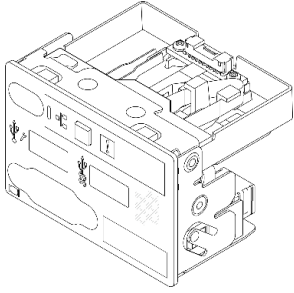
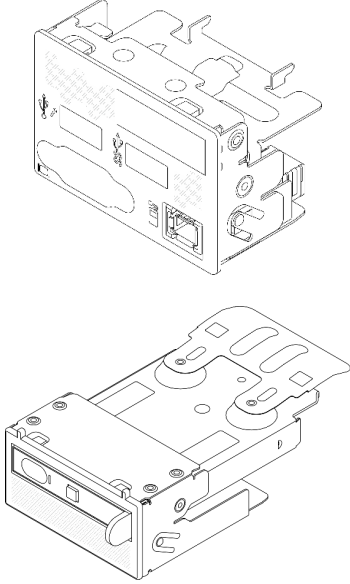
1 Radiator	2 Cold plate assembly
3 Leak Detection Connector	4 PSU air baffle
5 Liquid detection sensor module	6 Pump connector
7 The holder for the radiator	

Figure 9. Server top view for the liquid cooling configuration

Front I/O module

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

Depending on server models, your server supports the following front I/O modules.

FIO module	For server model with
 <p data-bbox="196 579 505 611"><i>Figure 10. FIO module type 1</i></p>	<ul data-bbox="841 241 1146 390" style="list-style-type: none"> • 4 x 2.5" front drive bays • 8 x 2.5" front drive bays • 10 x 2.5" front drive bays • 16 EDSFF front drive bays
 <p data-bbox="196 980 505 1012"><i>Figure 11. FIO module type 2</i></p>	<ul data-bbox="841 642 1136 674" style="list-style-type: none"> • 10 x 2.5" front drive bays
 <p data-bbox="196 1671 768 1728"><i>Figure 12. FIO module type 3 + integrated diagnostics panel</i></p>	<ul data-bbox="841 1043 1146 1108" style="list-style-type: none"> • 8 x 2.5" front drive bays • 16 EDSFF front drive bays

System-board-assembly layout

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

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

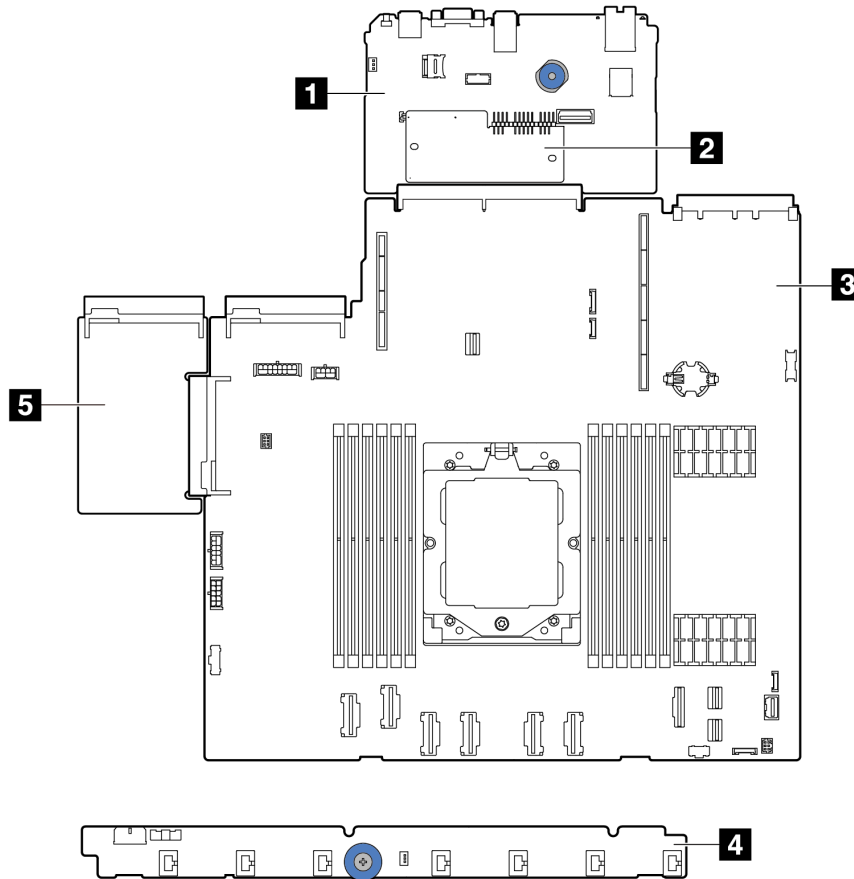


Figure 13. System-board-assembly layout

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

- [“System-board-assembly connectors” on page 33](#)
- [“System-board-assembly switches” on page 34](#)
- [“System-board-assembly LEDs” on page 331](#)

System-board-assembly connectors

The following illustrations show the internal connectors on the system board.

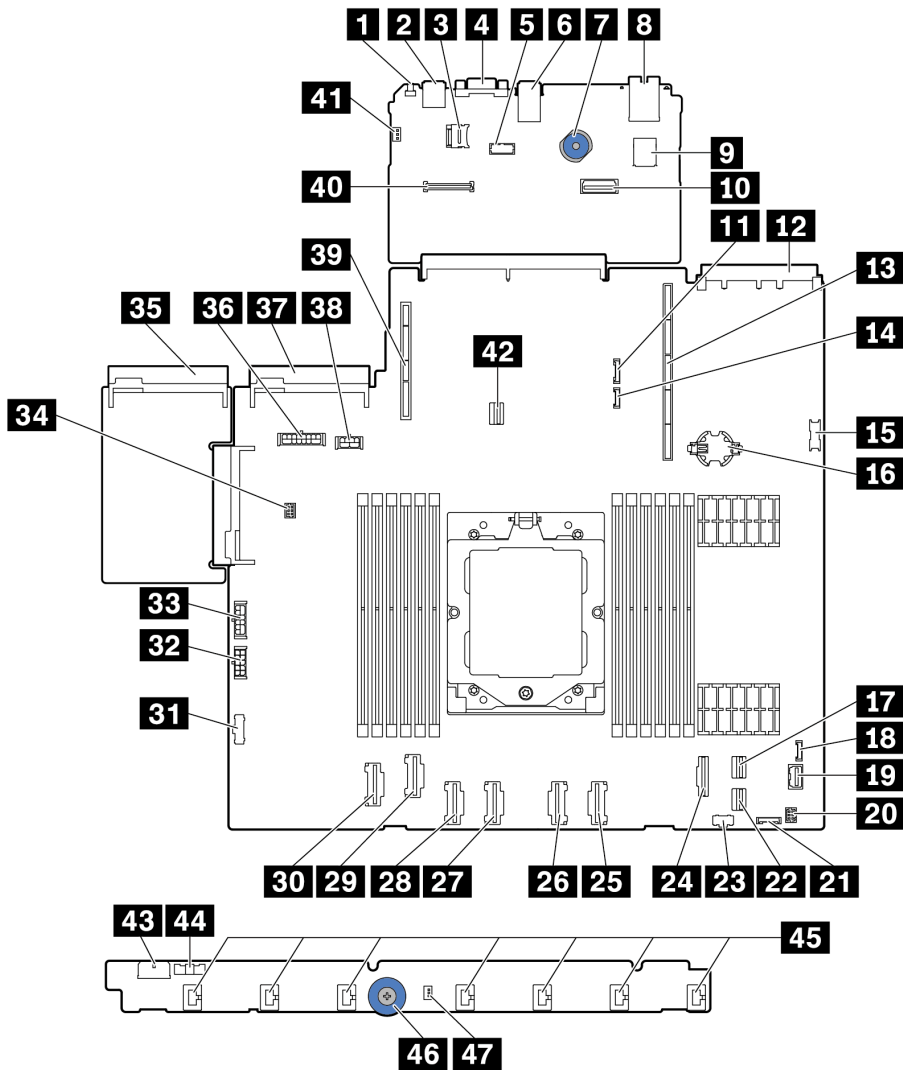


Figure 14. System-board-assembly connectors

Table 21. System-board connectors

Callout	Callout
1 NMI Button	2 Rear USB Connector 1
3 MicroSD Connector	4 VGA Connector
5 Serial Port Connector	6 Rear USB connector 2

Table 21. System-board connectors (continued)

Callout	Callout
7 Lift Handle	8 MGMT NIC connector
9 Internal USB Connector	10 Second MGMT Ethernet Connector
11 7mm/Rear BP Sideband Connector	12 OCP 3.0 Network Card Connector
13 Riser 1 Slot	14 Leak Detection Connector
15 Front USB Connector	16 CMOS Battery(CR2032)
17 PCIe Connector 8 / SATA Connector 1	18 External LCD Connector
19 Front VGA Connector	20 Front I/O connector for Y cable
21 Front Panel Connector	22 PCIe Connector 9 / SATA Connector 2
23 M.2 Power Connector	24 PCIe Connector 7 / SATA Connector 0
25 PCIe Connector 6	26 PCIe Connector 5
27 PCIe Connector 4	28 PCIe Connector 3
29 PCIe Connector 2	30 PCIe Connector 1
31 Fan Board Sideband Connector	32 Fan Board Power Connector
33 Internal RAID Power Connector	34 Pump Connector
35 Power Supply 1 Connector	36 BP Power Connector ^{note 1}
37 Power Supply 2 Connector	38 GPU/7mm/Rear BP Power Connector ^{note 2}
39 Riser 2 Slot	40 RoT Connector
41 Intrusion Switch Connector (Reserved)	42 M.2/7mm BP Signal Connector
43 Fan Board Power Connector	44 Fan Board Sideband Connector
45 Fan 1-7 Connectors	46 Lift Handle
47 Intrusion Switch Connector	

Notes:

1. The silkscreen of this connector on the system board assembly may be either **BP Pwr** or **BP1 Pwr**.
2. The silkscreen of this connector on the system board assembly may be either **7MM/RBP/GPU Pwr** or **7M/RBP/GPU Pwr**.

System-board-assembly switches

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 45
 - “Handling static-sensitive devices” on page 48
 - “Power off the server” on page 61

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

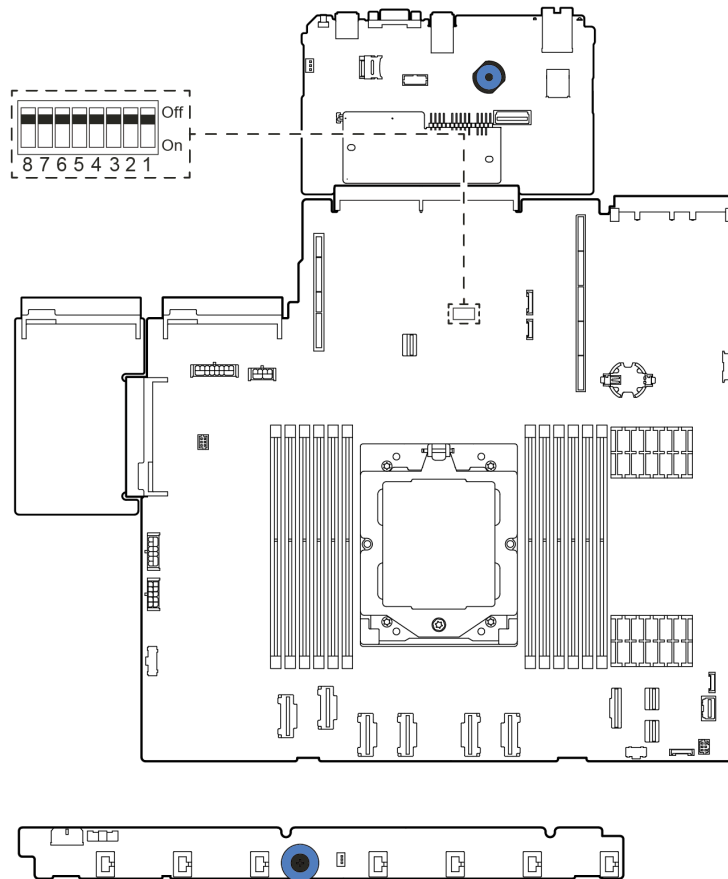


Figure 15. Switch block on the system board assembly

Table 22. 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.

Table 22. SW5 switch block on the system board assembly (continued)

Switch number	Switch name	Default position	Description
SW5-3	Password override	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

See the following section for information on available system LEDs and diagnostics display.

For more information, refer to [“Troubleshooting by system LEDs and diagnostics display” on page 326](#).

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.

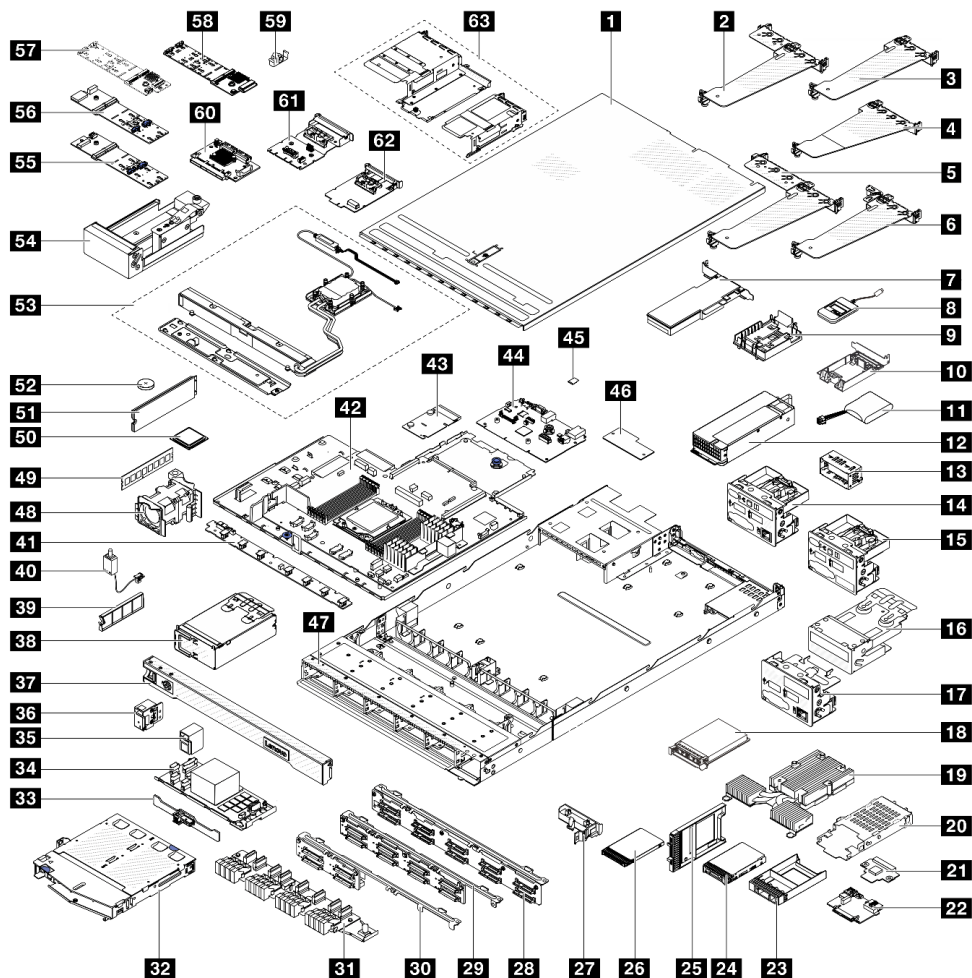


Figure 16. Server components

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.

Description	Type	Description	Type
1 Top cover	T1	2 Rear riser bracket (low profile-low profile)	T1
3 Rear riser bracket (low profile)	T1	4 Rear riser bracket (full height)	T1
5 Rear riser bracket (low profile-full height)	T1	6 Rear riser bracket (low profile-filler)	T1
7 PCIe adapter	T1	8 External diagnostics handset	T1
9 RAID flash power module holder (on chassis or on the system board tray)	T1	10 RAID flash power module holder (in the riser assembly)	T1
11 RAID flash power module	T1	12 Power supply unit	T1
13 Power supply unit filler	C	14 Front I/O module with diagnostics panel (1)	T1
15 Front I/O module with diagnostics panel (2)	T1	16 Integrated diagnostics panel assembly	T1
17 Front I/O module with diagnostics panel (3)	T1	18 OCP module	T1
19 Air cooling heat sink (T-shape)	F	20 7mm drive cage	T1
21 7mm drive backplane (top)	T2	22 7mm drive backplane (bottom)	T2
23 2.5-inch drive bay filler	C	24 2.5-inch drive	T1
25 7mm drive bay filler	C	26 7mm drive	T1
27 Power supply unit air baffle	T1	28 <ul style="list-style-type: none"> • 10 x 2.5-inch front drive backplane (AnyBay) • 10 x 2.5-inch front drive backplane (6 x SAS/ SATA+4 x NVMe) 	T2 for AnyBay T1 for 6+4
29 8 x 2.5-inch front drive backplane	T1	30 4 x 2.5-inch front drive backplane	T1
31 16-EDSFF front drive backplane	T1	32 2 x 2.5-inch rear drive cage	T1
33 2 x 2.5-inch rear drive backplane	T1	34 Internal RAID adapter	T2

Description	Type	Description	Type
35 Rack latch (right)	T1	36 Rack latch (left)	T1
37 Security bezel	C	38 4-EDSFF cage	T1
39 EDSFF drive bay filler	C	40 Intrusion switch	T1
41 Fan board	T2	42 Processor board	F
43 PIB board	F	44 System I/O board	F
45 MicroSD card	T1	46 Firmware and RoT Security Module	F
47 Chassis	F	48 System fan	T1
49 Memory module	T1	50 Processor	F
51 M.2 drive	T1	52 CMOS battery	C
53 Liquid assisted cooling module	F	54 M.2 cage	T2
55 ThinkSystem M.2 SATA/NVMe 2-Bay Enablement Kit	T1	56 ThinkSystem M.2 SATA/x4 NVMe 2-Bay Enablement Kit	T1
57 ThinkSystem M.2 NVMe 2-Bay RAID Enablement Kit	T1	58 ThinkSystem M.2 RAID B540i-2i SATA/NVMe Enablement Kit	T1
59 M.2 retainer clip	T1	60 Front OCP interposer card	T1
61 Rear OCP interposer card	T1	62 Management NIC adapter	T1
63 Front riser bracket (low profile-full height)	T1		

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 43](#) 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.

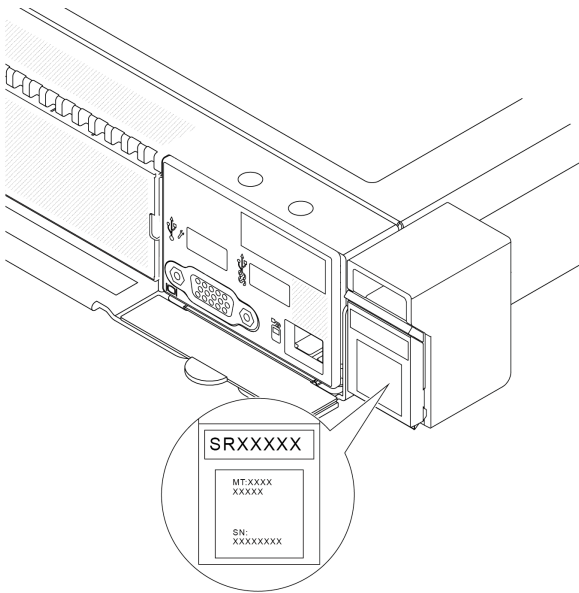


Figure 17. Location of the ID label

Lenovo XClarity Controller network access label

In addition, the Lenovo XClarity Controller 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.

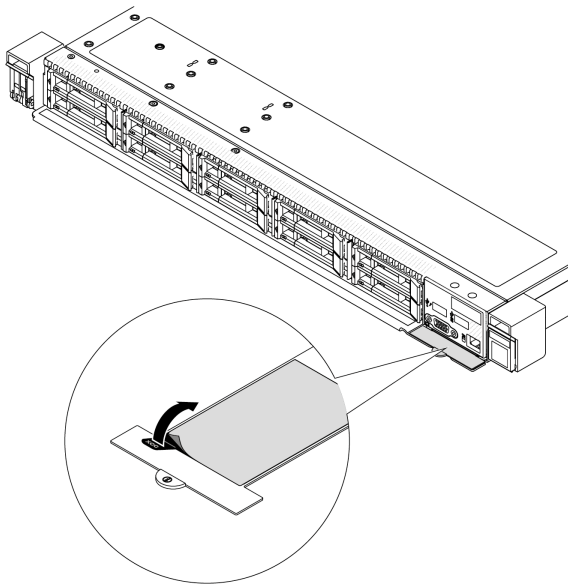


Figure 18. Lenovo XClarity Controller network access label on the pull-out information tab

Service Label and QR code

The system Service Label, which is located on the top cover, provides a quick response (QR) code for 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.

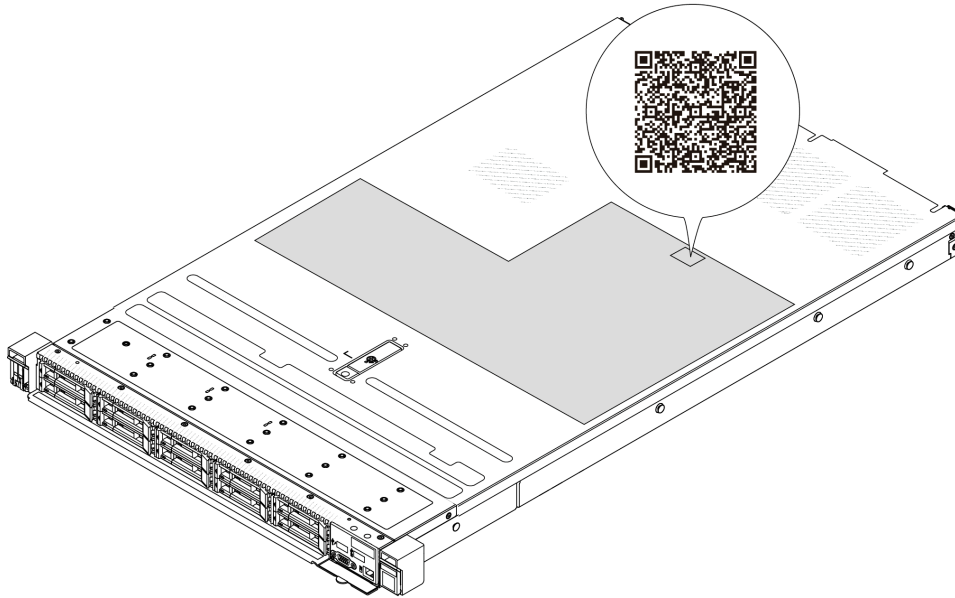


Figure 19. Service Label and QR code

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 41](#).
2. Install any required hardware or server options. See the related topics in [Chapter 5 “Hardware replacement procedures” on page 45](#).
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 111](#).
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 326](#)

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 [“System LEDs and diagnostics display” on page 36](#) 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 315](#).

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 47 and “Handling static-sensitive devices” on page 48.
- 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/sr635v3/7d9h/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 that the latest level of code is supported for the cluster solution 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 317.
- It is good practice to make sure that the server is working correctly before you install an optional component.
- Keep the working area clean, and place removed components on a flat and smooth surface that does not shake or tilt.
- Do not attempt to lift an object that might be too heavy for you. If you have to lift a heavy object, read the following precautions carefully:
 - Make sure that you can stand steadily without slipping.
 - Distribute the weight of the object equally between your feet.

- Use a slow lifting force. Never move suddenly or twist when you lift a heavy object.
- To avoid straining the muscles in your back, lift by standing or by pushing up with your leg muscles.
- Back up all important data before you make changes related to the disk drives.
- Have a small flat-blade screwdriver, a small Phillips screwdriver, 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 an 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

Refer to the below technical rules and limitations when you install the related server components.

Memory module installation rules and order

Memory modules must be installed in a specific order based on the memory configuration that you implement 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](#).

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 and memory mode that you are implementing is shown below.

Memory module installation guideline

Follow the rules below when installing DIMMs:

- Mixing DIMMs from different vendors is supported in a system.
- Mixing x4 and x8 DIMMs is not allowed in a system.
- Mixing 3DS RDIMM and non-3DS RDIMM is not allowed in a system.
- Mixing 4-rank 3DS RDIMM and 8-rank 3DS RDIMM is not allowed in a system.
- Mixing EC4 and EC8 DIMMs is not allowed in a system.
- Mixing 16 Gbit DIMMs (16GB, 32GB and 64GB) and 24 Gbit DIMMs (24GB, 48GB and 96GB) is not allowed in a system.
- 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.
- Only single-rank and dual-rank DIMM mixing is allowed in a system.
- When installing DIMMs with different capacity, install the DIMM with the highest capacity first following population sequence.
- For best performance, the population recommends identical memory capacity and rank across all 12 channels.
- Mixing 128 GB 3DS RDIMM and 256 GB 3DS RDIMM is not allowed in a system.

Memory module installation order

Notes: In the following tables:

- S1-S12 indicate DIMM slots 1-12.
- 1-12 indicate the installation order.

The following table shows the DIMM population sequence.

Table 23. DIMM population sequence

Total DIMMs	Slot number
-------------	-------------

Table 23. DIMM population sequence (continued)

	S12	S11	S10	S9	S8	S7	S6	S5	S4	S3	S2	S1
1 DIMM						1						
2 DIMMs						1	2					
4 DIMMs				3		1	2		4			
6 DIMMs				3	5	1	2	6	4			
8 DIMMs		7		3	5	1	2	6	4		8	
10 DIMMs		7	9	3	5	1	2	6	4	10	8	
12 DIMMs	11	7	9	3	5	1	2	6	4	10	8	12

PCIe slots and adapters

Understanding the technical rules for PCIe adapters helps you correctly install and configure PCIe adapters in the system.

For the technical rules for PCIe adapters, see the following for details.

- [“PCIe adapters supported for different models” on page 50](#)
- [“PCIe adapter installation rules and order” on page 51](#)
- [“Recommended slot installation priority for PCIe adapters” on page 51](#)
- [“Technical rules for mixing OCP/PCIe adapters with RAID/HBA adapters” on page 54](#)
- [“Technical rules for mixing PCIe adapters with processors” on page 54](#)

PCIe adapters supported for different models

Table 24. PCIe adapters supported and their locations

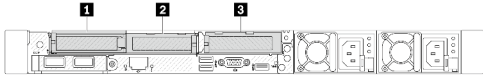
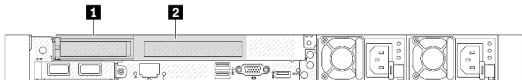
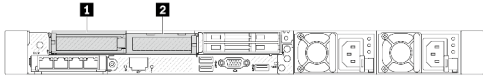
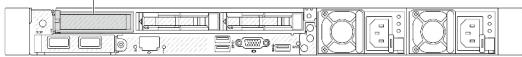
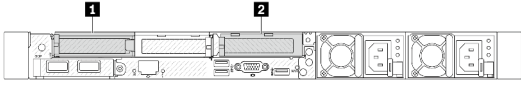
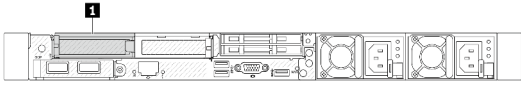
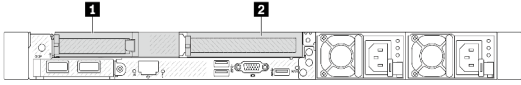
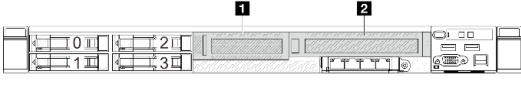
Server rear view	Supported types and slot location
	<p>Riser 1 assembly</p> <ul style="list-style-type: none"> • 1 Slot 1: PCIe x16 (x8, x4, x1), low-profile • 2 Slot 2: PCIe x16 (x8, x4, x1), low-profile <p>Riser 2 assembly</p> <ul style="list-style-type: none"> • 3 Slot 3: PCIe x16 (x8, x4, x1), low-profile
	<p>Riser 1 assembly</p> <ul style="list-style-type: none"> • 1 Slot 1: PCIe x16 (x8, x4, x1), low-profile • 2 Slot 2: PCIe x16 (x8, x4, x1), full-height <p>Note: One rear wall bracket must be installed next to the two PCIe slots.</p>
	<p>Riser 1 assembly</p> <ul style="list-style-type: none"> • 1 Slot 1: PCIe x16 (x8, x4, x1), low-profile • 2 Slot 2: PCIe x16 (x8, x4, x1), low-profile
	<p>Riser 1 assembly</p> <ul style="list-style-type: none"> • 1 Slot 1: PCIe x16 (x8, x4, x1), low-profile

Table 24. PCIe adapters supported and their locations (continued)

Server rear view	Supported types and slot location
	<p>Riser 1 assembly</p> <ul style="list-style-type: none"> • 1 Slot 1: PCIe x16 (x8, x4, x1), low-profile <p>Riser 2 assembly</p> <ul style="list-style-type: none"> • 2 Slot 3: PCIe x16 (x8, x4, x1), low-profile
	<p>Riser 1 assembly</p> <ul style="list-style-type: none"> • 1 Slot 1: PCIe x16 (x8, x4, x1), low-profile
	<p>Riser 1 assembly</p> <ul style="list-style-type: none"> • 1 Slot 1: PCIe x16 (x8, x4, x1), low-profile <p>Riser 2 assembly</p> <ul style="list-style-type: none"> • 2 Slot 3: PCIe x16 (x8, x4, x1), full-height
	<p>Riser 3 assembly:</p> <ul style="list-style-type: none"> • 1 Slot 4: PCIe x16 (x8, x4, x1), low-profile <p>Note: The cTDP supported by slot 4 is limited to 25W.</p> <p>Riser 4 assembly</p> <ul style="list-style-type: none"> • 2 Slot 5: PCIe x16 (x8, x4, x1), full-height

PCIe adapter installation rules and order

When installing different types of PCIe adapters, refer to the following suggested installation priority:

Table 25. Recommended installation priority for different types of PCIe adapters

Installation priority	
1. OCP module	6. InfiniBand adapter
2. Custom form factor (CFF) internal HBA/RAID adapter	7. Fiber channel adapter
3. Standard form factor (SFF) RAID adapter	8. Network adapter
4. SFF internal HBA adapter	9. External storage controller
5. GPU adapter	10. COM port bracket ^{note}

Note: When a COM port card is installed, it will occupy one PCIe slot (slot 3) and requires a low-profile riser bracket. See [“Rear riser card replacement” on page 187](#) for details about riser brackets.

Recommended slot installation priority for PCIe adapters

When installing a specific PCIe adapter, refer to the following suggested slot installation priority:

Table 26. Recommended slot installation priority for PCIe adapters

Recommended slot installation priority	PCIe adapters	Maximum supported number
Must be installed in slot 1	SFF Internal RAID/HBA adapters	1
Slot 1 > Slot 2	M.2/7mm RAID adapters: <ul style="list-style-type: none"> • Raid 5350-8i for M.2/7MM SATA Enable • Raid 540-8i for M.2/7MM NVMe Enable 	1
Slot 1 > Slot 3	<ul style="list-style-type: none"> • InfiniBand adapters: <ul style="list-style-type: none"> – ThinkSystem Nvidia ConnectX-7 NDR OSFP400 1-port PCIe Gen5 x16 InfiniBand Adapter – ThinkSystem NVIDIA ConnectX-7 NDR200/HDR QSFP112 2-Port PCIe Gen5 x16 InfiniBand Adapter • GPU adapter: ThinkSystem NVIDIA L4 24GB PCIe Gen4 Passive GPU 	2
Slot 1 > Slot 2 > Slot 3	Network adapter: ThinkSystem Broadcom 57454 10GBASE-T 4-port PCIe Ethernet Adapter	3
Slot 2 > Slot 3	Network adapter: ThinkSystem Broadcom 57504 10/25GbE SFP28 4-Port PCIe Ethernet Adapter	2
Slot 5 > Slot 1 > Slot 2 > Slot 3	<ul style="list-style-type: none"> • Network adapters: <ul style="list-style-type: none"> – ThinkSystem Broadcom 57508 100GbE QSFP56 2-port PCIe 4 Ethernet Adapter – ThinkSystem Mellanox ConnectX-6 Dx 100GbE QSFP56 2-port PCIe Ethernet Adapter – ThinkSystem AMD X3522 10/25GbE DSFP28 2-port PCIe Ethernet Adapter (Low Latency) • GPU adapters: <ul style="list-style-type: none"> – ThinkSystem NVIDIA A2 16GB PCIe Gen4 Passive GPU – ThinkSystem NVIDIA A2 16GB PCIe Gen4 Passive GPU w/o CEC • InfiniBand adapters: <ul style="list-style-type: none"> – Mellanox ConnectX-6 HDR100 IB/100GbE VPI 2-port x16 PCIe 3.0 HCA w/ Tall Bracket – ThinkSystem Mellanox ConnectX-6 HDR/200GbE QSFP56 1-port PCIe 4 VPI Adapter 	4

Table 26. Recommended slot installation priority for PCIe adapters (continued)

Recommended slot installation priority	PCIe adapters	Maximum supported number
Slot 5> Slot 2> Slot 3	ThinkSystem Broadcom 57504 10/25GbE SFP28 4-Port PCIe Ethernet Adapter	2
Slot 5> Slot 4> Slot 1> Slot 2> Slot 3	<ul style="list-style-type: none"> • Fiber channel adapters • External storage adapters • Network adapters: <ul style="list-style-type: none"> – ThinkSystem Broadcom 57416 10GBASE-T 2-Port PCIe Ethernet Adapter – ThinkSystem Broadcom 57414 10/25GbE SFP28 2-port PCIe Ethernet Adapter – ThinkSystem Broadcom 5719 1GbE RJ45 4-port PCIe Ethernet Adapter – ThinkSystem Intel X710-T2L 10GBase-T 2-Port PCIe Ethernet Adapter – ThinkSystem Intel X710-T4L 10GBase-T 4-Port PCIe Ethernet Adapter – ThinkSystem Intel I350-T4 PCIe 1Gb 4-Port RJ45 Ethernet Adapter – ThinkSystem Intel E810-DA2 10/25GbE SFP28 2-Port PCIe Ethernet Adapter – ThinkSystem Intel E810-DA4 10/25GbE SFP28 4-Port PCIe Ethernet Adapter – ThinkSystem Mellanox ConnectX-6 Lx 10/25GbE SFP28 2-port PCIe Ethernet Adapter • InfiniBand adapters: Mellanox ConnectX-6 HDR100 IB/100GbE VPI 1-port x16 PCIe 3.0 HCA w/ Tall Bracket 	5

Notes:

- For the low-profile + full-height configuration, the PCIe Ethernet adapters listed below cannot be installed on slot 1.
 - Lenovo ThinkSystem NetXtreme PCIe 1Gb 4-Port RJ45 Ethernet Adapter By Broadcom
 - Lenovo ThinkSystem I350-T4 PCIe 1Gb 4-Port RJ45 Ethernet Adapter By Intel
 - ThinkSystem Intel I350-T4 ML2 1Gb 4-Port RJ45 Ethernet Adapter
 - ThinkSystem Broadcom 57454 10GBASE-T 4-port PCIe Ethernet Adapter
- ThinkSystem Broadcom 57504 10/25GbE SFP28 4-port PCIe Ethernet Adapter can only be installed into the slot with a full-height riser bracket.

Notes: Rules for RAID/HBA adapters:

- RAID 940 series adapters require a RAID flash power module.
- 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. 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 366.](#)

- When Gen 3 M.2 backplane is installed, RAID 5350 or RAID 540 series are not supported.
- The HBA 4350/440 adapters do not support the Self-Encrypting Drive (SED) management feature.
- RAID arrays are not supported for SED or FIPS HDD/SSD drives. FIPS (Federal Information Processing Standard) 140-2 is a U.S. government standard that describes the encryption and related security requirements for sensitive but unclassified (SBU) information technology (IT) products. FIPS 140-2 defines four levels of security. SED are FIPS 140-2 Level 2 validated drives.

Technical rules for mixing OCP/PCIe adapters with RAID/HBA adapters

The OCP/PCIe adapters listed in the left column cannot be mixed with the RAID/HBA adapters listed in the right column.

OCP/PCIe adapters	RAID/HBA adapters
<ul style="list-style-type: none"> • ThinkSystem Intel E810-DA4 10/25GbE SFP28 4-port PCIe Ethernet Adapter • ThinkSystem Intel E810-DA4 10/25GbE SFP28 4-port OCP Ethernet Adapter • ThinkSystem Intel E810-DA2 10/25GbE SFP28 2-Port PCIe Ethernet Adapter • ThinkSystem Intel E810-DA2 10/25GbE SFP28 2-Port OCP Ethernet Adapter 	<ul style="list-style-type: none"> • ThinkSystem 4350-8i SAS/SATA 12Gb HBA • ThinkSystem 4350-16i SAS/SATA 12Gb HBA • ThinkSystem RAID 5350-8i PCIe 12Gb Adapter • ThinkSystem RAID 5350-8i PCIe 12Gb Internal Adapter • ThinkSystem RAID 9350-8i 2GB Flash PCIe 12Gb Adapter • ThinkSystem RAID 9350-8i 2GB Flash PCIe 12Gb Internal Adapter • ThinkSystem RAID 9350-16i 4GB Flash PCIe 12Gb Internal Adapter

Technical rules for mixing PCIe adapters with processors

When processors 9254, 9334, 9224, 9124, 9754 or 9734 are selected, Broadcom 5719 1GbE RJ45 4-port OCP Ethernet Adapter or Broadcom 5719 1GbE RJ45 4-port PCIE Ethernet Adapter cannot be installed.

Technical rules for drives

Use this section to understand the technical rules for drives.

Drive installation rules

The following rules for drives provide information necessary for installing a drive.

General rules

1. The drive bays are numbered to indicate the installation order (starting from number “0”). Follow the installation order when you install a drive. See [“Front view” on page 17.](#)
2. The drives in a single RAID array must be of the same type (as in hard disk drives (HDD), solid-state drives (SSD), and so on), same size, and same capacity.
3. If your server comes with rear drives, always install the rear backplane first. The drive installation should be rear drive bay 16 → 17, and then front drive bay 0 → 1 → 2 → 3 → 4 → 5 → 6 → 7 → 8 → 9.
4. The suggested priority of different drive types: NVMe SSD→SAS SSD→SATA SSD→SAS HDD→SATA HDD.
5. The installation order of different drive interface types: NVMe → SAS → SATA.
6. For EDSFF drives, follow the numerical order of the drive bay sequence. Do not skip bays when installing EDSFF drives.

Mixing rules

1. You can use drives from different vendors.
2. You can mix drives of different types and different capacities in one system, but not in one RAID array. And when you deploy a drive mix, install drives of lower capacity first.
3. When mixing NVMe/SAS/SATA drives in one system, install NVMe drives in a descending bay sequence order, 9 → 8 → 7...; and SAS/SATA drives in an ascending bay sequence order, 0 → 1 → 2....
4. EDSFF, U.2 and U.3 drives are all NVMe drives, but mixing EDSFF drives with U.2 or U.3 drives in one RAID array is not supported.

Special notes

1. For the server models with a single type or mixed types of drives, take 10 x 2.5" AnyBay drives for instance:
 - The installation order of a single type of drives (SAS/SATA/NVMe) should be: front drive bay 0 → 1 → 2 → 3 → 4 → 5 → 6 → 7 → 8 → 9.
 - The installation order of mixed types of drives should be: SAS/SATA installed from front drive bay 0 → 1 → 2..., and NVMe installed from front drive bay 9 → 8 → 7 → 6 → 5 → 4 → 3 → 2 → 1 → 0.
2. For the server models with rear drives installed, take 8 x 2.5" SAS/SATA front drives and 2 x 2.5" SAS/SATA rear drives for instance:

Drives can be installed to rear drive bay 16 → 17 first, and then front drive bay 0 → 1 → 2 → 3 → 4 → 5 → 6 → 7.
3. Onboard connections only support SATA HDDs/SSDs but do not support SAS HDDs.
4. Tri-mode RAID cards support U.3 NVMe SSDs but do not support U.2 NVMe SSDs.
5. When 7mm drives are installed, two PCIe adapters can be installed on the rear at most.
6. When rear 2x2.5 SSDs are installed, only one PCIe adapter can be installed on the rear.
7. When a Gen 3 M.2 SATA 2-Bay Enablement Kit is selected, at least one M.2 disk needs to be installed.
8. VMware ESXi does not support ThinkSystem 2.5 U.3 6500 ION 30.72TB Read Intensive NVMe PCIe 4.0 x4 HS SSD.

Thermal rules

This topic provides thermal rules for the server.

- [“Typical configurations: server models with front drive bays only” on page 56](#)
- [“Storage configurations: server models with rear bays” on page 57](#)
- [“GPU configurations: server models with GPU adapters” on page 57](#)
- [“Thermal rules for 256 GB 3DS RDIMMS” on page 58](#)
- [“Server models with PCIe/OCP adapters \(≥ 100 GB\) installed” on page 59](#)
- [“Fan locations and supported quantity for different configurations” on page 61](#)

Notes:

- The maximum supported DIMM quantity is 12.
- cTDP is short for Configurable Thermal Design Power. It refers to the maximum supported power of a processor.

Processor groups are defined as follows:

- Group B: 200 W ≤ cTDP ≤ 240 W
- Group A: 240 W < cTDP ≤ 300 W
- Group E: 320 W ≤ cTDP ≤ 400 W

Heat sink types and fan types in the tables are abbreviated as follows:

- Air cooling heat sink: AC
- Closed loop heat sink: CL
- Performance fan: Perf
- Standard fan: Std

Typical configurations: server models with front drive bays only

This section provides thermal information for server models with front drive bays only.

Note: When ThinkSystem 128GB TruDDR5 4800MHz (4Rx4) 3DS RDIMM-A v1 is used, performance fans must be installed.

Front bays	Max. Ambient Temp. (at sea level)	Processor group (A, B, E)	Heat sink	Fan type
<ul style="list-style-type: none"> • 10 x 2.5" NVMe • 10 x 2.5" AnyBay¹ • 10 x 2.5" SAS/SATA • 8 x 2.5" SAS/SATA • 6 x SAS/SATA + 4 x AnyBay • 6 x SAS/SATA + 2 x AnyBay + 2 x NVMe 	35°C	B	AC	Std
	35°C	B	AC/CL ¹	Perf
	35°C	A	AC/CL ¹	Perf
	45°C	B	AC	Perf
	40°C	A	AC	Perf
	25°C	E (9654/9654P processors only)	AC/CL ¹	Perf
	30°C	E	CL ¹	Perf
	35°C	E (9654/9654P/9554/9554P/9174F/9474F/9754/9734 processors only)	CL ¹	Perf
16-EDSFF	30°C	A and B	AC	Perf
	25°C	E (9654/9654P only)	AC	Perf
Using 10 x 2.5" chassis <ul style="list-style-type: none"> • 4 x 2.5" SAS/SATA • 4 x 2.5" NVMe • 4 x 2.5" AnyBay 	35°C	B	AC/CL	Perf
	45°C	B	AC	Perf
	40°C	A	AC	Perf
	25°C	E (9554/9554P/9754/9734 processors)	AC/CL	Perf
	30°C	E (9174F processors only)	AC/CL	Perf
	35°C	E (9654/9654P processors only)	AC/CL	Perf
	35°C	E	CL	Perf
Using 4 x 2.5" chassis <ul style="list-style-type: none"> • 4 x 2.5" SAS/SATA • 4 x 2.5" NVMe • 4 x 2.5" AnyBay 	45°C	B	AC	Perf
	40°C	A	AC	Perf
	25°C	E (9654/9654P processors only)	AC	Perf

Notes:

- When a 10 x 2.5" AnyBay backplane is used, only the following two configurations support closed loop heat sink:
 - 10 x 2.5" NVMe (Gen 4)
 - 8 x 2.5" NVMe (Gen 5)
- System performance may be impacted when the operating temperature is above 35 °C.

Storage configurations: server models with rear bays

This section provides thermal information for the storage configuration when rear drives (except 7mm drives) are installed.

Note: ThinkSystem 128GB TruDDR5 4800MHz (4Rx4) 3DS RDIMM-A v1 is not supported when rear drives (except 7mm drives) are installed.

Front bays	Max. Ambient Temp. (at sea level)	Processor group	Heat sink	Fan type
<ul style="list-style-type: none"> 10 x 2.5" SAS/SATA 10 x 2.5" NVMe 6 x 2.5" SAS/SATA + 4 x 2.5" AnyBay 	30°C	A and B	AC	Perf
	25°C	E (9654/9654P processors only)	AC	Perf
Using 4 x 2.5" chassis: <ul style="list-style-type: none"> 4 x 2.5" AnyBay 4 x 2.5" NVMe 	30°C	A and B	AC	Perf
	25°C	E (9654 and 9654P processors only)	AC	Perf

Notes:

- To support rear 2 x 2.5" SAS/SATA or NVMe (U.2/U.3) drives, the following conditions need to be met:
 - Gen 4 low-profile riser installed in Riser 1
 - No Riser 2 installed
 - No 7mm drives
 - No PCIe adapter installed in slot 2 and slot 3
- 10 x 2.5" AnyBay front backplanes support rear NVMe (U.2/U.3) drives but do not support rear SAS/SATA drives.

GPU configurations: server models with GPU adapters

This section provides thermal information for the GPU configuration.

The server supports the following GPUs:

- Low-profile, half-length, single-wide:
 - NVIDIA® A2
 - NVIDIA® L4

Notes:

- All GPU configurations require performance fans.
- ThinkSystem 128GB TruDDR5 4800MHz (4Rx4) 3DS RDIMM-A v1 is not supported when GPUs are installed.

Front bays	Ma- x. Am- bi- ent Te- mp. (at sea lev- el)	Processor group	He- at sink	Ma- x. GP- U Qty.	Supported GPU installation slot (s)
<ul style="list-style-type: none"> • 10 x 2.5" AnyBay • 10 x 2.5" NVMe • 10 x 2.5" SAS/SATA • 8 x 2.5" SAS/SATA • 6 x 2.5" SAS/SATA + 4 x 2.5" AnyBay • 6 x 2.5" SAS/SATA + 2 x 2.5" AnyBay + 2 x 2.5" NVMe 	30° C	B	AC	3	1, 2, 3
	35° C	A	AC	1	1
	25° C	E (9654/9654P processors only)	AC	1	1
16-EDSFF	30° C	A and B	AC	3	1, 2, 3
	25° C	E (9654/9654P processors only)	AC	1	1
Using 10 x 2.5" chassis <ul style="list-style-type: none"> • 4x2.5" SAS/SATA • 4x2.5" NVMe • 4 x 2.5" AnyBay 	35° C	A and B	AC	3	1, 2, 3
	30° C	E	CL	3	1, 2, 3
	30° C	E (9654/9654P/9174F processors only)	AC	3	1, 2, 3
	25° C	E (9554/9554P/9754/9734 processors only)	AC	3	1, 2, 3
Using 4 x 2.5" chassis <ul style="list-style-type: none"> • 4 x 2.5" SAS/SATA • 4 x 2.5" NVMe • 4 x 2.5" AnyBay 	30° C	B	AC	4	1, 2, 3, 5
	35° C	A	AC	2	1, 5
	25° C	E (9654/9654P processors only)	AC	1	1

Thermal rules for 256 GB 3DS RDIMMS

This section provides thermal information when ThinkSystem 256GB TruDDR5 4800MHz (8Rx4) 3DS RDIMM-A v1 is installed.

Note: ThinkSystem 256GB TruDDR5 4800MHz (8Rx4) 3DS RDIMM-A v1 is not supported when rear drives (except 7mm drives), GPU adapters or PCIe/OCP adapters (≥ 100GB) are installed.

Front bays	Max. Ambient Temp. (at sea level)	Processor group	Heat sink	Fan type
<ul style="list-style-type: none"> • 10 x 2.5" AnyBay • 10 x 2.5" NVMe • 10 x 2.5" SAS/SATA • 8 x 2.5" SAS/SATA • 6 x 2.5" SAS/SATA + 4 x 2.5" AnyBay • 6 x 2.5" SAS/SATA + 2 x 2.5" AnyBay + 2 x 2.5" NVMe 	25°C	A and B	AC	Perf
16-EDSFF	25°C	A and B	AC	Perf
Using 10 x 2.5" chassis <ul style="list-style-type: none"> • 4 x 2.5" SAS/SATA • 4 x 2.5" NVMe • 4 x 2.5" AnyBay 	30°C	A and B	AC	Perf
	25°C	A, B and E	CL	Perf
Using 4 x 2.5" chassis <ul style="list-style-type: none"> • 4 x 2.5" SAS/SATA • 4 x 2.5" NVMe • 4 x 2.5" AnyBay 	25°C	A and B	AC	Perf

Server models with PCIe/OCP adapters (≥ 100 GB) installed

- AOC: active optical cables
- DAC: direct attach cables

Note: Performance fans are needed for the following conditions.

Front bays	Max. Ambient Temp. (at sea level)	Processor	Heat sink	Max. PCIe/OC-P Qty	Suggested slots	Cable supported
<ul style="list-style-type: none"> 10 x 2.5" AnyBay^{note} 10 x 2.5" NVMe 10 x 2.5" SAS/SATA 8 x 2.5" SAS/SATA 6 x 2.5" SAS/SATA + 4 x 2.5" AnyBay 6 x 2.5" SAS/SATA + 2 x 2.5" AnyBay + 2 x 2.5" NVMe 	30° C	A and B	AC	3	1, 2, 3	AOC/DAC
	25° C	A and B	CL ^{note}	3	1, 2, 3	AOC/DAC
	25° C	E (9654/9654P processors only)	AC/CL ^{note}	3	1, 2, 3	without 100G AOC
	30° C	A, B, and E	CL ^{note}	3	1, 2, 3	without 100G AOC
16-EDSFF	30° C	A and B	AC	3	1, 2, 3	AOC/DAC
	25° C	E (9654/9654P processors only)	AC	3	1, 2, 3	without 100G AOC
Using 10 x 2.5" chassis <ul style="list-style-type: none"> 4 x 2.5" SAS/SATA 4 x 2.5" NVMe 4 x 2.5" AnyBay 	30° C	A and B	AC	3	1, 2, 3	AOC/DAC
	25° C	E	CL ^{note}	3	1, 2, 3	AOC/DAC
	25° C	E (9654/9654P/9174F/9554/9554P/9754/9734 processors only)	AC/CL ^{note}	3	1, 2, 3	AOC/DAC
	30° C	E (9654/9654P/9174F processors only)	AC	3	1, 2, 3	AOC/DAC
	30° C	E	CL ^{note}	3	1, 2, 3	without 100G AOC
Using 4 x 2.5" chassis <ul style="list-style-type: none"> 4 x 2.5" SAS/SATA 4 x 2.5" NVMe 4 x 2.5" AnyBay 	30° C	A and B	AC	5	1, 2, 3, 4, 5	AOC/DAC
	25° C	E (9654/9654P processors only)	AC	5	1, 2, 3, 4, 5	without 100G AOC

Notes: When a 10 x 2.5" AnyBay backplane is used, only the following two configurations support closed loop heat sink:

- 10 x 2.5" NVMe (Gen 4)
- 8 x 2.5" NVMe (Gen 5)

Fan locations and supported quantity for different configurations

The supported fan quantity and suggested installation slots vary with different configurations. See the following table for details.

Configurations	Limiting conditions	Fan quantity	Fan type	Fan locations (slots)	Fan dummy quantity
<ul style="list-style-type: none">• 16-EDSFF• 4 x 2.5" SAS/SATA• 4 x 2.5" NVMe• 4 x 2.5" AnyBay	N/A	7	Perf	1, 2, 3, 4, 5, 6, 7	1
<ul style="list-style-type: none">• 10 x 2.5" AnyBay• 10 x 2.5" NVMe• 10 x 2.5" SAS/SATA• 8 x 2.5" SAS/SATA• 6 x 2.5" SAS/SATA + 4 x 2.5" AnyBay• 6 x 2.5" SAS/SATA + 2 x 2.5" AnyBay + 2 x 2.5" NVMe	<ul style="list-style-type: none">• cTDP ≤ 240 W• No GPU adapter• No rear backplane• No PCIe/OCP adapter (≥ 100 GB)	6	Std	1, 2, 3, 4, 5, 6	2
	Other scenarios except the above	6	Perf	1, 2, 3, 4, 5, 6	2

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 326](#)

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 61](#).

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 326](#)

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 61](#).

Backplane replacement

Use this information to remove and install a backplane.

Remove the front 2.5-inch drive backplane

Use this information to remove the backplane for ten 2.5 inch hot-swap drives.

About this task

The following describes how to remove the backplane for ten 2.5-inch hot-swap drives. You can remove the backplane for four or eight 2.5-inch hot-swap drives in the same way.

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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. Remove the top cover. See [“Remove the top cover” on page 235](#).
- Step 2. Remove all the installed drives and drive fillers from the drive bays. See [“Remove a 2.5-inch hot-swap drive” on page 116](#).

Step 3. Grasp the backplane and carefully lift it out of the chassis.

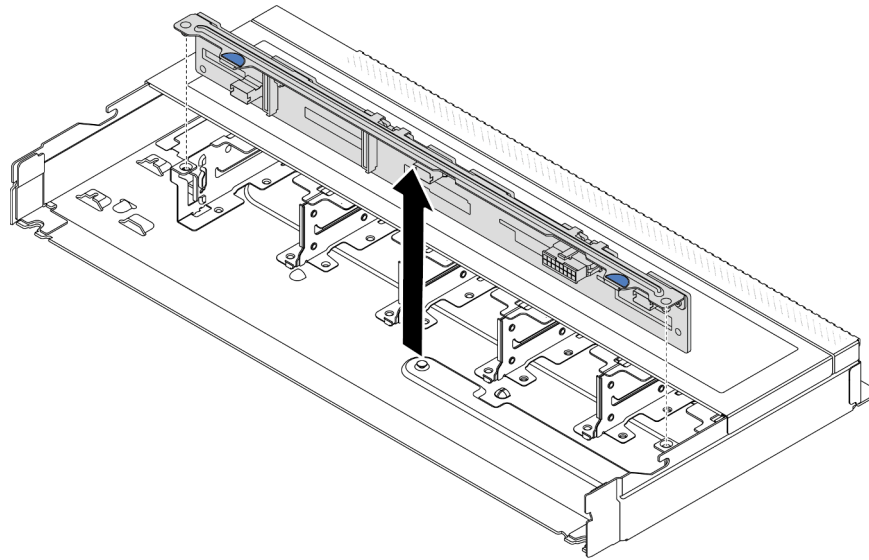


Figure 20. Removal of backplane for ten 2.5-inch hot-swap drives

Step 4. Disconnect the cables from the backplane. See [Chapter 6 “Internal cable routing” on page 241](#).

After you finish

If you are instructed to return the old backplane, follow all packaging instructions and use any packaging materials provided.

Demo video

[Watch the procedure on YouTube](#)

Install the front 2.5-inch drive backplane

Use this information to install the backplane for ten 2.5 inch hot-swap drives.

About this task

The following describes how to remove the backplane for ten 2.5-inch hot-swap drives. You can remove the backplane for four or eight 2.5-inch hot-swap drives in the same way.

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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 backplane to any unpainted surface on the outside of the server. And then, take the backplane 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 241](#).
- Step 3. Align the two pins on the backplane with the corresponding holes in the chassis.

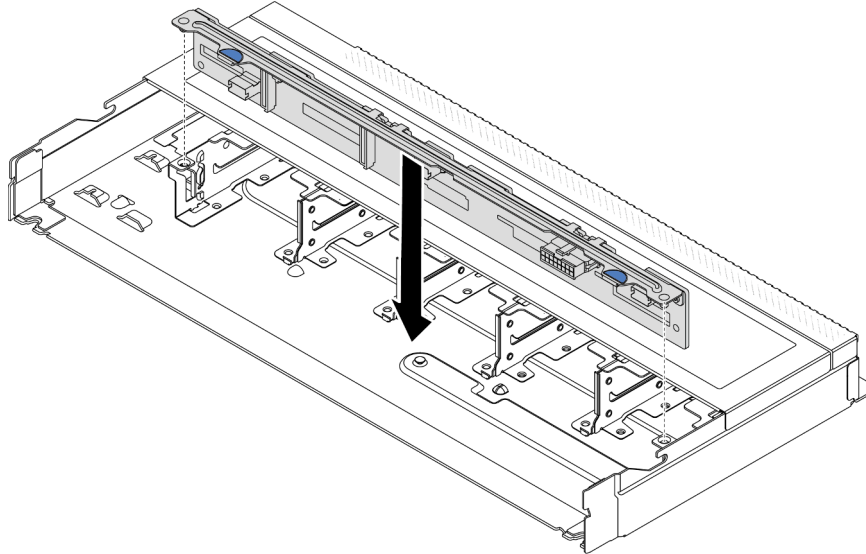


Figure 21. Installation of backplane for ten 2.5-inch hot-swap drives

- Step 4. Lower the backplane into the chassis. Ensure that the pins pass through the holes and the backplane is fully seated in place.
- Step 5. Connect the cables to the system board or expansion slots. See [Chapter 6 “Internal cable routing” on page 241](#).

After you finish

1. Reinstall all the drives and drive fillers into the drive bays. See [“Install a 2.5-inch hot-swap drive” on page 117](#).
2. Complete the parts replacement. See [“Complete the parts replacement” on page 238](#).

Demo video

[Watch the procedure on YouTube](#)

Remove the front 16-EDSFF drive backplane

Use this information to remove the backplane for front 16 EDSFF drives.

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.

- 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. Remove the top cover. See [“Remove the top cover” on page 235](#).
- Step 2. Remove all the installed drives and drive cages from the drive bays. See [“Remove a hot-swap EDSFF drive” on page 119](#).
- Step 3. Remove the backplane from the chassis.

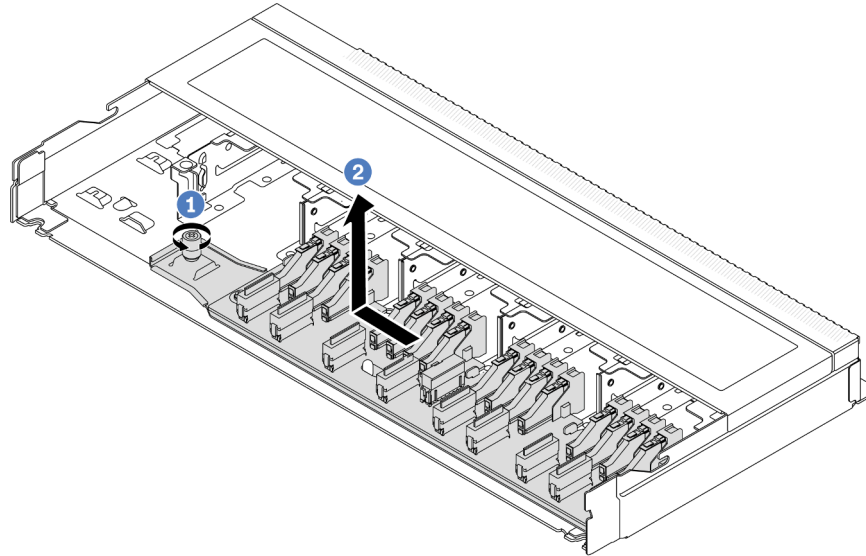


Figure 22. Removal of backplane for 16 EDSFF drives

- a. 1 Loosen the screw.
- b. 2 Slightly slide the backplane as shown and then lift it up.

- Step 4. Disconnect the cables from the backplane. See [Chapter 6 “Internal cable routing” on page 241](#).

After you finish

If you are instructed to return the old backplane, follow all packaging instructions and use any packaging materials provided.

Demo video

[Watch the procedure on YouTube](#)

Install the front 16-EDSFF drive backplane

Use this information to install the backplane for front 16 EDSFF drives.

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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 backplane to any unpainted surface on the outside of the server. And then, take the backplane 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 241](#).
- Step 3. Put the backplane down into place.

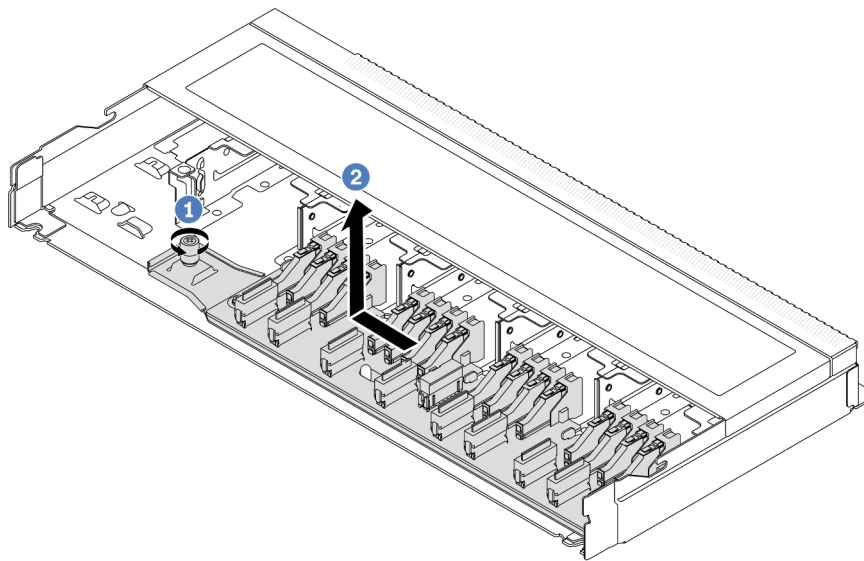


Figure 23. Installation of backplane for 16 EDSFF drives

- 1 Align the hole on the backplane with the pin on the chassis, place it down, and slightly slide it as shown.
 - 2 Tighten the screw to secure the backplane.
- Step 4. Connect the cables to the system board or expansion slots. See [Chapter 6 “Internal cable routing” on page 241](#). If the cable connectors come with protective dust caps, make sure to remove them before plugging in.

After you finish

1. Reinstall all the drives and drive cages into the drive bays. See [“Install a hot-swap EDSFF drive” on page 121](#).
2. Complete the parts replacement. See [“Complete the parts replacement” on page 238](#).

Demo video

[Watch the procedure on YouTube](#)

Remove the rear 2.5-inch drive backplane

Use this information to remove the 2.5-inch rear drive backplane.

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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. Prepare your server.

- a. Remove the top cover. See [“Remove the top cover” on page 235](#).
- b. Remove all installed drives and fillers (if any) from the drive bays. See [“Remove a 2.5-inch hot-swap drive” on page 116](#).

Step 2. Gently press and hold the tab on the rear hot-swap drive cage as shown and remove the air baffle from the rear hot-swap drive cage.

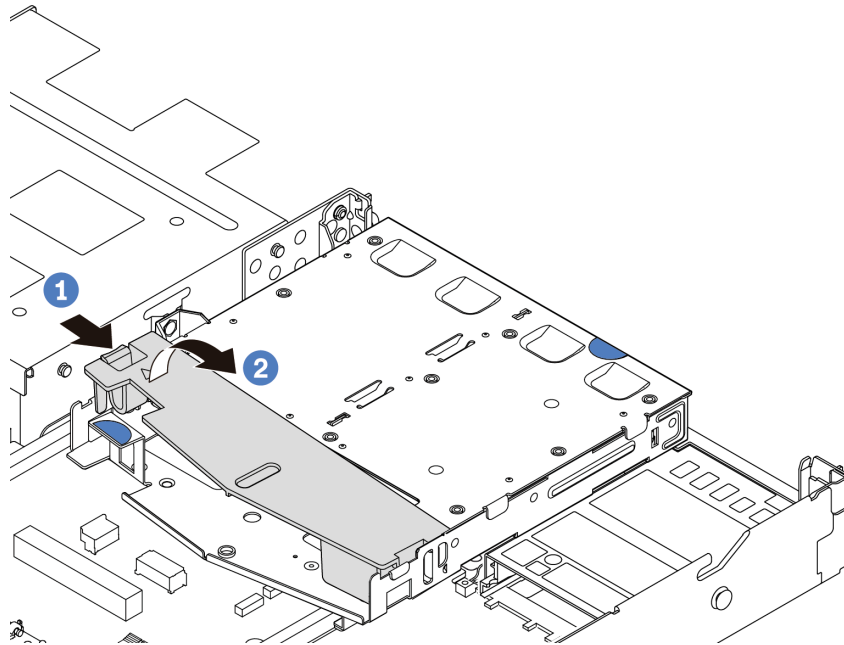


Figure 24. Air baffle removal

Step 3. Record the cable connections for 2.5-inch rear drive and then disconnect all cables from the backplanes. For information about the backplane cable routing, see [Chapter 6 “Internal cable routing” on page 241](#).

Step 4. Carefully lift the 2.5-inch rear drive backplane out of the rear hot-swap drive cage.

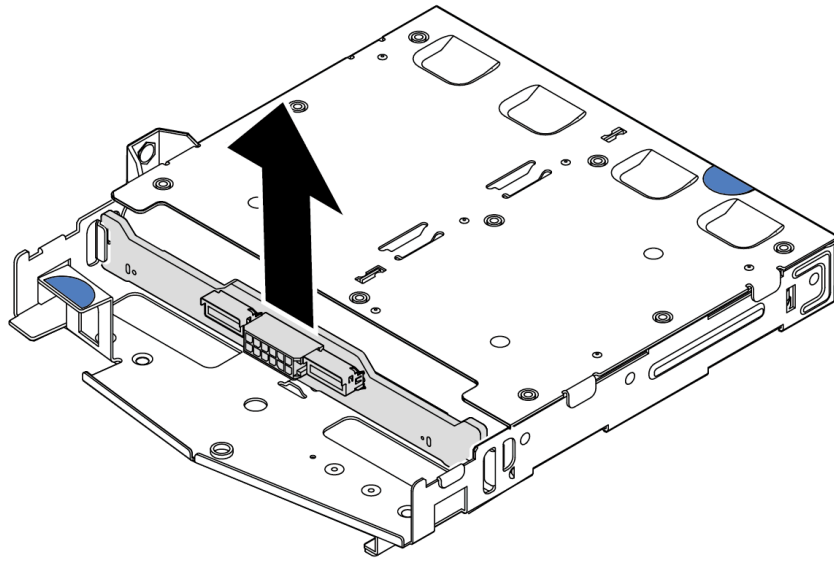


Figure 25. 2.5-inch rear drive backplane removal

After you finish

If you are instructed to return the old backplane, follow all packaging instructions and use any packaging materials provided.

Demo video

[Watch the procedure on YouTube](#)

Install the rear 2.5-inch drive backplane

Use this information to install the 2.5-inch rear drive backplane.

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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 rear backplane to any unpainted surface on the outside of the server. Then, take the rear backplane out of the package and place it on a static-protective surface.

Step 2. Align the rear backplane with the rear hot-swap drive cage and lower it into the rear hot-swap drive cage.

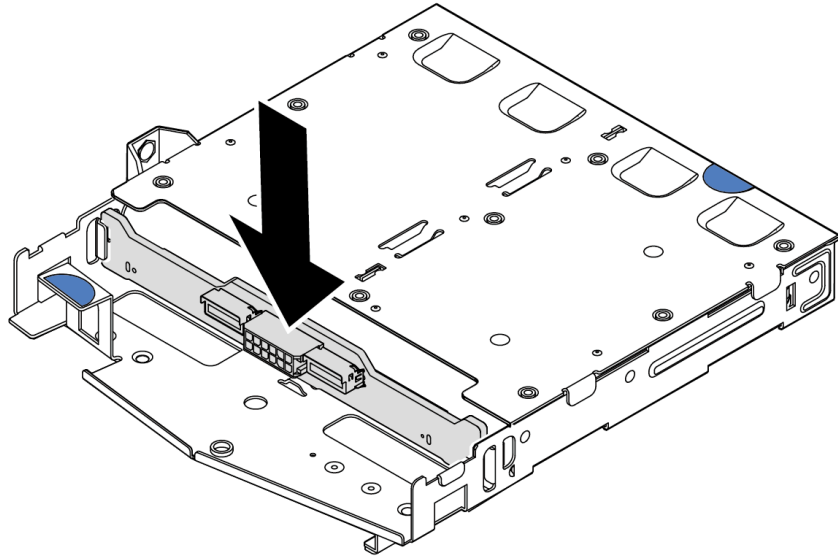


Figure 26. Rear backplane installation

Step 3. Connect the cables to the backplane. See [Chapter 6 “Internal cable routing” on page 241](#). If the cable connectors come with protective dust caps, make sure to remove them before plugging in.

Step 4. Install the air baffle into the rear hot-swap drive cage as shown.

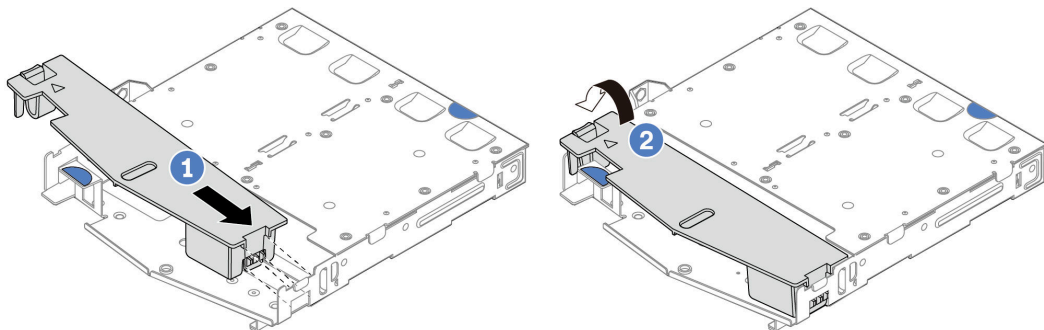


Figure 27. Air baffle installation

- a. ① Align the air baffle edge with the notch on the drive cage.
- b. ② Press the air baffle down and make sure that it is seated in place.

Step 5. Connect the cables to the system board or expansion slots. See [Chapter 6 “Internal cable routing” on page 241](#).

After you finish

1. Reinstall drives or drive fillers into the rear hot-swap drive cage. See [“Install a 2.5-inch hot-swap drive” on page 117](#).

2. Reinstall the drive assembly to the server. See [“Install the 2.5-inch rear drive assembly” on page 201](#).
3. Complete the parts replacement. See [“Complete the parts replacement” on page 238](#).

Demo video

[Watch the procedure on YouTube](#)

Remove the 7mm drive backplanes

Use this information to remove the 7mm drive backplanes.

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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: Depending on the specific type, your backplanes might look different from the illustration in this topic.

Step 1. Prepare your server.

- a. Remove the top cover. See [“Remove the top cover” on page 235](#).
- b. Remove all installed drives and fillers from the drive bays. See [“Remove a 2.5-inch hot-swap drive” on page 116](#).
- c. Record the cable connections for 7mm drives and then disconnect all cables from the backplanes. See [Chapter 6 “Internal cable routing” on page 241](#) and [“7mm drive backplane” on page 261](#). If the cable connectors come with protective dust caps, make sure to remove them before plugging in.
- d. Remove the 7mm drive assembly from the rear chassis. See [“Remove the 2.5-inch rear drive assembly” on page 200](#).

Step 2. Remove the 7mm drive backplane on the top.

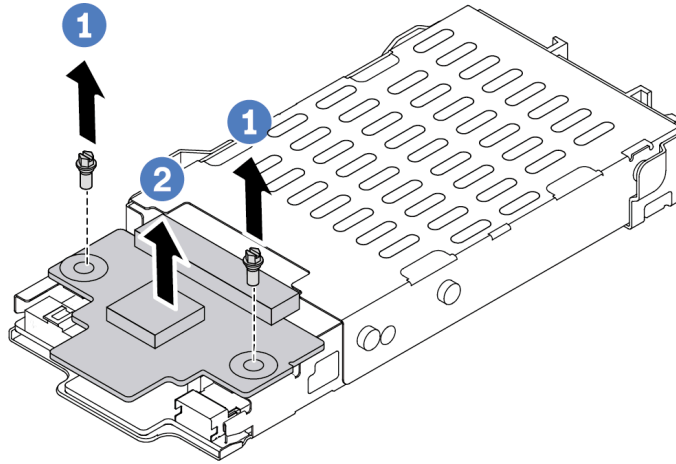


Figure 28. 7mm drive backplane removal (top)

- a. 1 Remove the two screws as shown.
- b. 2 Lift the top backplane up and put it aside.

Step 3. Remove the 7mm drive backplane at the bottom.

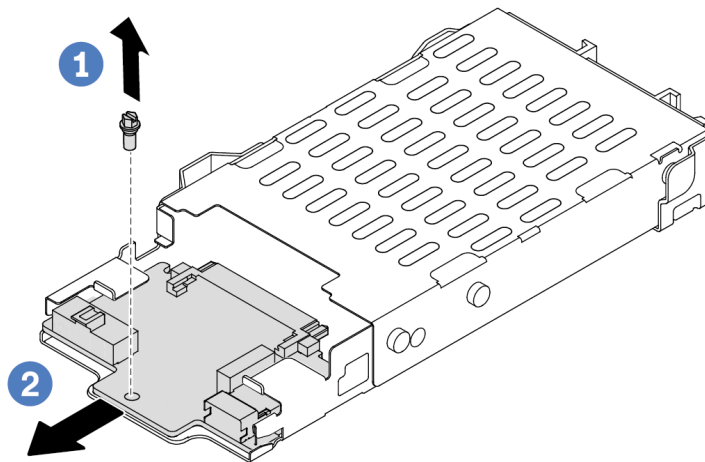


Figure 29. 7mm drive backplane removal (bottom)

- a. 1 Remove the screw as shown.
- b. 2 Slide the bottom backplane out from the cage as shown.

After you finish

If you are instructed to return the old backplanes, follow all packaging instructions and use any packaging materials provided.

Demo video

[Watch the procedure on YouTube](#)

Install the 7mm drive backplanes

Use this information to install the 7mm drive backplanes.

About this task

Attention:

- Read “[Installation Guidelines](#)” on page 45 and “[Safety inspection checklist](#)” on page 46 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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-DrpxDWLMfgtXO4O6BVYTim>.

Procedure

- Step 1. Touch the static-protective package that contains new backplanes to any unpainted surface on the outside of the server. And then, take new backplanes out of the package and place them on a static-protective surface.
- Step 2. Install the 7mm drive backplane at the bottom.

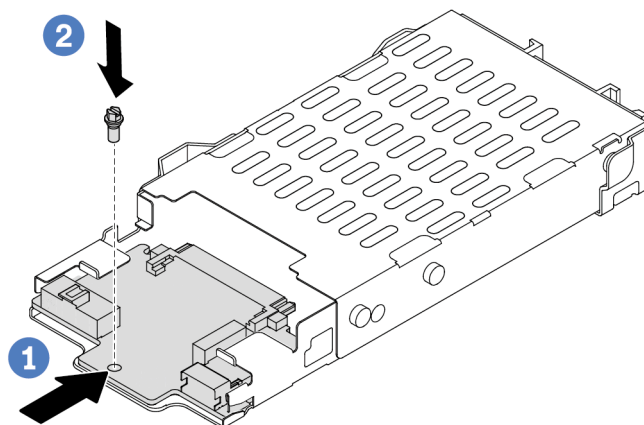


Figure 30. 7mm drive backplane installation (bottom)

- 1 Align the pin on the cage and slightly slide the bottom backplane into the cage until it is fully seated.

- b. **2** Install the screw as shown.

Step 3. Install the 7mm drive backplane on the top.

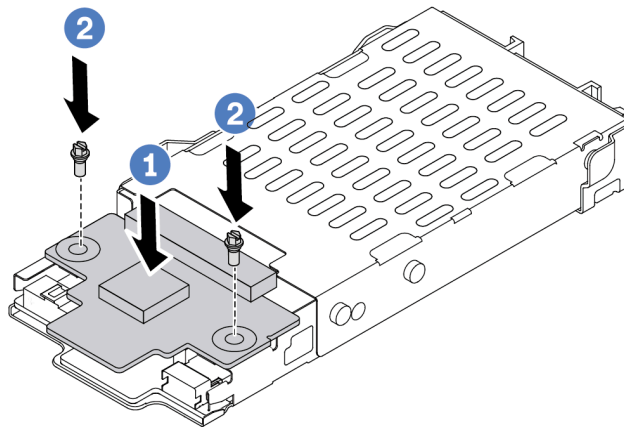


Figure 31. 7mm drive backplane installation (top)

- a. **1** Put the backplane down on the cage as shown.
- b. **2** Install the two screws to secure the top backplane in place.

Step 4. Connect the cables from the backplanes to the system board and riser slot. See [Chapter 6 “Internal cable routing” on page 241](#) and [“7mm drive backplane” on page 261](#). If the cable connectors come with protective dust caps, make sure to remove them before plugging in.

After you finish

1. Install the 7mm drive cage assembly on the rear chassis. See [“Install the 2.5-inch rear drive assembly” on page 201](#).
2. Reinstall all the drives and fillers (if any) into the drive bays. See [“Install a 2.5-inch hot-swap drive” on page 117](#).
3. Complete the parts replacement. See [“Complete the parts replacement” on page 238](#).

Demo video

[Watch the procedure on YouTube](#)

CMOS battery (CR2032) replacement

Use this information to remove and install the CMOS battery.

Remove the CMOS battery

Use this information 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/supportphonenumber> 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 45 and “[Safety inspection checklist](#)” on page 46 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.

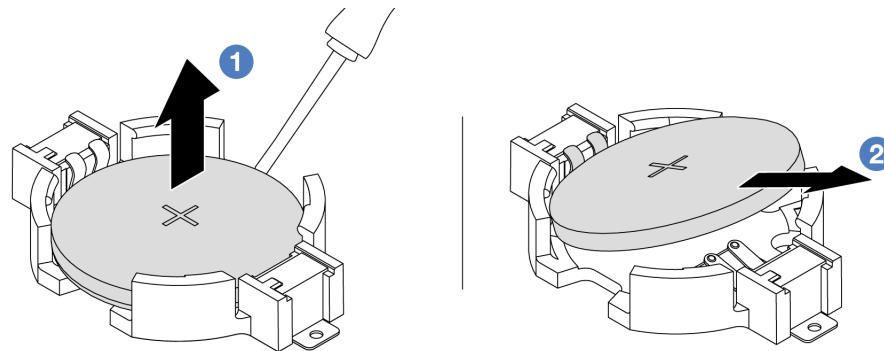
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

- Step 1. Remove the top cover. See [“Remove the top cover” on page 235](#).
- Step 2. Remove any parts and disconnect any cables that might impede your access to the CMOS battery.
- Step 3. Locate the CMOS battery. See [“System-board-assembly connectors” on page 33](#).
- Step 4. Open the battery clip as shown and carefully take the CMOS battery out of the socket.

Attention:

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



1. **1** Pry the CMOS battery from the socket with a flat-blade screwdriver.
2. **2** Remove the CMOS battery.

Figure 32. CMOS battery removal

After you finish

1. Install a new one. See [“Install the CMOS battery” on page 75](#).
2. Dispose of the CMOS battery as required by local ordinances or regulations.

Demo video

[Watch the procedure on YouTube](#)

Install the CMOS battery

Use this information 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/supportphonenumberlist> 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:

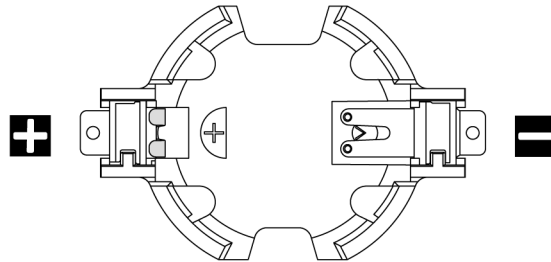
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power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

Attention:

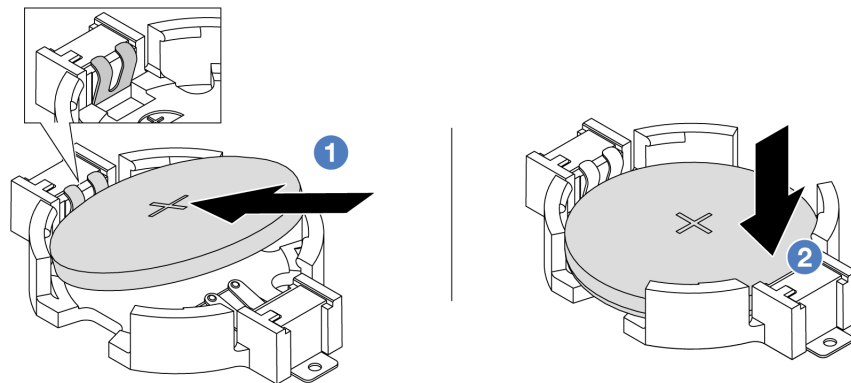
- Read “[Installation Guidelines](#)” on page 45 and “[Safety inspection checklist](#)” on page 46 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping 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 any parts you removed and connect the cables.
- Step 2. Touch the static-protective package that contains the CMOS battery to any unpainted surface on the outside of the server. Then, take the CMOS battery out of the package.
- Step 3. Install the CMOS battery. Ensure that the CMOS battery is seated in place.



Note: Before you install the CMOS battery from or into the socket, differentiate between the positive and negative ends. Use the illustration above for guidance.



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

1. Tilt the battery and insert it to the positive end on the socket, and make sure that the battery goes tight to the metal clip.
2. Press the battery down until it clicks into the socket.

Figure 33. CMOS battery installation

After you finish

1. Complete the parts replacement. See [“Complete the parts replacement” on page 238](#).
2. Use the Setup utility to set the date, time, and any passwords.

Demo video

[Watch the procedure on YouTube](#)

EDSFF cage replacement

Use this information to remove and install an EDSFF cage.

Remove an EDSFF cage

Use this information to remove an EDSFF cage.

About this task

Attention:

- Read [“Installation Guidelines”](#) on page 45 and [“Safety inspection checklist”](#) on page 46 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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 security bezel is installed, remove it first. See [“Remove the security bezel”](#) on page 207.
- Step 2. Locate the EDSFF cage you need to remove, and then remove all the EDSFF drives installed in it. See [“Remove a hot-swap EDSFF drive”](#) on page 119.
- Step 3. Remove the EDSFF cage from the chassis.

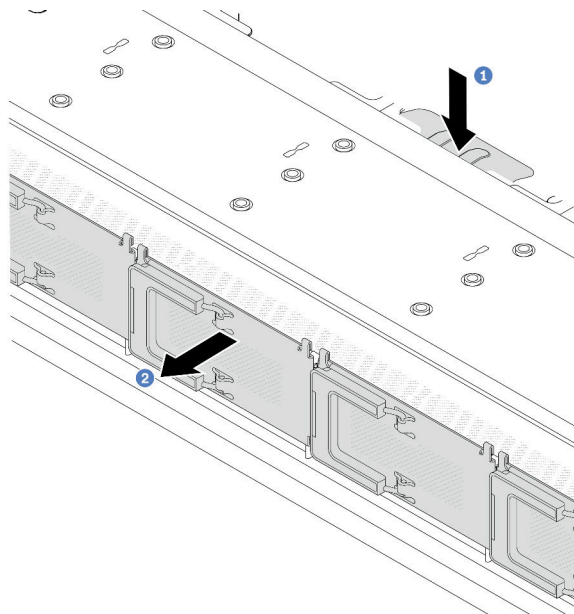


Figure 34. EDSFF cage removal

- a. **1** Press down the extended tab on the other side of the front chassis.
- b. **2** Slide the EDSFF cage out of the front chassis.

After you finish

1. Install a new EDSFF cage. See [“Install an EDSFF cage”](#) on page 79.
2. If you are instructed to return the old EDSFF cage, follow all packaging instructions and use any packaging materials provided.

Demo video

[Watch the procedure on YouTube](#)

Install an EDSFF cage

Use this information to install an EDSFF cage.

About this task

Attention:

- Read “[Installation Guidelines](#)” on page 45 and “[Safety inspection checklist](#)” on page 46 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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 EDSFF cage to any unpainted surface on the outside of the server. And then, take the EDSFF cage out of the package and place it on a static-protective surface.
- Step 2. Slide the diagnostics panel assembly into the front chassis as shown. And ensure that it is seated in place.

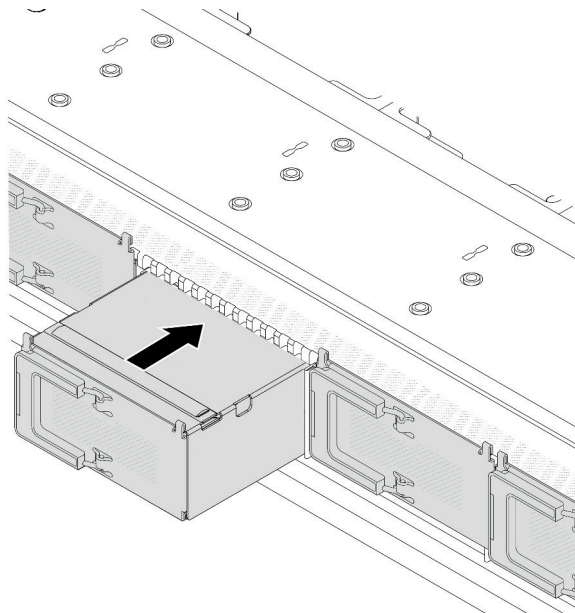


Figure 35. EDSFF cage installation

Step 3. Remove the EDSFF drive cage cover.

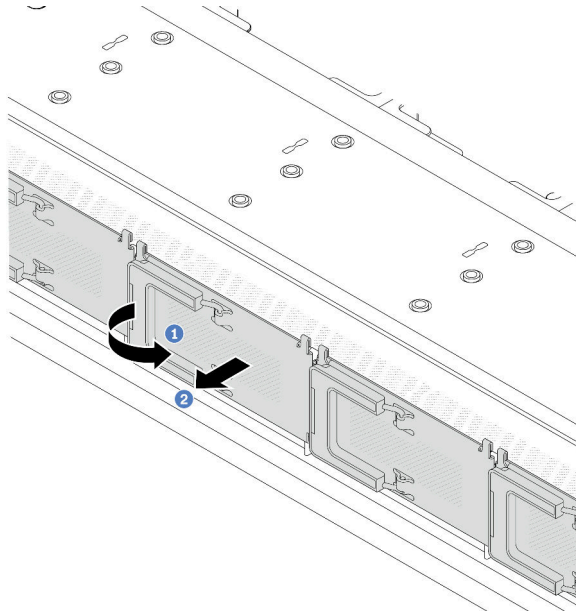


Figure 36. EDSFF drive cage cover removal

- a. ① Open the handle as shown.
- b. ② Grasp the handle and remove the drive cage cover.

Step 4. Install EDSFF drives into the EDSFF cage. See [“Install a hot-swap EDSFF drive” on page 121](#).

After you finish

Complete the parts replacement. See [“Complete the parts replacement” on page 238](#).

Demo video

[Watch the procedure on YouTube](#)

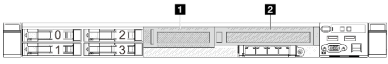
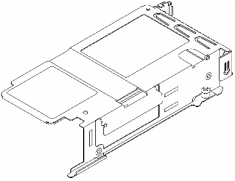
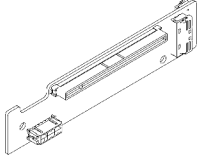
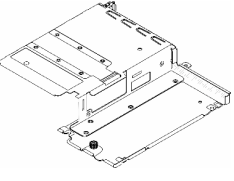
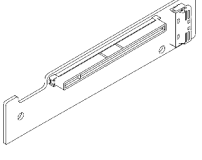
Front riser assembly replacement

A complete front riser assembly consists of two front riser cages, two front riser cards and two PCIe adapters. See this topic to understand how to remove and assemble a front riser assembly.

Server front configuration and riser assemblies

See this section to identify the correlations between the front configuration and riser assemblies.

Table 27. Server front configuration and riser assemblies

Server front configuration	Riser 3 assembly	Riser 4 assembly
 <p>Figure 37. Two front PCIe slots</p>	 <p>Figure 38. Riser 3 LP bracket</p>  <p>Figure 39. Riser 3 card</p>	 <p>Figure 40. Riser 4 FH bracket</p>  <p>Figure 41. Riser 4 card</p>

- [“Front riser cage replacement” on page 81](#)
- [“Front riser card and PCIe adapter replacement” on page 83](#)

Front riser cage replacement

Follow instructions in this section to remove and install the front riser cage.

- [“Remove the front riser cage” on page 81](#)
- [“Install the front riser cage” on page 82](#)

Remove the front riser cage

Follow the instructions in this section to remove the front riser cage.

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) 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 61](#).
- 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. Remove the top cover, see [“Remove the top cover” on page 235](#).
- Step 2. Remove the cables connected to the processor board, see [“Front riser assembly” on page 249](#).
- Step 3. Remove the front riser cage.

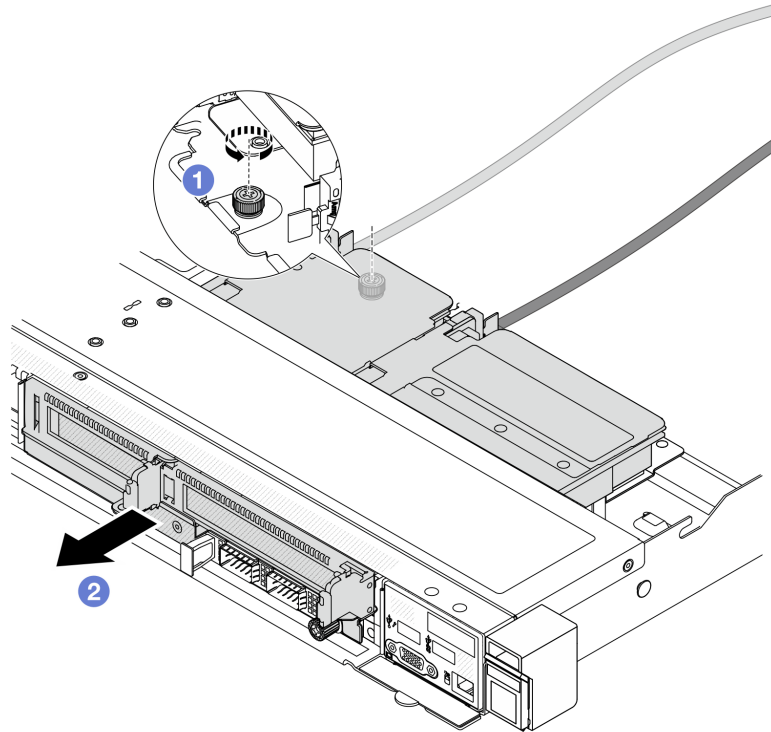


Figure 42. Removing the front riser cage

- a. 1 Loosen the screw on the rear of the front riser cage.
- b. 2 Pull the front riser cage out of the chassis.

Step 4. Remove the front riser assembly and PCIe adapter from the front riser cage, see [“Remove the front riser card and PCIe adapter” on page 84](#).

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 riser cage

Follow the instructions in this section to install the front riser cage.

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) 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 61](#).

- 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 front riser assembly and PCIe adapter to the front riser cage, see [“Install the front riser card and PCIe adapter” on page 86](#).
- Step 2. Remove the top cover. See [“Remove the top cover” on page 235](#).
- Step 3. Install the front riser cage.

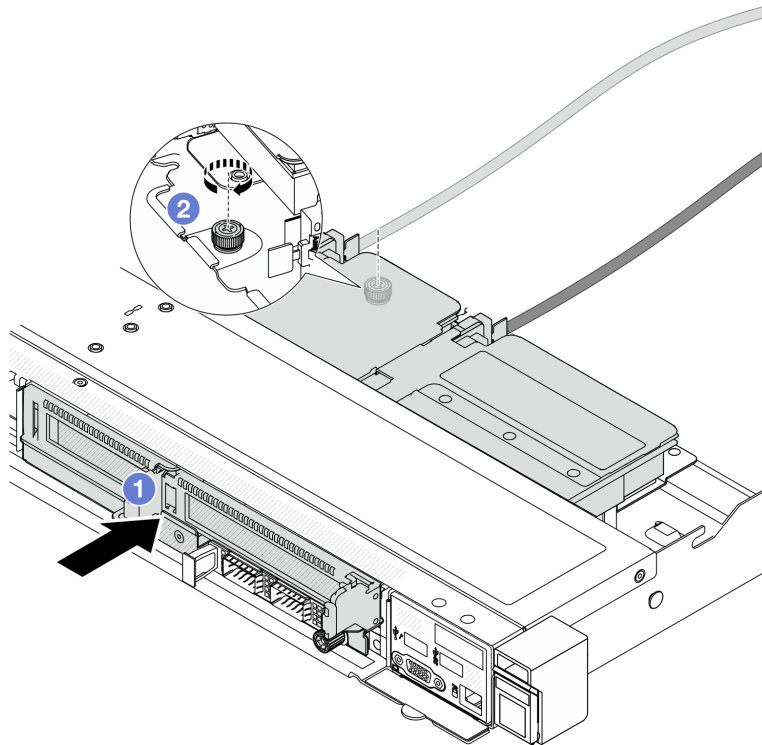


Figure 43. Installing the front riser cage

- a. 1 Push the front riser cage into the chassis.
- b. 2 Tighten the screw on the rear of the front riser cage to secure it to the chassis.

After you finish

Complete the parts replacement. See [“Complete the parts replacement” on page 238](#).

Demo video

[Watch the procedure on YouTube](#)

Front riser card and PCIe adapter replacement

Follow instructions in this section to remove and install a front riser assembly and PCIe adapter.

- [“Remove the front riser card and PCIe adapter” on page 84](#)
- [“Install the front riser card and PCIe adapter” on page 86](#)

Remove the front riser card and PCIe adapter

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

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) 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 61](#).
- 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. Remove the front riser cage, see [“Remove the front riser cage” on page 81](#).

Step 2. Separate the low-profile riser cage from the full-height riser cage.

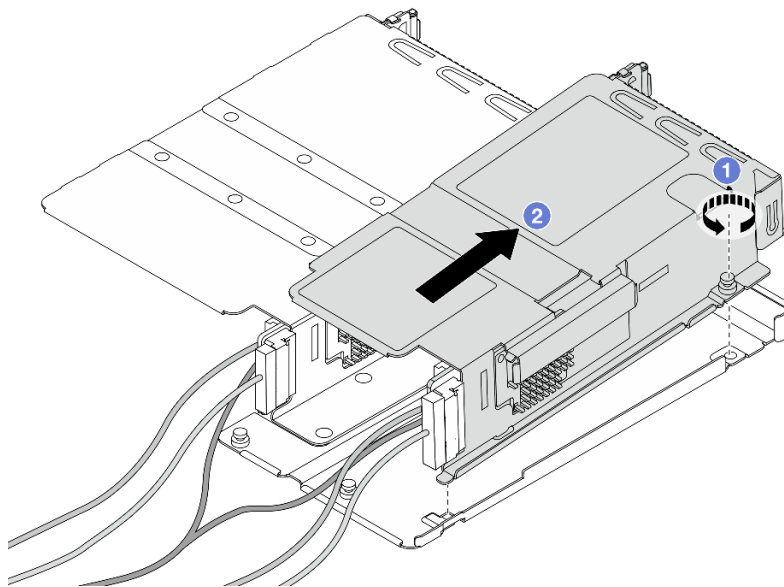


Figure 44. Separating the two cages

- 1 Loosen the screw that secures the low-profile cage to full-height one.
- 2 Tilt the cage and lift it out.

Step 3. Remove the PCIe adapter from the riser cage.

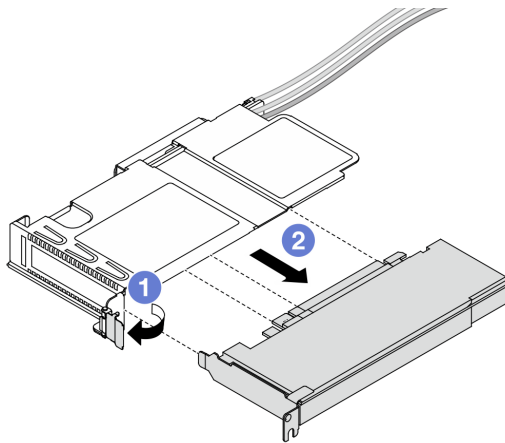


Figure 45. Removing the PCIe adapter

- a. ① Rotate the latch on the riser cage to open position.
- b. ② Disengage the PCIe adapter from the cage.

Step 4. Disconnect the cables from the riser card. For more details, see [“Front riser assembly” on page 249](#).

Step 5. Repeat the previous two steps on the full-height cage.

Step 6. Remove the riser cards from both riser cages.

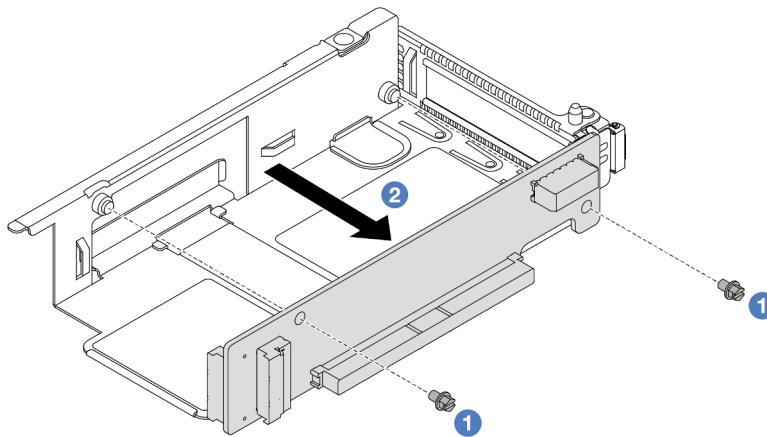


Figure 46. Removing the riser card from low-profile cage

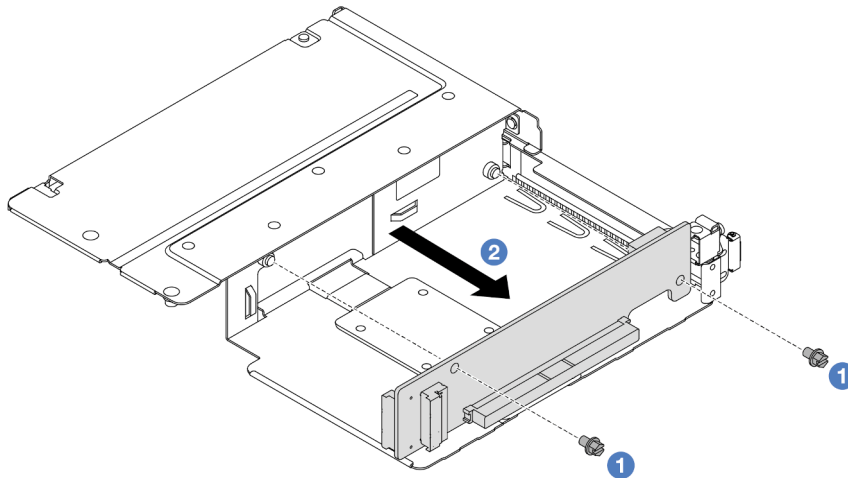


Figure 47. Removing the riser card from full-height cage

- a. ① Remove the two screws that secure the riser card to the cage.
- b. ② Remove the riser card.

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 riser card and PCIe adapter

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

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) 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 61](#).
- 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 front riser card and PCIe adapter to any unpainted surface on the outside of the server. Then, take the front riser card and PCIe adapter out of the package and place it on a static-protective surface.

Step 2. Install the front riser cards to both cages.

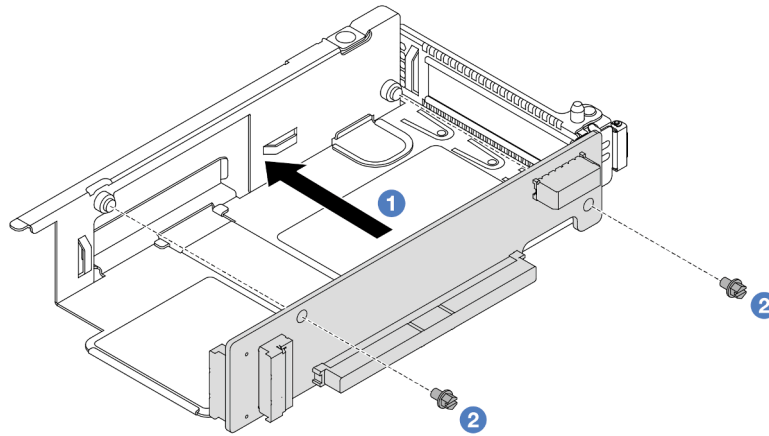


Figure 48. Installing the riser card to low-profile cage

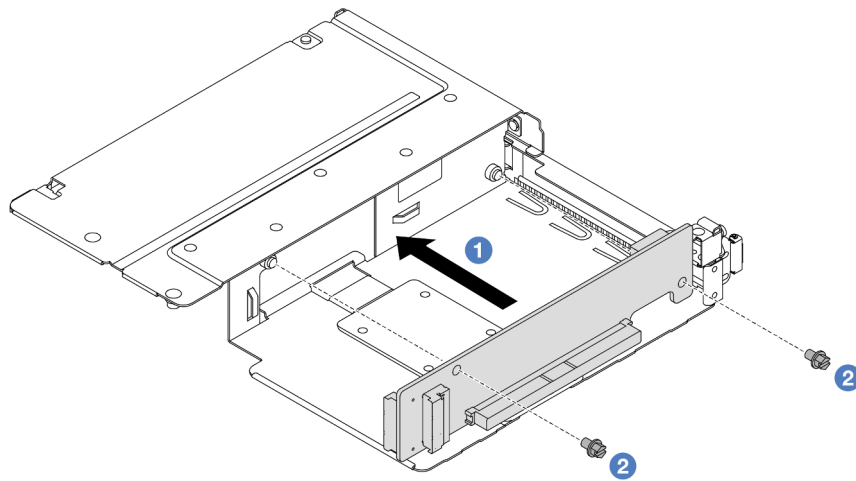


Figure 49. Installing the riser card to full-height cage

- a. 1 Align the screw holes on the riser cards with the corresponding ones on the cages.
- b. 2 Install the two screws to secure the riser cards to the cages.

Step 3. Connect the cables to the riser cards. For more details, see [“Front riser assembly” on page 249](#).

Step 4. Install the PCIe adapter to the riser cage.

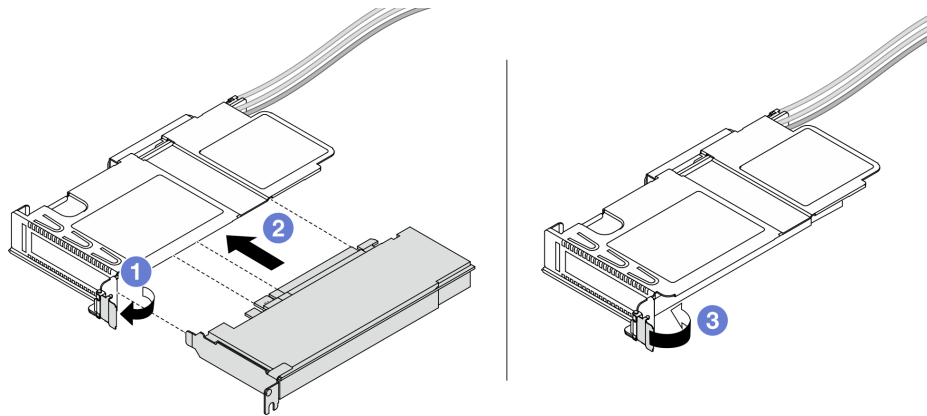


Figure 50. Installing the PCIe adapter

- a. ① Rotate the latch on the riser cage to open position.
- b. ② Align the PCIe adapter with the PCIe slot on the riser card. Then, carefully press the PCIe adapter straight into the slot until it is securely seated.
- c. ③ Rotate the latch on the riser cage to close position.

Step 5. Repeat the previous step on the full-height cage.

Step 6. Assemble the low-profile riser cage and the full-height riser cage.

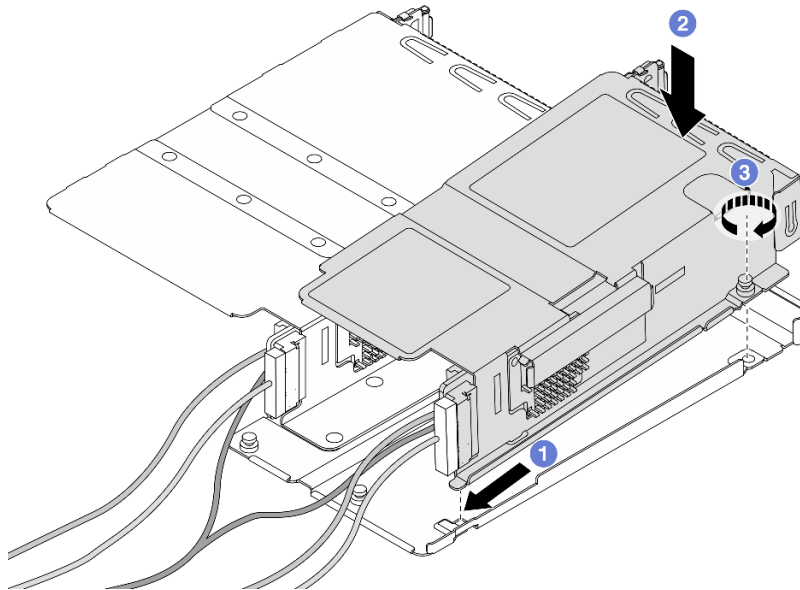


Figure 51. Assembling the two riser cages

- a. ① Tilt the low-profile cage and insert it to the latch on the full-height one.
- b. ② Place the low-profile cage down and align the screw holes.
- c. ③ Tighten the screw and make sure the low-profile cage is secured.

After you finish

Complete the parts replacement. See [“Complete the parts replacement” on page 238](#).

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 89](#)
- [“OCP interposer card replacement” on page 91](#)

Front OCP module replacement

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

- [“Remove the front OCP module” on page 89](#)
- [“Install the front OCP module” on page 90](#)

Note: The OCP module is available only on some models.

Remove the front OCP module

Follow the steps in this section to remove a front OCP module.

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) 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 61](#).
- 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. Remove the front OCP module.

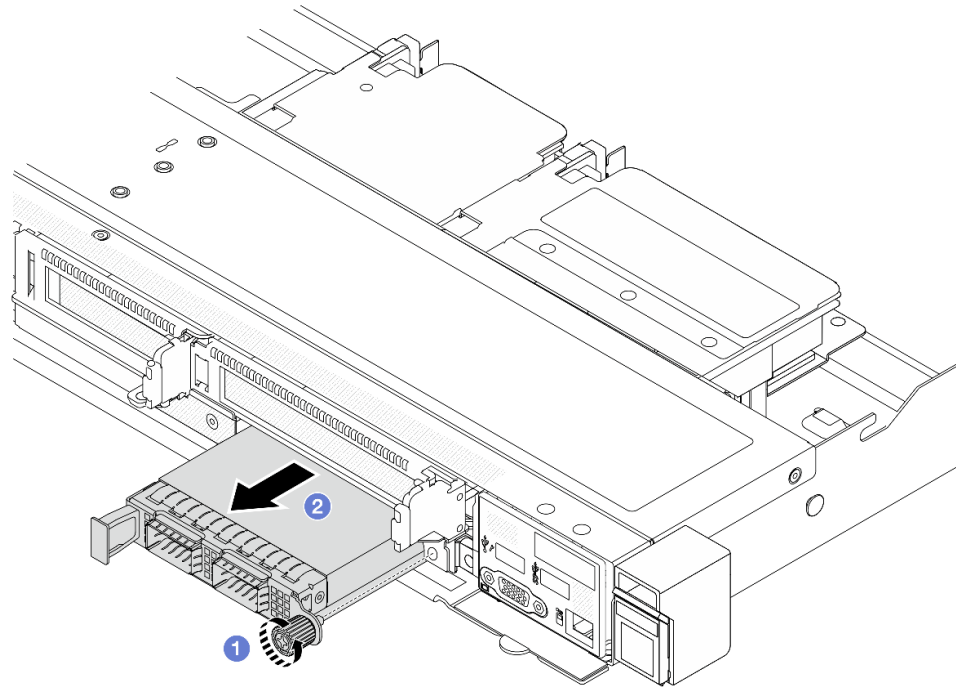


Figure 52. Removing the front OCP module

- a. ① Loosen the thumbscrew that secures the OCP module. Use a screwdriver if needed.
- b. ② Pull out the OCP module.

After you finish

1. Install a new front OCP module or a module filler. See [“Install the front OCP module” on page 90](#).
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 the steps in this section to install a front OCP module.

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) 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 61](#).
- 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 OCP module to any unpainted surface on the outside of the server. Then, take the OCP module out of the package and place it on a static-protective surface.

Step 2. Install a front OCP module.

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

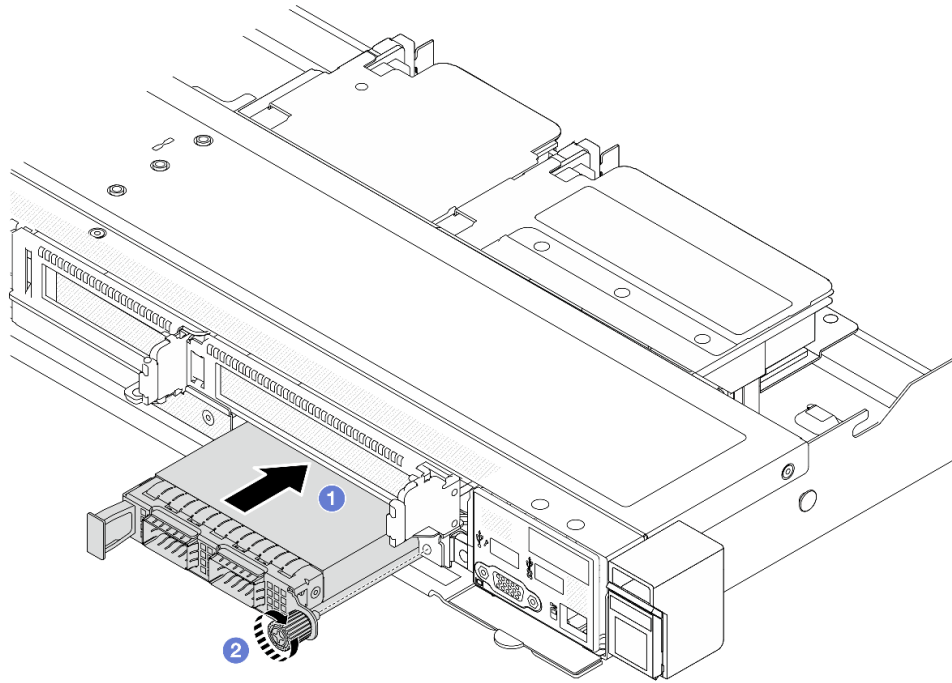


Figure 53. Installing the front OCP module

- a. 1 Push the OCP module by its handle on the left until it is fully inserted into the connector on the front OCP interposer card.
- b. 2 Fully tighten the thumbscrew to secure the adapter. Use a screwdriver if needed.

After you finish

Complete the parts replacement. See [“Complete the parts replacement” on page 238](#).

Demo video

[Watch the procedure on YouTube](#)

OCP interposer card replacement

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

- [“Remove the front OCP interposer card” on page 92](#)
- [“Install the front OCP interposer card” on page 93](#)

- [“Remove the rear OCP interposer card” on page 94](#)
- [“Install the rear OCP interposer card” on page 95](#)

Remove the front OCP interposer card

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

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) 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 61](#).
- 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. Remove the top cover. See [“Remove the top cover” on page 235](#).
- Step 2. Remove the front riser cage. See [“Remove the front riser cage” on page 81](#).
- Step 3. Remove the front OCP module. See [“Remove the front OCP module” on page 89](#).
- Step 4. Remove the front OCP interposer card.

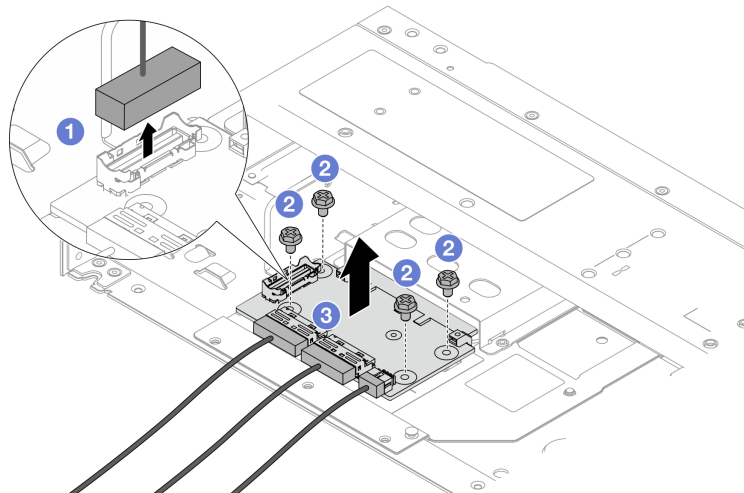


Figure 54. Removing the front OCP interposer card

- 1 Disconnect the sideband connector to gain access to the screw underneath.
 - 2 Loosen four screws.
 - 3 Lift the front OCP interposer card out of the chassis.
- Step 5. Disconnect the cables on the front OCP interposer card. For more details, see [“OCP interposer card” on page 251](#).

After you finish

1. Install a new front OCP interposer card. See [“Install the front OCP interposer card” on page 93](#).
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 the steps in this section to install a front OCP interposer card.

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) 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 61](#).
- 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 front OCP interposer card to any unpainted surface on the outside of the server. Then, take the front OCP interposer card out of the package and place it on a static-protective surface.
- Step 2. Remove the top cover. See [“Remove the top cover” on page 235](#).
- Step 3. Connect the cables to the front OCP interposer card. For more details, see [“OCP interposer card” on page 251](#).
- Step 4. Install the front OCP interposer card to the chassis.

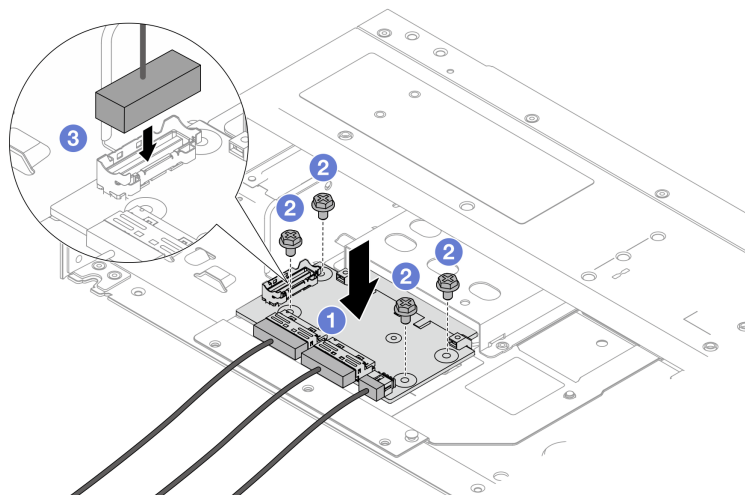


Figure 55. Installing the front OCP interposer card

- a. **1** Place the front OCP interposer card on the chassis, and align the screw holes.

- b. 2 Tighten four screws.
- c. 3 Connect the sideband connector.

After you finish

Complete the parts replacement. See [“Complete the parts replacement” on page 238](#).

Demo video

[Watch the procedure on YouTube](#)

Remove the rear OCP interposer card

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

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) 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 61](#).
- 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. Remove the top cover. See [“Remove the top cover” on page 235](#).
- Step 2. Disconnect the cables on the rear OCP interposer card. For more details, see [“OCP interposer card” on page 251](#).
- Step 3. Remove the rear OCP interposer card.

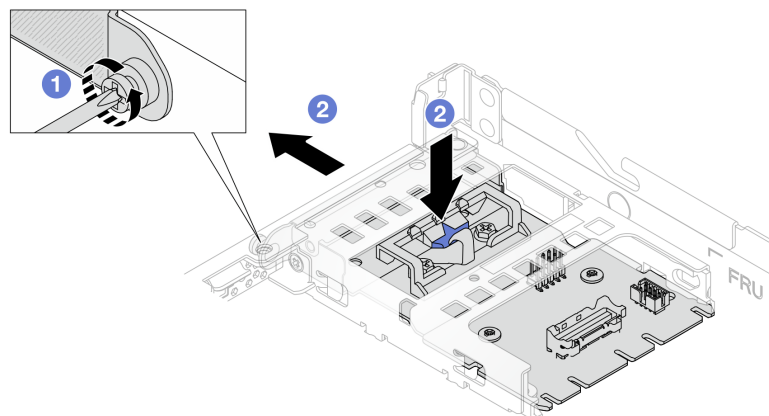


Figure 56. Removing the rear OCP interposer card

- a. 1 Loosen the screw that secures the rear OCP interposer card.

- b. 2 Press and hold the blue latch. And pull the rear OCP interposer card by the latch out from the chassis.

After you finish

1. Install a new rear OCP interposer card. See [“Install the rear OCP interposer card” on page 95](#).
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 the steps in this section to install a rear OCP interposer card.

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) 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 61](#).
- 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 rear OCP interposer card to any unpainted surface on the outside of the server. Then, take the rear OCP interposer card out of the package and place it on a static-protective surface.
- Step 2. Remove the top cover. See [“Remove the top cover” on page 235](#).
- Step 3. Install the rear OCP interposer card.

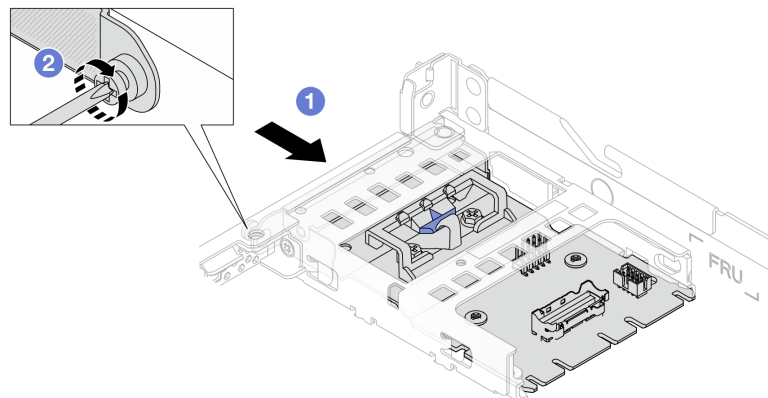


Figure 57. Installing the rear OCP interposer

- a. 1 Slide the rear OCP interposer into the slot until it is fully seated.
- b. 2 Tighten the screw to secure the rear OCP interposer.

Step 4. Connect the cables to the rear OCP interposer card. For more details, see [“OCP interposer card” on page 251](#).

After you finish

Complete the parts replacement. See [“Complete the parts replacement” on page 238](#).

Demo video

[Watch the procedure on YouTube](#)

Front I/O module replacement

Use this information to remove and install the front I/O module .

Remove the front I/O module

Use this information to remove the front I/O module.

About this task

The following illustrates how to remove the front I/O module with diagnostics panel. You can remove other front I/O modules in the same way.

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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. Remove the top cover. See [“Remove the top cover” on page 235](#).

Step 2. If the security bezel is installed, remove it. See [“Remove the security bezel” on page 207](#).

Step 3. Disconnect the front I/O cables from the system board. See [“Front I/O module cable routing” on page 248](#).

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 system board assembly.
- 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.

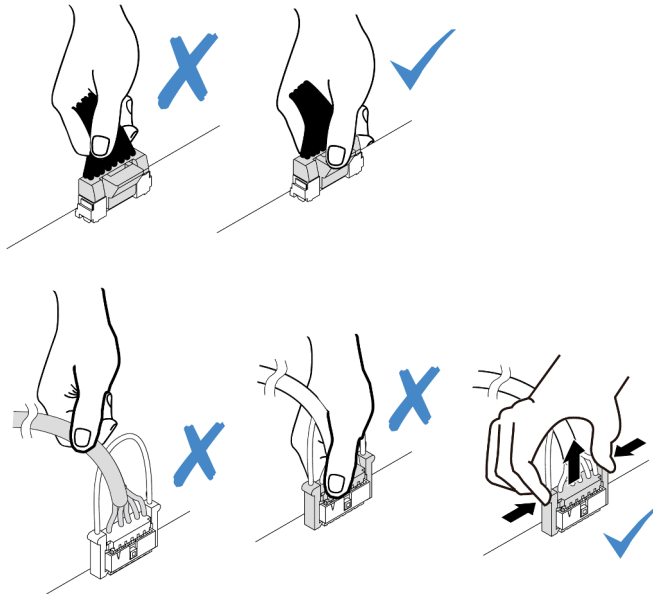
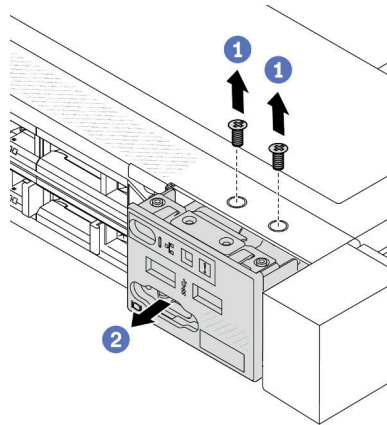


Figure 58. Disconnecting cables from the system board assembly

Step 4. Remove the front I/O module.



- a. 1 Remove the screws that secure the front I/O module.
- b. 2 Slide the front I/O module out of the front chassis.

After you finish

If you are instructed to return the old front I/O module, follow all packaging instructions and use any packaging materials provided.

Demo video

[Watch the procedure on YouTube](#)

Install the front I/O module

Use this information to install the front I/O module.

About this task

The following illustrates how to install the front I/O module with diagnostics panel. You can install other front I/O modules in the same way.

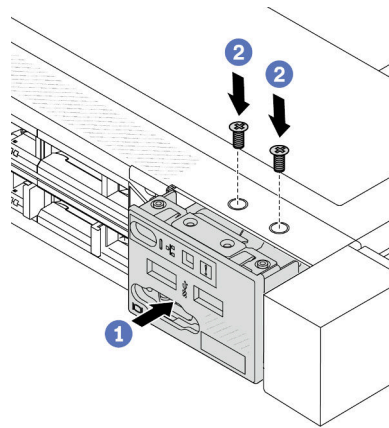
Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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 front I/O module to any unpainted surface on the outside of the server. Then, take the front I/O module out of the package and place it on a static-protective surface.

Step 2. Install the front I/O module.



- a. **1** Insert the front I/O module into the front chassis.
- b. **2** Install the screws to secure the front I/O module in place.

After you finish

1. Connect the front I/O cables to the system board. See [“Front I/O module cable routing” on page 248](#).
2. Complete the parts replacement. See [“Complete the parts replacement” on page 238](#).

Demo video

[Watch the procedure on YouTube](#)

Remove the Integrated Diagnostics Panel assembly

Use this information to remove the Integrated Diagnostics Panel assembly.

About this task

Attention:

- Read “[Installation Guidelines](#)” on page 45 and “[Safety inspection checklist](#)” on page 46 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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. Remove the top cover. See “[Remove the top cover](#)” on page 235.
- Step 2. If the security bezel is installed, remove it. See “[Remove the security bezel](#)” on page 207.
- Step 3. Remove the Integrated Diagnostics Panel assembly from the chassis.

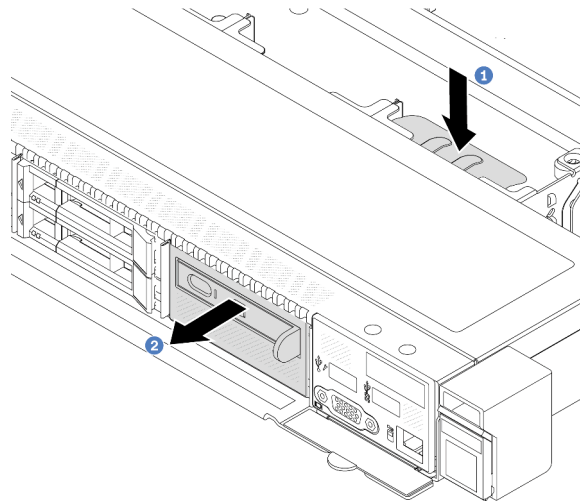


Figure 59. Integrated Diagnostics Panel assembly removal

- a. **1** Press down the extended tab on the other side of the front chassis.
- b. **2** Slide the assembly out of the front chassis.

Step 4. Remove the Integrated Diagnostics Panel from its assembly.

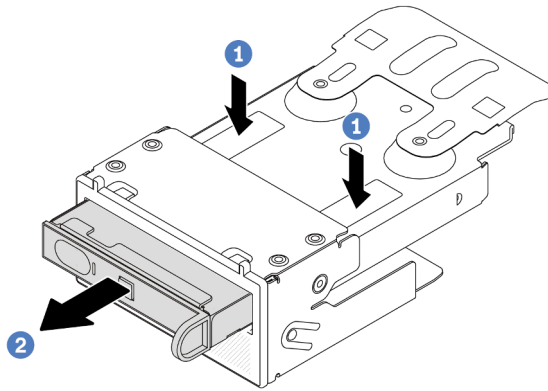


Figure 60. Integrated Diagnostics Panel removal

- a. **1** Press down the clips as shown.
- b. **2** Pull the Integrated Diagnostics Panel by its handle to get it out of its assembly.

After you finish

1. Install a new Integrated Diagnostics Panel assembly or filler. See [“Install the Integrated Diagnostics Panel assembly” on page 100](#).
2. If you are instructed to return the old Integrated Diagnostics Panel assembly, follow all packaging instructions and use any packaging materials provided.

Demo video

[Watch the procedure on YouTube](#)

Install the Integrated Diagnostics Panel assembly

Use this information to install the diagnostics panel assembly.

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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 diagnostics panel assembly to any unpainted surface on the outside of the server. And then, take the assembly out of the package and place it on a static-protective surface.

Step 2. If there is a filler installed on the front chassis, remove it as shown.

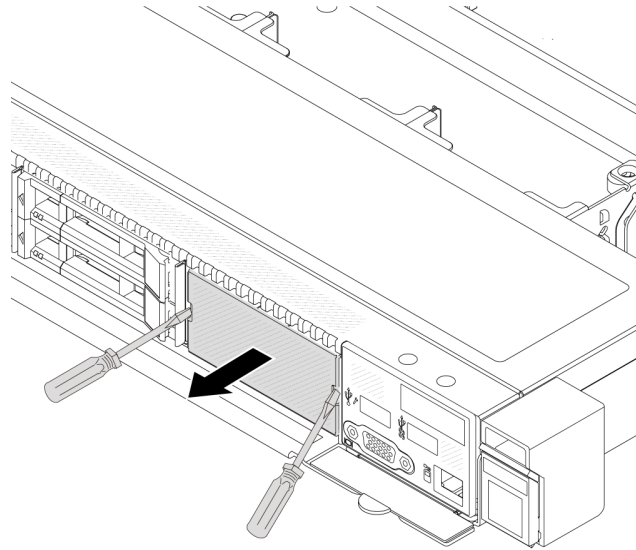


Figure 61. Filler removal

Step 3. Insert the Integrated Diagnostics Panel into its assembly. Ensure that the panel is fully seated into its assembly.

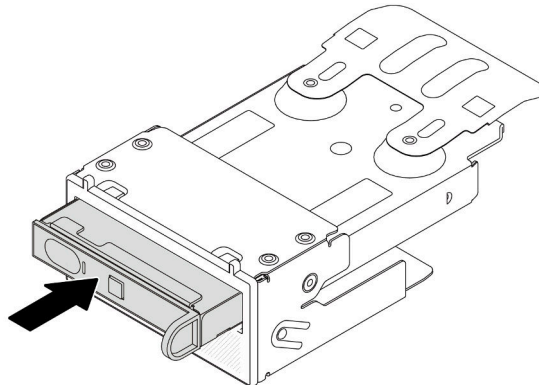


Figure 62. Integrated Diagnostics Panel installation into its assembly

Step 4. Slide the diagnostics panel assembly into the front chassis as shown. And ensure that it is seated in place.

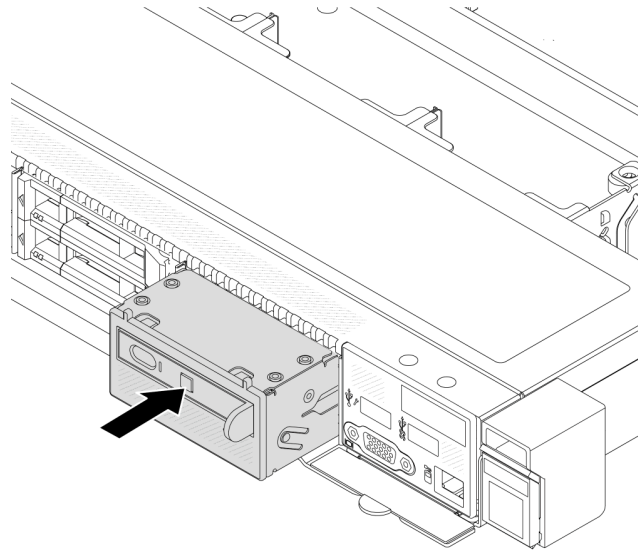


Figure 63. Diagnostics panel assembly installation

After you finish

Complete the parts replacement. See [“Complete the parts replacement” on page 238](#).

Demo video

[Watch the procedure on YouTube](#)

Fan board replacement

Use this information to remove and install the fan board.

Remove the fan board

Use this information to remove the fan board.

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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 removing the fan board:

1. Remove the top cover. See [“Remove the top cover” on page 235](#).
2. Remove system fans. See [“Remove a system fan” on page 231](#).
3. Disconnect the fan board power cable and sideband cable. See [“Power/Sideband cable routing” on page 276](#).

4. Disconnect any cables that might impede your access to the fan board. Before cable disconnection, record where the cables are connected to the system board. See [Chapter 6 “Internal cable routing” on page 241](#).

To remove the fan board, complete the following steps:

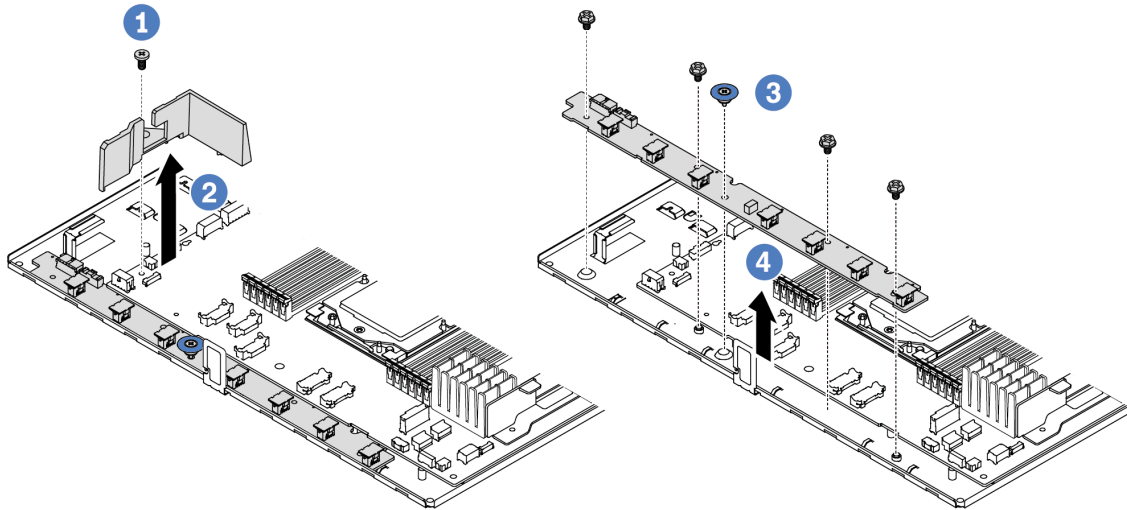


Figure 64. Fan board removal

- Step 1. 1 Remove the screw from the small air baffle.
- Step 2. 2 Gently grasp the Small air baffle and carefully lift it out of the system board tray.
- Step 3. 3 Remove the four screws and the lift handle from the fan board.
- Step 4. 4 Gently hold and lift the fan board from the system board tray.

If you are instructed to return the old fan board, follow all packaging instructions and use any packaging materials that are provided.

Demo video

[Watch the procedure on YouTube](#)

Install the fan board

Use this information to install the fan board.

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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 installing the fan board, touch the static-protective package that contains the new fan board to any unpainted surface on the outside of the server. Then, take the new fan board out of the package and place it on a static-protective surface.

To install the fan board, complete the following steps:

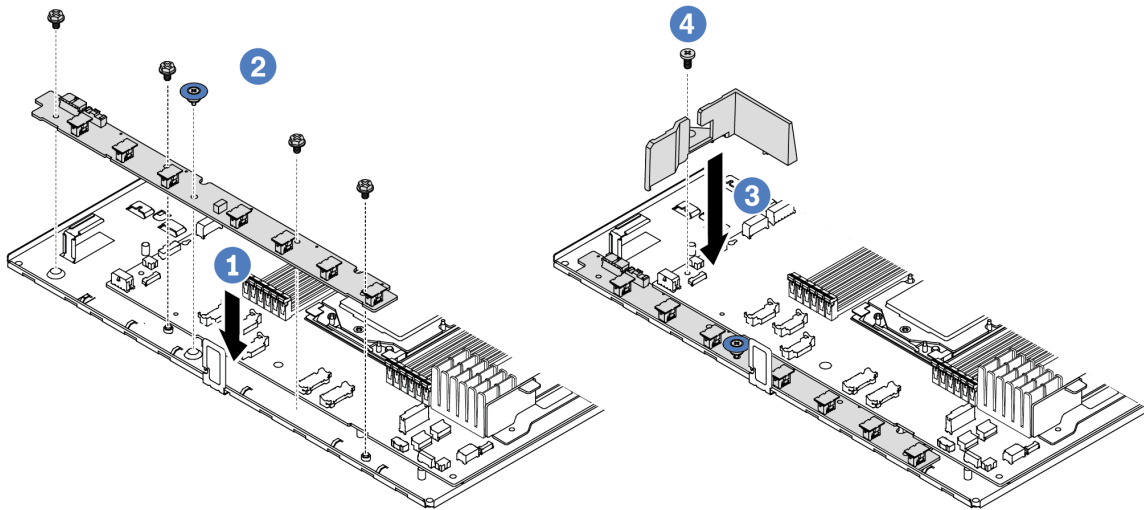


Figure 65. Fan board installation

- Step 1. ① Gently hold and lower the fan board into the system board tray.
- Step 2. ② Install the four screws and the lift hand to secure the fan board.
- Step 3. ③ Install the screw of the air baffle.
- Step 4. ④ Install the Small air baffle to the system board tray.

After installing the fan board:

1. Connect the fan board power cable, sideband cable, and other cables you disconnected before. See [Chapter 6 “Internal cable routing” on page 241](#).
2. Install the system fans. See [“Install a system fan” on page 233](#).
3. Complete the parts replacement. See [“Complete the parts replacement” on page 238](#).

Demo video

[Watch the procedure on YouTube](#)

GPU replacement

Use this information to remove and install a GPU adapter.

- [“Remove a GPU adapter” on page 104](#)
- [“Install a GPU adapter” on page 106](#)

Remove a GPU adapter

Use this information to remove a GPU adapter.

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) 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 61](#).
- 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.

- 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 108](#).
- Remove the top cover. See [“Remove the top cover” on page 235](#).
- If you are replacing a GPU adapter from riser 1 or riser 2 assembly, remove the adjacent riser assembly for easier operation. See [“Remove a rear riser card” on page 191](#).

Step 2. Remove the riser assembly that has the GPU adapter installed from the system board (system board assembly).

Note: The following uses riser 1 assembly as an example for illustration. It is similar for other riser assemblies. See [“Remove a rear riser card” on page 191](#).

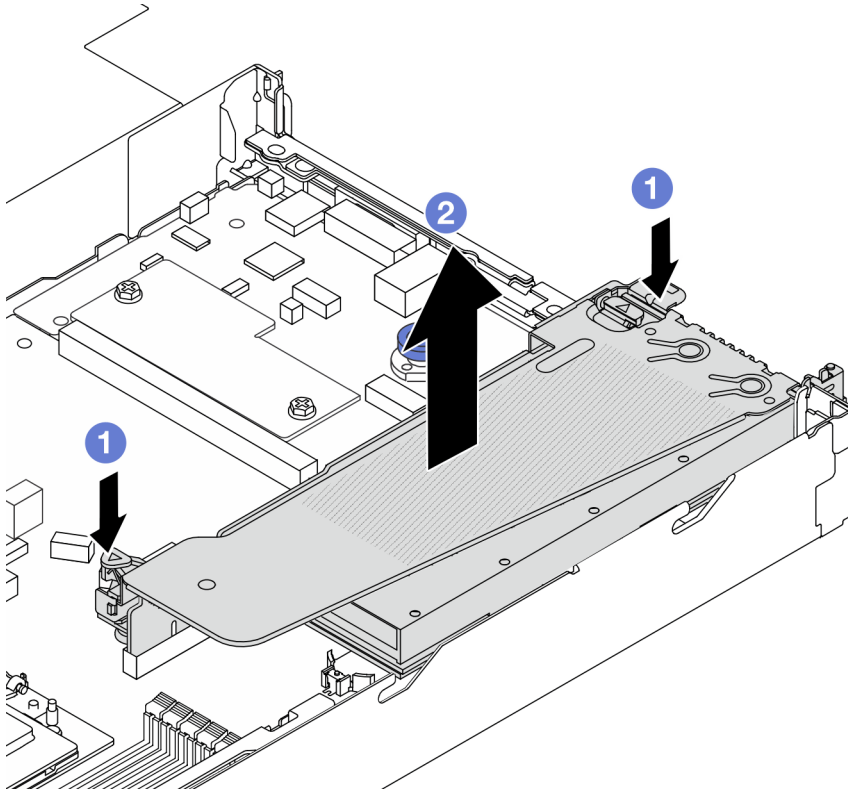


Figure 66. Removing the riser assembly

- ① Press the latches on the riser bracket.

- b. 2 Grasp the riser assembly by its edges and carefully lift it straight up and off the chassis.

Note: If you are removing a GPU adapter on riser 3 assembly, slightly lift the riser assembly up, and disconnect cables from the system board (system board assembly) first.

Step 3. Remove the GPU adapter from the riser bracket.

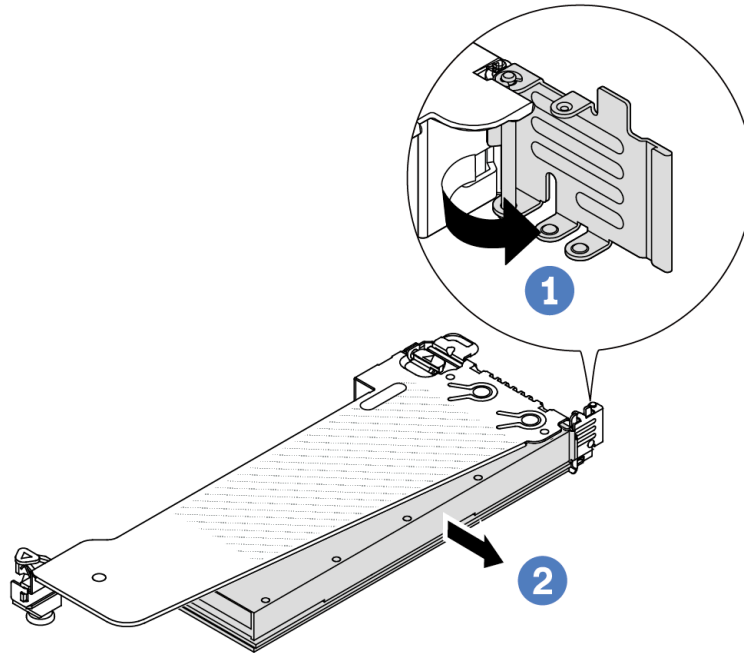


Figure 67. Removing the GPU adapter

- 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

Note: The replacement procedures of GPU adapters is the same as PCIe adapters.

[Watch the procedure on YouTube](#)

Install a GPU adapter

Use this information to install a GPU adapter.

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) 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 61](#).
- 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 55](#).
- All installed GPU adapters must be identical.

Procedure

- Step 1. Make preparation for the task.
- Step 2. Locate the appropriate PCIe slot for the new GPU adapter. See [“PCIe slots and adapters” on page 50](#).
- Step 3. Install the GPU adapter into the PCIe slot on the riser card.

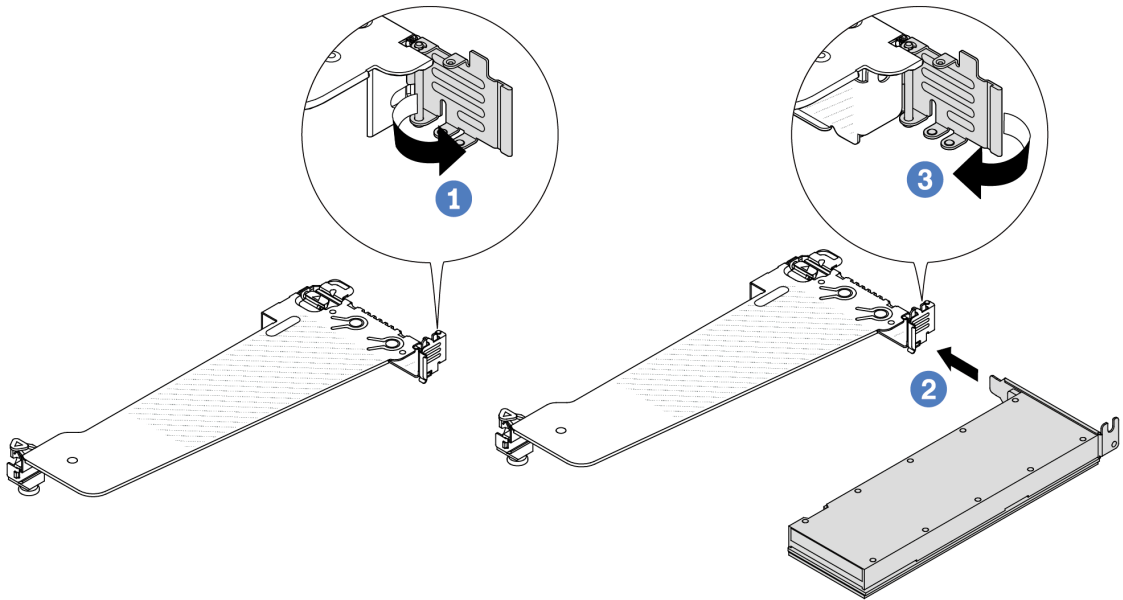


Figure 68. Installing the GPU adapter

- 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. Install the riser assembly with the GPU adapter: Align the riser card with the PCIe slot on the system board (system board assembly). Carefully press the riser card straight into the slot until it is securely seated.

Note: The following uses riser 1 assembly as an example for illustration. It is similar for other riser assemblies. See [“Install a rear riser card” on page 194](#).

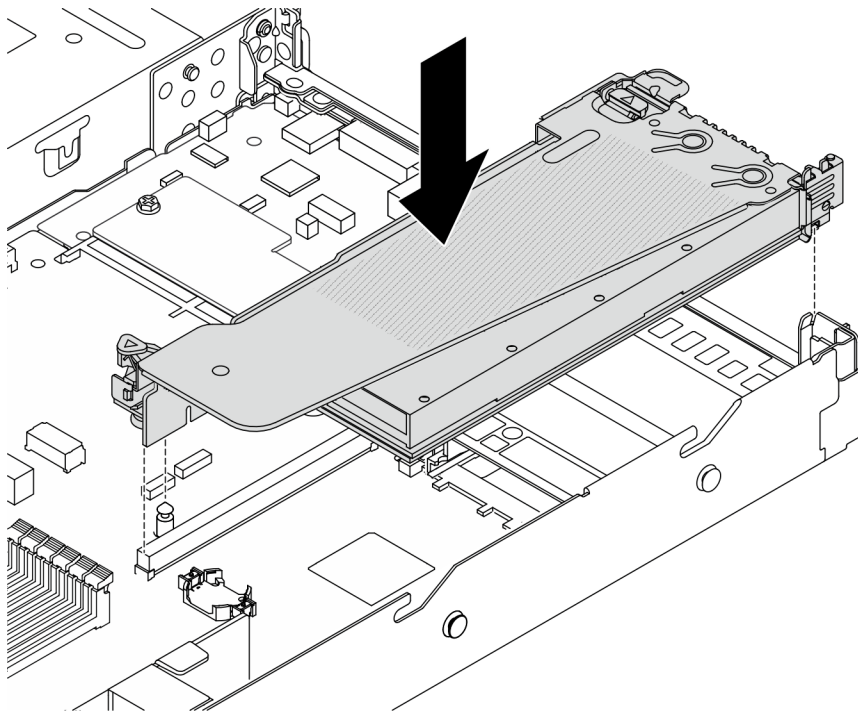


Figure 69. Installing the riser assembly

After you finish

Complete the parts replacement. See [“Complete the parts replacement” on page 238](#).

Demo video

Note: The replacement procedures of GPU adapters is the same as PCIe adapters.

[Watch the procedure on YouTube](#)

Server replacement

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

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.

S006



CAUTION:

When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.
- Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) 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 61](#).

CAUTION:

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

Procedure

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

Rack front

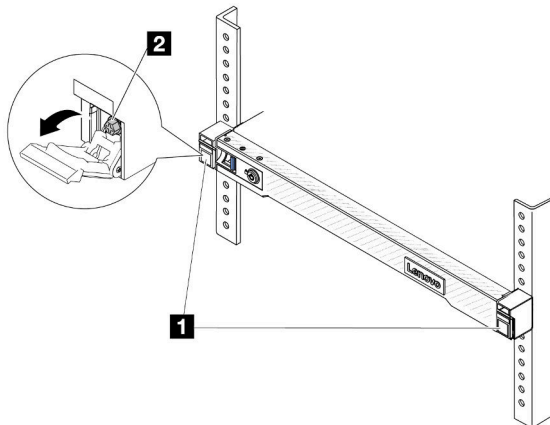


Figure 70. Disengaging server from the rack

1	Latches
2	Screw

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

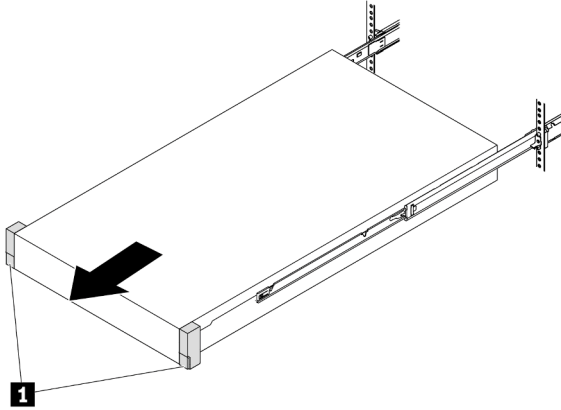


Figure 71. Pulling out the server

1	Mounting ears
----------	---------------

Step 3. Remove the server from the rack.

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

Rack front

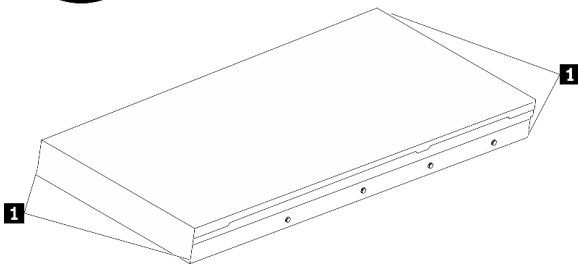


Figure 72. Lifting up the server

1	Lift points
----------	-------------

Rack Front

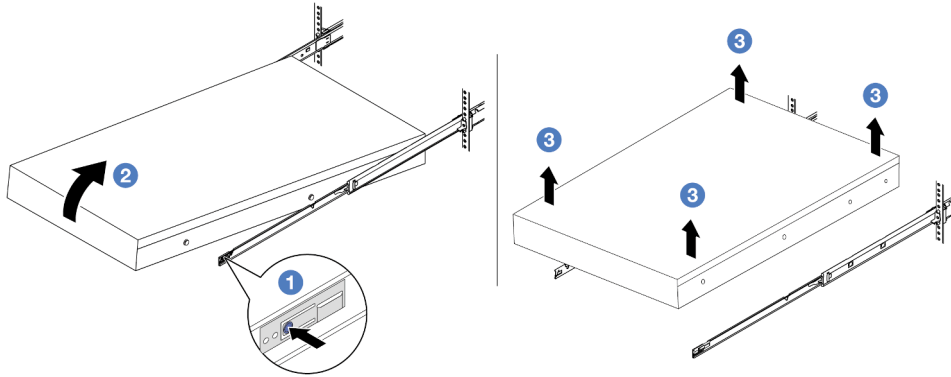


Figure 73. Removing the server from the rack.

- 1** Press the release tabs to disengage the rails from the server.
- 2** Carefully lift up the front end of the server slightly to detach the nailheads from the slots on the rails.
- 3** With three people, 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.

Demo video

[Watch the procedure on YouTube](#)

Install the server to rack

Follow instructions in this section to install the server to the rack.

S036



18 - 32 kg (39 - 70 lb)



32 - 55 kg (70 - 121 lb)

CAUTION:
Use safe practices when lifting.

S006



CAUTION:

When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.
- Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) 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 61](#).

CAUTION:

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

Procedure

Step 1. From the front of the rack, pull the rails all the way out until they stop

Attention: You can only install the server successfully when the rails are fully extended.

Rack front

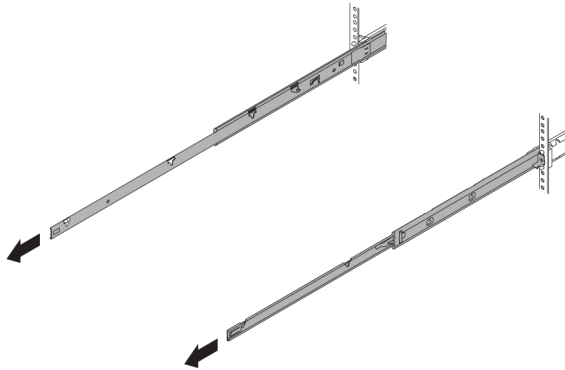


Figure 74. Pulling out the rails

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

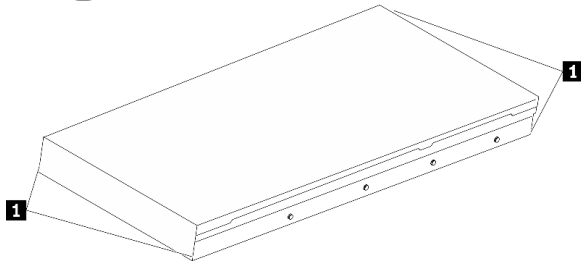
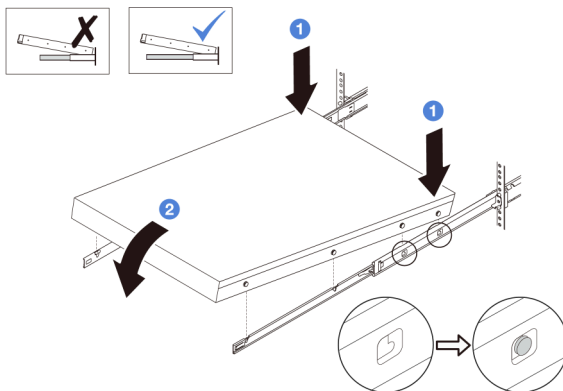


Figure 75. Lifting up the server

1	Lift points
----------	-------------

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

Attention: You can only install the server successfully when the rails are fully extended.



- a. **1** Tilt the server and slowly lower the 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.

Step 4. Slide the server into rack.

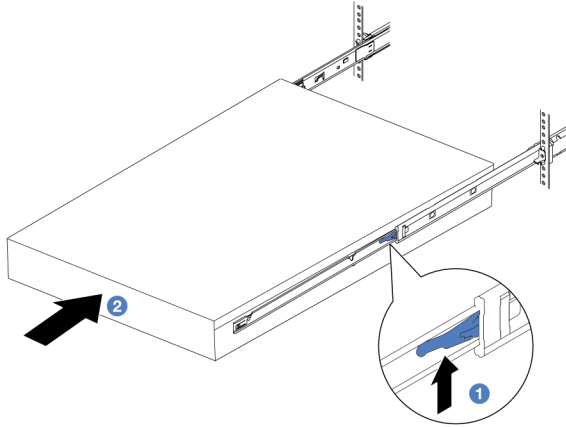


Figure 76. Installing the server into the rack

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

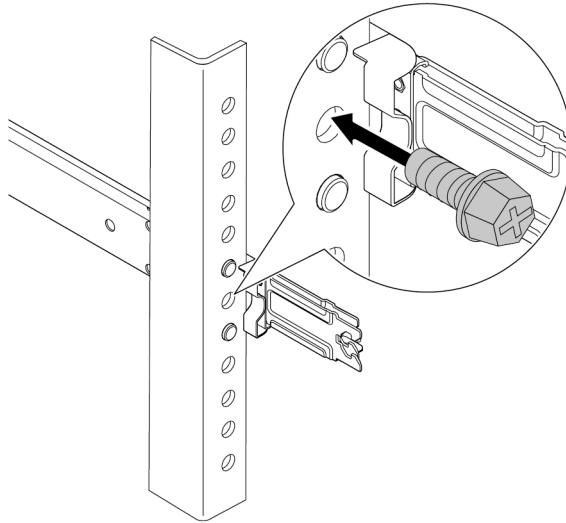


Figure 77. Securing the server to the rear of the rack

- b. Secure the server to the front of the rack. Fasten the two screws located on the front of the server.

Rack front

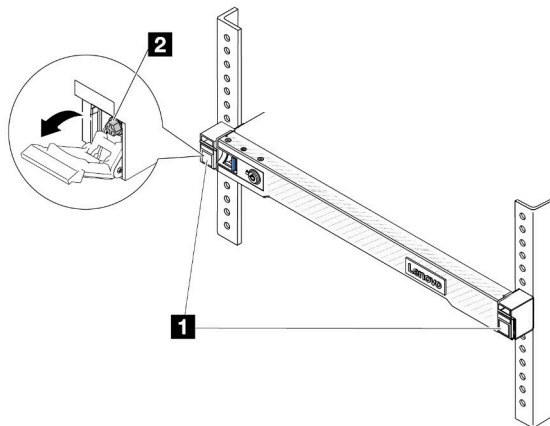


Figure 78. Securing the server to the front of the rack

1	Latches
2	Screw

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 61](#).
3. Update the server configuration. See [“Complete the parts replacement” on page 238](#).

Demo video

[Watch the procedure on YouTube](#)

Hot-swap drive replacement

Use this information 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.

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 the instructions and those in this topic.
- 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 any removed drive fillers for future use to cover vacant bays.
- 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 2.5-inch hot-swap drive

Use this information to remove a 2.5-inch hot-swap drive.

About this task

The following describes the information that you must consider for this task:

- Ensure that you have backed up data on your drive, especially if it is part of a RAID array.
 - Before you make changes to drives, RAID adapters, or drive backplanes, back up all important data that is stored on the drives.
 - Before you remove any component of a RAID array, back up all RAID configuration information.
- If one or more NVMe drives are to be removed, it is recommended to disable them first in Safely Remove Hardware and Eject Media (Windows) or filesystem (Linux). Log in to XClarity Controller and go to the **Storage** menu to identify and locate the drive type and corresponding drive bay number. If the drive bay numbers come with the term “NVMe”, it indicates that the installed drives are NVMe drives.

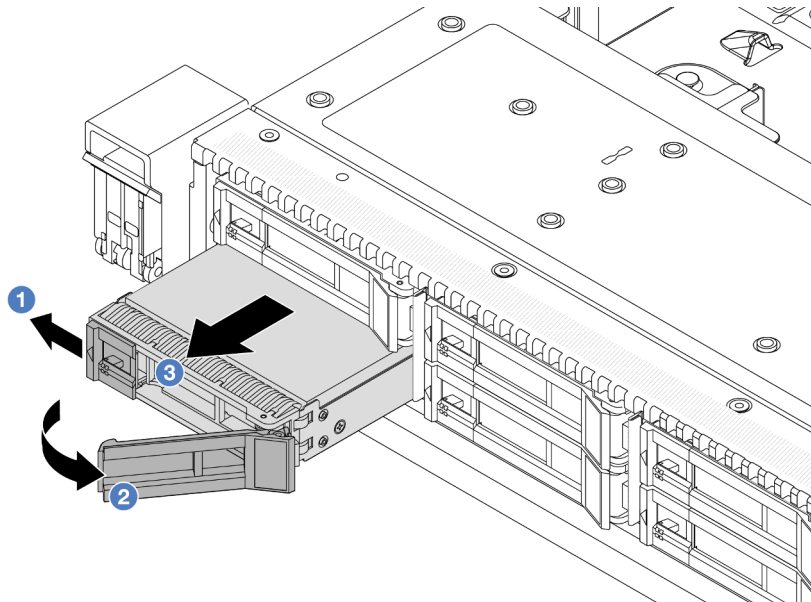
Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) 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.
- 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

Step 1. If the security bezel is installed, remove it first. See [“Remove the security bezel” on page 207](#).

Step 2. Remove a hot-swap drive.



- a. **1** Slide the release latch to the left to open the drive tray handle.
- b. **2** Open the drive handle.
- c. **3** Slide the drive out of the drive bay.

After you finish

1. Install the drive filler or a new drive to cover the drive bay. See [“Install a 2.5-inch hot-swap drive” on page 117](#).
2. If you are instructed to return the old hot-swap drive, follow all packaging instructions and use any packaging materials provided.

Demo video

[Watch the procedure on YouTube](#)

Install a 2.5-inch hot-swap drive

Use this information to install a 2.5-inch hot-swap drive.

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) 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 drive to any unpainted surface on the outside of the server. And then, take the drive out of the package and place it on a static-protective surface.
- Step 2. Remove the drive filler from the drive bay and keep the drive filler in a safe place.

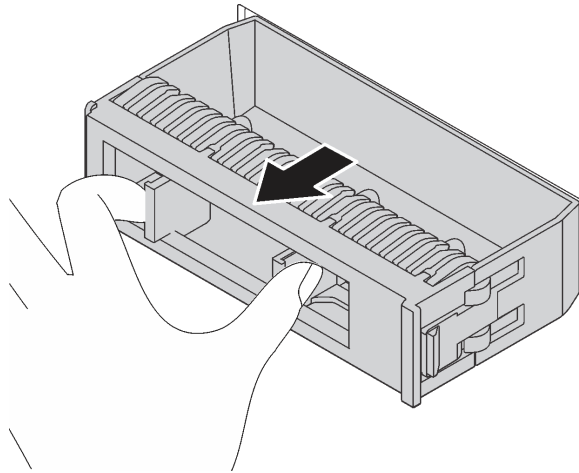


Figure 79. Drive filler removal

- Step 3. Install the drive in the drive bay.

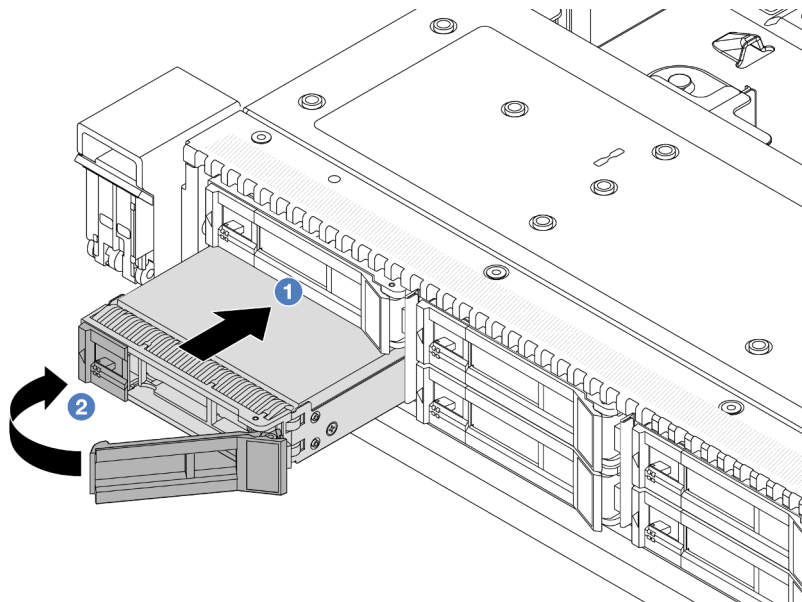


Figure 80. Hot-swap drive installation

- a. **1** Ensure that the drive tray handle is in the open position. Slide the drive into the drive bay until it snaps into position.
 - b. **2** Close the drive tray handle to lock the drive in place.
- Step 4. Check the drive LEDs to verify that the drive is operating normally. For details, see [“Drive LEDs” on page 327](#).
- Step 5. 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 208](#).
2. Use the Lenovo XClarity Provisioning Manager to configure the RAID if necessary. For more information, see <https://pubs.lenovo.com/lxpm-overview/>.

Demo video

[Watch the procedure on YouTube](#)

Remove a hot-swap EDSFF drive

Use this information to remove an EDSFF drive.

About this task

The following describes the information that you must consider for this task:

- Ensure that you have backed up data on your drive, especially if it is part of a RAID array.
 - Before you make changes to drives, RAID adapters, or drive backplanes, back up all important data that is stored on the drives.
 - Before you remove any component of a RAID array, back up all RAID configuration information.
- If one or more NVMe drives are to be removed, it is recommended to disable them first in Safely Remove Hardware and Eject Media (Windows) or filesystem (Linux). Log in to XClarity Controller and go to the **Storage** menu to identify and locate the drive type and corresponding drive bay number. If the drive bay numbers come with the term “NVMe”, it indicates that the installed drives are NVMe drives.

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) 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.
- 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

Step 1. If the security bezel is installed, remove it first. See [“Remove the security bezel” on page 207](#).

Step 2. Remove the EDSFF drive cage cover.

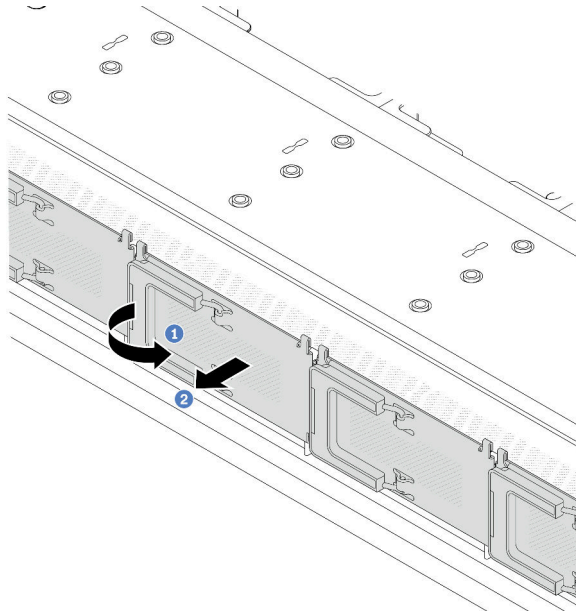


Figure 81. EDSFF drive cage cover removal

- a. 1 Open the handle as shown.
- b. 2 Grasp the handle and remove the drive cage cover.

Step 3. Remove the EDSFF drive.

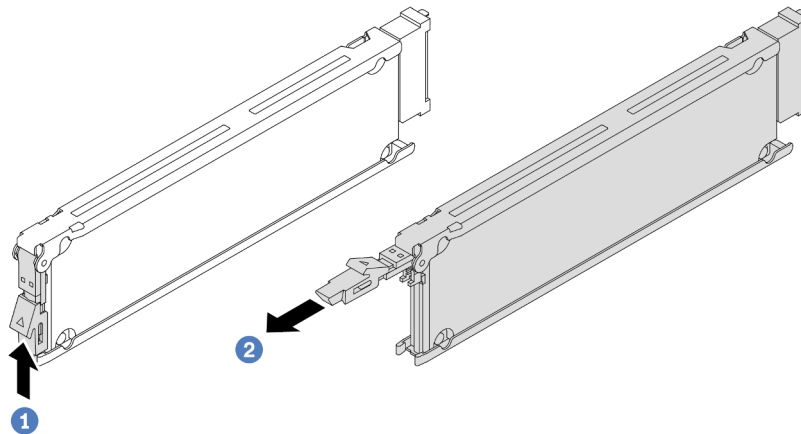


Figure 82. EDSFF drive removal

- a. 1 Slide the release latch as shown to open the drive tray handle.
- b. 2 Grasp the handle and slide the drive out of the drive bay.

After you finish

1. Install a new drive or a drive cage cover to cover the drive bay. See [“Install a hot-swap EDSFF drive” on page 121.](#)

2. If you are instructed to return the old EDSFF drive, follow all packaging instructions and use any packaging materials provided.

Demo video

[Watch the procedure on YouTube](#)

Install a hot-swap EDSFF drive

Use this information to install an EDSFF drive.

About this task

Attention:

- Read “[Installation Guidelines](#)” on [page 45](#) and “[Safety inspection checklist](#)” on [page 46](#) 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 drive to any unpainted surface on the outside of the server. Then, take the drive out of the package and place it on a static-protective surface.
- Step 2. Remove the drive filler from the drive bay and keep the drive filler in a safe place.

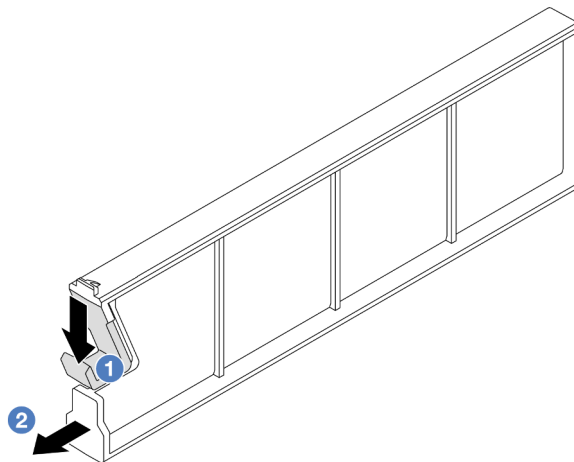


Figure 83. Remove an EDSFF drive filler

- a. 1 Press the latch down to disengage the drive clip from the cage.
- b. 2 Pull and slide the filler out.

Step 3. Install the EDSFF drive.

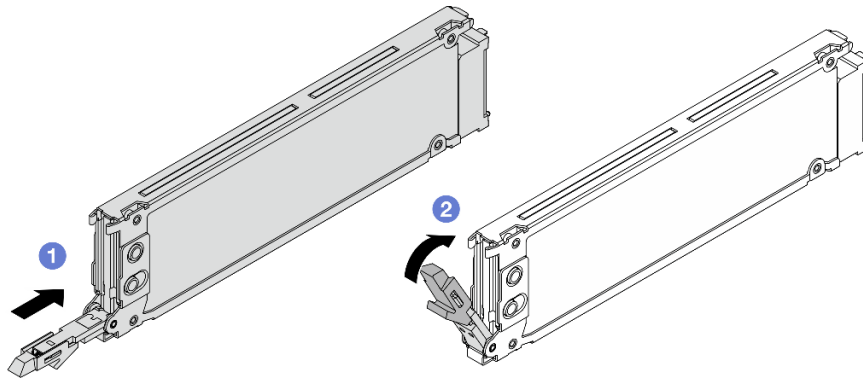


Figure 84. EDSFF drive installation

- a. 1 Ensure that the drive tray handle is in the open position. Slide the drive into the drive bay until it snaps into position.
- b. 2 Close the drive tray handle to lock the drive in place.

Step 4. Continue to install additional EDSFF drives if necessary.

Step 5. Install the EDSFF drive cage cover.

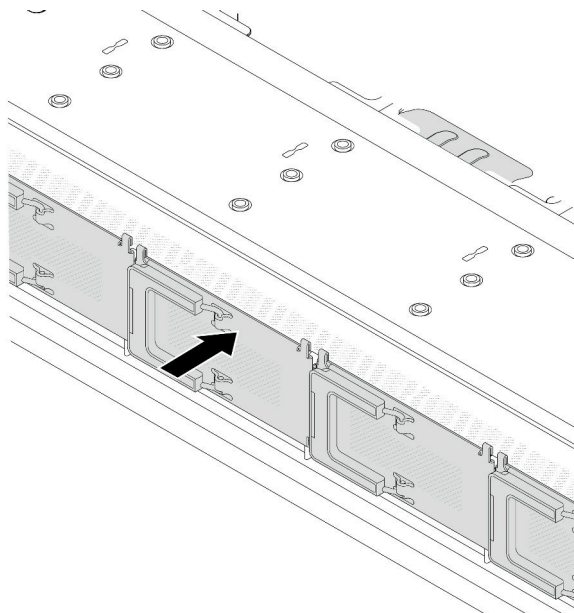


Figure 85. EDSFF drive cage cover installation

After you finish

1. Reinstall the security bezel if you have removed it. See [“Install the security bezel” on page 208](#).
2. Use the Lenovo XClarity Provisioning Manager to configure the RAID if necessary. For more information, see: <https://pubs.lenovo.com/lxpm-overview/>

Demo video

[Watch the procedure on YouTube](#)

Hot-swap power supply unit replacement

Use this information to remove and install a hot-swap power supply unit.

Remove a hot-swap 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 45](#) and [“Safety inspection checklist” on page 46](#) 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.

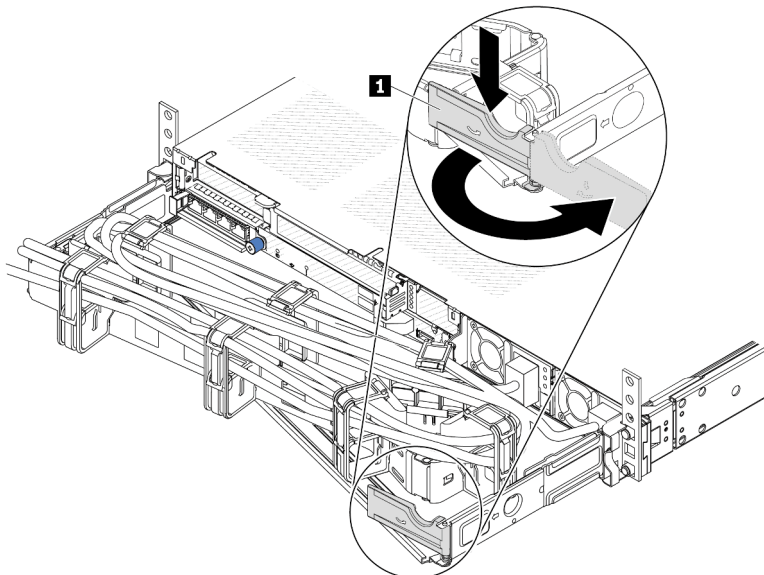


Figure 86. Adjusting the CMA

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 330.

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.

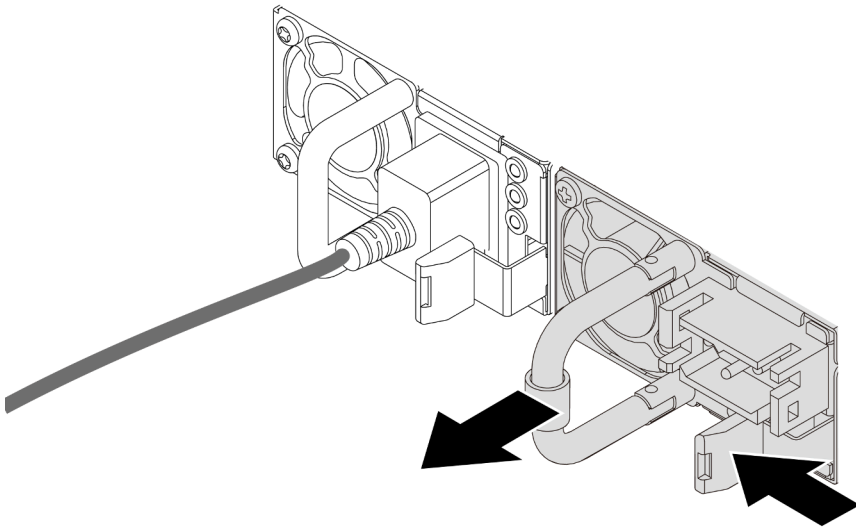


Figure 87. Removing the power supply unit

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 hot-swap power supply](#)” on page 125.

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 hot-swap power supply

Use this information to install a hot-swap power supply.

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/Invo-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 88. Example power supply unit label on the top cover

Attention:

- Read “[Installation Guidelines](#)” on page 45 and “[Safety inspection checklist](#)” on page 46 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 hot-swap power supply to any unpainted surface on the outside of the server. And then, take the hot-swap power supply out of the package and place it on a static-protective surface.
- Step 2. If there is a power-supply filler installed, remove it.

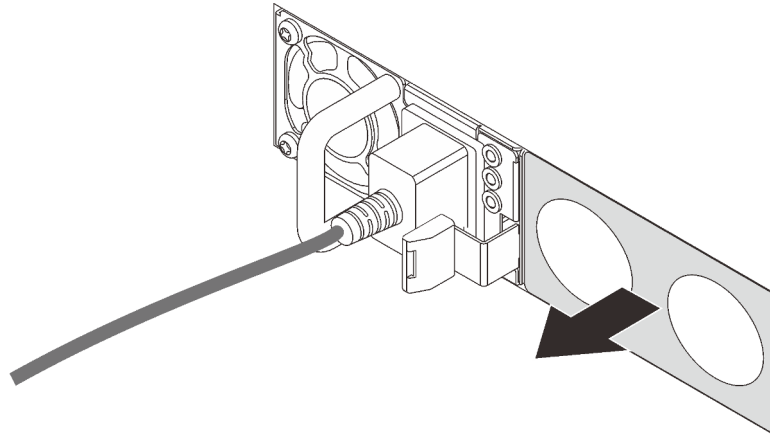


Figure 89. Hot-swap power supply filler removal

Step 3. Slide the new hot-swap power supply into the bay until it snaps into position.

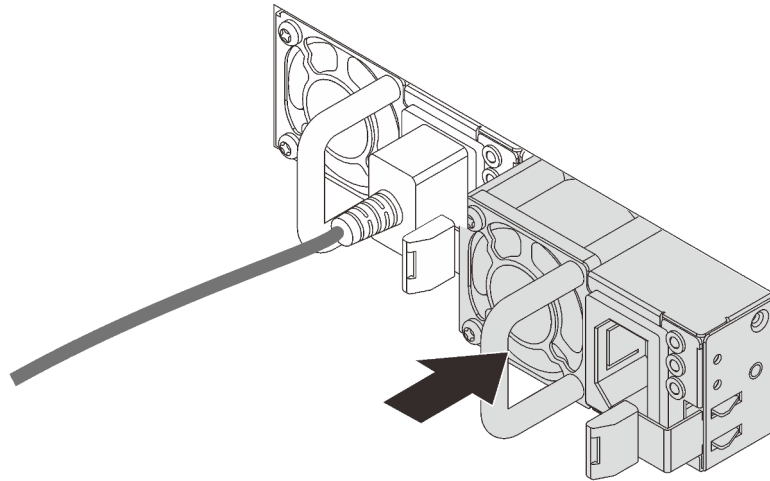



Figure 90. Hot-swap power supply installation

Step 4. Connect the power supply unit 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 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 -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 then 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. 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, 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 are lit, indicating that the power supply is operating properly.

Demo video

[Watch the procedure on YouTube](#)

Internal CFF HBA/RAID adapter replacement

Use this information to remove and install the internal CFF HBA/RAID adapter.

Remove the internal CFF HBA/RAID adapter

Use this information to remove the internal CFF HBA/RAID adapter.

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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. Remove the top cover. See [“Remove the top cover” on page 235](#).
- Step 2. Remove any components that may impede access to the internal CFF HBA/RAID adapter.
- Step 3. Disconnect all cables from the internal CFF HBA/RAID adapter. See [“CFF RAID/HBA adapter” on page 246](#) and [Chapter 6 “Internal cable routing” on page 241](#).

Step 4. Lift the release pin, slightly slide the internal CFF HBA/RAID adapter as shown, and carefully lift it out of the chassis.

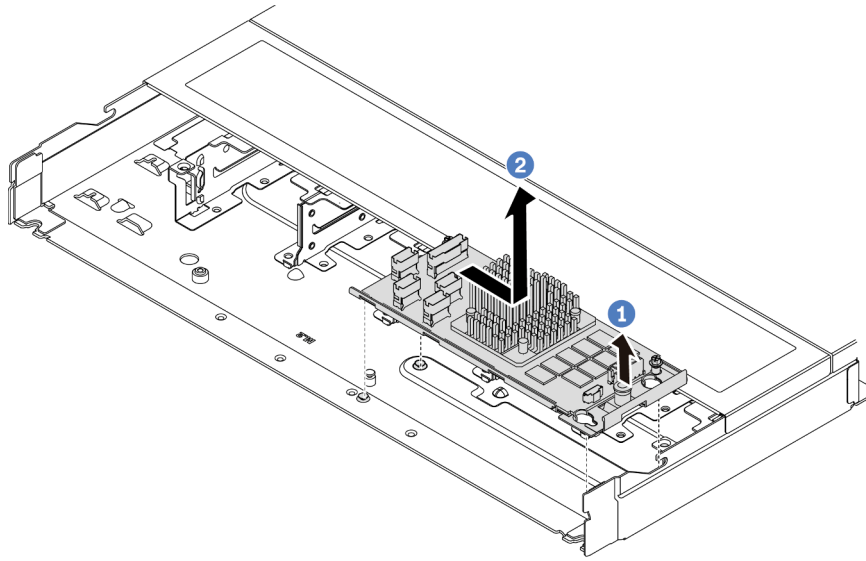


Figure 91. Internal CFF HBA/RAID adapter removal

After you finish

If you are instructed to return the old internal CFF HBA/RAID adapter, follow all packaging instructions and use any packaging materials that are provided.

Demo video

[Watch the procedure on YouTube](#)

Install the internal CFF HBA/RAID adapter

Use this information to install the internal CFF HBA/RAID adapter.

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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 internal CFF HBA/RAID adapter to any unpainted surface on the outside of the server. Then, take the internal CFF HBA/RAID adapter out of the package and place it on a static-protective surface.

Step 2. Align the notches on the tray with the pins on the chassis, place down the internal CFF HBA/RAID adapter, and slightly slide it as shown to secure it on the chassis.

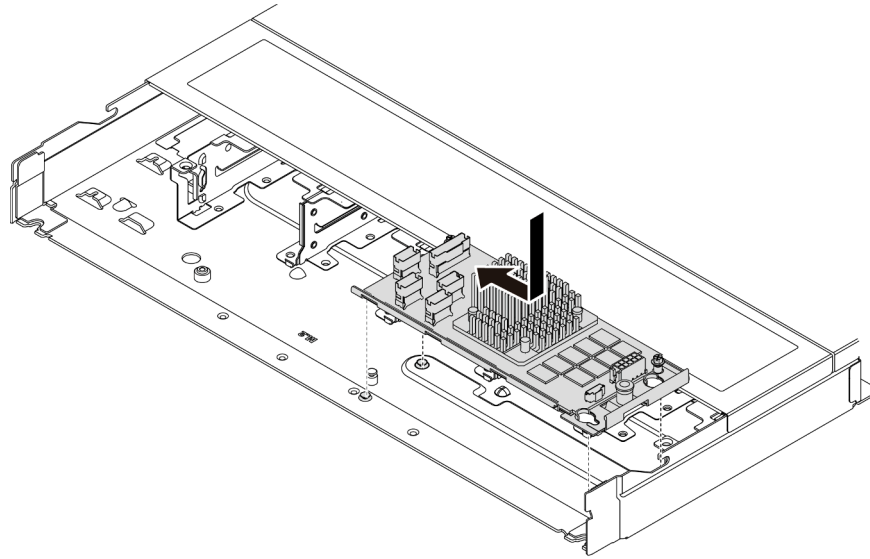


Figure 92. Internal CFF HBA/RAID adapter installation

Step 3. Connect cables to the internal RAID adapter. See [Chapter 6 “Internal cable routing” on page 241](#).

After you finish

Complete the parts replacement. See [“Complete the parts replacement” on page 238](#).

Demo video

[Watch the procedure on YouTube](#)

Intrusion switch replacement

Use this information to remove and install an 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 an intrusion switch

Use this information to remove an intrusion switch.

About this task

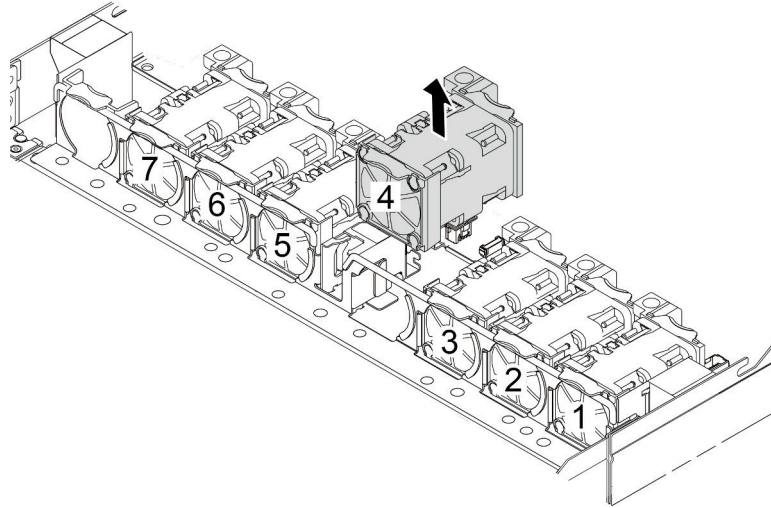
Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

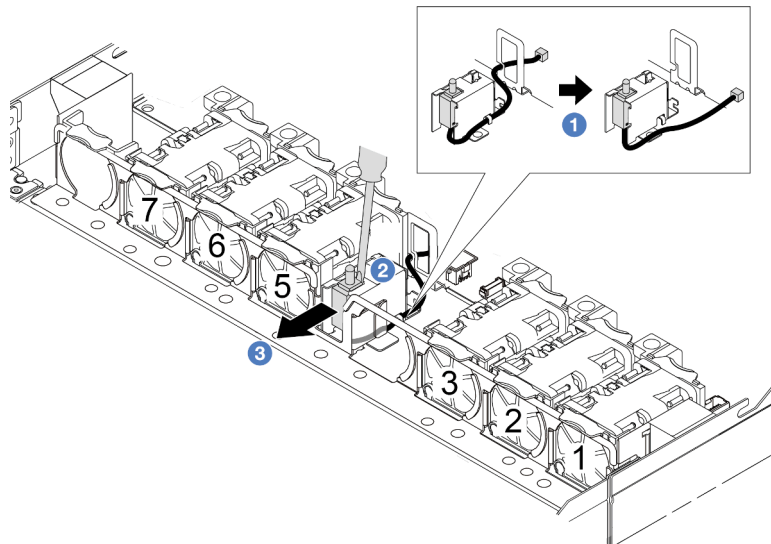
Procedure

Step 1. Remove the top cover. See [“Remove the top cover” on page 235](#).

Step 2. Remove the number 4 fan.

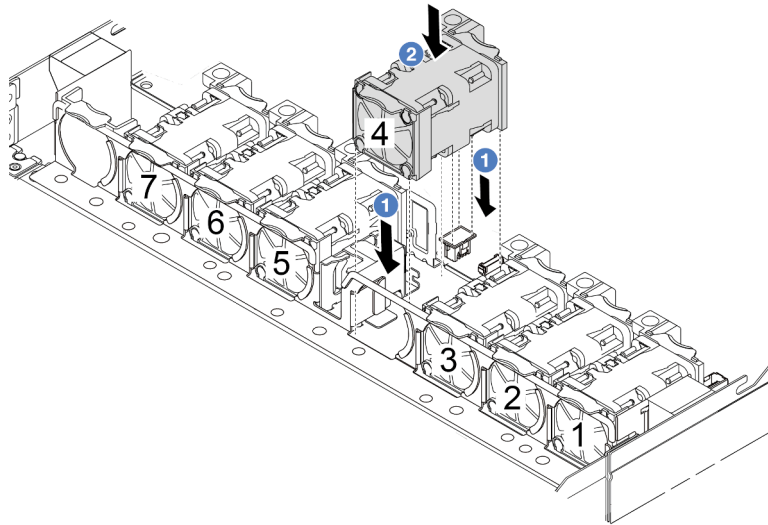


Step 3. Remove the intrusion switch.



- a. **1** Disconnect the cable of the intrusion switch from the system board. For the location of the intrusion switch connector and cable routing information, refer to [“System-board-assembly connectors” on page 33](#) and [“Intrusion switch” on page 251](#). Route the cable out of the cable clip.
- b. **2** Insert the tip of a slotted screwdriver into the gap between the cage and switch and push backward.
- c. **3** Slide the intrusion switch as shown to remove it.

Step 4. Re-install the number 4 fan.



After you finish

If you are instructed to return the old intrusion switch, follow all packaging instructions and use any packaging materials that are provided.

Demo video

[Watch the procedure on YouTube](#)

Install an intrusion switch

Use this information to install an intrusion switch.

About this task

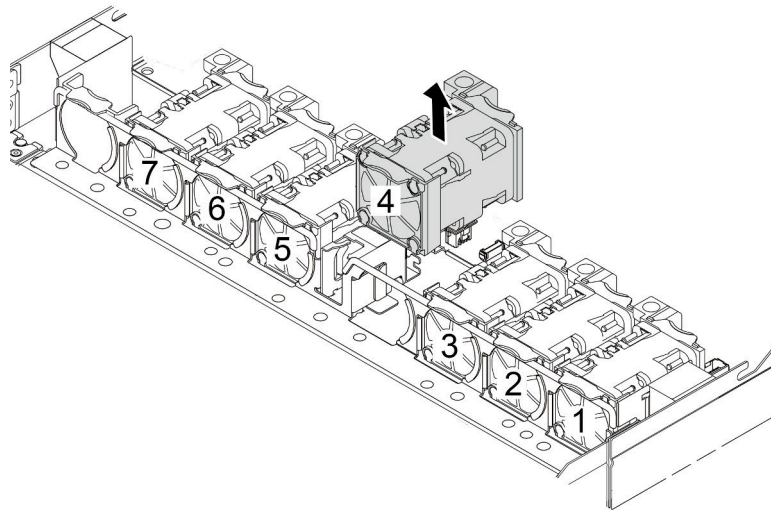
Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

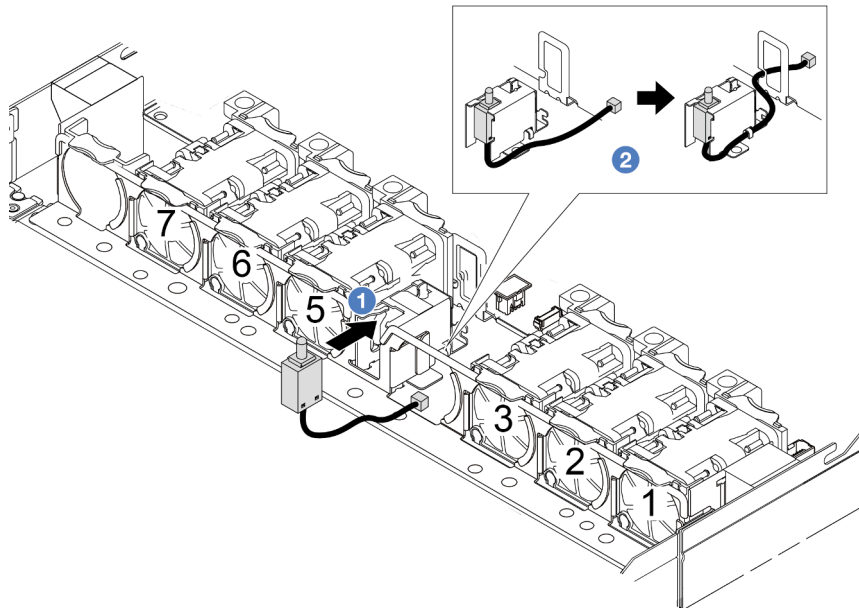
Procedure

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

Step 2. Remove the number 4 fan.



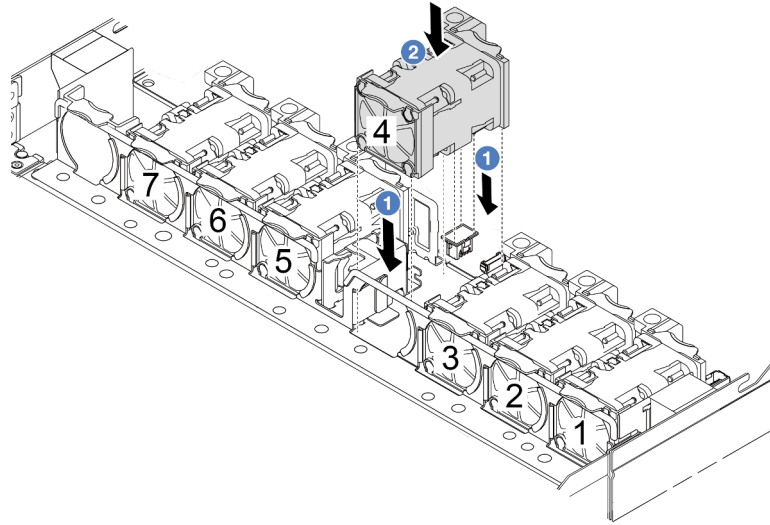
Step 3. Install the intrusion switch.



- a. ① Insert the intrusion switch into the cage.
- b. ② Route the cable into the cable clip.

Step 4. Connect the cable of the intrusion switch to the intrusion switch connector on the system board. See [“Intrusion switch” on page 251](#).

Step 5. Re-install the number 4 fan.



After you finish

Complete the parts replacement. See [“Complete the parts replacement” on page 238](#).

Demo video

[Watch the procedure on YouTube](#)

Lenovo Neptune(TM) Liquid to Air Module replacement (trained technicians only)

Follow instructions in this section to remove and install the Lenovo Neptune (TM) Liquid to Air Module (L2AM). This module can also be called the closed loop cooling 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.
- When the server has an L2AM module (Closed loop cooling module) installed, you must apply for a handle (L2AM heat sink bracket) first if you need to install or remove the processor board, I/O board, processor and PIB board. However, while replacing the old L2AM module with a new one, you do not need to apply for a handle (L2AM heat sink bracket) as the new L2AM module contains it.

Remove the Lenovo Neptune(TM) Liquid to Air Module

Follow instructions in this section to remove the Lenovo Neptune(TM) Liquid to Air Module (hereafter referred to as L2AM).

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 45 and [“Safety inspection checklist”](#) on page 46 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 61.
- 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.
- 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 108.

CAUTION:
Ensure that the module handle (L2AM heat sink bracket) is installed when removing or installing the L2AM. Do not touch the radiator fins. Touching the radiator fins might damage the L2AM.

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. Remove the top cover. See [“Remove the top cover”](#) on page 235.
- Step 2. Remove the backplane and the backplane cables if necessary. See [“Remove the front 2.5-inch drive backplane”](#) on page 62 and [“Power/Sideband cable routing”](#) on page 276.
- Step 3. Disconnect the pump cable and leak detection cable of the L2AM module from the connector on the system board assembly. See [“Lenovo Neptune\(TM\) Liquid to Air Module cable routing”](#) on page 274.

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 system board assembly.
- 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.

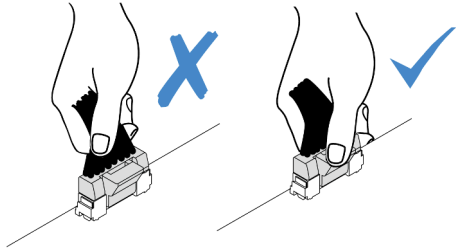
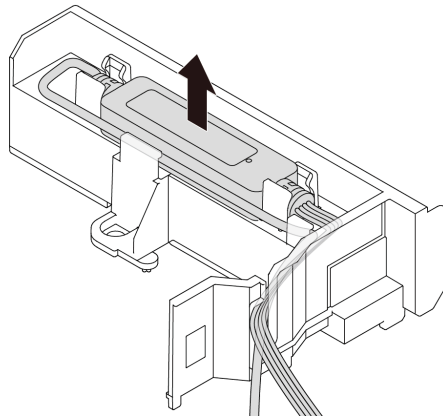
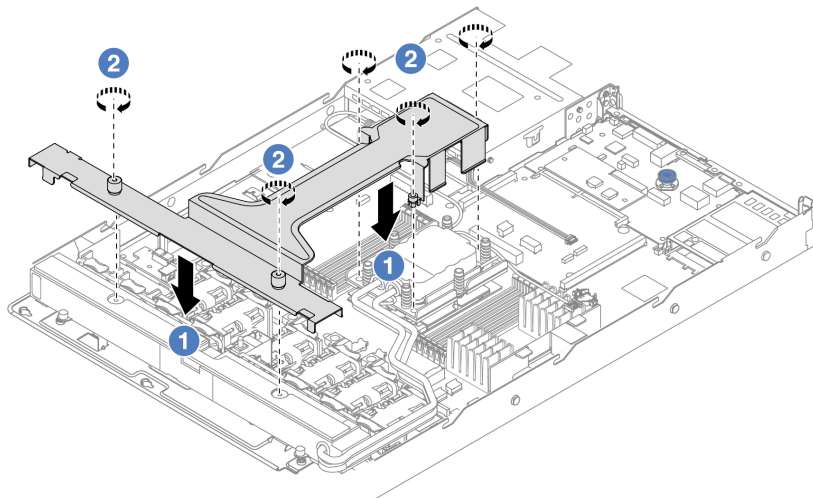


Figure 93. Disconnecting cables from the system board assembly

Step 4. Route the leak detection cable out of the cable clips on the leak detection module.

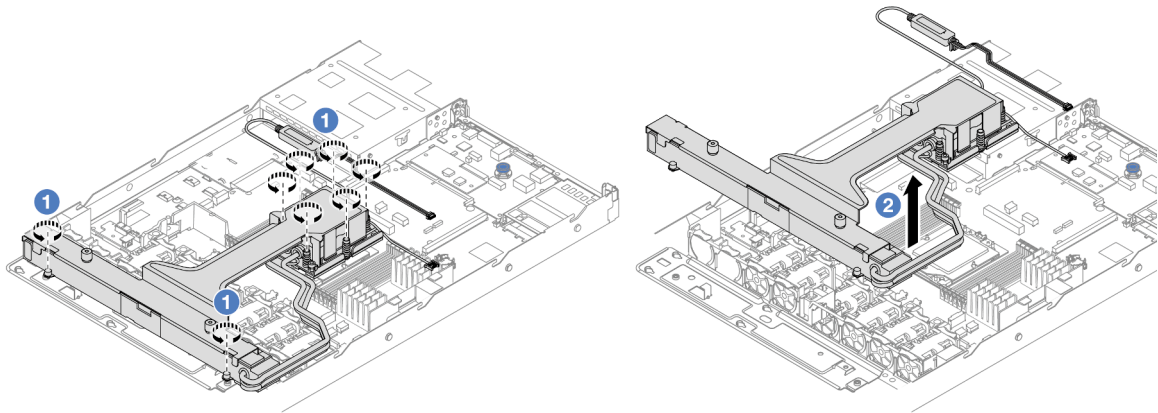


Step 5. Re-install the module handle (L2AM heat sink bracket) to the L2AM.



- a. 1 Place the module handle (L2AM heat sink bracket) evenly on the L2AM and align screw holes.
- b. 2 Tighten the five screws. Ensure that the screws are secured in place.

Step 6. Disengage the L2AM from processors.

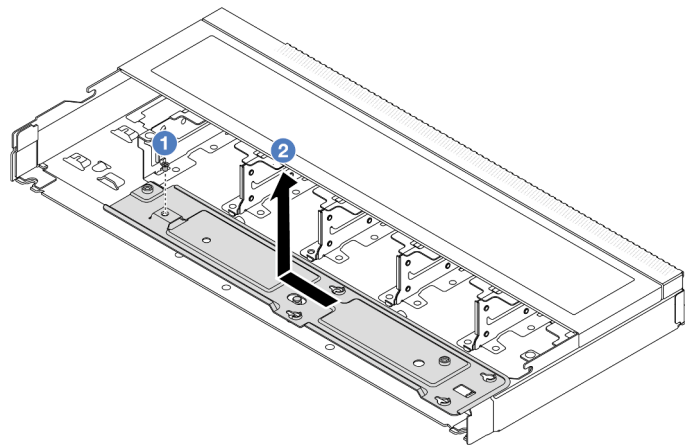


- a. ① Fully loosen the eight Torx T20 nuts in the removal sequence shown on the heat-sink label on the cold plate assembly and radiator.
- b. ② Grasp the middle of the module handle (L2AM heat sink bracket) and one T20 screw fastening the radiator to carefully lift the L2AM from the processor sockets. If the L2AM cannot be fully lifted out of the socket, further loosen the Torx T20 nuts and try lifting the L2AM again.

Step 7. Place the L2AM on the shipping tray.

Step 8. If there is any old thermal grease on the cold plates, gently clean the top of the cold plates with an alcohol cleaning pad.

Step 9. Optionally, if you do not need to install a new L2AM module, remove the radiator tray from the chassis.



- a. ① Remove the screw on the radiator tray.
- b. ② Move the radiator tray to the left and lift it out of the chassis.

Step 10. Remove the PSU air baffle. See [“Remove a power supply unit air baffle” on page 162](#).

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(TM) Liquid to Air Module

Follow instructions in this section to install the Lenovo Neptune(TM) Liquid to Air Module (L2AM).

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 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.

CAUTION:
When removing a new L2AM 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 damages.

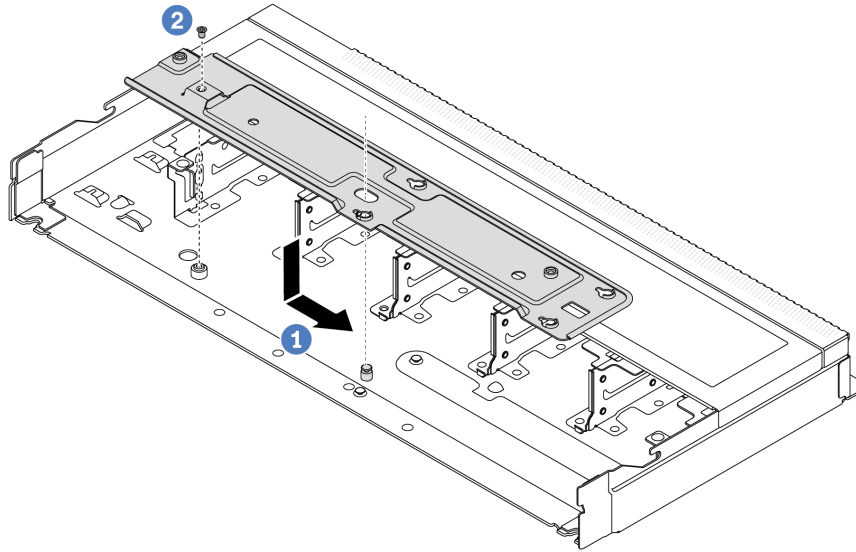
CAUTION:
Ensure that the module handle (L2AM heat sink bracket) is installed when removing or installing the L2AM. Do not touch the radiator fins. Touching the radiator fins might damage the L2AM.

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

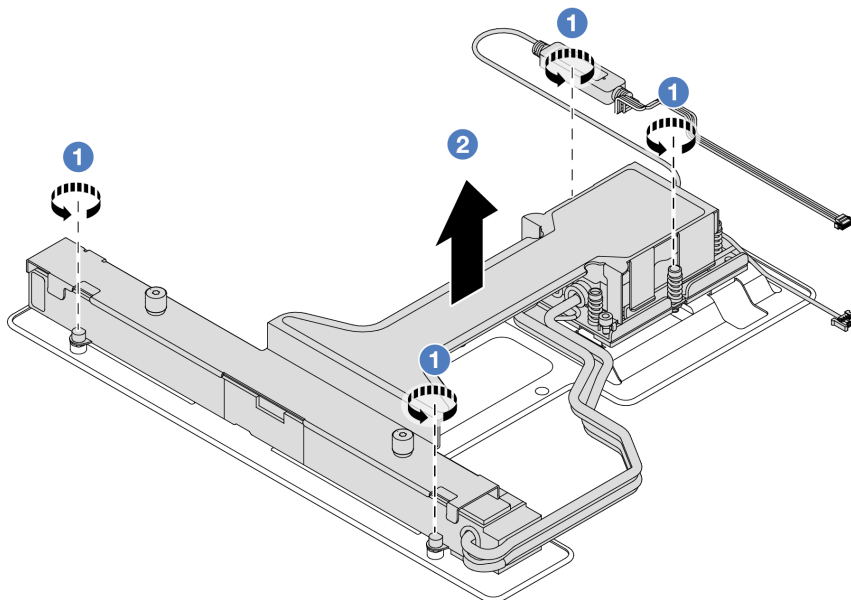
Procedure

- Step 1. Install the PSU air baffle. See [“Install a power supply unit air baffle baffle” on page 163](#).
- Step 2. If you have removed the radiator tray, install the radiator tray to the chassis.



- a. 1 Place the tray evenly into the chassis and then move it to the right so that the screw hole on the tray aligns with the hole on the chassis.
- b. 2 Tighten the screw.

Step 3. Separate the L2AM module from the shipping tray.

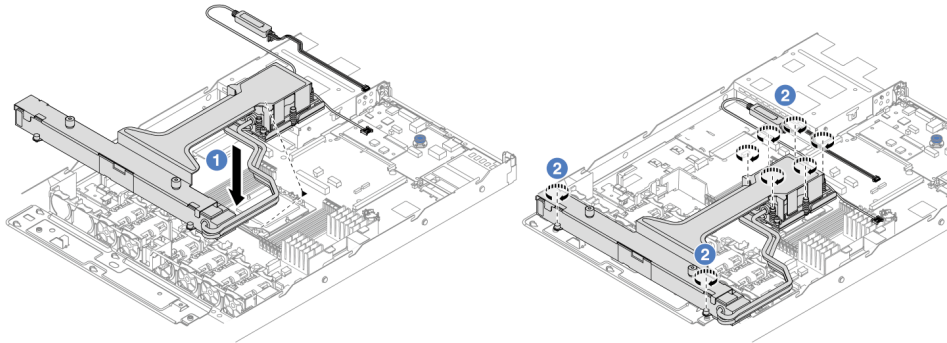


1. ① Loosen the four screws on the L2AM shipping tray.
2. ② Grasp the middle of the module handle (L2AM heat sink bracket) and one T20 screw fastening the radiator to lift the L2AM to separate the module from the shipping tray.

Step 4. Make sure you have an alcohol cleaning pad available.

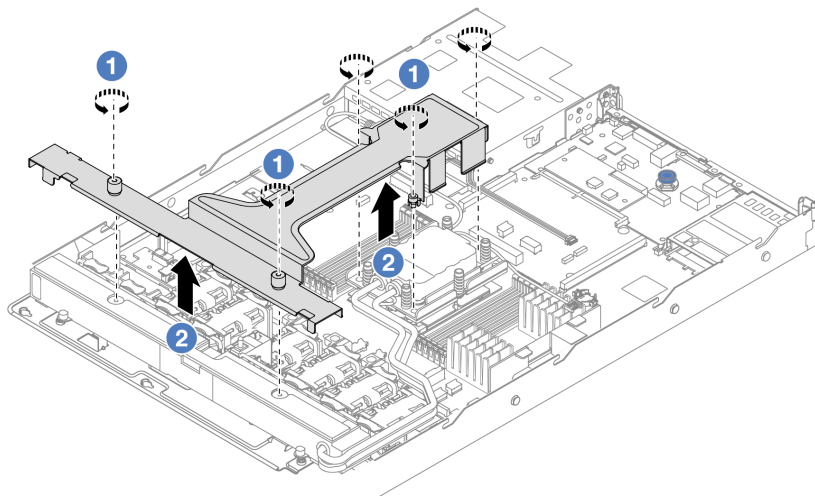
Attention: If there is any old thermal grease on the processors, gently clean the top of the processors with an alcohol cleaning pad.

Step 5. Install the L2AM to the system board assembly.



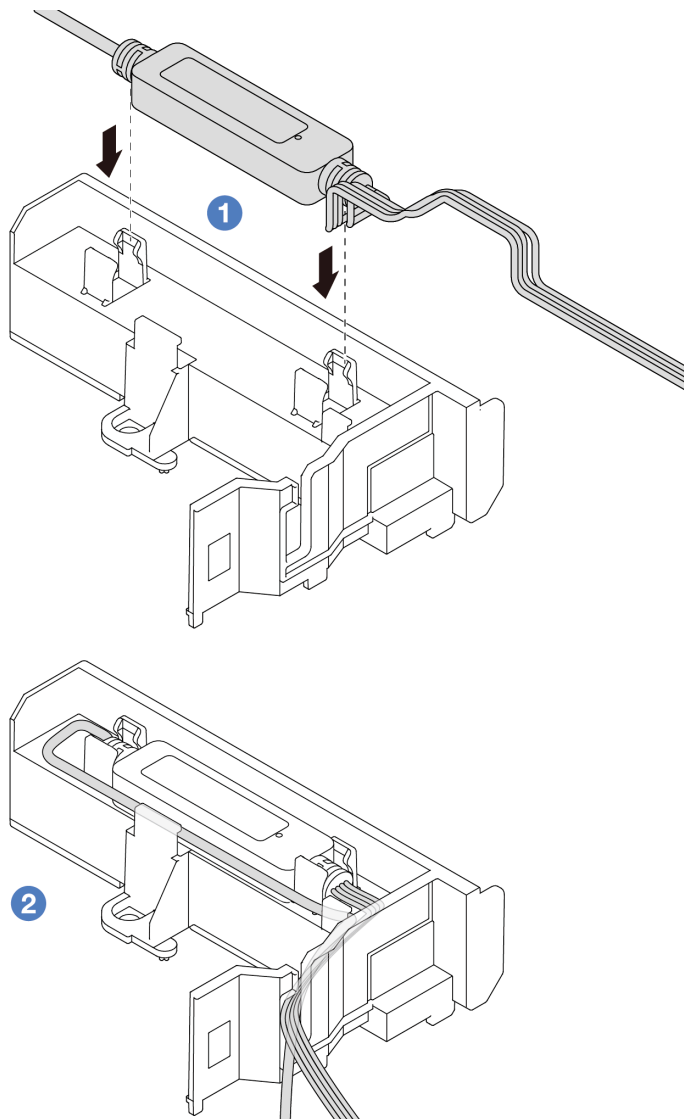
1. ① Align the triangular mark on the cold plate assembly label with the triangular mark on the processor carrier and processor. Install the L2AM onto the processor-carrier. Press the carrier into place until the clips at all four corners engage.
2. ② Fully tighten the eight Torx T20 nuts in the installation sequence shown on the cold plate assembly and the radiator. Tighten the screws and then, visually inspect to make sure that there is no gap between the screw shoulder beneath the cold plate assembly and the processor socket.

Step 6. Separate the module handle (L2AM heat sink bracket) from the module.



1. ① Loosen the five screws on the module handle (L2AM heat sink bracket).
2. ② Grasp the middle of the module handle (L2AM heat sink bracket) to separate it from the module.

Step 7. Install the leak detection module to the PSU air baffle.



1. ① Install the L2AM into the two clips on the PSU air baffle. Ensure that the module is secured in place.
2. ② After the module is secured, route the cable through the cable clips to keep tidy for later cable routing arrangements.

Note: For liquid detection sensor module working status, see [“Liquid detection sensor LED” on page 347](#).

Step 8. Connect the pump cable and leak detection cable of the L2AM to the connectors on the system board assembly. See [“Lenovo Neptune\(TM\) Liquid to Air Module cable routing” on page 274](#).

After you finish

1. Install the backplane and the backplane cables if you removed them before. See [“Install the front 2.5-inch drive backplane” on page 63](#) and [“Power/Sideband cable routing” on page 276](#).
2. Complete the parts replacement. See [“Complete the parts replacement” on page 238](#).

Demo video

[Watch the procedure on YouTube](#)

Management NIC adapter replacement

Follow instructions in this section to install or remove 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 141](#)
- [“Install the management NIC adapter” on page 142](#)

Remove the management NIC adapter

Follow instructions in this section to remove the ThinkSystem V3 Management NIC Adapter Kit (management NIC adapter).

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) 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 61](#).
- 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, remove the server from the rack.
 - c. Remove the top cover. See [“Remove the top cover” on page 235](#).
 - d. If the server comes with a riser 1 assembly, remove it first. See [“Remove a rear riser card” on page 191](#).
- Step 2. Disconnect the cable on the management NIC adapter, see [“Management NIC adapter” on page 266](#).
- Step 3. Remove the management NIC adapter.

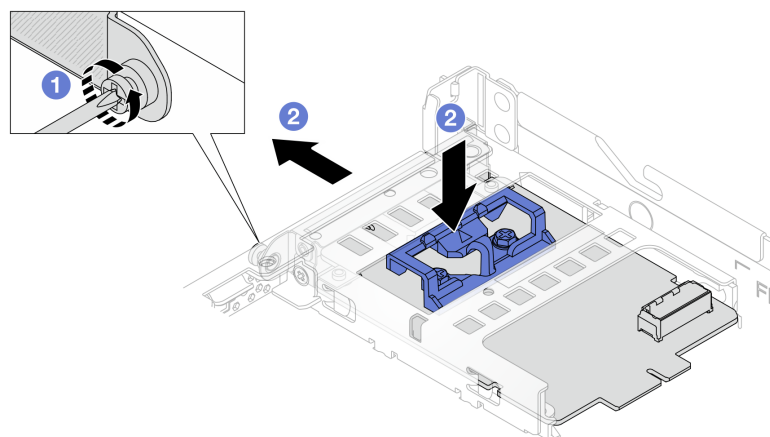


Figure 94. Removing the management NIC adapter

- a. 1 Loosen the screw that secures the management NIC adapter.
- b. 2 Press and hold the blue latch. And pull 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 142](#).
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 ThinkSystem V3 Management NIC Adapter Kit (management NIC adapter).

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) 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 61](#).
- 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/sr635v3/7d9h/downloads/driver-list/> to see the latest firmware and driver updates for your server.

- Go to [“Update the firmware” on page 317](#) for more information on firmware updating tools.

Procedure

Step 1. If a filler is installed, remove it.

Step 2. Install the management NIC adapter.

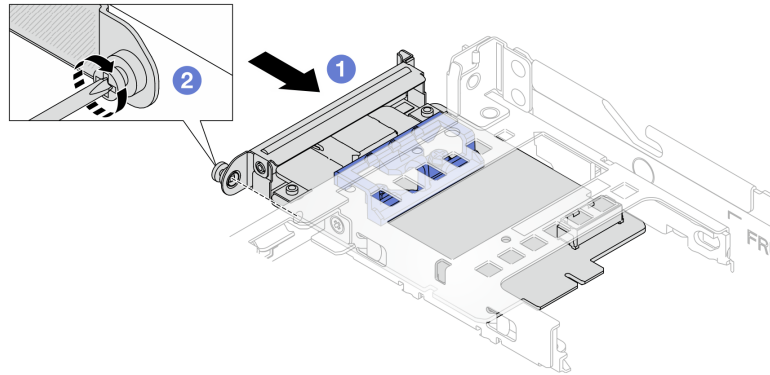


Figure 95. Installing the management NIC adapter

- 1 Slide the management NIC adapter into the slot until it is fully seated.
- 2 Tighten the screw to secure the management NIC adapter.

Step 3. Connect the cable to the management NIC adapter. See [“Management NIC adapter” on page 266](#).

Step 4. Install the riser 1 assembly if you have removed it. See [“Install a rear riser card” on page 194](#).

After you finish

1. Complete the parts replacement. See [“Complete the parts replacement” on page 238](#).
2. Access the Lenovo XClarity Controller; then, select **Network** in **BMC Configuration** and enable **Ethernet Port 2**.

Demo video

[Watch the procedure on YouTube](#)

Memory module replacement

Use the following procedures to remove and install a memory module.

Remove a memory module

Use this information to remove a memory module.

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) 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 61](#).
- 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.
- 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 108](#).
- If you are not installing a replacement memory module to the same slot, make sure you have memory module filler available.
- Memory modules are sensitive to static discharge and require special handling. Refer to the standard guidelines for [“Handling static-sensitive devices” on page 48](#).
 - Always wear an electrostatic-discharge strap when removing or installing memory modules. Electrostatic-discharge gloves can also be used.
 - Never hold two or more memory modules together so that they do not touch each other. Do not stack memory modules directly on top of each other during storage.
 - Never touch the gold memory module connector contacts or allow these contacts to touch the outside of the memory module connector housing.
 - Handle memory modules with care: never bend, twist, or drop a memory module.
 - Do not use any metal tools (such as jigs or clamps) to handle the memory modules, because the rigid metals may damage the memory modules.
 - Do not insert memory modules while holding packages or passive components, which can cause package cracks or detachment of passive components by the high insertion force.

Important: Remove or install memory modules for one processor at a time.

Procedure

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. Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 61](#).
- Step 2. Remove the top cover. See [“Remove the top cover” on page 235](#).

Step 3. Remove the memory module from the slot.

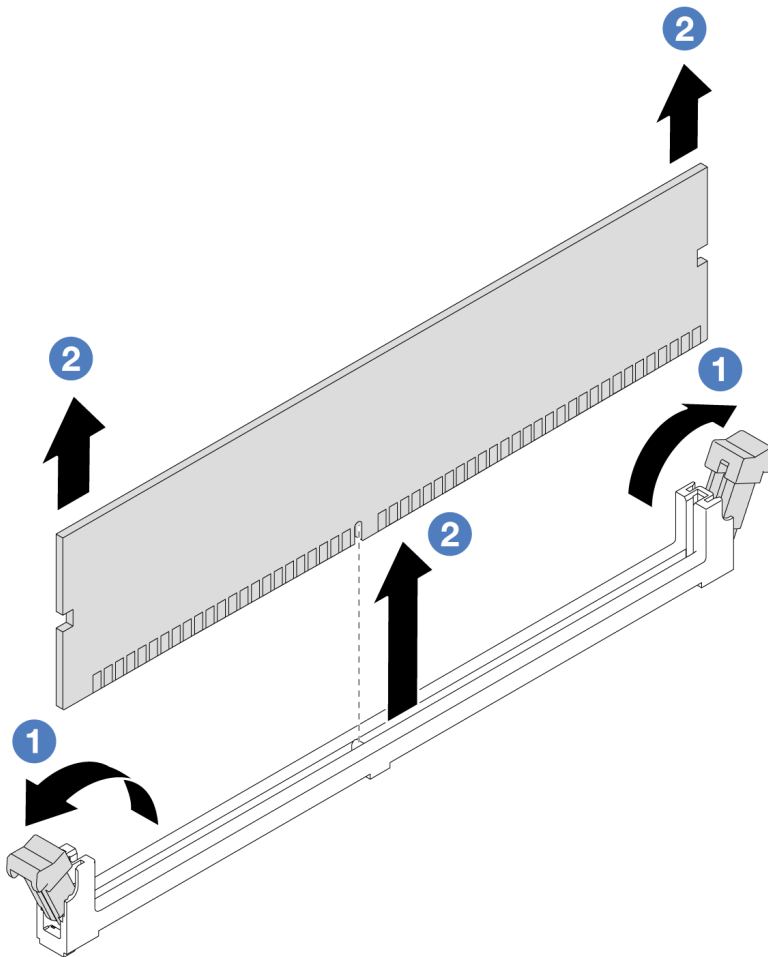


Figure 96. Memory module removal

- a. **1** Open the retaining clip on each end of the memory module slot.

Attention: To avoid breaking the retaining clips or damaging memory module slots, handle the clips gently.

- 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 145](#).
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 45 and “[Safety inspection checklist](#)” on page 46 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.
- Make sure to adopt one of the supported configurations listed in “[Memory module installation rules and order](#)” on page 49.
- Memory modules are sensitive to static discharge and require special handling. Refer to the standard guidelines at “[Handling static-sensitive devices](#)” on page 48:
 - Always wear an electrostatic-discharge strap when removing or installing memory modules. Electrostatic-discharge gloves can also be used.
 - Never hold two or more memory modules together so that they do not touch each other. Do not stack memory modules directly on top of each other during storage.
 - Never touch the gold memory module connector contacts or allow these contacts to touch the outside of the memory module connector housing.
 - Handle memory modules with care: never bend, twist, or drop a memory module.
 - Do not use any metal tools (such as jigs or clamps) to handle the memory modules, because the rigid metals may damage the memory modules.
 - Do not insert memory modules while holding packages or passive components, which can cause package cracks or detachment of passive components by the high insertion force.

Important: Remove or install memory modules for one processor at a time.

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/sr635v3/7d9h//downloads/driver-list/> to see the latest firmware and driver updates for your server.
- Go to “[Update the firmware](#)” on page 317 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. Touch the static-protective package that contains the memory module to any unpainted surface on the outside of the server. Then, take the memory module out of the package and place it on a static-protective surface.
- Step 2. Locate the required memory module slot on the system board.

Note: Ensure that you observe the installation rules and sequence in “[Memory module installation rules and order](#)” on page 49.

Step 3. Install the memory module into the slot.

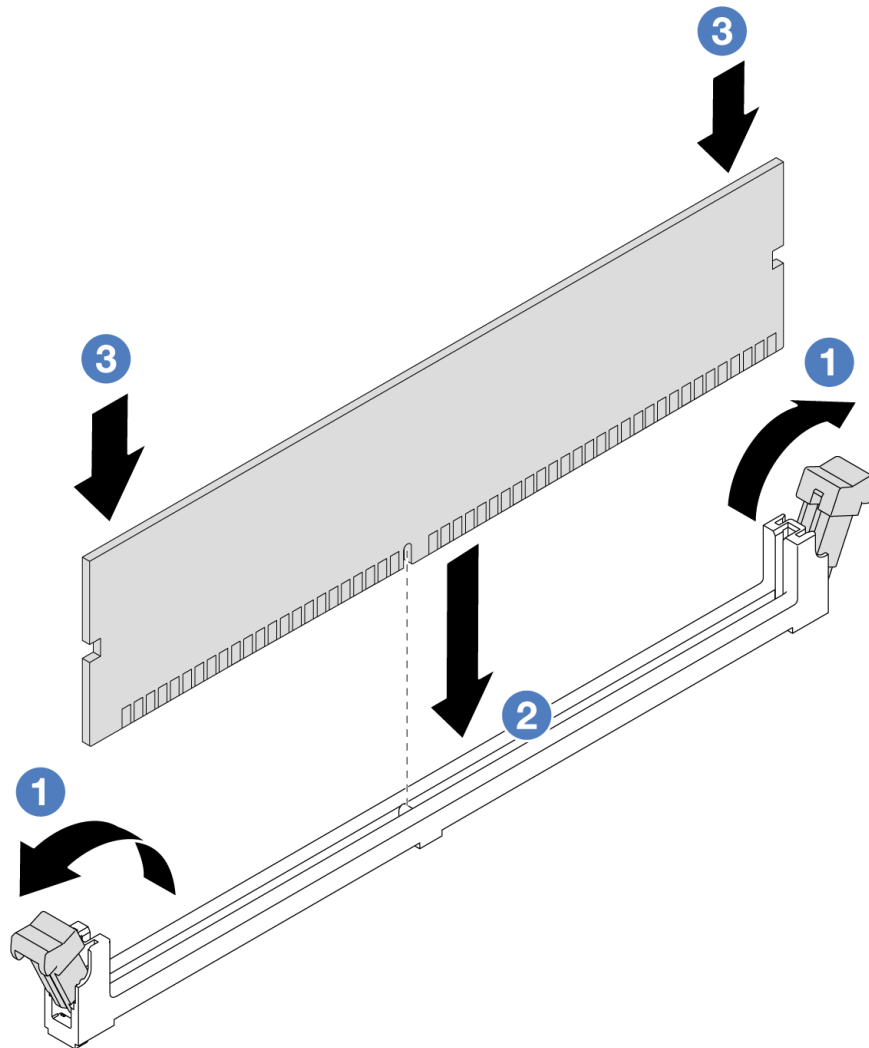


Figure 97. Memory module installation

- a. 1 Open the retaining clip on each end of the memory module slot.

Attention: To avoid breaking the retaining clips or damaging the memory module slots, open and close the clips gently.

- b. 2 Align the memory module with the slot, and gently place the memory module on the slot with both hands.
- c. 3 Firmly press both ends of the memory module straight down into the slot until the retaining clips snap into the locked position.

Note: 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.

After you finish

- Complete the parts replacement. See [“Complete the parts replacement” on page 238](#).

Demo video

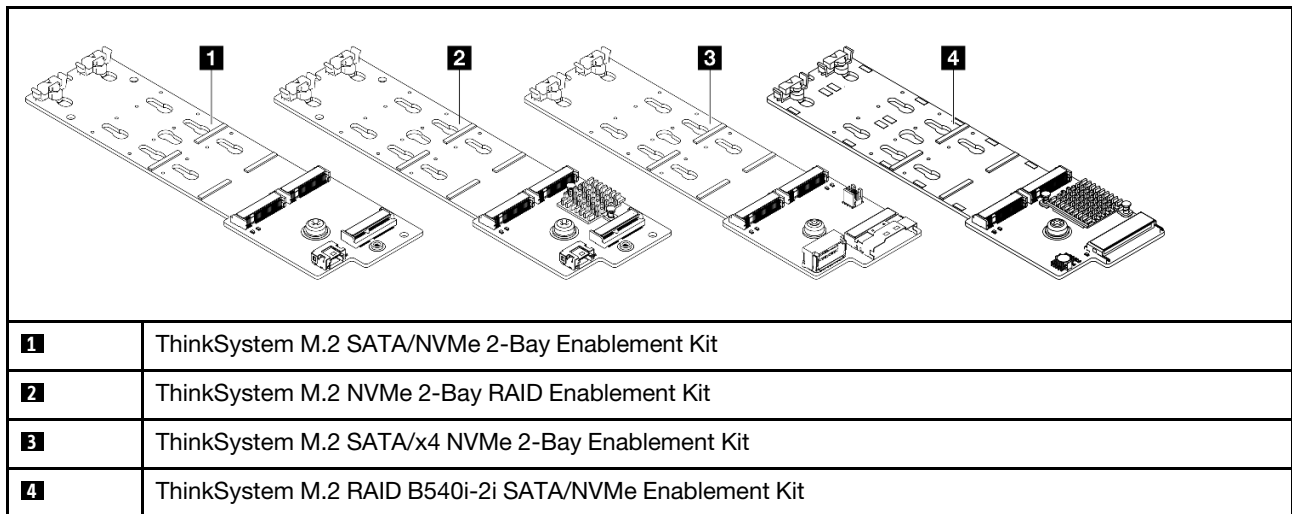
[Watch the procedure on YouTube](#)

M.2 backplane and M.2 drive replacement

Use this information to remove and install the M.2 backplane and M.2 drive (an assembled M.2 backplane and M.2 drive is also known as M.2 module).

The server supports four types of M.2 backplanes. The removal and installation methods are similar.

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



Remove the M.2 backplane and M.2 drive

Use this information to remove the M.2 backplane and M.2 drive.

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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. Remove the top cover. See [“Remove the top cover” on page 235](#).

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

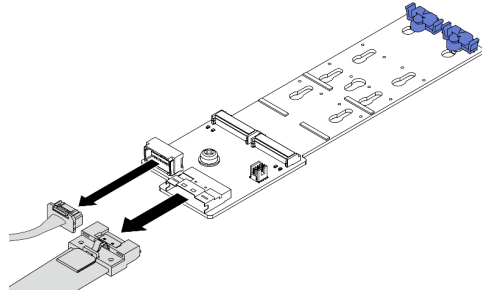


Figure 98. ThinkSystem M.2 SATA/x4 NVMe 2-Bay Enablement Kit

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

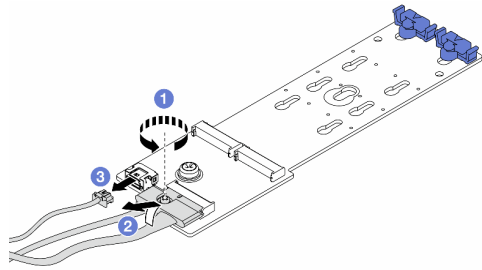


Figure 99. ThinkSystem M.2 SATA/NVMe 2-Bay Enablement Kit/ThinkSystem M.2 NVMe 2-Bay RAID Enablement Kit

1. 1 Loosen the screw on the signal cable.
2. 2 Tilt the connector and remove it.
3. 3 Remove the power cable.

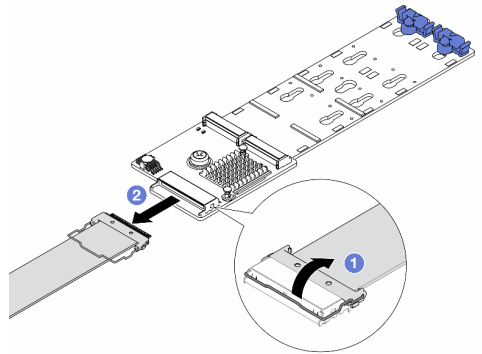


Figure 100. ThinkSystem M.2 RAID B540i-2i SATA/NVMe Enablement Kit

1. 1 Pull up the latch on the M.2 cable.
2. 2 Disconnect the M.2 cable from the M.2 backplane.

Step 3. Remove the M.2 drive from the M.2 backplane.

Note: The M.2 backplane you want to remove might be different from the following illustrations, but the removal method is the same.

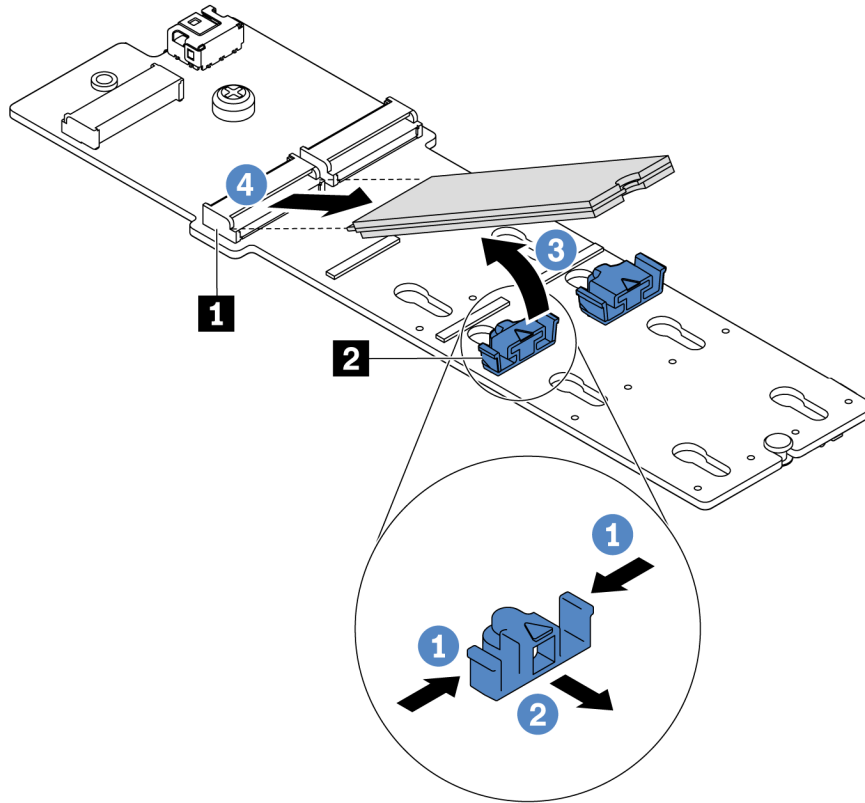


Figure 101. M.2 drive removal

- a. 1 Press both sides of the retainer 2.
- b. 2 Slide the retainer backward to loosen the M.2 drive from the M.2 backplane.
- c. 3 Rotate the M.2 drive away from the M.2 backplane.
- d. 4 Pull the M.2 drive away from the connector 1 at an angle of approximately 30 degrees.

Step 4. Remove the M.2 module from the chassis.

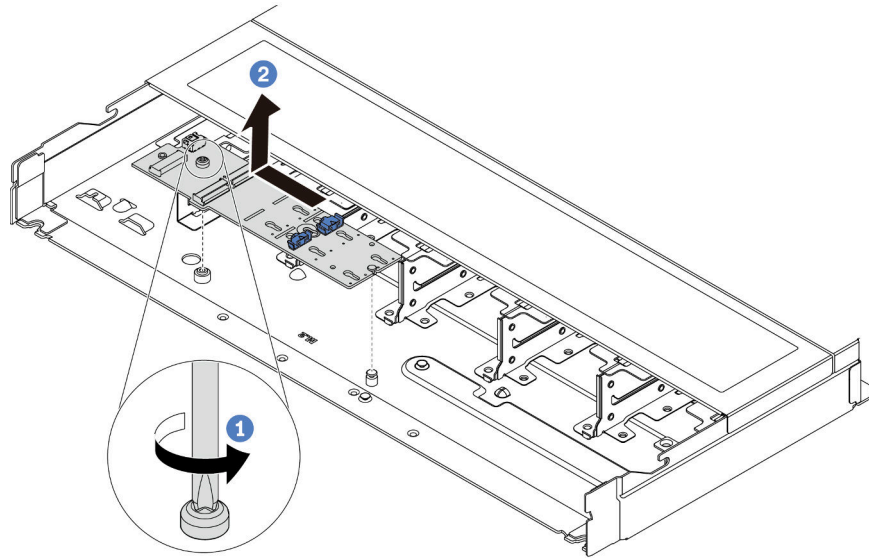


Figure 102. M.2 module removal

- a. 1 Loosen the screw.
- b. 2 Release the M.2 backplane from the pin and carefully lift the M.2 backplane out from the chassis.

After you finish

If you are instructed to return the old M.2 backplane or M.2 drive, follow all packaging instructions and use any packaging materials that are provided.

Demo video

[Watch the procedure on YouTube](#)

Adjust the retainer on the M.2 backplane

Use this information to adjust the retainer on the M.2 backplane.

About this task

Attention:

- Read “[Installation Guidelines](#)” on page 45 and “[Safety inspection checklist](#)” on page 46 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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-DrpxDWLMfgtXO4O6BVYTim>.

Procedure

Note: The M.2 backplane you want to adjust might be different from the following illustrations, but the adjustment method is the same.

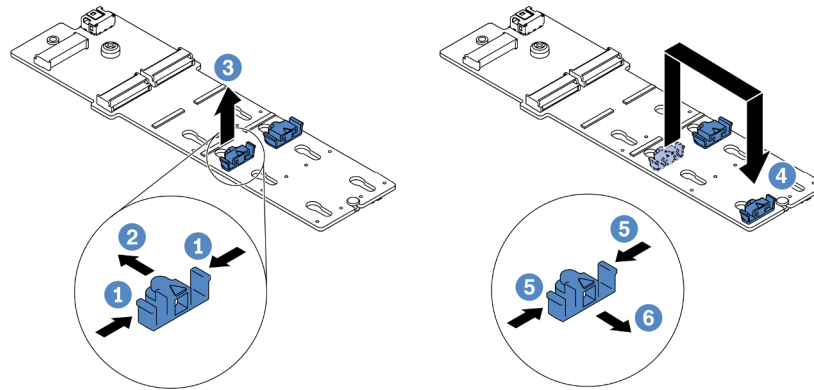


Figure 103. M.2 retainer adjustment

- Step 1. ① Press both sides of the retainers.
- Step 2. ② Move the retainer forward until it is in the large opening of the keyhole.
- Step 3. ③ Take the retainer out of the keyhole.
- Step 4. ④ Insert the retainer into the correct keyhole into which the retainer should be installed to accommodate the particular size of the M.2 drive you wish to install.
- Step 5. ⑤ Press both sides of the retainer.
- Step 6. ⑥ Slide the retainer backwards until it is seated in place.

Install the M.2 backplane and M.2 drive

Use this information to install the M.2 backplane and M.2 drive.

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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 M.2 backplane and M.2 drive to any unpainted surface on the outside of the server. Then, take the M.2 backplane and M.2 drive out of the package and place them on a static-protective surface.

Notes:

- The M.2 backplane module is shipped with a loose screw, but the screw is not necessarily used for the installation.
- The M.2 backplane you want to install might be different from the following illustrations, but the installation method is the same.

Step 2. Adjust the retainer on the M.2 backplane to accommodate the particular size of the M.2 drive you wish to install. See [“Adjust the retainer on the M.2 backplane”](#) on page 151.

Step 3. Locate the M.2 drive slot on the M.2 backplane.

Note: For some M.2 backplanes that support two identical M.2 drives, install the M.2 drive in slot 0 first.

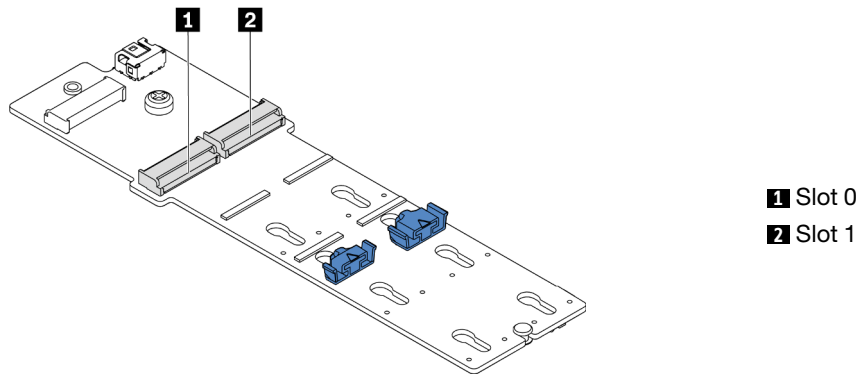


Figure 104. M.2 drive slot

Step 4. Install the M.2 backplane onto the chassis.

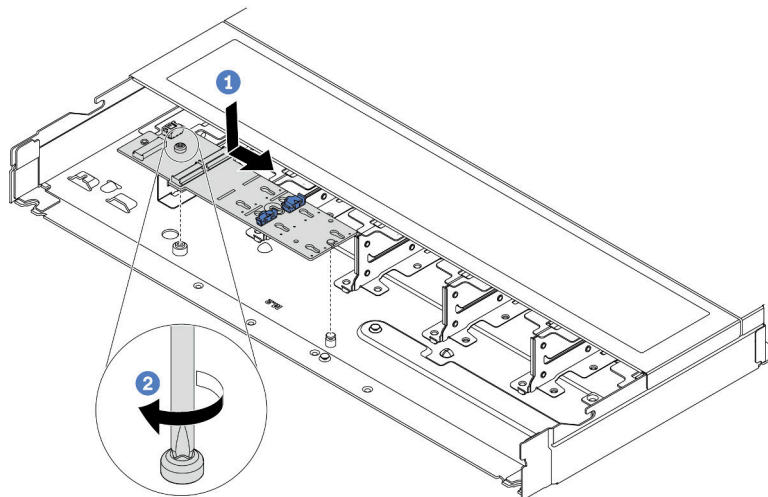


Figure 105. M.2 backplane installation

- 1 Align the notch of the M.2 backplane with the pin on the chassis, and then place down the M.2 backplane.
- 2 Tighten the screw to secure the M.2 backplane.

Step 5. Install the M.2 drive on the M.2 backplane.

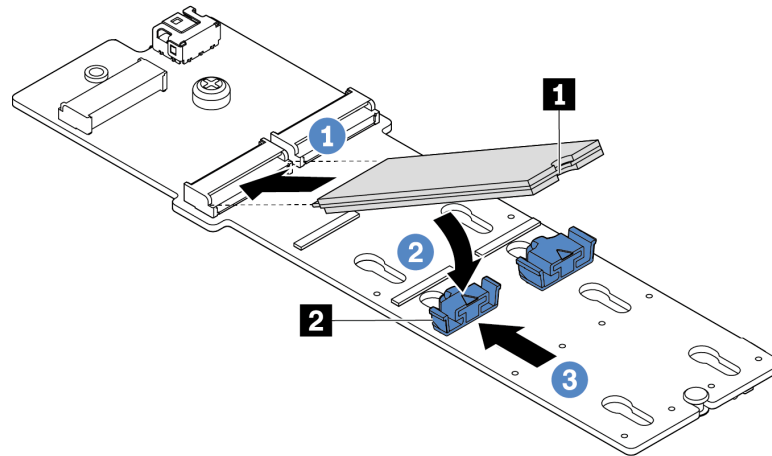
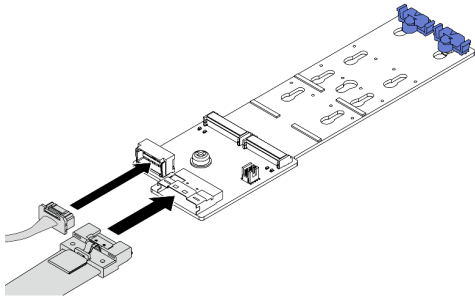
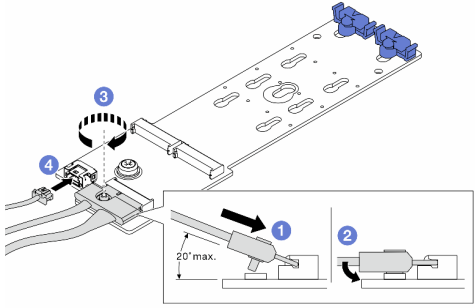
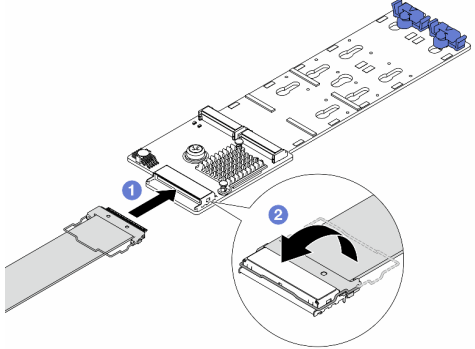


Figure 106. M.2 drive installation

- a. ① Insert the M.2 drive at an angle of approximately 30 degrees into the connector.
- 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 forward (toward the connector) to secure the M.2 drive into place.

Step 6. Connect the cables to the M.2 backplane and processor board. See the table below and [“M.2 drive backplane cable routing” on page 268](#).

 <p><i>Figure 107. ThinkSystem M.2 SATA/x4 NVMe 2-Bay Enablement Kit</i></p>	<p>Connect the M.2 cables from the M.2 backplane.</p>
 <p><i>Figure 108. ThinkSystem M.2 SATA/NVMe 2-Bay Enablement Kit/ThinkSystem M.2 NVMe 2-Bay RAID Enablement Kit</i></p>	<ol style="list-style-type: none"> 1. 1 Tilt the connector at an angle of 20 degrees or lower, and insert it until its bottom surface reaches the ramp. 2. 2 Press the connector down flat. 3. 3 Tighten the screw on the signal cable. 4. 4 Connect the power cable.
 <p><i>Figure 109. ThinkSystem M.2 RAID B540i-2i SATA/NVMe Enablement Kit</i></p>	<ol style="list-style-type: none"> 1. 1 Connect the M.2 cable to the M.2 backplane. 2. 2 Rotate the latch on the cable as illustrated, and press the latch down until it clicks into place.

After you finish

1. Complete the parts replacement. See [“Complete the parts replacement” on page 238](#).
2. Use the Lenovo XClarity Provisioning Manager to configure the RAID. For more information, see: <https://pubs.lenovo.com/lxpm-overview/>

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 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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 108](#).
- b. Remove the top cover. See [“Remove the top cover” on page 235](#).
- c. If your server comes with a rear drive assembly, remove it first. See [“Remove the 2.5-inch rear drive assembly” on page 200](#).
- d. If your server comes with a 7mm rear drive assembly, remove it first. See [“Remove the 7mm rear drive assembly” on page 204](#).
- e. 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.

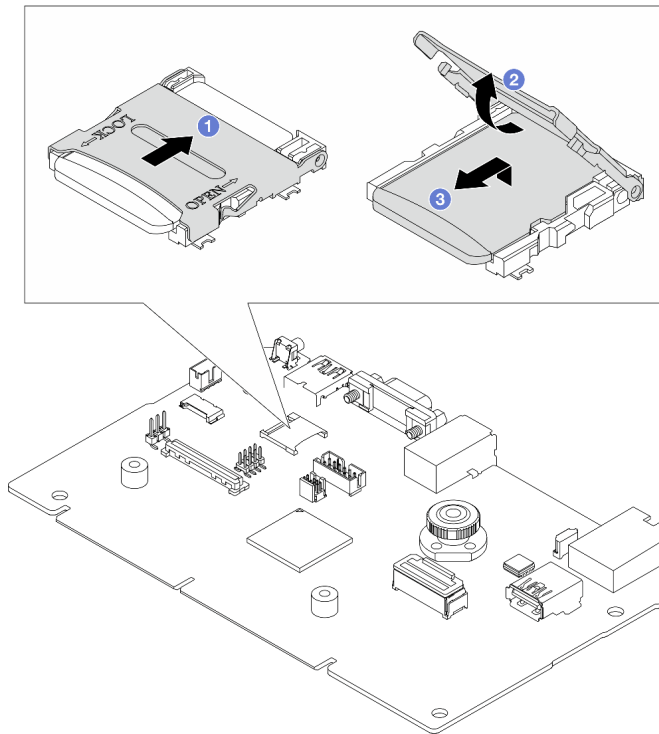


Figure 110. Removing MicroSD card

- a. 1 Slide the socket lid to the open position.
- b. 2 Lift open the socket lid.
- c. 3 Remove the MicroSD card from the socket.

Notes:

- If replacing with a new MicroSD card, the firmware historical data and user data stored in the defective MicroSD card would 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](#).

After you finish

1. Install a replacement unit. See [“Install the MicroSD card” on page 157](#).
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:

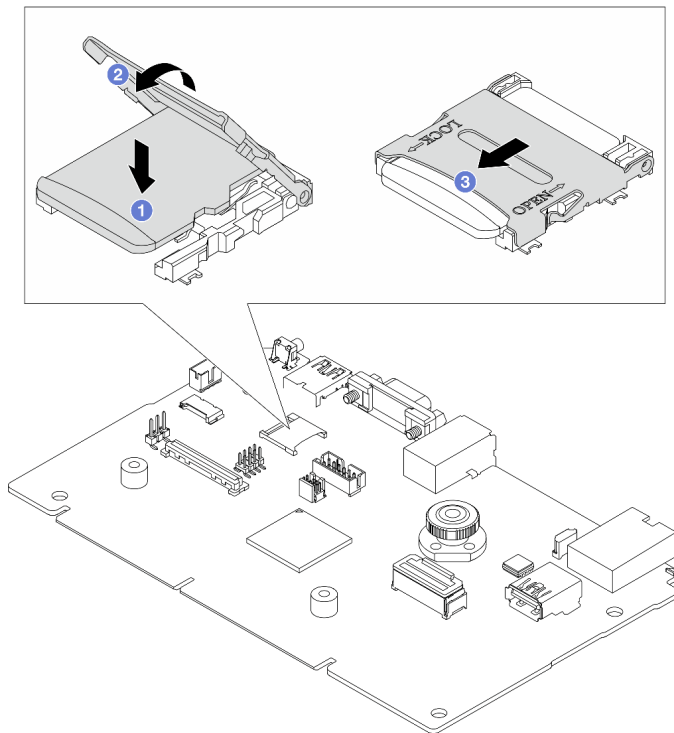
- Read “Installation Guidelines” on page 45 and “Safety inspection checklist” on page 46 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive 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 MicroSD card.

Note: After the MicroSD card is removed, the firmware historical data and user data stored in the defective MicroSD card would be lost. After a new MicroSD card is installed, subsequent firmware update history will be saved to the new card.

Figure 111. Installing the MicroSD card



- Step 2. ① Place the MicroSD card into the socket.
- Step 3. ② Close the socket lid.
- Step 4. 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](#)

PCIe adapter replacement

Use this information to remove and install a PCIe adapter.

The PCIe adapter can be an Ethernet adapter, a host bus adapter (HBA), a PCIe RAID adapter, a PCIe interposer adapter, a PCIe solid-state drive, a PCIe GPU, and any other supported PCIe adapter.

Notes:

- Depending on the specific type, the PCIe adapter might look different from the illustrations in this topic.
- Use any documentation that comes with the PCIe adapter, and follow the instructions and those in this topic.

Remove a PCIe adapter

Use this information to remove a PCIe adapter.

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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. Remove the top cover. See [“Remove the top cover” on page 235](#).
- Step 2. Remove the riser assembly. See [“Remove a rear riser card” on page 191](#).
- Step 3. Remove the PCIe adapter from the riser assembly.

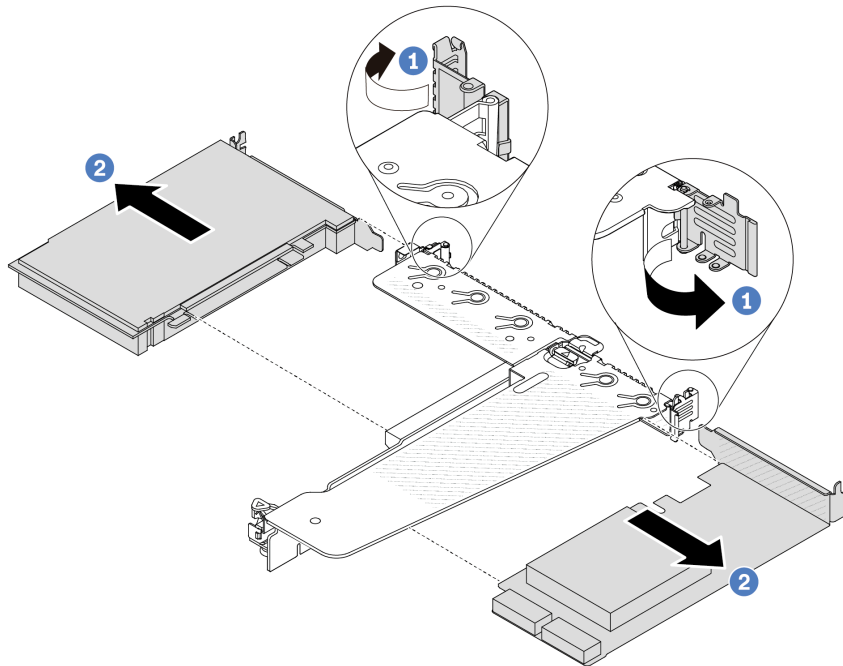


Figure 112. PCIe adapter removal from the LP-FH riser assembly

- a. ① Rotate the latch on the riser bracket to open position.
- b. ② Grasp the PCIe adapter by its edges and carefully pull it out of the PCIe adapter slot on the riser card.

Note: The procedure for removing a PCIe adapter is similar for different types of riser assembly. In this topic, the LP-FH riser assembly is used as an example.

After you finish

1. Install a PCIe adapter or PCIe adapter filler. See [“Install a PCIe adapter” on page 160](#).
2. If you are instructed to return the old PCIe adapter, follow all packaging instructions and use any packaging materials that are provided.

Demo video

[Watch the procedure on YouTube](#)

Install a PCIe adapter

Use this information to install a PCIe adapter.

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.

- 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 PCIe adapter to any unpainted surface on the outside of the server. Then, take the PCIe adapter out of the package and place it on a static-protective surface.
- Step 2. Locate the correct PCIe slot for the PCIe adapter. For information about the PCIe slots and supported PCIe adapters, see [“Rear view” on page 24](#).
- Step 3. Install the PCIe adapter and secure it to the riser assembly.

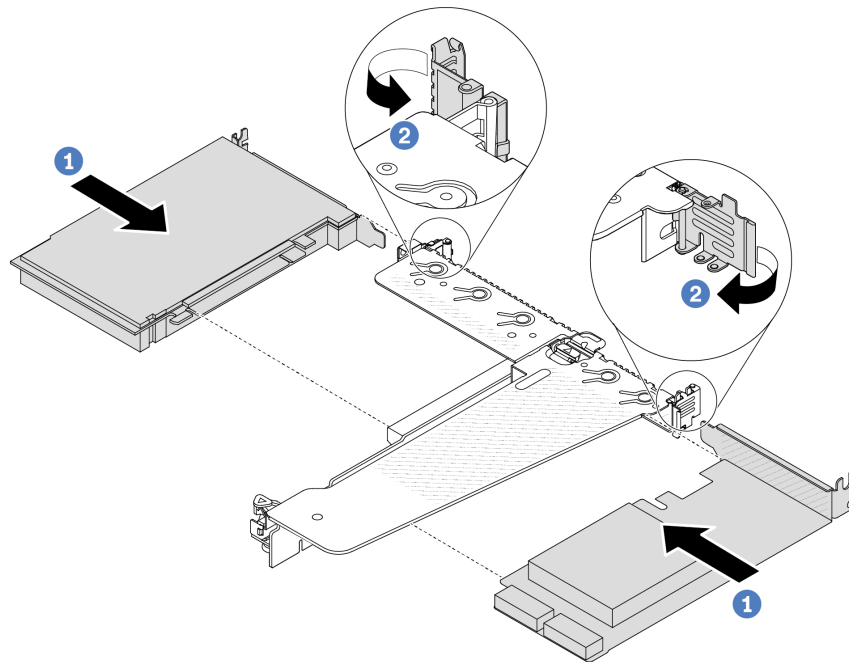


Figure 113. PCIe adapter installation into the LP-FH riser assembly

- 1 Align the PCIe adapter with the PCIe slot on the riser card. Then, carefully press the PCIe adapter straight into the slot until it is securely seated and its bracket is secured.
- 2 Rotate the latch on the riser bracket to closed position.

Notes:

1. Ensure that PCIe adapter installation meets the rules in [“PCIe slots and adapters” on page 50](#).
2. The procedure for installing a PCIe adapter is similar for different types of riser assembly. In this topic, the LP-FH riser assembly is used as an example.

- Step 4. Connect cables to the PCIe adapter in the riser assembly. See [Chapter 6 “Internal cable routing” on page 241](#).

After you finish

1. Reinstall the riser assembly. See [“Install a rear riser card” on page 194](#).

2. Complete the parts replacement. See [“Complete the parts replacement” on page 238](#).

Demo video

[Watch the procedure on YouTube](#)

Power supply unit air baffle replacement

Use this information to remove and install a power supply unit air baffle (PSU air baffle).

Note: PSU air baffle is installed only when installing a closed loop heat sink (L2AM module).

Remove a power supply unit air baffle

Use this information to understand how to remove a power supply unit air baffle.

About this task

Attention: Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) 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.

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.

Procedure

- Step 1. Remove the top cover. See [“Remove the top cover” on page 235](#).
- Step 2. Disconnect the cables adjacent to the power supply unit air baffle. For proper operation guidelines, see [Chapter 6 “Internal cable routing” on page 241](#).
- Step 3. Remove the power supply unit air baffle.

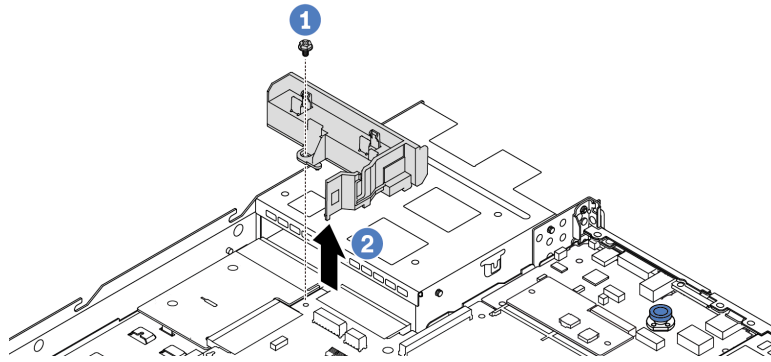


Figure 114. Power supply unit air baffle removal

- a. 1 Loosen the screw on the air baffle.
- b. 2 Lift the air baffle out of the chassis.

After you finish

If you are instructed to return the old air baffle, follow all packaging instructions and use any packaging materials that are provided.

Demo video

[Watch the procedure on YouTube](#)

Install a power supply unit air baffle

Use this information to understand how to install a power supply unit air baffle.

About this task

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.

Attention: Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) 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 the server is installed with the security bezel, remove it first. See [“Remove the security bezel” on page 207](#).

Step 2. Install the power supply unit air baffle.

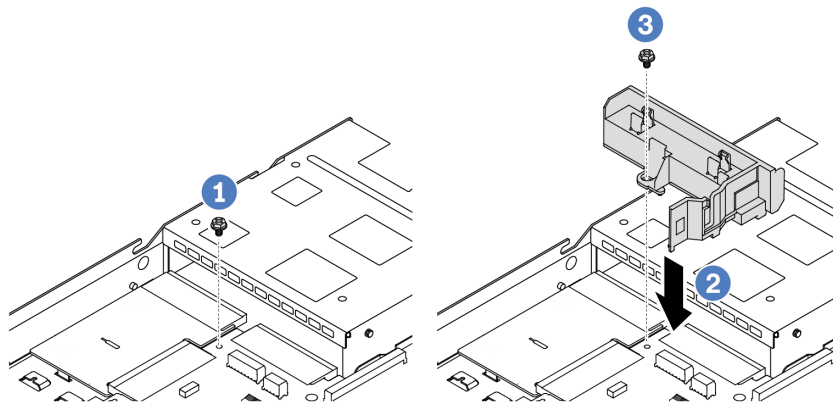


Figure 115. Power supply unit air baffle installation

- a. 1 Remove the screw on the chassis.
- b. 2 Align the screw hole on the air baffle and the chassis, and put the air baffle down.
- c. 3 Tighten the screw and ensure that the air baffle is secured in place.

After you finish

- Properly route and secure the cables in the server. Refer to detailed cable routing information for each component in [Chapter 6 “Internal cable routing” on page 241](#).
- Complete the parts replacement. See [“Complete the parts replacement” on page 238](#).

Demo video

[Watch the procedure on YouTube](#)

Processor and heat sink replacement (Trained technicians only)

Use this information to remove and install a processor or a heat sink.

Notes:

- The server supports two types of heat sinks: air cooling (T-shape) heat sink and closed loop heat sink. For detailed information on heat sink selection, see [“Thermal rules” on page 55](#).
- This section is for processor and air cooling (T-shape) heat sink replacement. For the replacement of closed loop heat sink (L2AM module), refer to [“Lenovo Neptune\(TM\) Liquid to Air Module replacement \(trained technicians only\)” on page 133](#).

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](#).
- 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](#).
- When the server has an L2AM module (Closed loop cooling module) installed, you must apply for a handle (L2AM heat sink bracket) first if you need to install or remove the processor board, I/O board, processor and PIB board. However, while replacing the old L2AM module with a new one, you do not need to apply for a handle (L2AM heat sink bracket) as the new L2AM module contains it.

Attention:

- Before you begin replacing a processor, make sure that you have an 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.

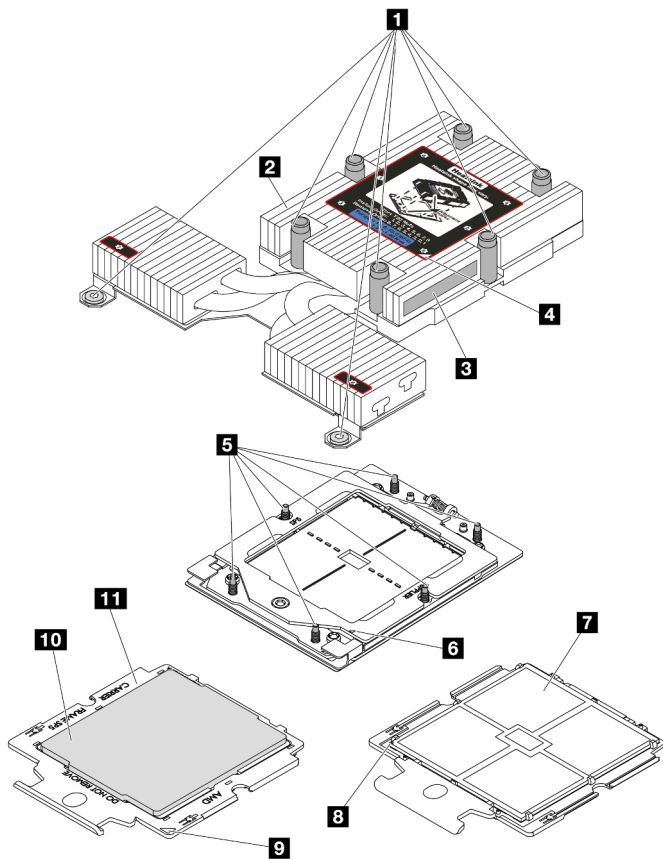


Figure 116. Processor and heat sink components

1 Captive screws (8)	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	

- [“Remove a heat sink” on page 166](#)
- [“Remove a processor” on page 168](#)
- [“Install a processor” on page 171](#)
- [“Install a heat sink” on page 169](#)

Remove a heat sink

Use this information to remove a heat sink. This procedure must be executed by a trained technician.

About this task

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 45](#) and [“Safety inspection checklist” on page 46](#) 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 61](#).
- 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 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 108](#).
- b. Remove the top cover. See [“Remove the top cover” on page 235](#).

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.

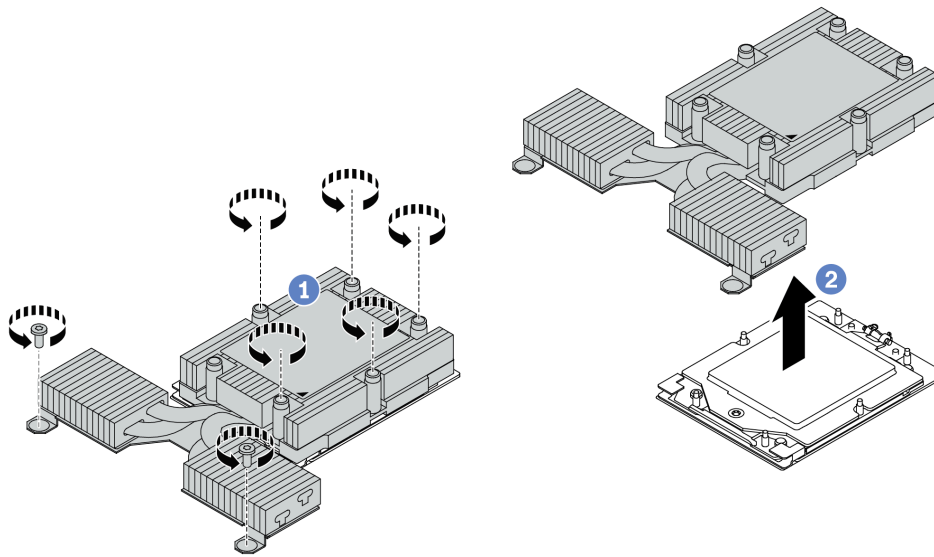


Figure 117. Removing an air cooling heat sink

- 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 169](#).
- If you are replacing a processor, remove the processor. See [“Remove a processor” on page 168](#).
- 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

Use this information to remove a processor.

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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

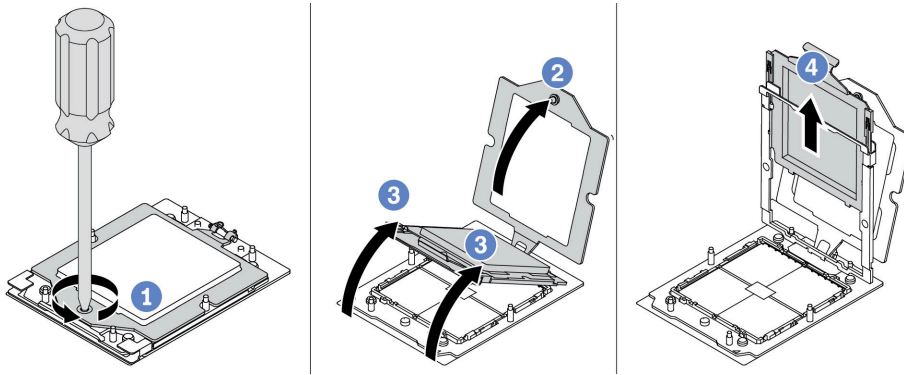


Figure 118. Processor removal

- Step 1. ① Use a Torx T20 screwdriver to loosen the captive 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 171](#).
- 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 heat sink

Follow the instructions in this section to install a heat sink. This procedure must be executed by a trained technician.

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) 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 61](#).
- 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 the actual scenario.

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 170](#).
 - If no, go to [Step 3 step 3 on page 170](#).

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.

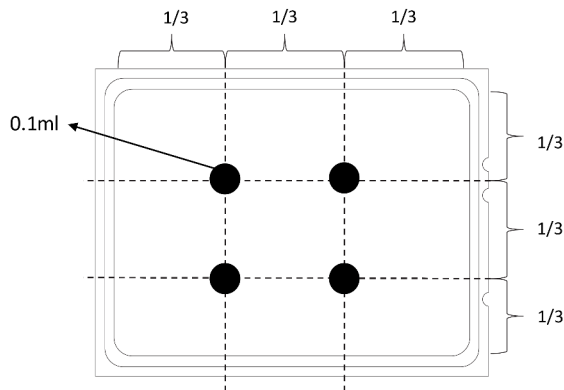


Figure 119. Applying thermal grease

Step 3. Install the heat sink.

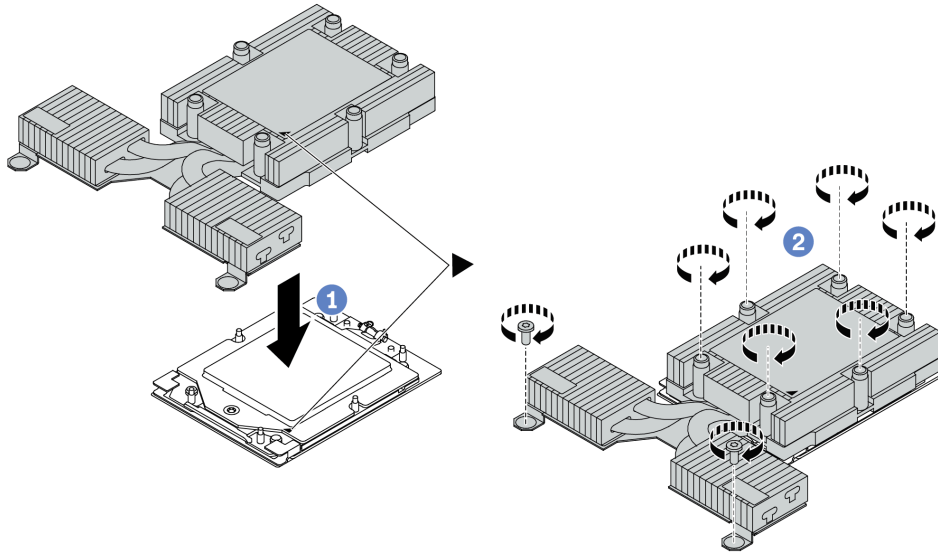


Figure 120. Installing an air cooling heat sink

- a. 1 Align the triangular mark and screws on the heat sink with the triangular mark and threaded posts on the processor carrier; then install the heat sink onto the processor carrier.
- b. 2 Fully tighten all the screws *in the installation sequence shown* on the heat-sink label.

After you finish

1. Install any parts that you have removed.
2. Complete the parts replacement. See [“Complete the parts replacement” on page 238](#).

Demo video

[Watch the procedure on YouTube](#)

Install a processor

Use this information to install a processor. This task requires a Torx T20 driver. The procedure must be executed by a trained technician.

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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:

- The heat sink, processor, and processor carrier for your system might be different from those shown in the illustrations.

- See <https://serverproven.lenovo.com> for a list of processors supported for your server. All processors on the system board (system board assembly) must have the same speed, number of cores, and frequency.
- Before you install a new processor or replacement processor, update your system firmware to the latest level. See “Update the firmware” on page 317.

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/sr635v3/7d9h/downloads/driver-list/> to see the latest firmware and driver updates for your server.
- Go to “Update the firmware” on page 317 for more information on firmware updating tools.

Procedure

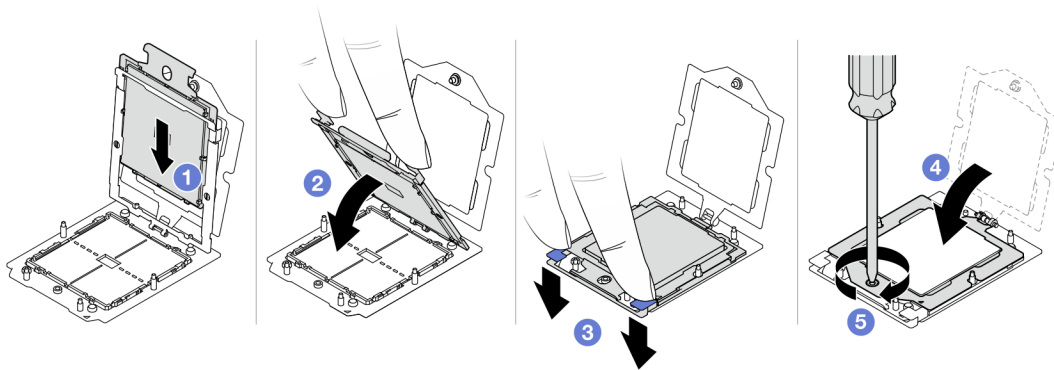


Figure 121. Processor installation

Step 1. ① Slide the processor carrier into the rail frame.

Attention:

- Make sure the processor carrier is well seated inside the rail frame.
- Make sure the rear of processor carrier does not float above the rail frame.

Step 2. ② Use the index finger of both hands to press down the rail frame.

Step 3. ③ Use the index finger of both hands to press down the rail frame down until the blue latches lock into place.

Step 4. ④ Close the retention frame.

Step 5. ⑤ Use a Torx T20 screwdriver to tighten the screw.

After you finish

Install the heat sink. See “Install a heat sink” on page 169.

Demo video

[Watch the procedure on YouTube](#)

Power inverter board (PIB) replacement

Use this information to remove and install the power inverter board (PIB) board replacement.

Note:

Remove the PIB board

Use this information to remove the PIB board.

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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 removing the PIB board:

1. Remove the top cover. See [“Remove the top cover” on page 235](#).
2. Pull out the power supplies slightly. Ensure that they are disconnected from the system board.
3. Remove the system board assembly out of the chassis. See [“Remove the system I/O board or processor board” on page 222](#).

To remove the PIB board, complete the following steps:

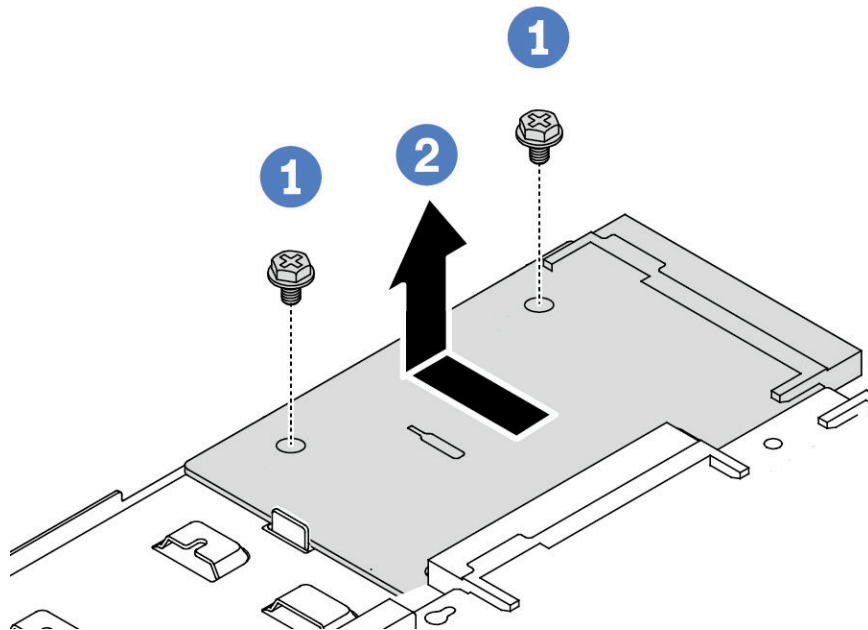


Figure 122. PIB board removal

- Step 1. ① Remove the two screws from the PIB board.
- Step 2. ② Pull out the PIB board outward from the system board tray.

If you are instructed to return the old PIB board, follow all packaging instructions and use any packaging materials that are provided.

Demo video

[Watch the procedure on YouTube](#)

Install the PIB board

Use this information to install the PIB board.

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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 installing the PIB board, touch the static-protective package that contains the new PIB board to any unpainted surface on the outside of the server. Then, take the new PIB board out of the package and place it on a static-protective surface.
- Before installing the PIB board, ensure that the system board assembly is removed out of the chassis first. See: [“Remove the system I/O board or processor board” on page 222](#).

To install the PIB board, complete the following steps:

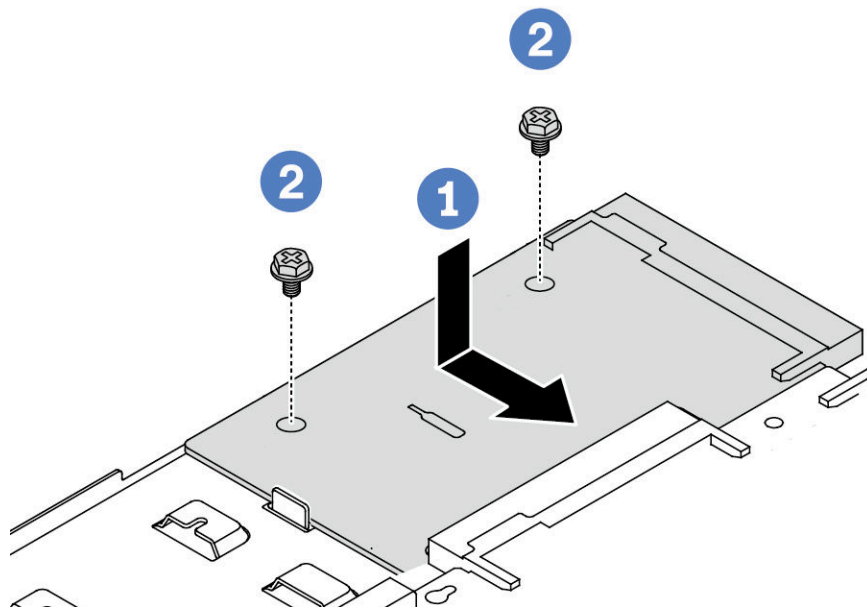


Figure 123. PIB board installation

- Step 1. **1** Align the PIB board with the connector on the processor board, and use both hands to push the PIB board and slightly insert it into the connector.
- Step 2. **2** Install the two screws to secure the PIB board.

After installing the PIB board:

1. Install the system board assembly into the chassis. See [“Install the system I/O board or processor board” on page 226](#).
2. Push the power supplies into the bays until they click into place.
3. Complete the parts replacement. See [“Complete the parts replacement” on page 238](#).

Demo video

[Watch the procedure on YouTube](#)

Rack latches replacement

Use this information to remove and install the rack latches.

Remove the rack latches

Use this information to remove the rack latches.

About this task

Attention: Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.

Procedure

- Step 1. If the server is installed with the security bezel, remove it first. See [“Remove the security bezel” on page 207](#).
- Step 2. On each side of the server, remove the two screws that secure the rack latch.

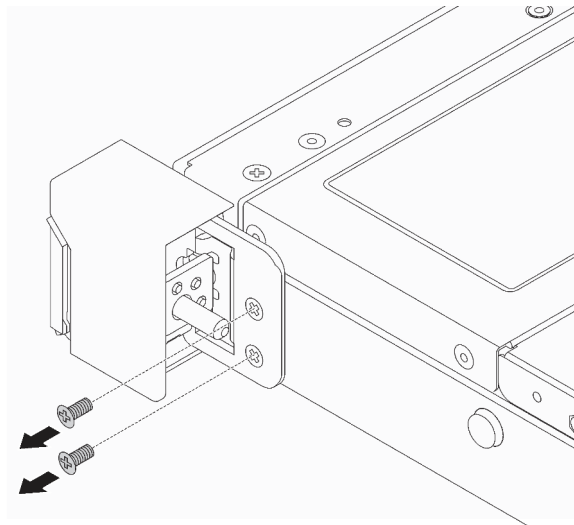


Figure 124. Rack latch screws removal

Step 3. On each side of the server, remove the rack latch from the chassis as shown.

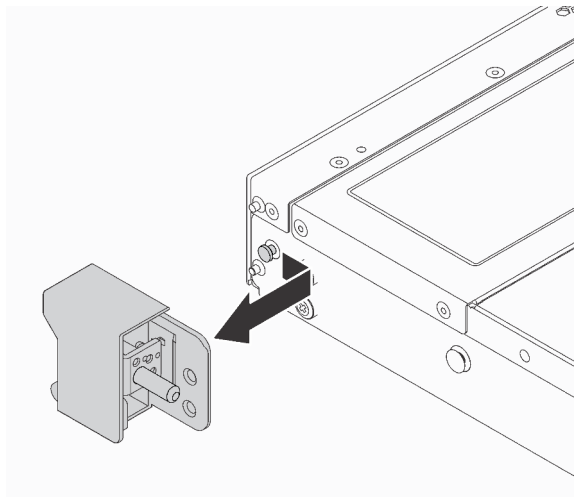


Figure 125. Rack latch removal

After you finish

If you are instructed to return the old rack latches, follow all packaging instructions and use any packaging materials that are provided.

Demo video

[Watch the procedure on YouTube](#)

Install the rack latches

Use this information to install the rack latches.

About this task

Attention: Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.

Procedure

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

Step 2. On each side of the server, align the rack latch with the pin on the chassis. Then, press the rack latch onto the chassis and slightly slide it forward as shown.

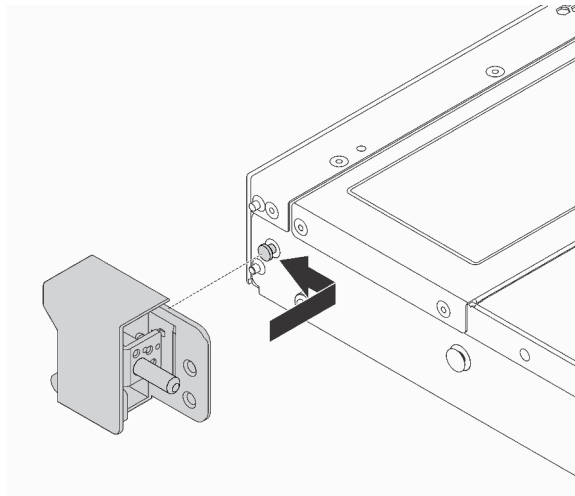


Figure 126. Rack latch installation

Step 3. Install the two screws to secure the rack latch on each side of the server.

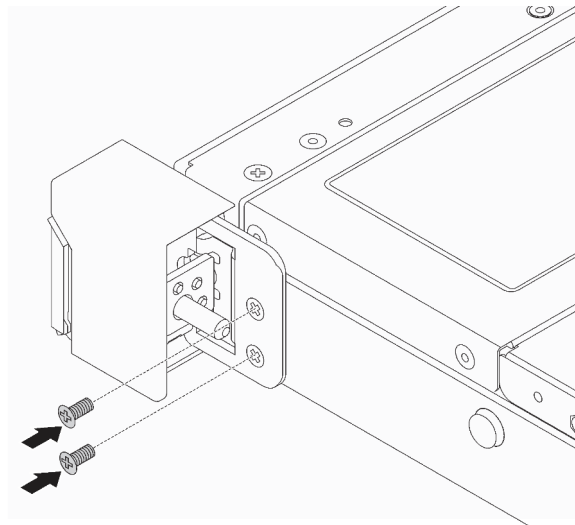


Figure 127. Rack latch screws installation

After you finish

Complete the parts replacement. See [“Complete the parts replacement”](#) on page 238.

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. You can purchase a RAID flash power module from Lenovo. Use this information to remove and install a RAID flash power module.

For a list of supported options, see:
<https://serverproven.lenovo.com>

RAID flash power modules can be installed on the chassis, the system board tray or riser slot 3.

Locations of RAID flash power modules

Use the illustration and table below to locate the RAID flash power modules.

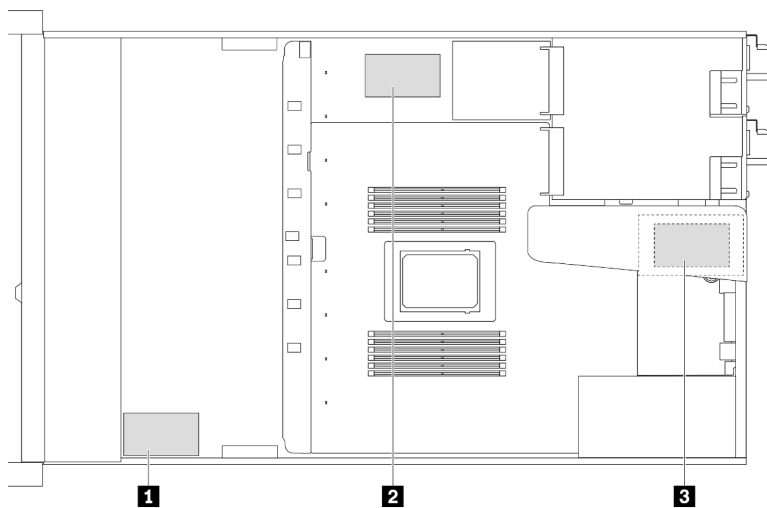


Figure 128. RAID flash power modules on the chassis

No.	Location	Suggested Priority	Use Scenarios
1	RAID flash power module on the chassis	1	Power for CFF and SFF RAID/HBA
2	RAID flash power module on the system board tray	2	Power for SFF RAID/HBA
3	RAID flash power module on the riser assembly (slot 3)	3	Power for SFF RAID/HBA

Remove the RAID flash power module on the chassis

Use this information to remove the RAID flash power module on the chassis.

About this task

Attention:

- Read “[Installation Guidelines](#)” on page 45 and “[Safety inspection checklist](#)” on page 46 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.

- 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. Remove the top cover. See [“Remove the top cover” on page 235](#).
- Step 2. Disconnect the cable of the RAID flash power module.
- Step 3. Remove the RAID flash power module on the chassis.

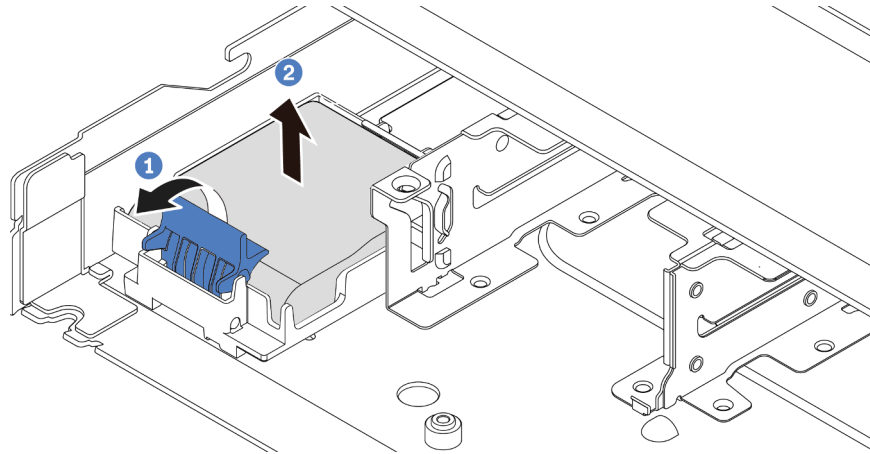


Figure 129. Removal of the RAID flash power module on the chassis

- 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.

- Step 4. Remove the RAID flash power module holder as shown if necessary.

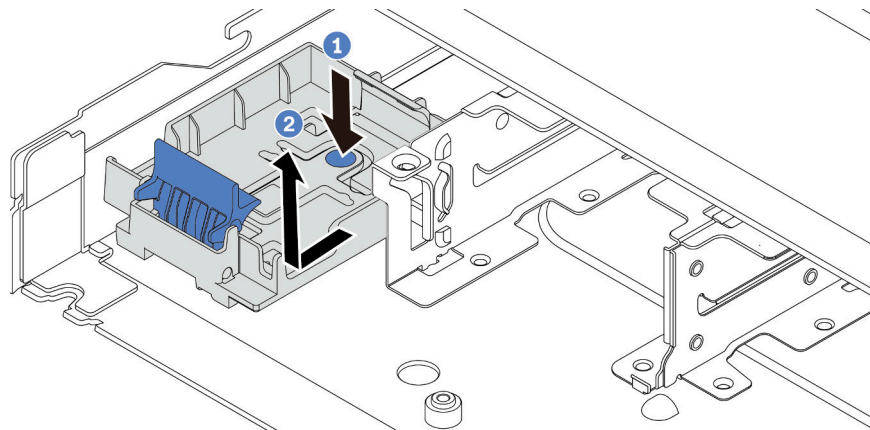


Figure 130. RAID flash power module holder removal

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](#)

Install the RAID flash power module on the chassis

Use this information to install the RAID flash power module on the chassis.

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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 RAID flash power module to any unpainted surface on the outside of the server. Then, take the RAID flash power module out of the package and place it on a static-protective surface.
- Step 2. If the server comes with a tray that covers the place of the RAID flash power module on the chassis, remove it first.

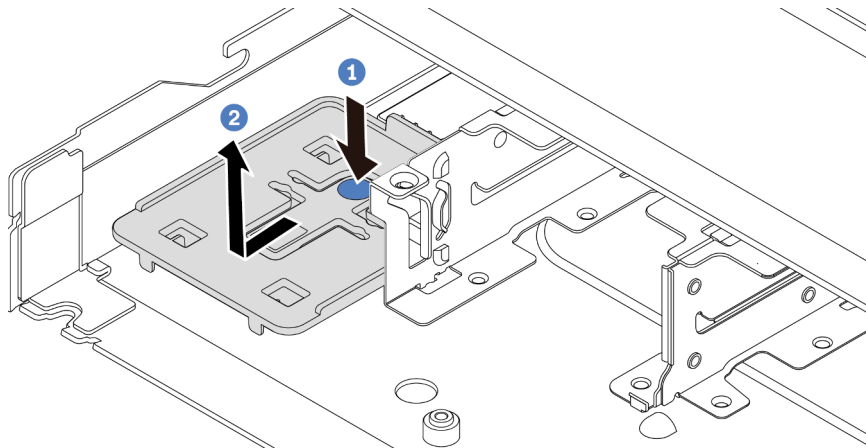


Figure 131. Tray removal

Step 3. If the server does not have a RAID flash power module holder on the chassis, install one first.

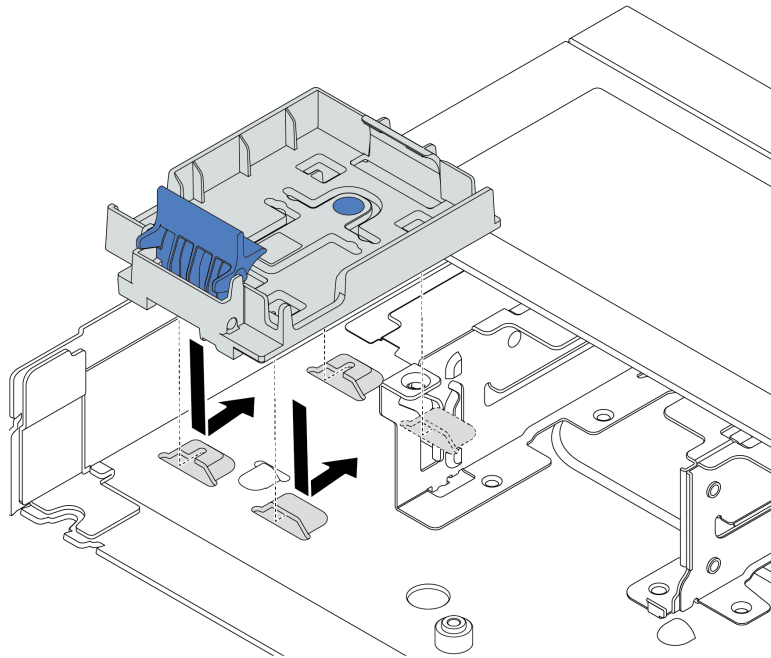


Figure 132. RAID flash power module holder installation

Step 4. Install the RAID flash power module on the chassis.

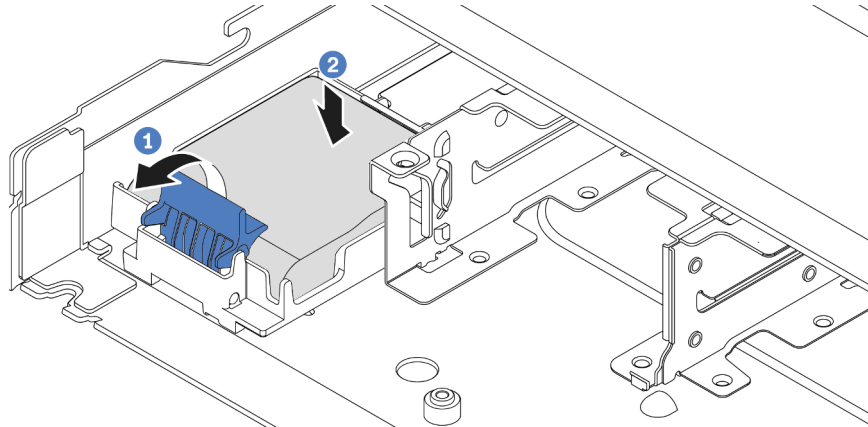


Figure 133. Installation of the RAID flash power module on the chassis

- a. ① Open the retention clip on the holder.
- b. ② Put the RAID flash power module into the holder and press it down to secure it into the holder.

After you finish

1. Connect the super capacitor module to an adapter with the extension cable that comes with the flash power module. See [“RAID flash power modules” on page 253](#).
2. Complete the parts replacement. See [“Complete the parts replacement” on page 238](#).

Demo video

[Watch the procedure on YouTube](#)

Remove the RAID flash power module on the system board tray

Use this information to remove the RAID flash power module on the system board tray.

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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. Remove the top cover. See [“Remove the top cover” on page 235](#).
- Step 2. Disconnect the cable of the RAID flash power module.
- Step 3. Remove the RAID flash power module on the system board tray.

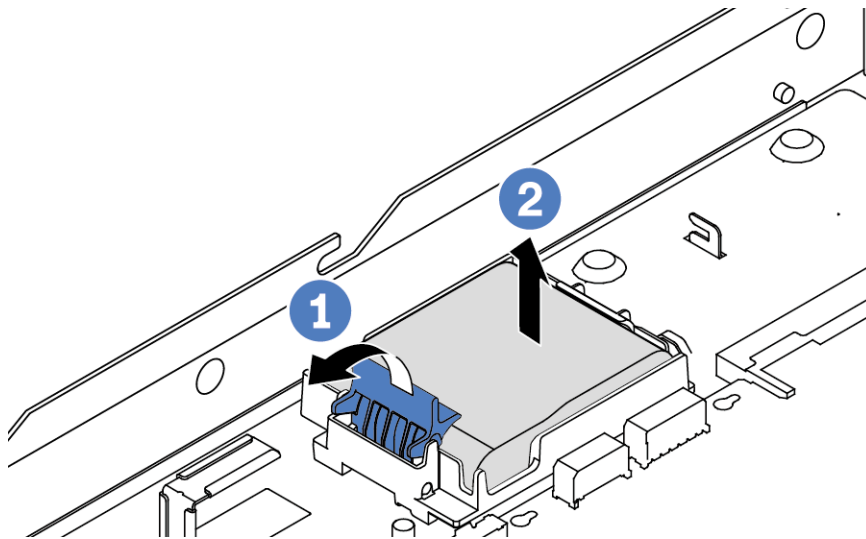


Figure 134. Removal of the RAID flash power module on the system board tray

- 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.

Step 4. Remove the RAID flash power module holder as shown if necessary.

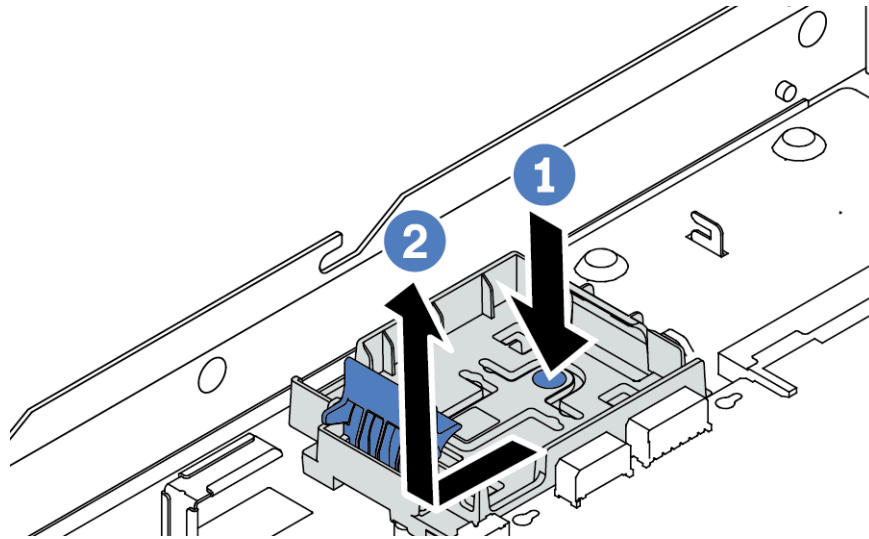


Figure 135. RAID flash power module holder removal

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](#)

Install the RAID flash power module on the system board tray

Use this information to install the RAID flash power module on the system board tray.

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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 RAID flash power module to any unpainted surface on the outside of the server. Then, take the RAID flash power module out of the package and place it on a static-protective surface.

Step 2. If the server comes with a tray that covers the place of the RAID flash power module on the system board tray, remove it first.

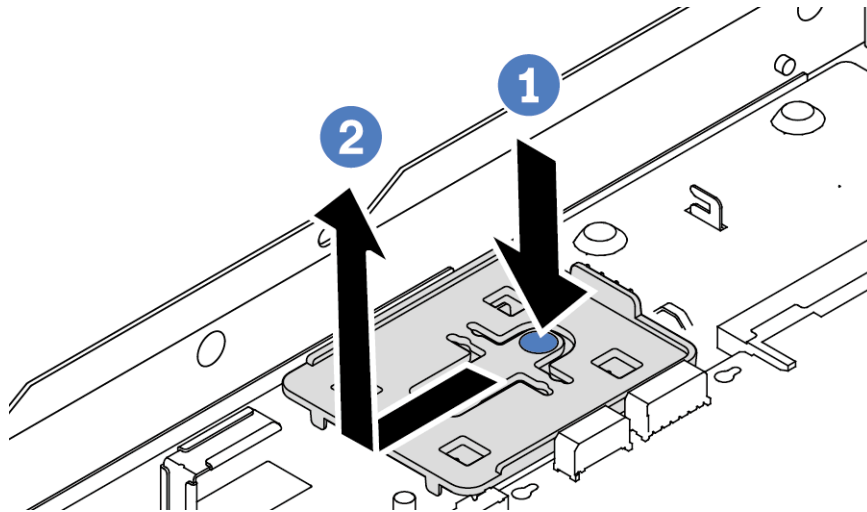


Figure 136. Tray removal

Step 3. If the server does not have a RAID flash power module holder on the system board tray, install one first.

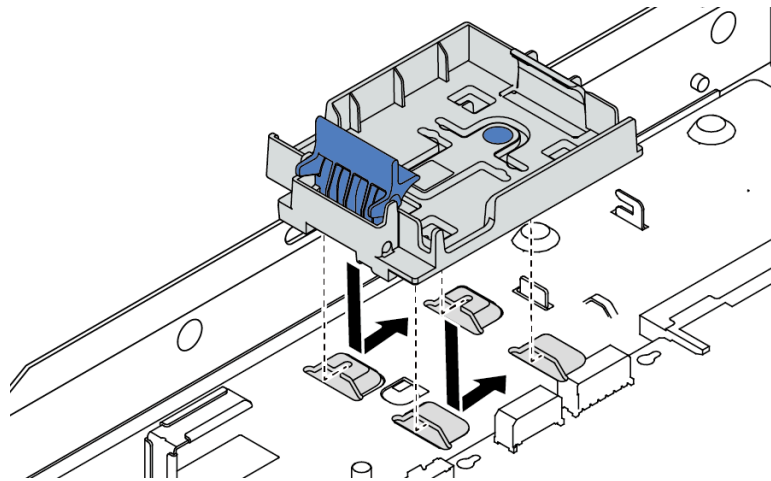


Figure 137. RAID flash power module holder installation

Step 4. Install the RAID flash power module on the system board tray.

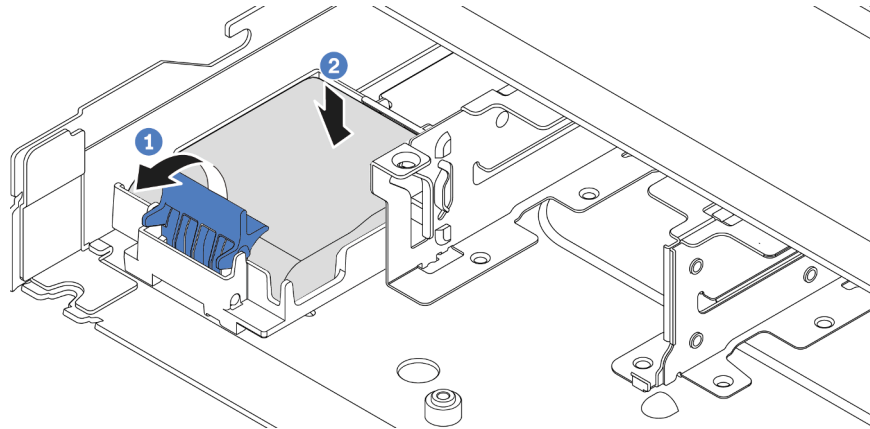


Figure 138. Installation of the RAID flash power module on the system board tray

- a. **1** Open the retention clip on the holder.
- b. **2** Put the RAID flash power module into the holder and press it down to secure it into the holder.

After you finish

1. Connect the super capacitor module to an adapter with the extension cable that comes with the flash power module. See [“RAID flash power modules” on page 253](#).
2. Complete the parts replacement. See [“Complete the parts replacement” on page 238](#).

Demo video

[Watch the procedure on YouTube](#)

Remove the RAID flash power module on the riser assembly

Use this information to remove the RAID flash power module on the riser assembly.

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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. Remove the top cover. See [“Remove the top cover” on page 235](#).
- Step 2. Disconnect the cable of the RAID flash power module.
- Step 3. Remove the riser assembly. See [“Remove a rear riser card” on page 191](#).

Step 4. Remove the RAID flash power module from the riser assembly.

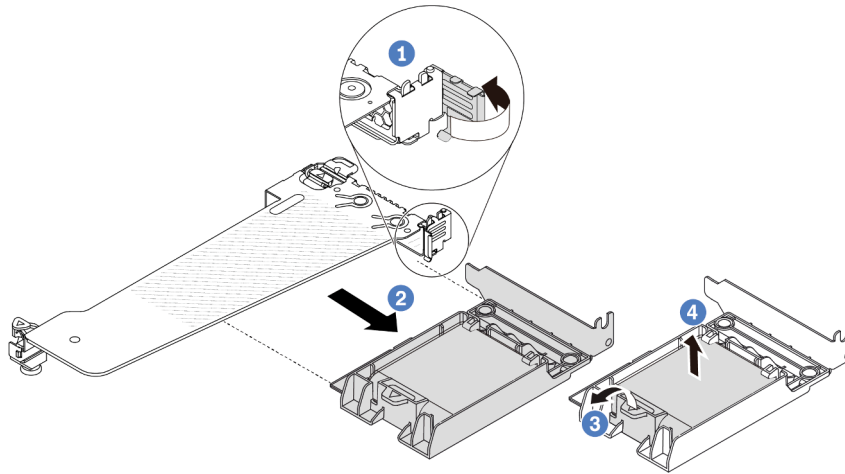


Figure 139. Removal of the RAID flash power module from the riser assembly

- a. ① Rotate the latch on the riser bracket to the open position.
- b. ② Remove the RAID flash power assembly from the riser assembly.
- c. ③ Open the retention clip on the holder of the RAID flash power module.
- d. ④ Take the RAID flash power module out of the holder.

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](#)

Install the RAID flash power module on the riser assembly

Use this information to install the RAID flash power module on the riser assembly.

About this task

Attention:

- Read “[Installation Guidelines](#)” on page 45 and “[Safety inspection checklist](#)” on page 46 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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 RAID flash power module to any unpainted surface on the outside of the server. Then, take the RAID flash power module out of the package and place it on a static-protective surface.
- Step 2. Install the RAID flash power module on the riser assembly.

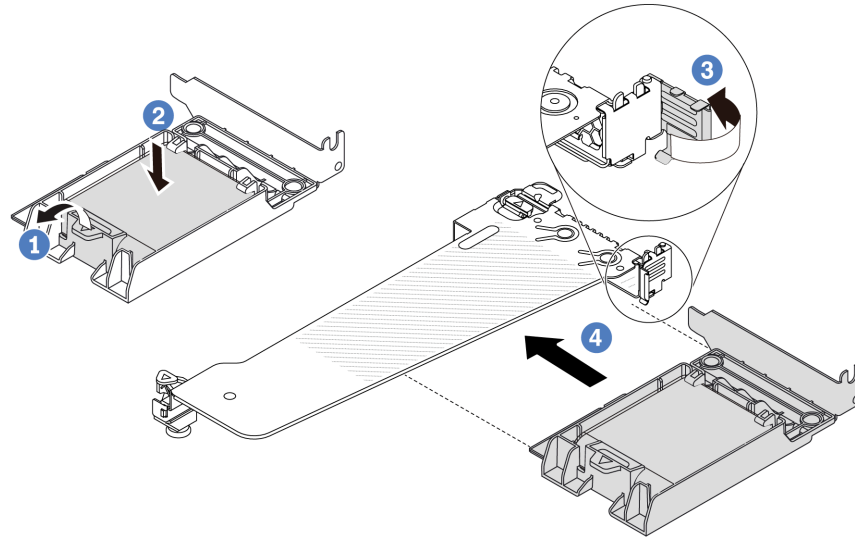


Figure 140. Installation of the RAID flash power module on the riser assembly

- a. ① Open the retention clip on the holder.
- b. ② Put the RAID flash power module into the holder and press it down to secure it into the holder.
- c. ③ Rotate the latch on the riser bracket to the open position.
- d. ④ Align the RAID flash power assembly with the slot on the riser card. Then, carefully press the RAID flash power assembly straight into the slot until it is securely seated and its bracket is secured.

After you finish

1. Install the riser assembly on the chassis. See [“Install a rear riser card” on page 194](#).
2. Connect the flash power module to an adapter with the extension cable that comes with the flash power module. See [“RAID flash power modules” on page 253](#).
3. Complete the parts replacement. See [“Complete the parts replacement” on page 238](#).

Demo video

[Watch the procedure on YouTube](#)

Rear riser card replacement

Use this information to remove and install a rear riser card.

- [“Server rear configuration and riser assemblies” on page 188](#)
- [“The overview of riser brackets” on page 190](#)

- “The overview of riser cards” on page 191

Server rear configuration and riser assemblies

See this section to identify the correlations between the rear configuration and riser assemblies.

Table 28. Server rear configuration and riser assemblies¹

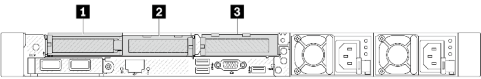
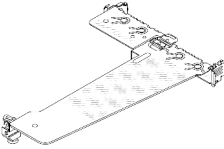
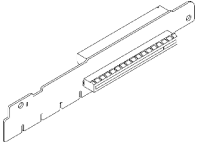
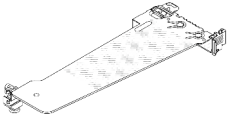
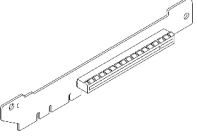
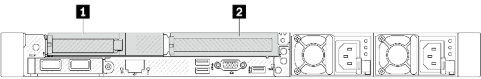
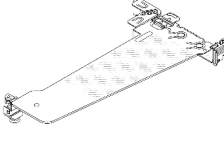
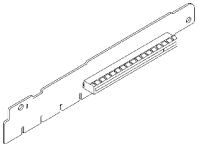
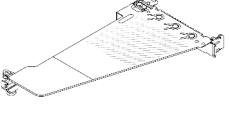
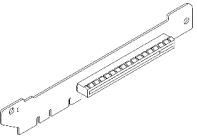
Server rear configuration	Riser 1 assembly	Riser 2 assembly
 <p>Figure 141. Three PCIe slots</p>	 <p>Figure 142. Riser 1 LP-LP bracket</p>  <p>Figure 143. Riser 1 BF² card</p>	 <p>Figure 144. Riser 2 bracket</p>  <p>Figure 145. Riser 2 card</p>
 <p>Figure 146. Two PCIe slots</p>	 <p>Figure 147. Riser 1 LP-filler bracket</p>  <p>Figure 148. Riser 1 card</p>	 <p>Figure 149. Riser 2 FH bracket</p>  <p>Figure 150. Riser 2 card</p>

Table 28. Server rear configuration and riser assemblies¹ (continued)

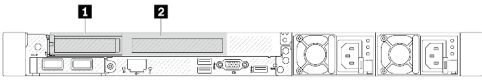
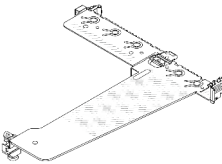
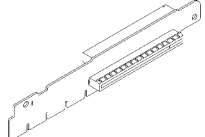
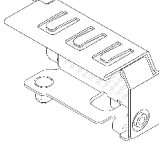
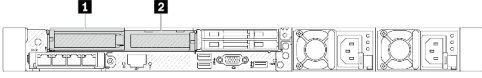
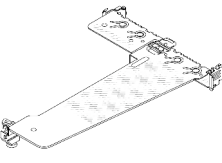
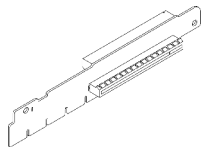
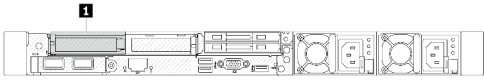
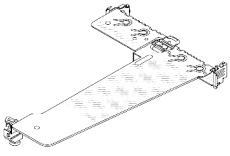
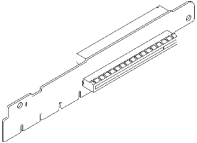
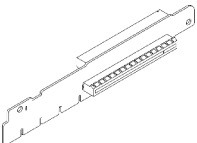
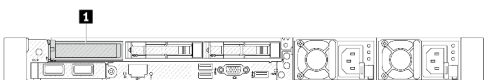
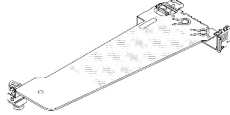
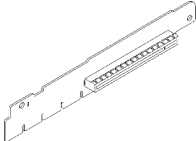
Server rear configuration	Riser 1 assembly	Riser 2 assembly
 <p>Figure 151. Two PCIe slots</p>	 <p>Figure 152. Riser 1 LP-FH bracket</p>  <p>Figure 153. Riser 1 BF card</p>	<p>Riser 2 assembly is not supported.</p> <p>A rear wall bracket is required for this configuration.</p>  <p>Figure 154. A rear wall bracket</p>
 <p>Figure 155. Two PCIe slots</p>	 <p>Figure 156. Riser 1 LP-LP bracket</p>  <p>Figure 157. Riser 1 BF card</p>	<p>Riser 2 assembly is not supported.</p>

Table 28. Server rear configuration and riser assemblies¹ (continued)

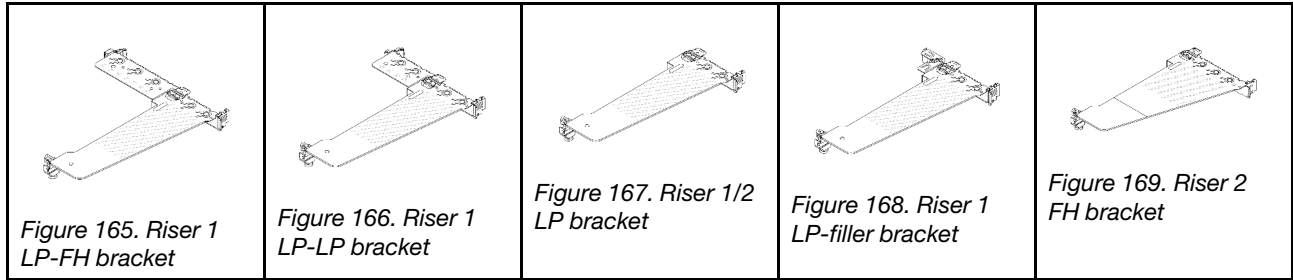
Server rear configuration	Riser 1 assembly	Riser 2 assembly
 <p>Figure 158. One PCIe slot</p>	 <p>Figure 159. Riser 1 LP-LP bracket</p> <p>Choose either one below to assemble:</p> <ul style="list-style-type: none">  <p>Figure 160. Riser 1 BF card</p>  <p>Figure 161. Riser 1 card</p> 	<p>Riser 2 assembly is not supported.</p>
 <p>Figure 162. One PCIe slot</p>	 <p>Figure 163. Riser 1 LP bracket</p>  <p>Figure 164. Riser 1 card</p>	<p>Riser 2 assembly is not supported.</p>

Notes:

1. The illustrations of riser brackets and cards may look slightly different from the physical ones.
2. BF: “butterfly”, a riser card with slots on both sides.

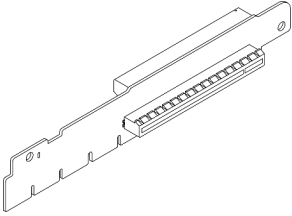
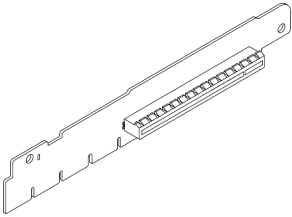
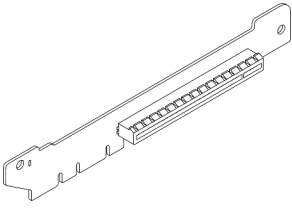
The overview of riser brackets

See this section to identify different riser brackets.



The overview of riser cards

See this section to identify different riser cards.

Riser card	Notes
 <p>Figure 170. A Gen 4/5 BF riser card</p>	<ul style="list-style-type: none"> Depending on the server configuration or specific orders, the riser card can be a Gen 4 or Gen 5 card. This section only breaks down how to match the cards with the brackets as the appearance and the installation methods are the same for the Gen 4 and Gen 5 BF cards.
 <p>Figure 171. A Gen 4/5 riser card</p>	<p>This card can be:</p> <ul style="list-style-type: none"> A Gen 4 riser 1 card A Gen 5 BF riser 1 card with one slot removed
 <p>Figure 172. A Gen 4/5 riser card</p>	<p>Gen 4/5 riser 2 card</p>

Remove a rear riser card

Use this information to remove a rear riser card.

About this task

The riser assembly you want to remove might be different from the following illustrations, but the removal method is the same. The following takes the LP-FH riser assembly as an example.

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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. Remove the top cover. See [“Remove the top cover” on page 235](#).
- Step 2. 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 3. Press the two latches on both ends at the same time, and carefully lift it out of the chassis by the two latches.

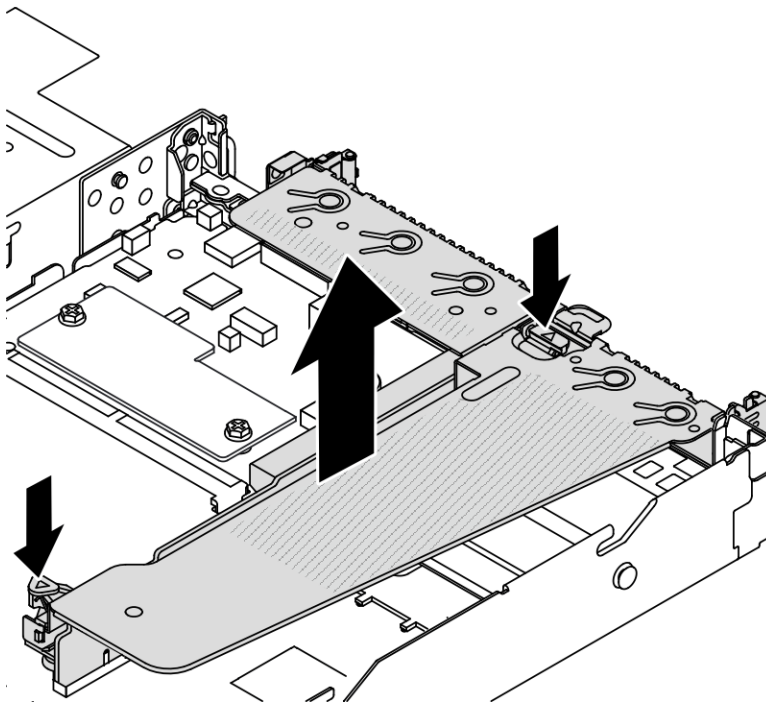


Figure 173. Riser assembly removal

- Step 4. If necessary, remove the PCIe adapters that are installed on the riser card. See [“Remove a PCIe adapter” on page 159](#).

Step 5. Remove the riser card from the bracket.

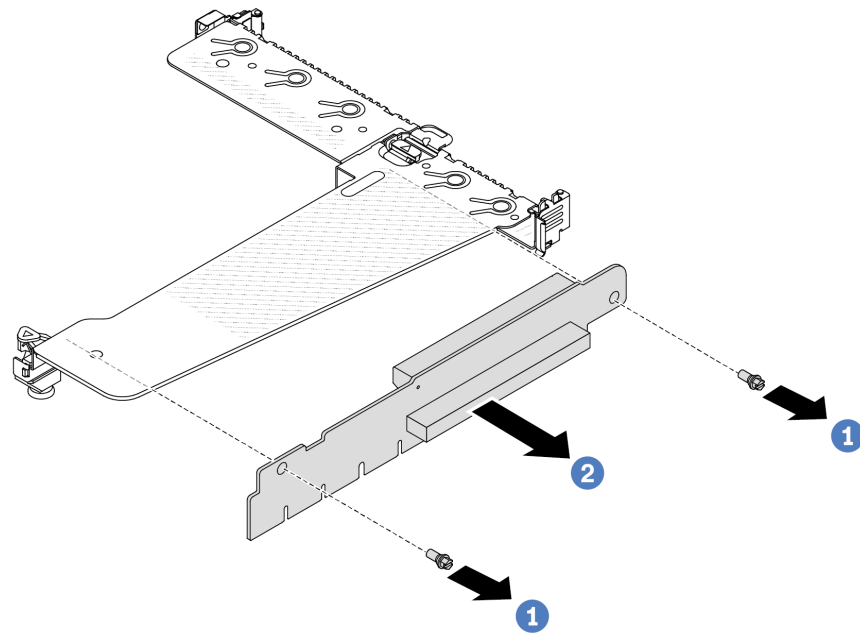


Figure 174. Riser card removal

- a. **1** Remove the two screws that secure the riser card to the bracket.
- b. **2** Remove the riser card.

After you finish

1. If you are instructed to return the old riser card, follow all packaging instructions and use any packaging materials that are provided.
2. Remove the rear wall bracket if you would like to install a non-LP-FH riser assembly.

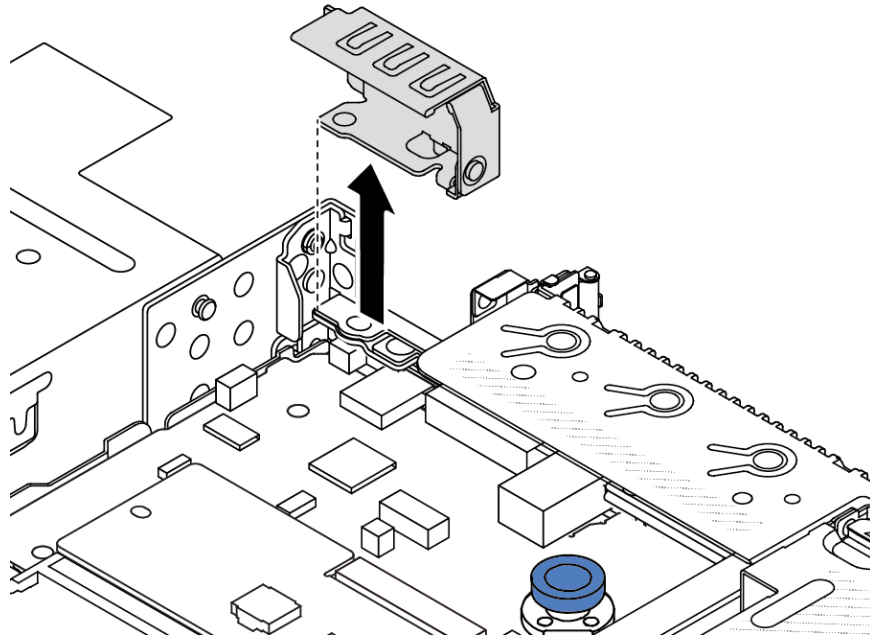


Figure 175. Rear wall bracket removal

Demo video

[Watch the procedure on YouTube](#)

Install a rear riser card

Use this information to install a rear riser card.

About this task

The riser assembly you want to install might be different from the following illustrations, but the installation method is the same. The following takes the LPFH riser assembly as an example.

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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 riser card to any unpainted surface on the outside of the server. Then, take the riser card out of the package and place it on a static-protective surface.

Step 2. Install the riser card and secure it to the bracket.

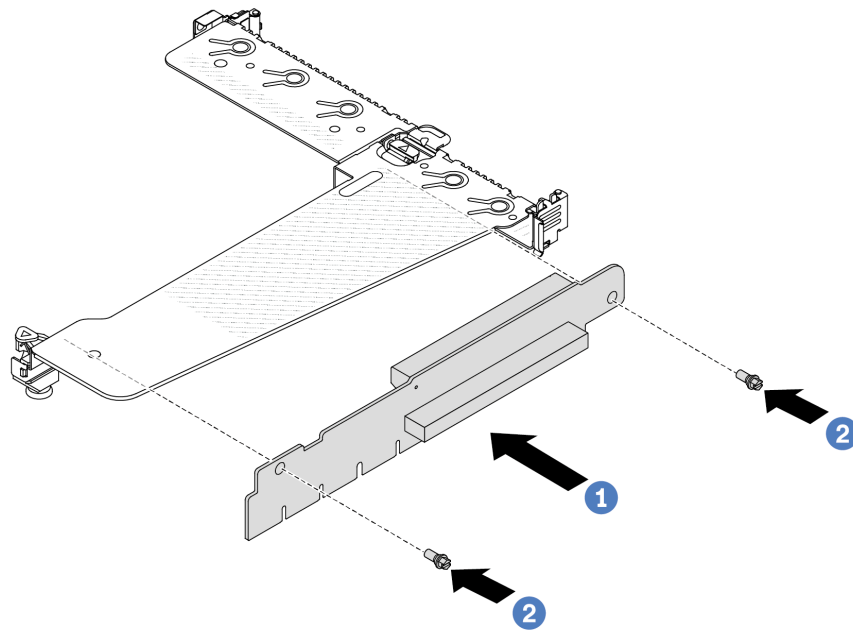


Figure 176. Riser card installation

1. 1 Align the screw holes in the riser card with the corresponding ones in the bracket.
 2. 2 Install the two screws to secure the riser card to the bracket.
- Step 3. If necessary, reinstall the PCIe adapters on the riser card. See [“Install a PCIe adapter” on page 160](#). Then, refer to your note to reconnect any cables of the PCIe adapters on the riser card. Or you can refer to the [Chapter 6 “Internal cable routing” on page 241](#) and locate the cable routing information for your configuration options.

Step 4. Position the riser assembly on the chassis. Align the plastic clip and two pins on the bracket with the guide pin and two holes on the chassis, and align the riser card with the riser slot on the system board. Then, carefully press the riser assembly straight down into the slot until it is fully seated.

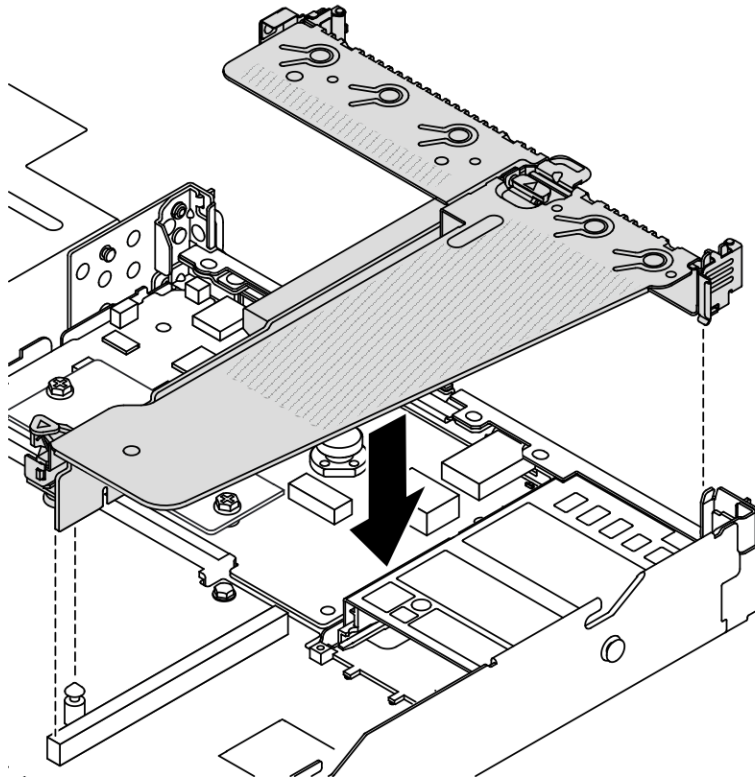


Figure 177. Riser assembly installation

After you finish

Complete the parts replacement. See [“Complete the parts replacement” on page 238](#).

Demo video

[Watch the procedure on YouTube](#)

Rear OCP module replacement

Use this information to remove and install the rear OCP module.

Notes:

- The OCP module is available only on some models.
- 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.

Remove the rear OCP module

Use this information to remove the rear OCP module.

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

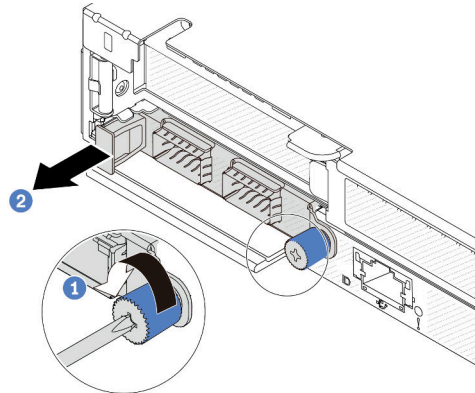
Procedure

Figure 178. OCP module removal

- Step 1. **1** Loosen the thumbscrew that secures the adapter.
- Step 2. **2** Pull out the OCP module by its handle on the left as shown.

After you finish

Install a new OCP module or a card filler. See [“Install the rear OCP module” on page 197](#).

Demo video

[Watch the procedure on YouTube](#)

Install the rear OCP module

Use this information to install the rear OCP module.

About this task**Attention:**

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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: 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.

Procedure

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

Step 2. Install the OCP module.

Notes:

- Ensure that the Ethernet adapter is fully seated and the thumbscrew is securely tightened. Otherwise, the OCP module will not get full connection and may not function.
- If there is an OCP module installed, when the system is powered off but still plugged in to AC power, system fans will continue to spin at a much lower speed. This is the system design to provide proper cooling for the OCP module.

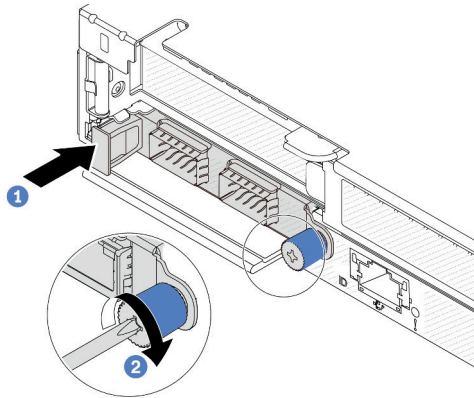


Figure 179. OCP module installation

- a. **1** Push the OCP module by its handle on the left until it is fully inserted into the connector on the system board.
- b. **2** Fully tighten the thumbscrew to secure the adapter.

Notes:



Figure 180. OCP module (two connectors, seen from the rear)

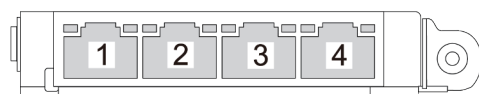


Figure 181. OCP module (four connectors, seen from the rear)

- The OCP module is an optional part. It is default to be installed on the rear and optional in the front of the server.
- If the 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.

After you finish

Complete the parts replacement. See [“Complete the parts replacement” on page 238](#).

Demo video

[Watch the procedure on YouTube](#)

Rear drive assembly replacement

Use this information to remove and install the rear drive assembly.

Remove the 2.5-inch rear drive assembly

Use this information to remove the 2.5-inch rear drive assembly.

About this task

The following illustrates how to remove the 2.5-inch rear drive assembly.

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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. Remove the top cover. See [“Remove the top cover” on page 235](#).
- Step 2. Remove the drives or drive fillers installed in the rear drive cage. See [“Remove a 2.5-inch hot-swap drive” on page 116](#).
- Step 3. Disconnect the rear drive cage cables from the system board or the PCIe adapter. See [Chapter 6 “Internal cable routing” on page 241](#).

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 system board assembly.
- 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.

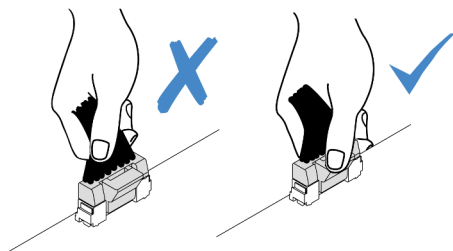


Figure 182. Disconnecting cables from the system board assembly

Step 4. Hold the two blue touch points and directly lift the rear drive cage out of the chassis.

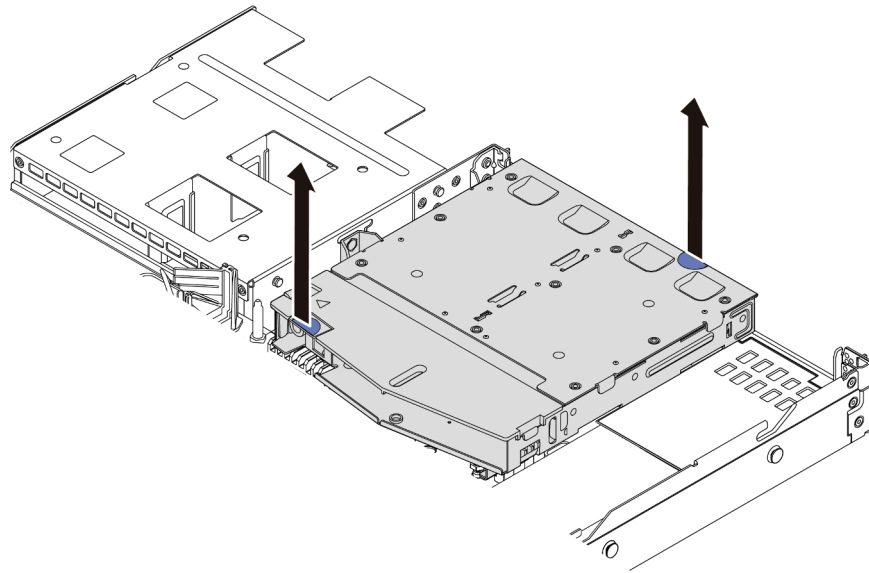


Figure 183. Hot-swap rear drive cage removal

Step 5. If the rear backplane is reused, remove the rear backplane. See [“Remove the rear 2.5-inch drive backplane” on page 67](#).

After you finish

If you are instructed to return the old rear drive cage, follow all packaging instructions and use any packaging materials provided.

Demo video

[Watch the procedure on YouTube](#)

Install the 2.5-inch rear drive assembly

Use this information to install the 2.5-inch rear drive assembly.

About this task

The following illustrates how to install the 2.5-inch rear drive assembly.

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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 rear drive cage to any unpainted surface on the outside of the server. And then, take the rear drive cage out of the package and place it on a static-protective surface.
- Step 2. Gently press and hold the tab on the rear drive cage as shown and remove the air baffle from the rear drive cage.

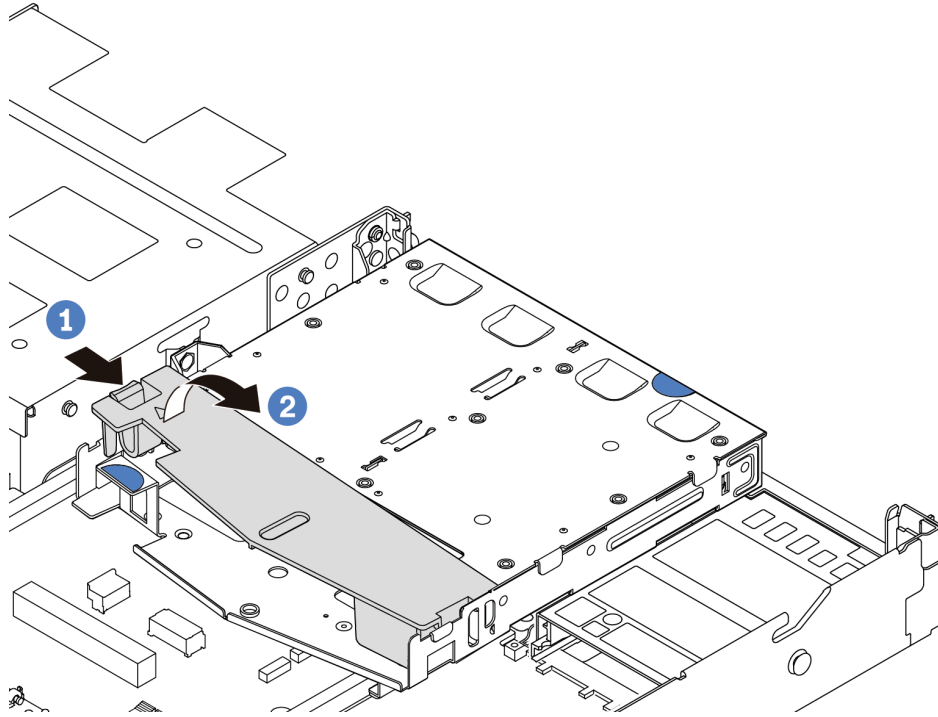


Figure 184. Air baffle removal

- a. 1 Press the tab on one side to disengage the air baffle.
- b. 2 Lift the air baffle to remove it from drive cage.
- Step 3. Align the rear backplane with the rear drive cage and lower it into the rear drive cage.

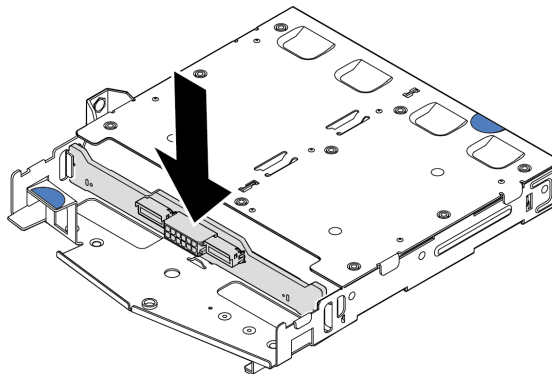


Figure 185. Rear backplane installation

- Step 4. Connect the cables to the backplane.
- Step 5. Install the air baffle into the rear drive cage as shown.

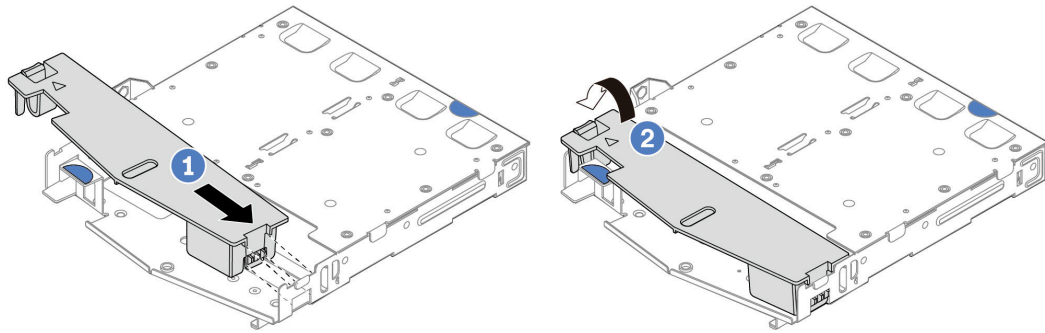


Figure 186. Air baffle installation

- a. 1 Align the air baffle edge with the notch on the drive cage.
 - b. 2 Press the air baffle down and make sure that it is seated in place.
- Step 6. Align the pins on the rear drive cage with the corresponding hole and slot in the chassis. Then, lower the rear drive cage into the chassis until it is fully seated.

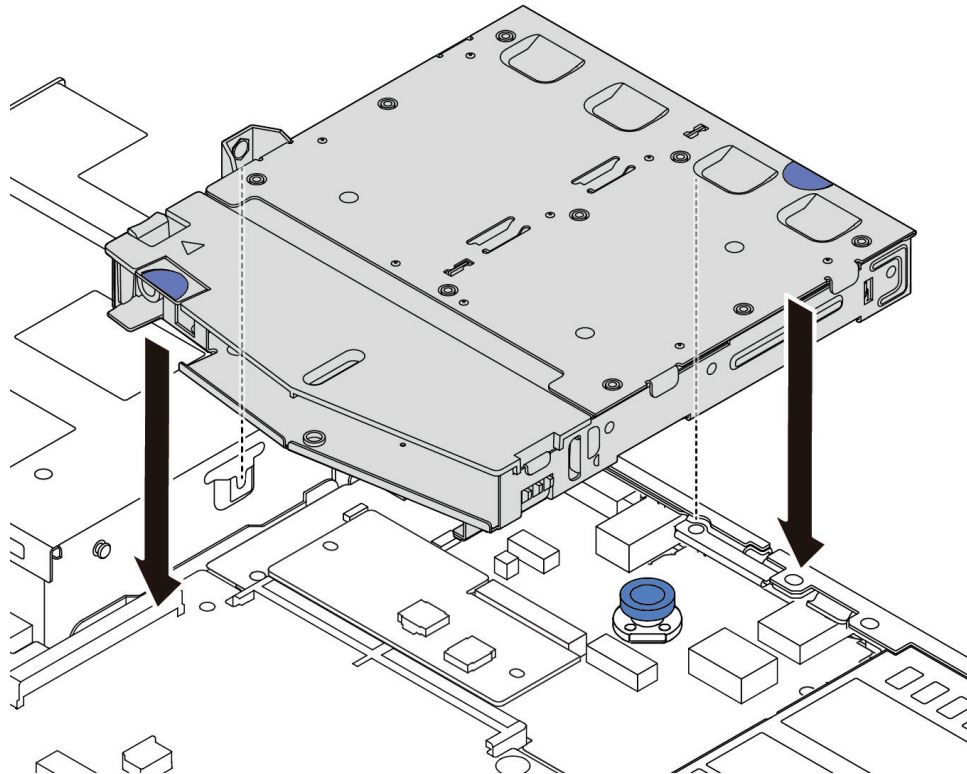


Figure 187. Hot-swap rear drive cage installation

- Step 7. Connect the cables to the system board or expansion slots. See [Chapter 6 “Internal cable routing” on page 241](#).

After you finish

1. Reinstall the drives or drive fillers into the rear drive cage. See [“Install a 2.5-inch hot-swap drive” on page 117](#).
2. Complete the parts replacement. See [“Complete the parts replacement” on page 238](#).

Demo video

[Watch the procedure on YouTube](#)

Remove the 7mm rear drive assembly

Use this information to remove the rear drive assembly.

About this task

The following illustrates how to remove the 7mm rear drive assembly.

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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. Remove the top cover. See [“Remove the top cover” on page 235](#).
- Step 2. Remove the drives or drive fillers installed in the rear drive cage. See [“Remove a 2.5-inch hot-swap drive” on page 116](#).
- Step 3. Disconnect the rear drive cage cables from the system board or the PCIe adapter. See [Chapter 6 “Internal cable routing” on page 241](#).

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 system board assembly.
- 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.

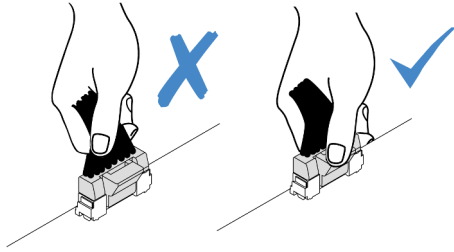


Figure 188. Disconnecting cables from the system board assembly

Step 4. Lift the rear drive cage out of the chassis.

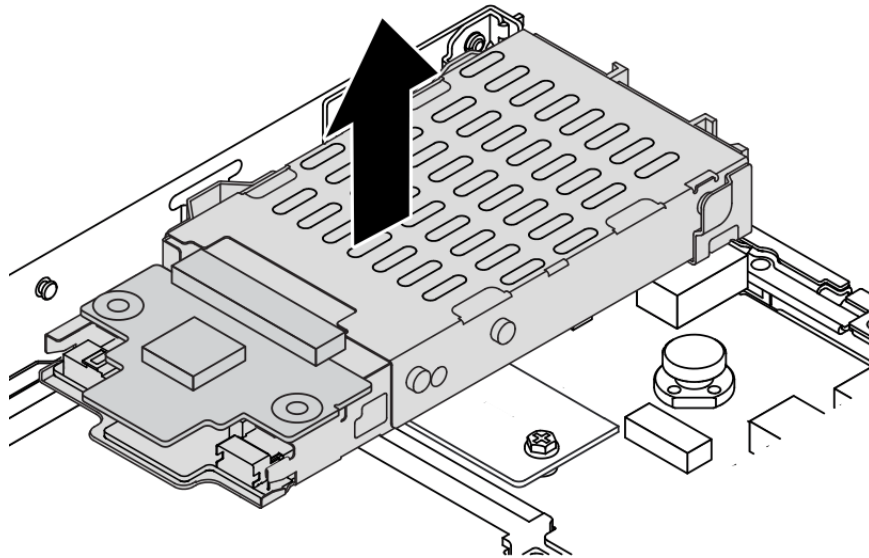


Figure 189. Hot-swap rear drive cage removal

Step 5. If the rear backplane is reused, remove the rear backplane. See [“Remove the 7mm drive backplanes” on page 70](#).

After you finish

If you are instructed to return the old rear drive cage, follow all packaging instructions and use any packaging materials provided.

Demo video

[Watch the procedure on YouTube](#)

Install the 7mm rear drive assembly

Use this information to install the rear drive assembly.

About this task

The following illustrates how to install the 7mm rear drive assembly.

Attention:

- Read [“Installation Guidelines”](#) on page 45 and [“Safety inspection checklist”](#) on page 46 to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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 rear drive cage to any unpainted surface on the outside of the server. And then, take the rear drive cage out of the package and place it on a static-protective surface.
- Step 2. Install the 7mm backplane, see [“Install the 7mm drive backplanes”](#) on page 72.
- Step 3. Align the pins on the 7mm rear drive cage with the corresponding pin and slot in the chassis. Then, lower the rear drive cage into the chassis until it is fully seated.

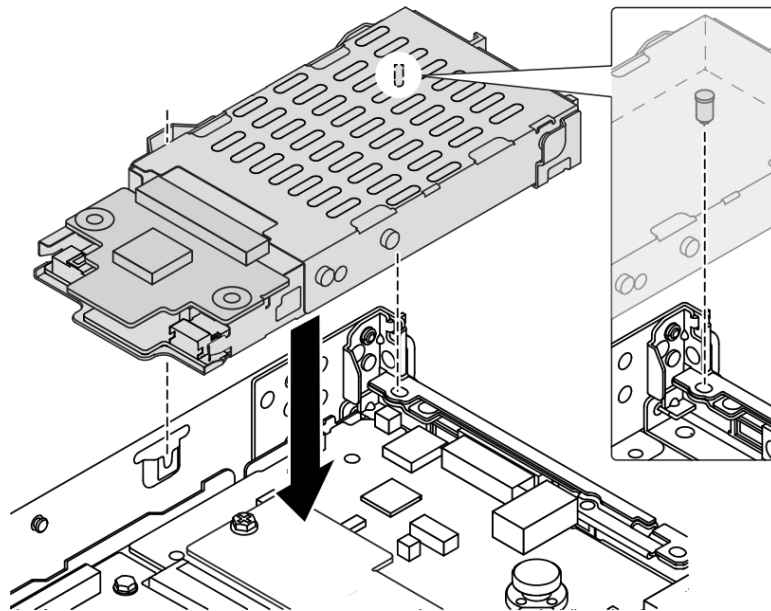


Figure 190. Hot-swap rear drive cage installation

- Step 4. Connect the cables from the backplanes to the system board and riser slot. See [Chapter 6 “Internal cable routing”](#) on page 241.

After you finish

1. Reinstall the drives or drive fillers into the rear drive cage. See [“Install a 2.5-inch hot-swap drive”](#) on page 117.
2. Complete the parts replacement. See [“Complete the parts replacement”](#) on page 238.

Demo video

[Watch the procedure on YouTube](#)

Security bezel replacement

Use this information to remove and install the security bezel.

Note: The security bezel is available on some models.

Remove the security bezel

Use this information to remove the security bezel.

About this task

Attention: Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.

Procedure

Step 1. Use the key to unlock the security bezel.

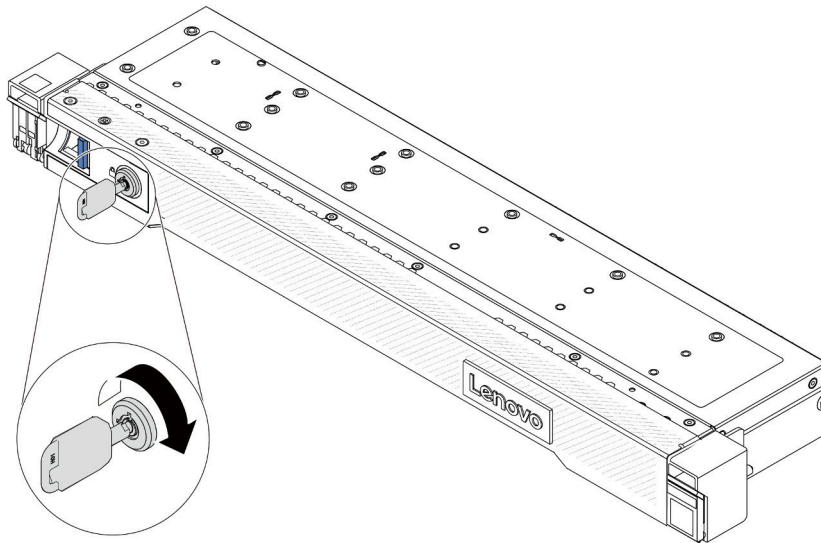


Figure 191. Unlocking the security bezel

Step 2. Remove the security bezel.

Attention: Before you ship the rack with the server installed, reinstall and lock the security bezel into place.

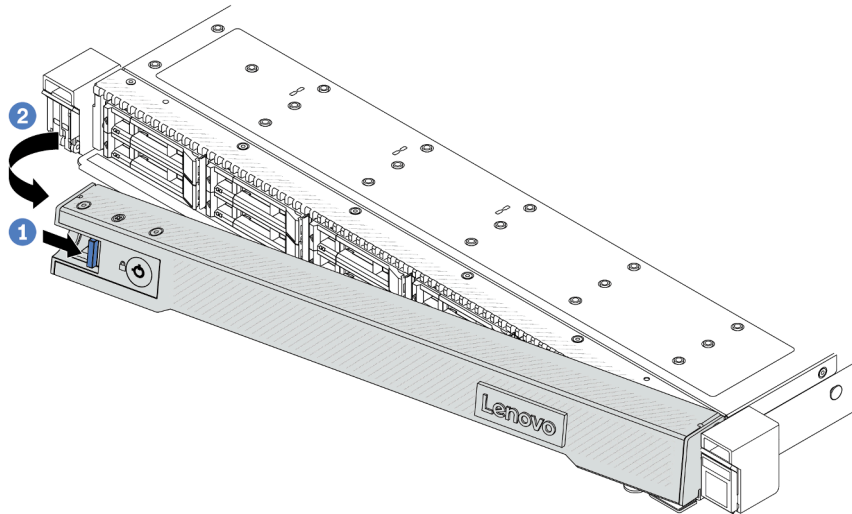


Figure 192. Security bezel removal

- a. **1** Press the release latch.
- b. **2** Rotate the security bezel outward to remove it from the chassis.

Demo video

[Watch the procedure on YouTube](#)

Install the security bezel

Use this information to install the security bezel.

About this task

Attention: Read “[Installation Guidelines](#)” on page 45 and “[Safety inspection checklist](#)” on page 46 to ensure that you work safely.

Procedure

Step 1. If you have removed the rack latches, reinstall them. See “[Install the rack latches](#)” on page 176.

Step 2. If the key is held inside the security bezel, remove it out of the security bezel.

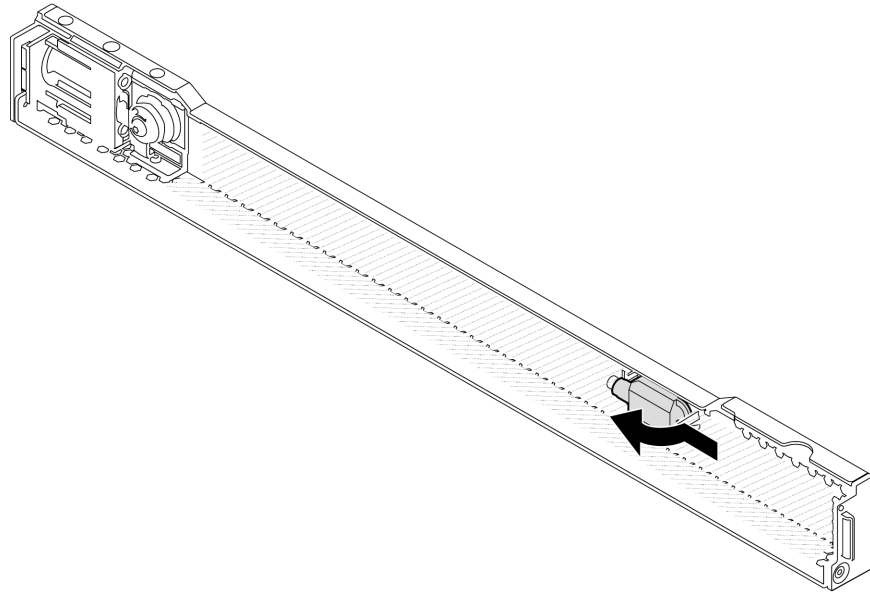


Figure 193. Key removal

Step 3. Install the security bezel to the chassis.

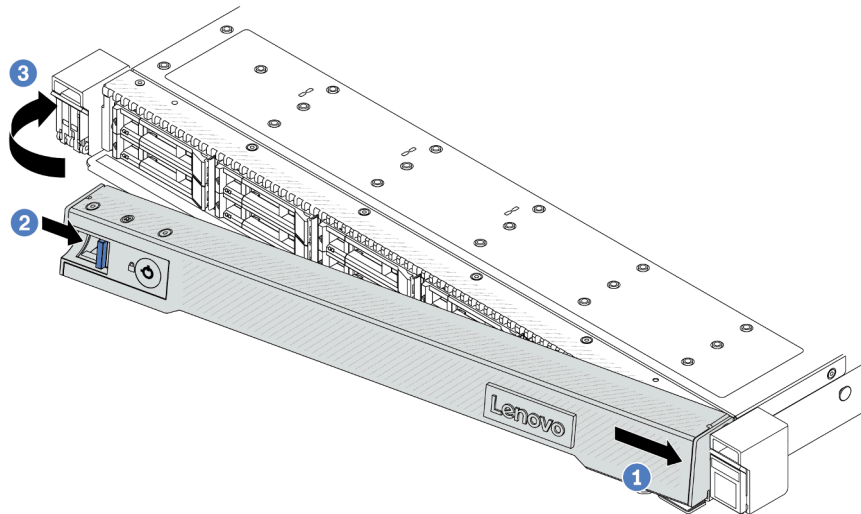


Figure 194. Security bezel installation

- a. 1 Insert the tab on the security bezel into the slot on the right rack latch.
- b. 2 Press and hold the blue release latch.
- c. 3 Rotate the security bezel inward until the left side clicks into place.

Step 4. Use the key to lock the security bezel to the closed position.

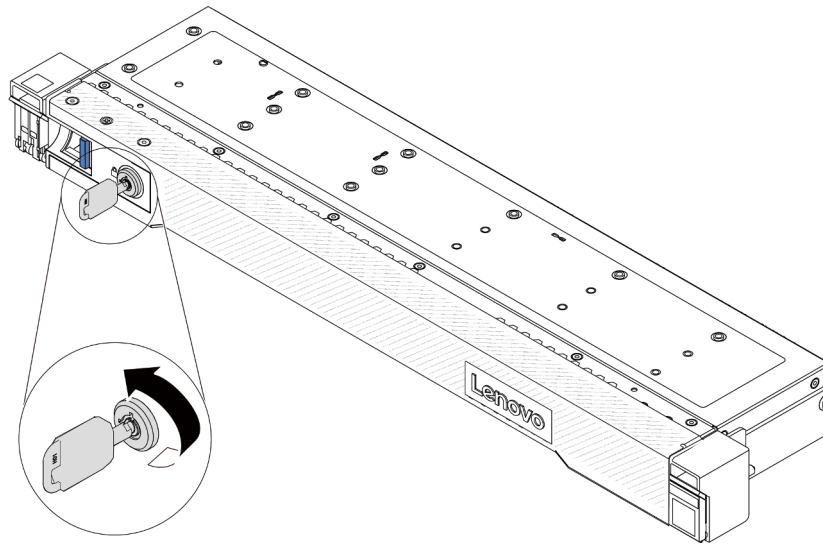


Figure 195. Locking the security bezel

Demo video

[Watch the procedure on YouTube](#)

Serial port module replacement

Use this information to remove and install a serial port module.

Remove a serial port module

Use this information to remove a serial port module.

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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. Remove the top cover. See [“Remove the top cover” on page 235](#).
- Step 2. Disconnect the cable of the serial port module from the system board.
- Step 3. Press the two latches on both ends at the same time, and carefully lift the riser cage out of the chassis by two latches.

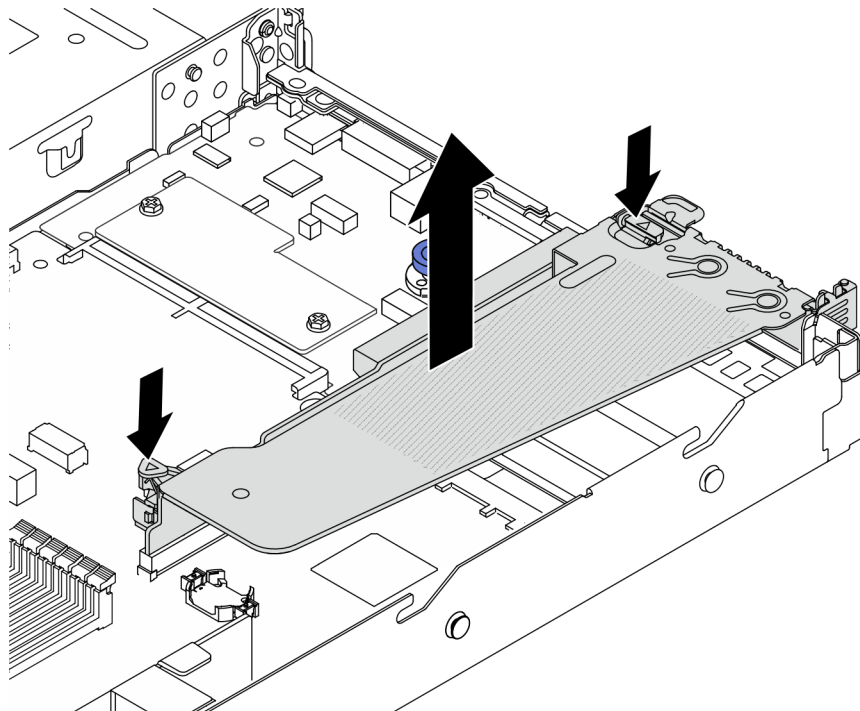


Figure 196. Removing the riser bracket

- Step 4. Open the retention latch and remove the serial port module from the riser bracket.

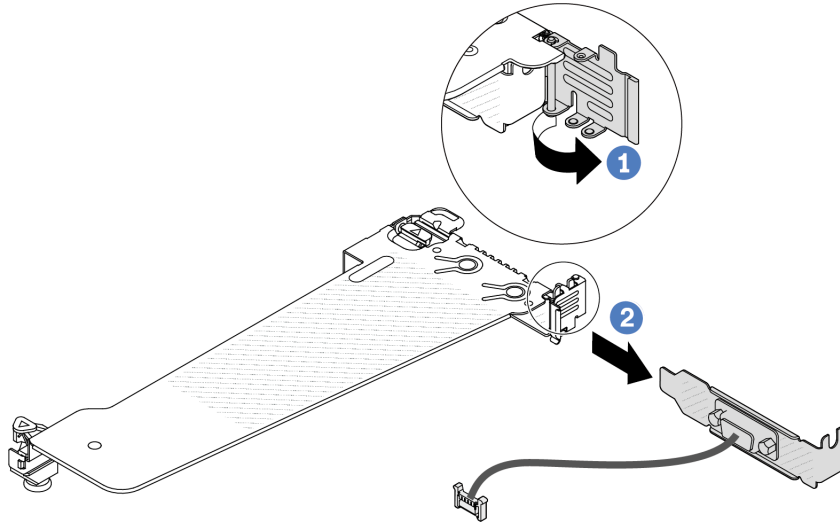


Figure 197. Removing the riser bracket

- a. ① Open the retention latch.
- b. ② Remove the serial port module from the riser bracket.

Step 5. (Optional) If you need to replace the serial port bracket, use a 5 mm wrench to disassemble the serial port cable from the bracket.

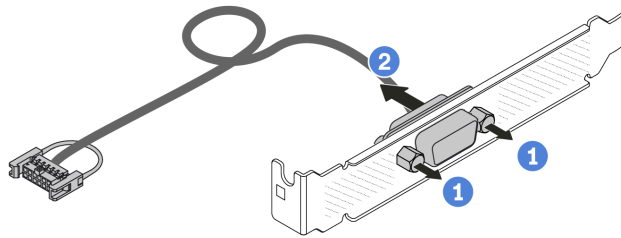


Figure 198. Disassembling the serial port module

- a. ① Loosen the two screws.
- b. ② Pull out the serial port cable from the bracket.

After you finish

1. Install a new serial port module, a PCIe adapter, or a PCIe slot bracket to cover the place. See [“Install a serial port module” on page 213](#) and [“Install a PCIe adapter” on page 160](#).
2. If you are instructed to return the old serial port module, follow all packaging instructions and use any packaging materials that are provided.

Demo video

[Watch the procedure on YouTube](#)

Install a serial port module

Use this information to install a serial port module.

About this task

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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 [“PCIe slots and adapters” on page 50](#) to ensure that you install the serial port module to a correct PCIe slot.

Procedure

- Step 1. Touch the static-protective package that contains the component to any unpainted surface on the outside of the server. Then, take the component out of the package and place it on a static-protective surface.
- Step 2. Use a 5 mm wrench to install the serial port cable into the bracket.

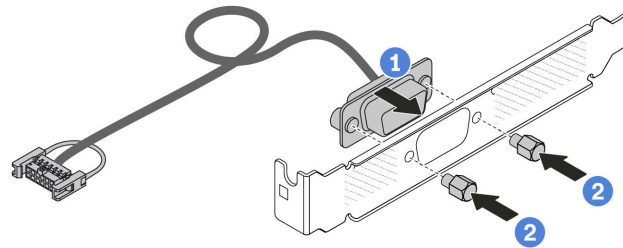


Figure 199. Assembling the serial port module

- 1 Align the two screw holes on the cable connector to the bracket.
 - 2 Install the two screws to the bracket.
- Step 3. Install the serial port module to the riser bracket.

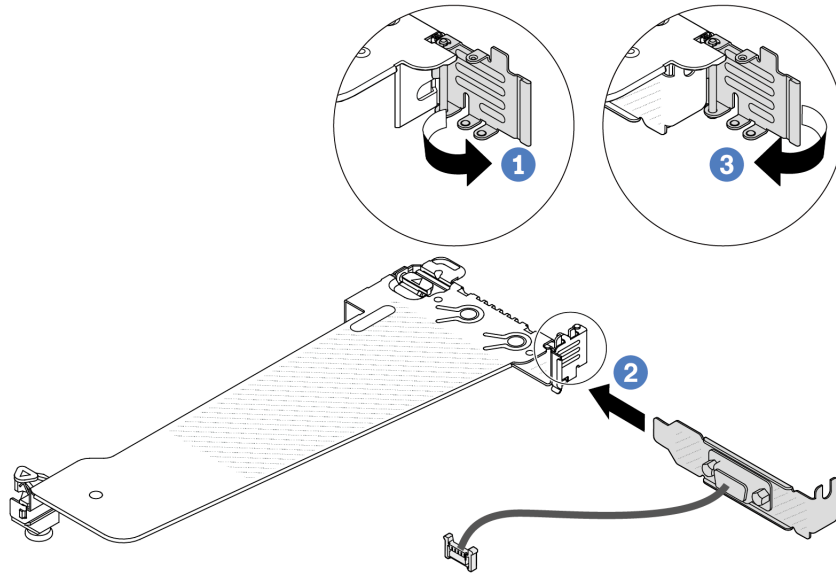


Figure 200. Installing the serial port module

- a. 1 Open the retention latch on the riser cage.
- b. 2 Install the serial port module to the riser bracket.
- c. 3 Close the retention latch and ensure that the serial port module is securely installed.

Step 4. Install the riser assembly to the server.

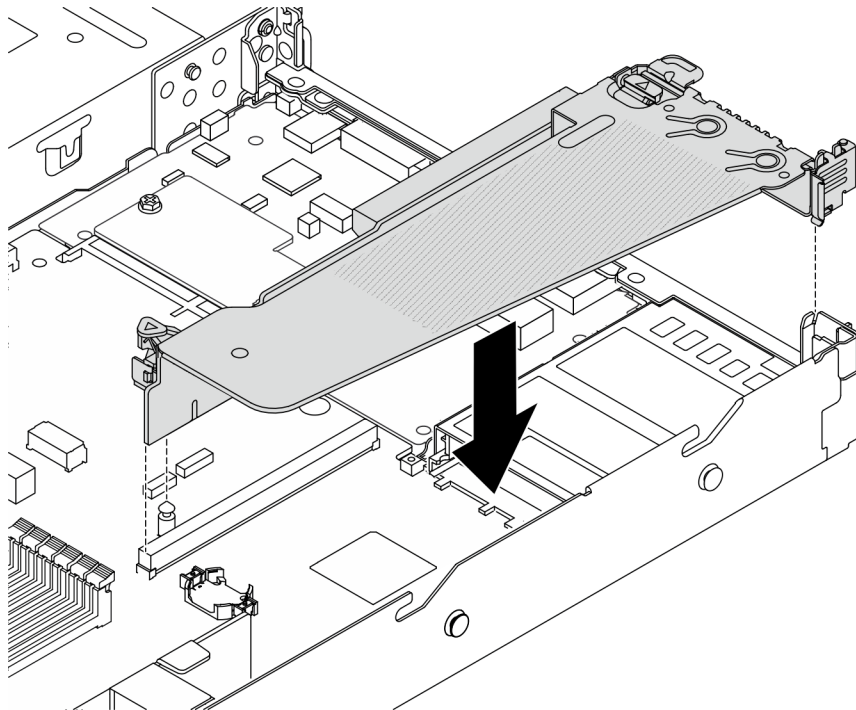


Figure 201. Installing the riser assembly

Step 5. Connect the cable of the serial port module to the serial-port-module connector on the system board. For the location of the serial-port-module 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 238](#).
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](#)

System board assembly replacement (Trained technicians 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](#).
 - 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 which contains the firmware and RoT security module, system I/O board, processor board, fan board and PIB board.

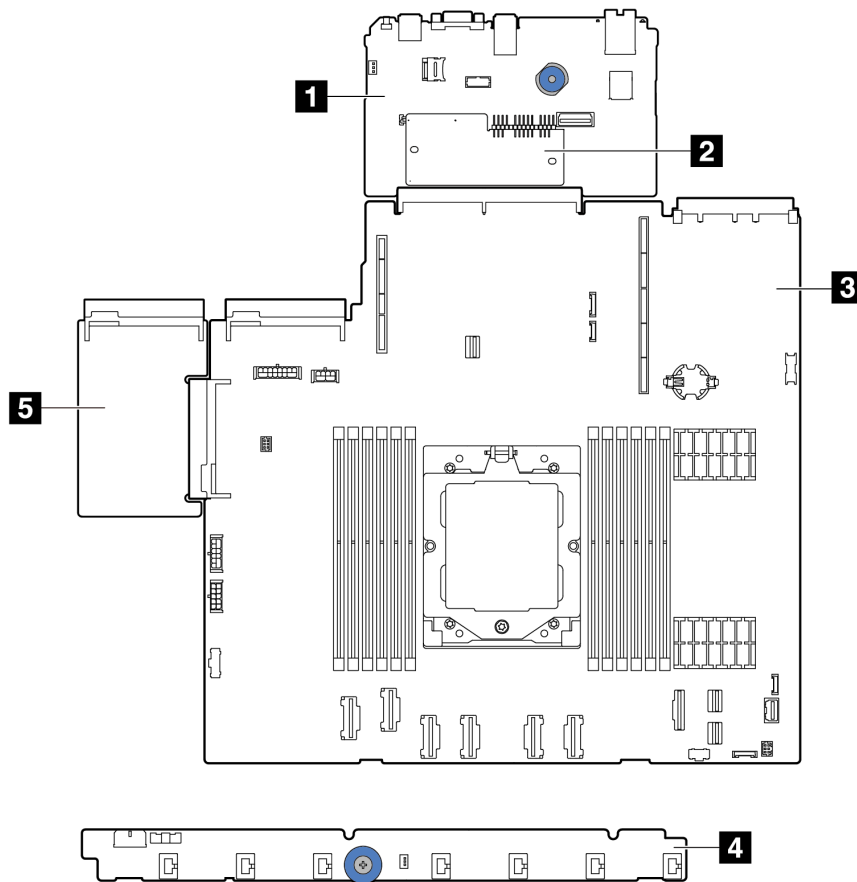


Figure 202. System-board-assembly layout

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

For the installation and removal of the fan board and the PIB board, see [“Fan board replacement”](#) on page 102 and [“Power inverter board \(PIB\) replacement”](#) on page 173.

For the installation and removal of RoT module, IO board and processor board, see:

- [“Remove the firmware and RoT security module”](#) on page 217

- [“Install the firmware and RoT security module” on page 218](#)
- [“Remove the system I/O board or processor board” on page 222](#)
- [“Install the system I/O board or processor board” on page 226](#)

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 45](#) and [“Safety inspection checklist” on page 46](#) 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 61](#).
- 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/sr635v3/7d9h//downloads/driver-list/> to see the latest firmware and driver updates for your server.
- Go to [“Update the firmware” on page 317](#) for more information on firmware updating tools.

Procedure

Step 1. Make preparation for the task.

- Perform OneCLI commands to back up the UEFI settings. See [OneCLI commands that save configuration settings](#).
- 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](#).
- 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.
- Remove the top cover. See [“Remove the top cover” on page 235](#).
- If your server comes with riser assemblies or a rear drive cage, remove it first.
 - [“Remove a rear riser card” on page 191](#)
 - [“Remove the 7mm rear drive assembly” on page 204](#)
 - [“Remove the 2.5-inch rear drive assembly” on page 200](#)

Step 2. Remove the firmware and RoT security module.

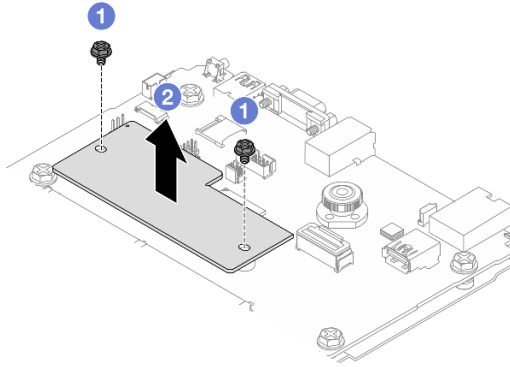


Figure 203. Firmware and RoT security module removal

- a. ① Loosen the two screws on the firmware and RoT security module.
- b. ② 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 45](#) and [“Safety inspection checklist” on page 46](#) 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 61](#).
- 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/sr635v3/7d9h/downloads/driver-list/> to see the latest firmware and driver updates for your server.
- Go to “[Update the firmware](#)” on [page 317](#) 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.

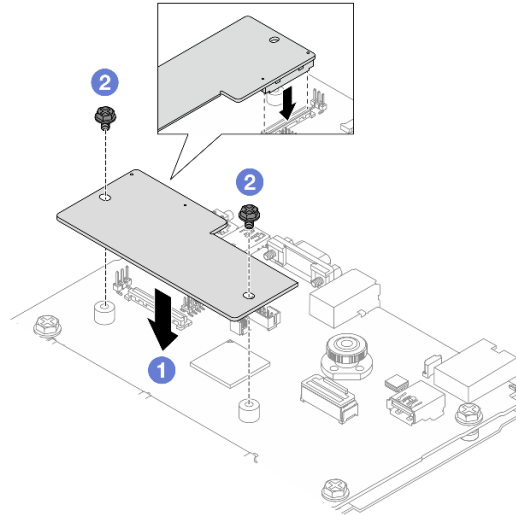


Figure 204. Firmware and RoT security module *installation*

- 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.
- 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:
 - “[Install a rear riser card](#)” on [page 194](#)
 - “[Install the 7mm rear drive assembly](#)” on [page 205](#)
 - “[Install the 2.5-inch rear drive assembly](#)” on [page 201](#)
2. Complete the parts replacement. See “[Complete the parts replacement](#)” on [page 238](#).
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/observe TPM” on page 220](#).
- Update the TPM firmware. See [“Update the TPM firmware” on page 221](#).
- Enable UEFI Secure Boot. See [“Enable UEFI Secure Boot” on page 221](#).

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 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" --imm <userid>:<password>@<ip_address> --override
```

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 PASSWORD (zero, not an uppercase o)
- `<ip_address>` is the IP address of the BMC.

Example:

```
D:\onecli>OneCli.exe config set TrustedComputingGroup.HideTPMfromOS "Yes" --imm USERID:PASSWORD=10.245.39.79 --override
Lenovo XClarity Essentials OneCLI 1xce_onecli01p-2.3.0
Licensed Materials - Property of Lenovo
(C) Copyright Lenovo Corp. 2013-2018 All Rights Reserved
If the parameters you input includes password, please Note that:
* The password must consist of a sequence of characters from `0-9a-zA-Z_+.$%!*^&*()=' set
* Use "" to quote when password parameters include special characters
* Do not use reserved characters in path name when parameter contains path
Invoking SET command ...
Connected to BMC at IP address 10.245.39.79 by IPMI
TrustedComputingGroup.HideTPMfromOS=Yes
Success.
```

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" --imm <userid>:<password>@<ip_address> --override
```

Example:

```
D:\onecli3>OneCli.exe config set TrustedComputingGroup.HideTPMfromOS "No" --imm USERID:PASSWORD=11@10.245.39.79 --override
Lenovo XClarity Essentials OneCLI 1xce_onecli01h-3.0.1
(C) Lenovo 2013-2020 All Rights Reserved

OneCLI License Agreement and OneCLI Legal Information can be found at the following location:
"D:\onecli3\Lic"

[!s]Certificate check finished [100%][=====]
Invoking SET command ...
Connected to BMC at IP address 10.245.39.79 by IPMI
TrustedComputingGroup.HideTPMfromOS=No
Configure successfully, please reboot system.
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 PASSWORD (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**.
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 SecureBootConfiguration.SecureBootSetting Enabled --bmc <userid>:<password>@<ip_<br>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 PASSWORD (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 SecureBootConfiguration.SecureBootSetting Disabled --bmc <userid>:<password>@<ip_<br>address>
```

Remove the system I/O board or processor board

Follow instructions in this section to remove the system I/O board or 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 system-board assembly, and set them aside on a static-protective surface for reinstallation.
- While replacing the old LACM module with a new one, you do not need to apply for a handle as the new LACM module contains it. However, you must apply for a handle first if you need to install or remove the processor board, I/O board, and PIB board when the server has an LACM module installed.

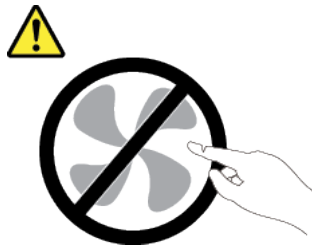
- When disconnecting cables, make a list of each cable and record the connectors the cable is connected to, and use the record as a cabling checklist after installing the new system board assembly.

Attention:

- Read “Installation Guidelines” on page 45 and “Safety inspection checklist” on page 46 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 61.
- 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.

- 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.
- Save the system configuration to an external device with Lenovo XClarity Essentials.
- 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 61](#).
- 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.
- f. Remove the top cover. See [“Remove the top cover” on page 235](#).
- g. If your server comes with a rear cage, remove it first. See [“Remove the rear 2.5-inch drive backplane” on page 67](#).
- h. Record where the cables are connected to the system board assembly; 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 system board assembly.
- 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.

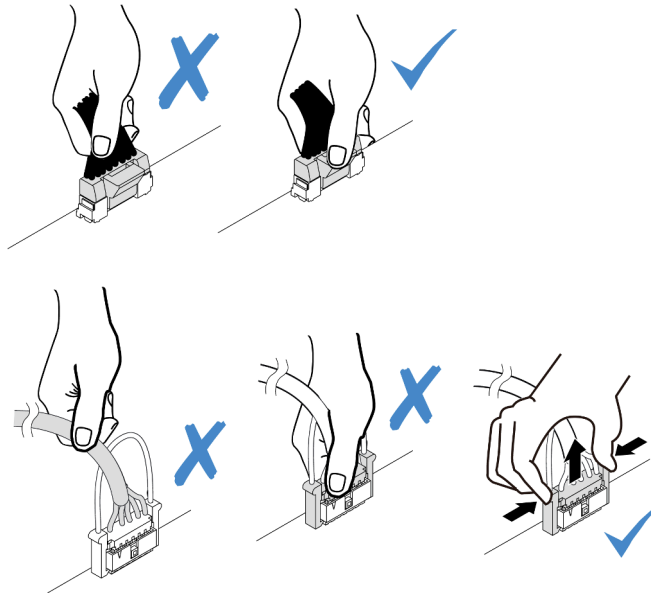


Figure 205. Disconnecting cables from the system board assembly

- 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 a system fan” on page 231](#)
 - [“Remove a memory module” on page 143](#) (for processor board replacement only)
 - [“Processor and heat sink replacement \(Trained technicians only\)” on page 165](#)
 - [“Remove the CMOS battery” on page 73](#) (for processor board replacement only)
 - [“Remove a rear riser card” on page 191](#)
 - [“Remove the rear OCP module” on page 196](#)

- j. Pull out the power supplies slightly. Ensure that they are disconnected from the system board assembly.

Step 2. Remove the system board assembly.

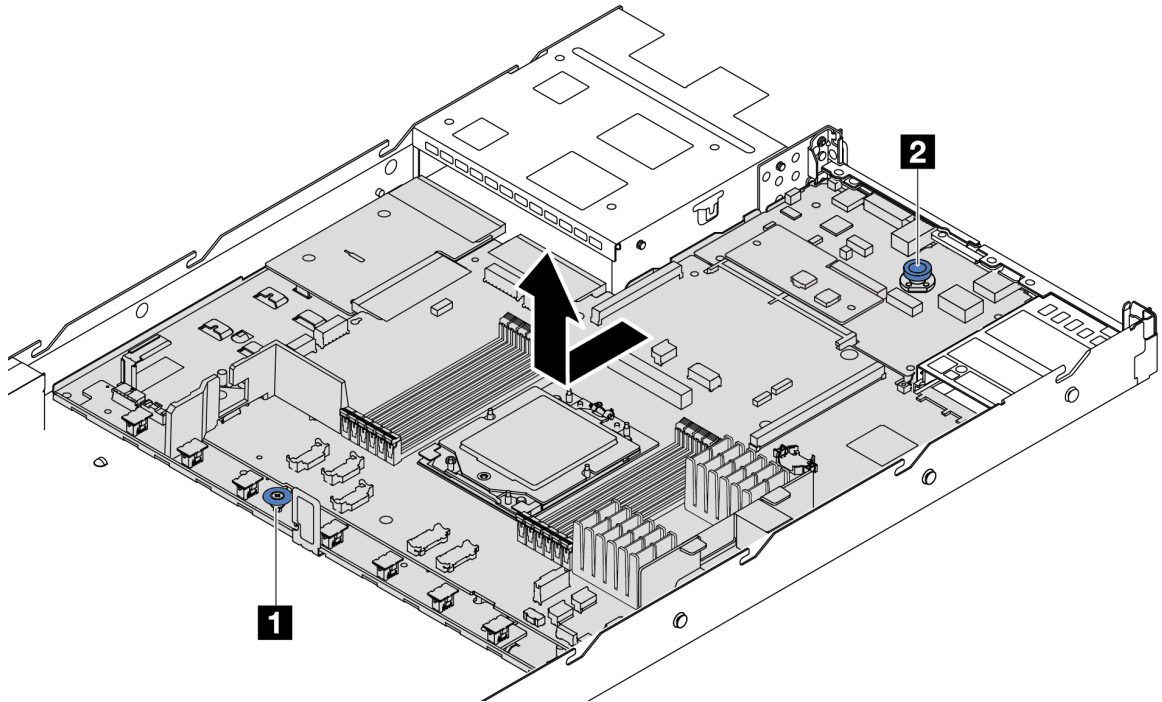


Figure 206. System board assembly removal

- a. ① Hold the lift handle **1** and lift the release pin **2** at the same time and slide the system board toward the front of the server.
- b. ② 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 102](#) and [“Remove the PIB board” on page 173](#).

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 217](#). If you are going to replace the processor board, go to next step directly.

Step 5. (Optional) Remove the MicroSD card. See [“Remove the MicroSD card” on page 156](#).

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.

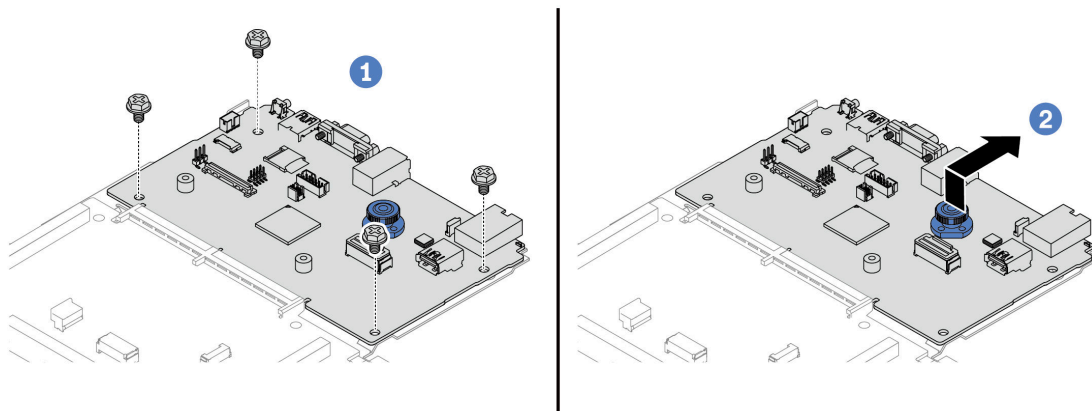


Figure 207. Separating the system I/O board from the processor board

- a. 1 Remove the screws that secure the system I/O board.
- b. 2 Lift and hold the rear lifting 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. Take a socket cover from the processor socket assembly on the new processor board and orient it correctly above the processor socket assembly on the removed processor board.
 2. Gently press down the socket cover legs to the processor socket assembly, pressing on the edges to avoid damage to the socket pins. You might hear a click on the socket cover is securely attached.
 3. **Make sure** that the socket cover is securely attached to the processor socket assembly.
- If you plan to recycle the component, see [“Disassemble the system board assembly for recycle” on page 367](#).

Demo video

[Watch the procedure on YouTube](#)

Install the system I/O board or processor board

Follow instructions in this section to install the system I/O board or 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 45 and “[Safety inspection checklist](#)” on page 46 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 61.
- 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/sr635v3/7d9h//downloads/driver-list/> to see the latest firmware and driver updates for your server.
- Go to “[Update the firmware](#)” on page 317 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 board onto the processor board. See “[Install the fan board](#)” on page 103 and “[Install the PIB board](#)” on page 174.
- 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.

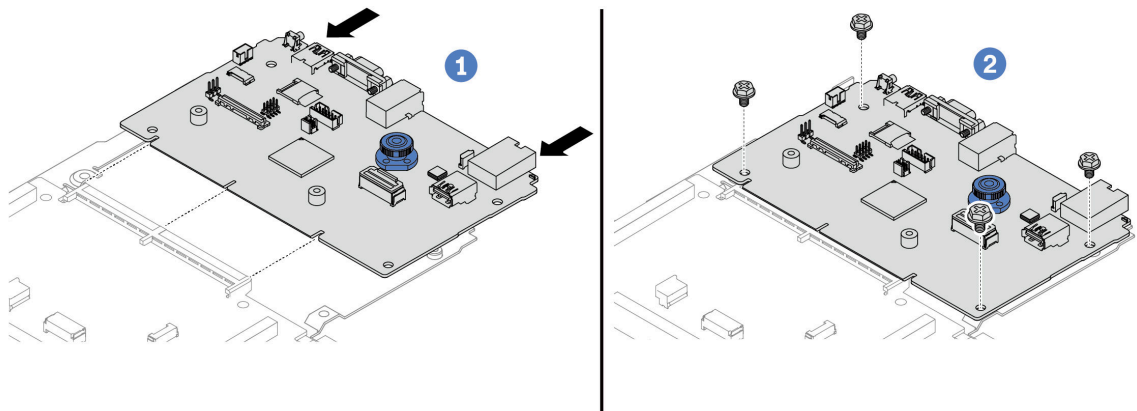
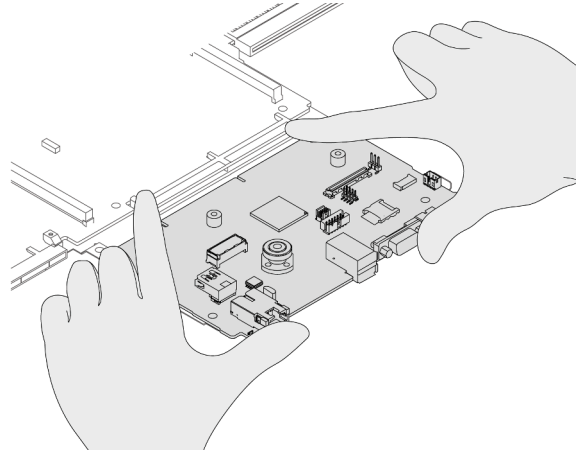


Figure 208. Installing the system I/O board onto the processor board

- 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 218](#).

Step 5. Install the MicroSD card ([“Install the MicroSD card” on page 157](#)).

Step 6. Install the system board assembly into the server.

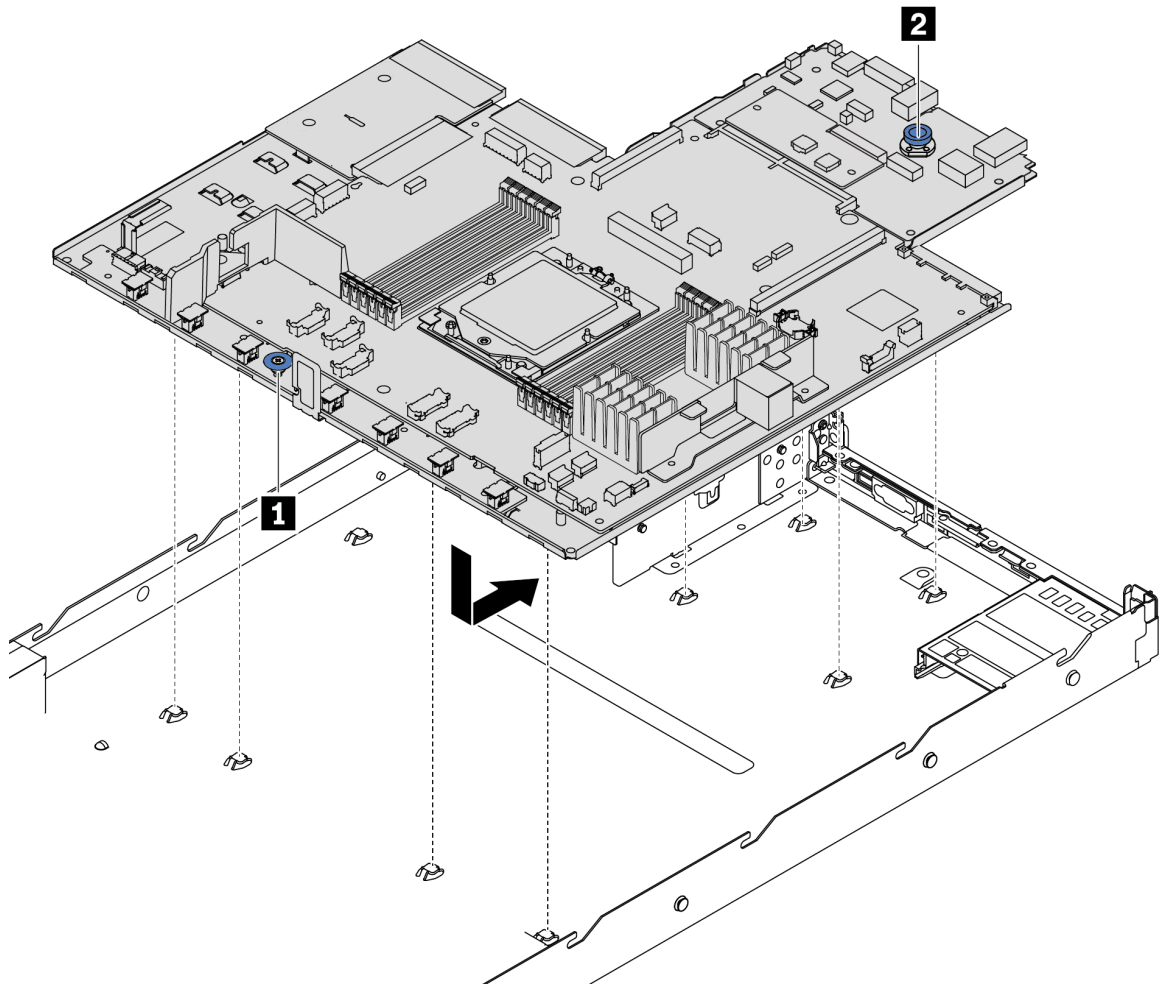


Figure 209. System board assembly installation

- a. 1 Hold the lift handle 1 and the release pin 2 at the same time to lower the system board into the chassis.
- b. 2 Slide the system board to the rear of the server until the system board snaps into position. Ensure that:
 - The rear connectors on the new system board are inserted into the corresponding holes in the rear panel.
 - The release pin 2 secures the system board in place.

After you finish

1. Install any components that you have removed:
 - [“Install a processor” on page 171](#)
 - [“Install a memory module” on page 145](#)
 - [“Install the CMOS battery” on page 75](#)
 - [“Install the RAID flash power module on the chassis” on page 180](#)
 - [“Install a system fan” on page 233](#)

- [“Install a rear riser card” on page 194](#)
 - [“Install the rear OCP module” on page 197](#)
 - [“Backplane replacement” on page 62](#)
2. Reconnect all the required cables to the same connectors on the system board assembly. See [Chapter 6 “Internal cable routing” on page 241](#).
 3. Ensure that all components have been reassembled correctly and that no tools or loose screws are left inside the server.
 4. Reinstall the top cover. See [“Install the top cover” on page 236](#).
 5. If the server was installed in a rack, reinstall the server into the rack. See [“Install the server to rack” on page 111](#).
 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 61](#).
 8. If the processor board is replaced, update the vital product data (VPD). See [“Update the Vital Product Data \(VPD\)” on page 230](#).

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 41](#).

9. Optionally, enable UEFI Secure Boot. See [“Enable UEFI Secure Boot” on page 221](#).

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]
```

```
onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifierEx <system model> --override [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 xxxxyyy, where xxxx is the machine type and yyy is the server model number.
<s/n>	The serial number on the server. Type zzzzzzz, where zzzzzzz 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 aaaaaaaaaaaaaaaaaaaaaaaaaaaaaa, where aaaaaaaaaaaaaaaaaaaaaaaaaaaaaa is the asset tag number.
[access_method]	<p>The access method that you select to access the target server.</p> <ul style="list-style-type: none"> • 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> <p>Notes:</p> <ul style="list-style-type: none"> – <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

Use this information to remove and install a system fan.

Remove a system fan

Use this information to remove a system fan. You can remove a hot-swap fan without powering off the server, which helps you avoid significant interruption to the operation of the system.

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 45](#) and [“Safety inspection checklist” on page 46](#) 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. Remove the top cover. See [“Remove the top cover” on page 235](#).

Step 2. Grasp the fan tabs on both ends of the system fan and carefully lift the system fan out of the server.

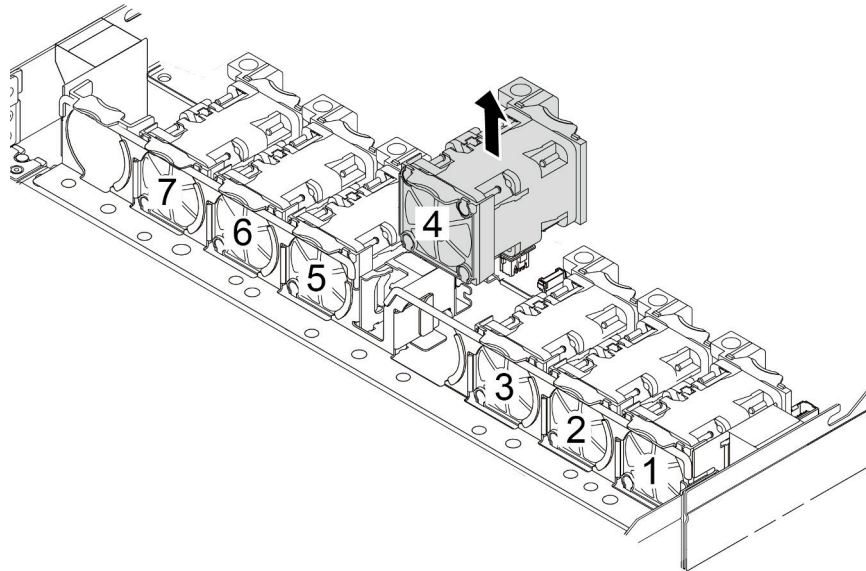


Figure 210. System fan removal

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 233](#).
2. If you are instructed to return the old system fan, follow all packaging instructions and use any packaging materials that are provided.

Demo video

[Watch the procedure on YouTube](#)

Install a system fan

Use this information to install a system fan. You can install a hot-swap fan without powering off the server, which helps you avoid significant interruption to the operation of the system.

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 45](#) and [“Safety inspection checklist” on page 46](#) 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 system fan to any unpainted surface on the outside of the server. Then, take the system fan out of the package and place it on a static-protective surface.

Step 2. Install the system fan.

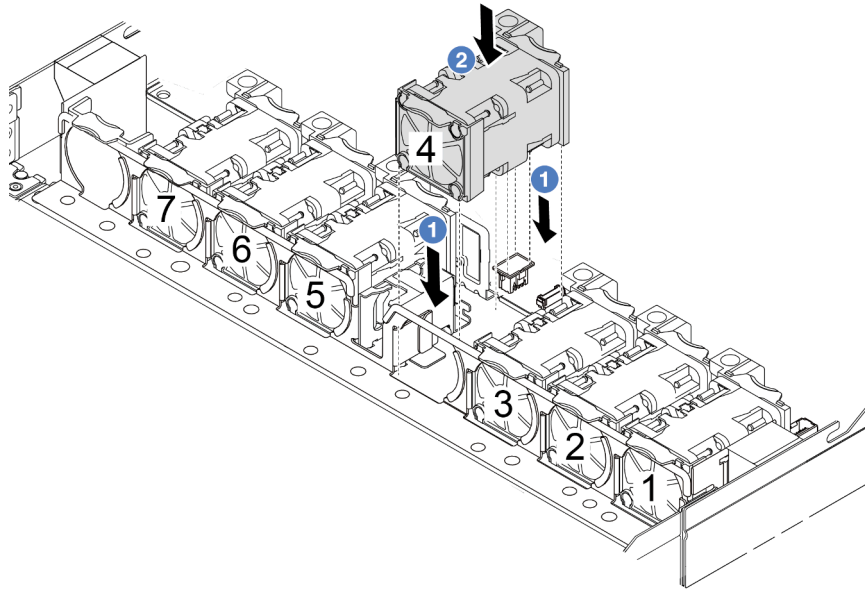


Figure 211. System fan installation

After you finish

Complete the parts replacement. See [“Complete the parts replacement” on page 238](#).

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

Follow instructions in this section to remove the top cover.

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.

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.

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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, remove the server from the rack. See the Rack Installation Guide that comes with the rail kit for your server.

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.

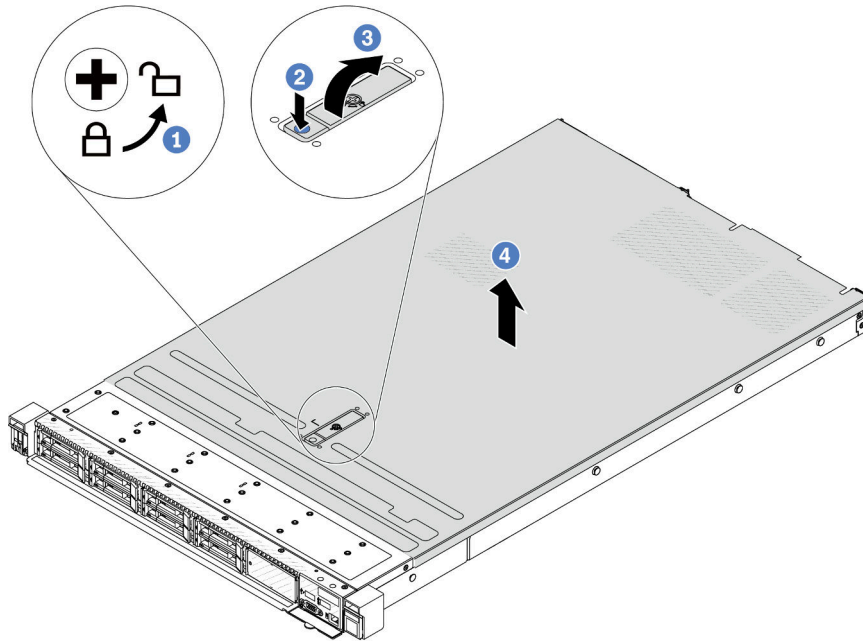


Figure 212. Top cover removal

- 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

Replace any options as required or install a new top cover. See [“Install the top cover” on page 236](#).

Demo video

[Watch the procedure on YouTube](#)

Install the top cover

Follow instructions in this section to install the top cover.

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.

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.

Attention:

- Read [“Installation Guidelines” on page 45](#) and [“Safety inspection checklist” on page 46](#) to ensure that you work safely.
- Power off the server and disconnect all power cords for this task.
- 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.

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.

Note: A new top cover comes without a service label attached. If you need a service label, order it together with the new top cover and attach the service label to the new top cover first.

Procedure

Step 1. Check your server and ensure 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.
- All internal cables are connected and routed correctly. See [Chapter 6 “Internal cable routing” on page 241](#).

Step 2. Install the top cover to your server.

Attention: Handle the top cover carefully. Dropping the top cover with the cover latch open might damage the cover latch.

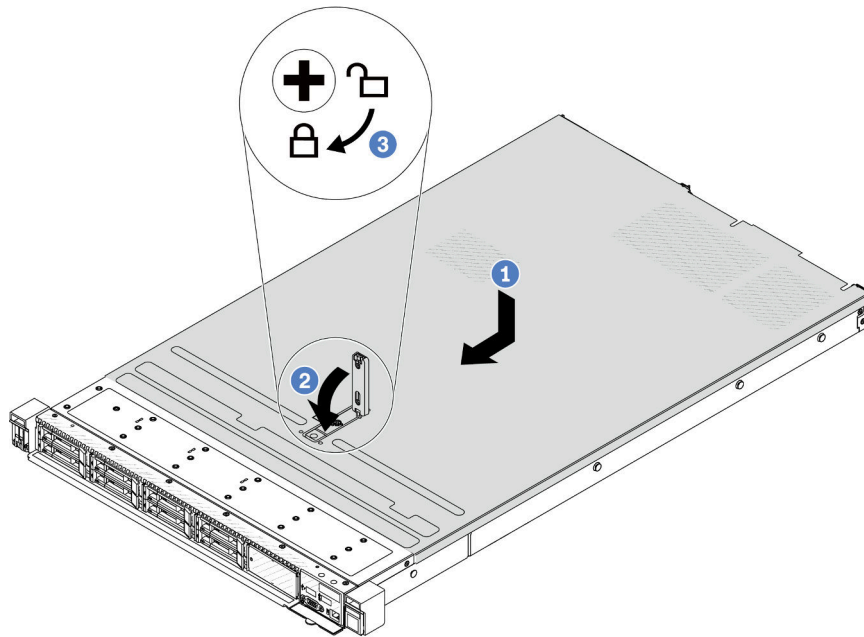


Figure 213. Top cover installation

- a. **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 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 the chassis correctly.

- b. **2** Press down the cover latch and ensure that the cover latch is completely closed.
- c. **3** Use a screwdriver to turn the cover lock to the locked position.

After you finish

After installing the top cover, complete the parts replacement. See [“Complete the parts replacement” on page 238](#).

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 top cover. See [“Install the top cover” on page 236](#).
4. If the sever was installed in a rack, reinstall the server into the rack. See [“Install the server to rack” on page 111](#).
5. Reconnect the power cords and any cables that you removed.
6. Power on the server and any peripheral devices. See [“Power on the server” on page 61](#).
7. 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 317](#).
 - 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.

Follow below guidelines when connecting cables:

- 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.

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

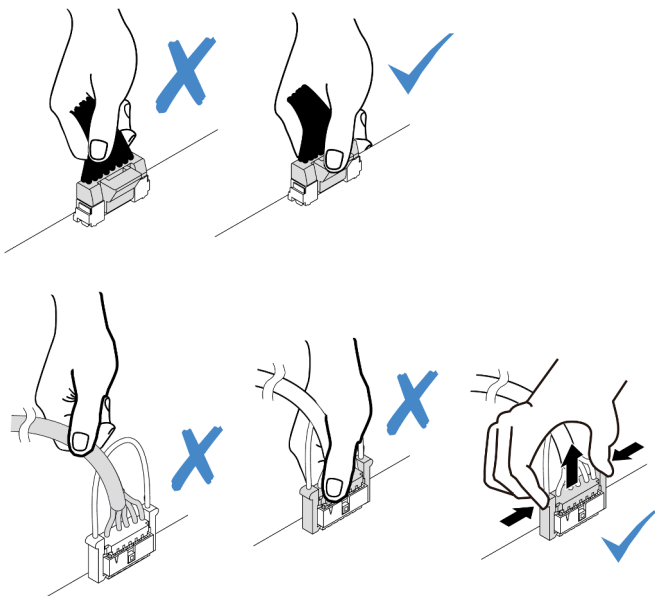


Figure 214. Disconnecting cables from the system board assembly

Identifying connectors

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

Drive backplane connectors

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

- [“10 x 2.5-inch SAS/SATA/AnyBay backplane” on page 242](#)

- “8 x 2.5-inch SAS/SATA backplane” on page 243
- “4 x 2.5-inch SAS/SATA/NVMe/AnyBay backplane” on page 243
- “16 x EDSFF backplane” on page 244
- “Rear 7mm SAS/SATA/NVMe backplane” on page 244
- “Rear 2 x 2.5-inch SAS/SATA/NVMe backplane” on page 245
- “M.2 drive backplane” on page 245

10 x 2.5-inch SAS/SATA/AnyBay backplane

See this section to locate the connectors on the 10 x 2.5-inch drive backplane.

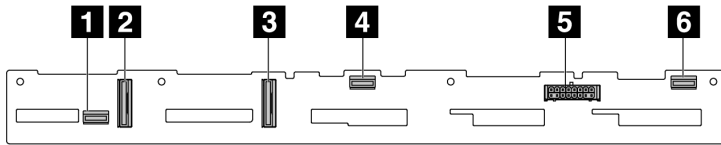
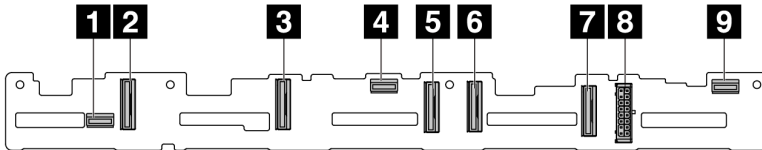


Figure 215. 6 x SAS/SATA + 4 x Anybay backplane

- 1** SAS 2
- 2** NVMe 2–3
- 3** NVMe 0–1
- 4** SAS 1
- 5** Power
- 6** SAS 0



- 1** SAS 2
- 2** NVMe 8–9
- 3** NVMe 6–7
- 4** SAS 1
- 5** NVMe 4–5
- 6** NVMe 2–3
- 7** NVMe 0–1
- 8** Power
- 9** SAS 0

Figure 216. 10 x 2.5 AnyBay backplane (Gen 4)

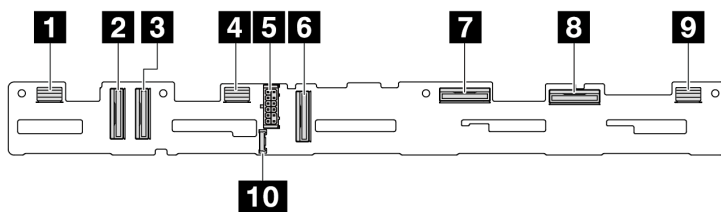


Figure 217. 10 x 2.5 AnyBay backplane (Gen 5)

- 1 SAS 8–9
- 2 NVMe 8–9
- 3 NVMe 6–7
- 4 SAS 4–7
- 5 Power
- 6 NVMe 4–5
- 7 NVMe 2–3
- 8 NVMe 0–1
- 9 SAS 0–3
- 10 Sideband connector

8 x 2.5-inch SAS/SATA backplane

See this section to locate the connectors on the 8 x 2.5-inch drive backplane.

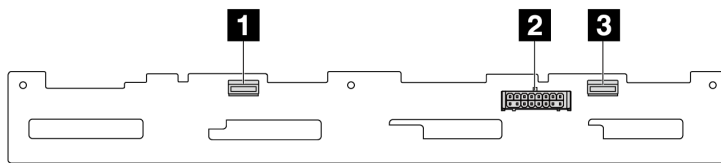


Figure 218. 8 x 2.5 SAS/SATA backplane

- 1 SAS 1
- 2 Power
- 3 SAS 0

4 x 2.5-inch SAS/SATA/NVMe/AnyBay backplane

See this section to locate the connectors on the 4 x 2.5-inch drive backplane.

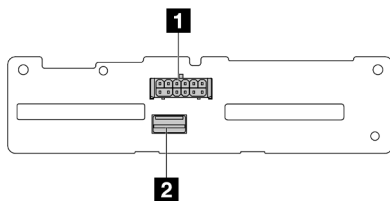


Figure 219. 4 x 2.5-inch SAS/SATA backplane

- 1 Power
- 2 SAS

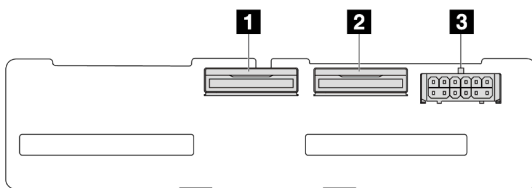


Figure 220. 4 x 2.5-inch NVMe backplane

- 1 NVMe 2–3

- 2 NVMe 0-1
- 3 Power

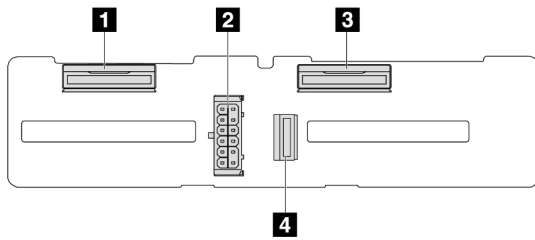
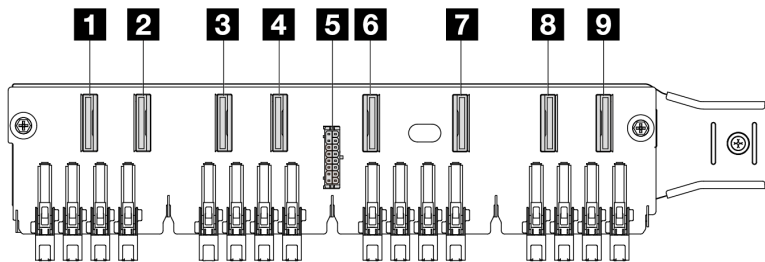


Figure 221. 4 x 2.5-inch AnyBay backplane

- 1 NVMe 2-3
- 2 Power
- 3 NVMe 0-1
- 4 SAS

16 x EDSFF backplane

See this section to locate the connectors on the 16 x EDSFF drive backplane.



- 1 EDSFF 0-1
- 2 EDSFF 2-3
- 3 EDSFF 4-5
- 4 EDSFF 6-7
- 5 Power
- 6 EDSFF 8-9
- 7 EDSFF 10-11
- 8 EDSFF 12-13
- 9 EDSFF 14-15

Rear 7mm SAS/SATA/NVMe backplane

See this section to locate the connectors on the rear 7mm drive backplane.

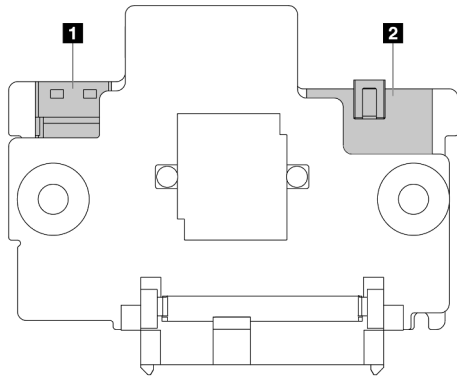


Figure 222. 7mm SAS/SATA/NVMe backplane (top + bottom)

- 1 Power
- 2 Signal

Rear 2 x 2.5-inch SAS/SATA/NVMe backplane

See this section to locate the connectors on the rear 2 x 2.5-inch drive backplane.

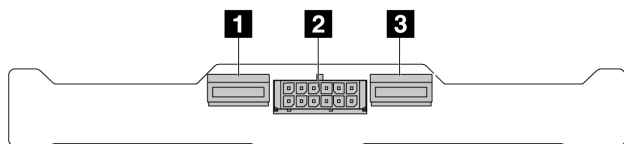


Figure 223. Rear 2 x 2.5 NVMe backplane

- 1 NVMe 1
- 2 Power
- 3 NVMe 0

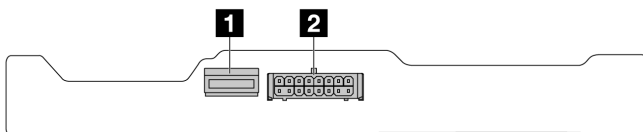


Figure 224. Rear 2 x 2.5 SAS/SATA backplane

- 1 SAS
- 2 Power

M.2 drive backplane

To locate the connectors on the M.2 drive backplanes, see [“M.2 backplane and M.2 drive replacement”](#) on [page 148](#) for details.

CFF RAID/HBA adapter

Use the section to understand the power cable and signal input cable routing for CFF RAID/HBA adapters.

Cable routing for CFF RAID adapters

For the locations of connectors on the processor board, refer to [“System-board-assembly connectors” on page 33](#).

The figures below present the power and input cable routing of CFF RAID/HBA adapters.

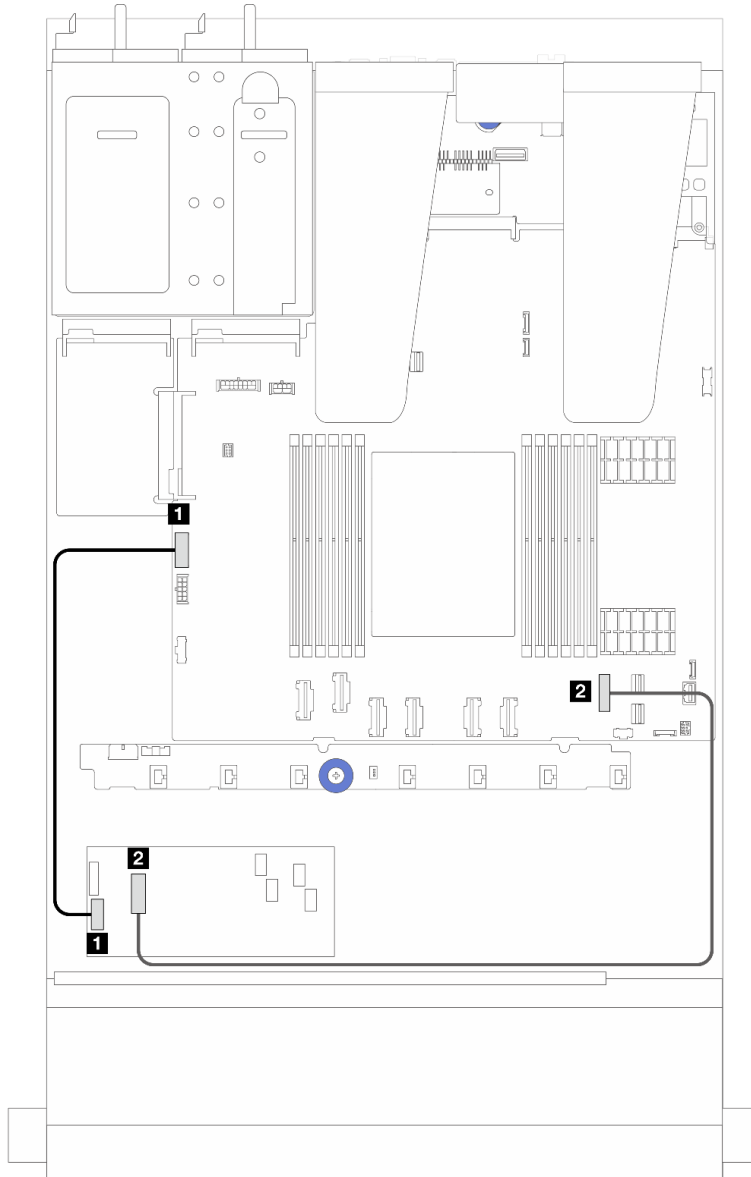


Figure 225. Gen 3 CFF RAID/HBA adapter power and input cabling

From	To
1 CFF power on the CFF RAID/HBA adapter	1 Internal RAID power connector
2 CFF input on the CFF RAID/HBA adapter	2 PCIe connector 7 on the processor board

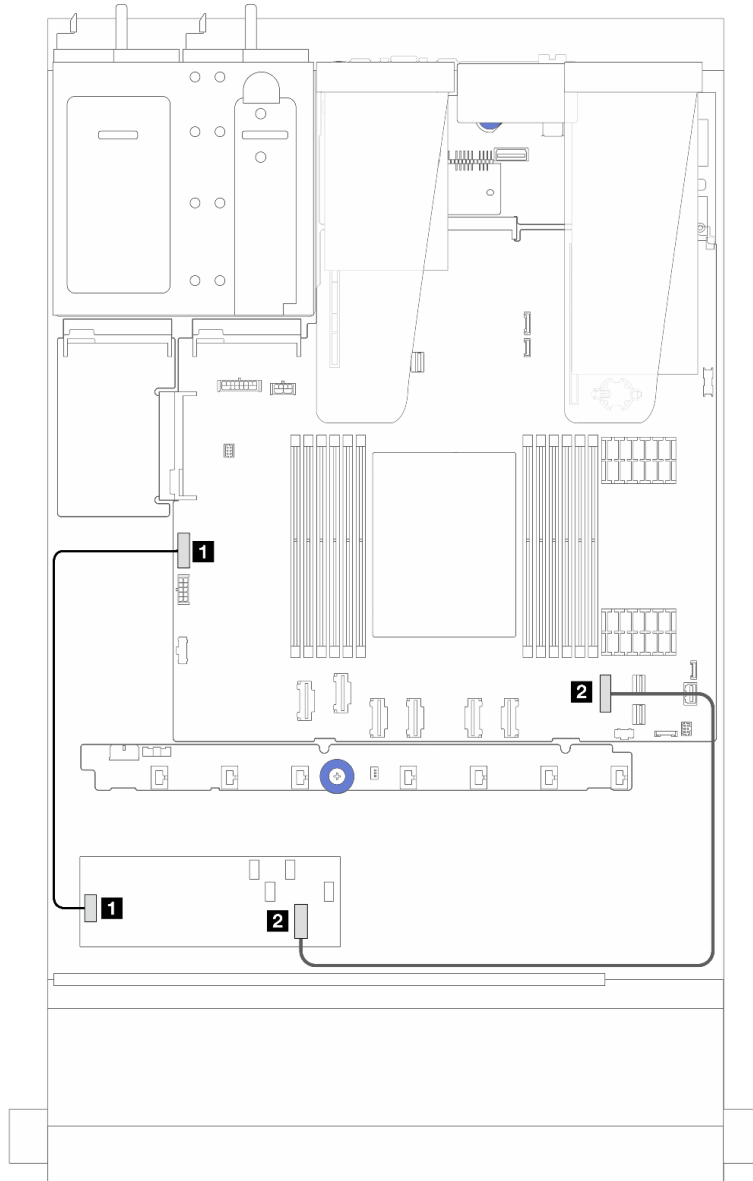


Figure 226. Gen 4 CFF RAID adapter power and input cabling

From	To
1 CFF power on the CFF RAID/HBA adapter	1 Internal RAID power connector
2 CFF input on the CFF RAID/HBA adapter	2 PCIe connector 7 on the processor board

Front I/O module cable routing

Use the section to understand the cable routing for front I/O module.

Note: The illustration shows the cabling scenario for server models with 2.5-inch front drive bays. Location of each connector on the front of the server varies by models. For detailed location of front I/O components for different models, see “Front view” in *User Guide*.

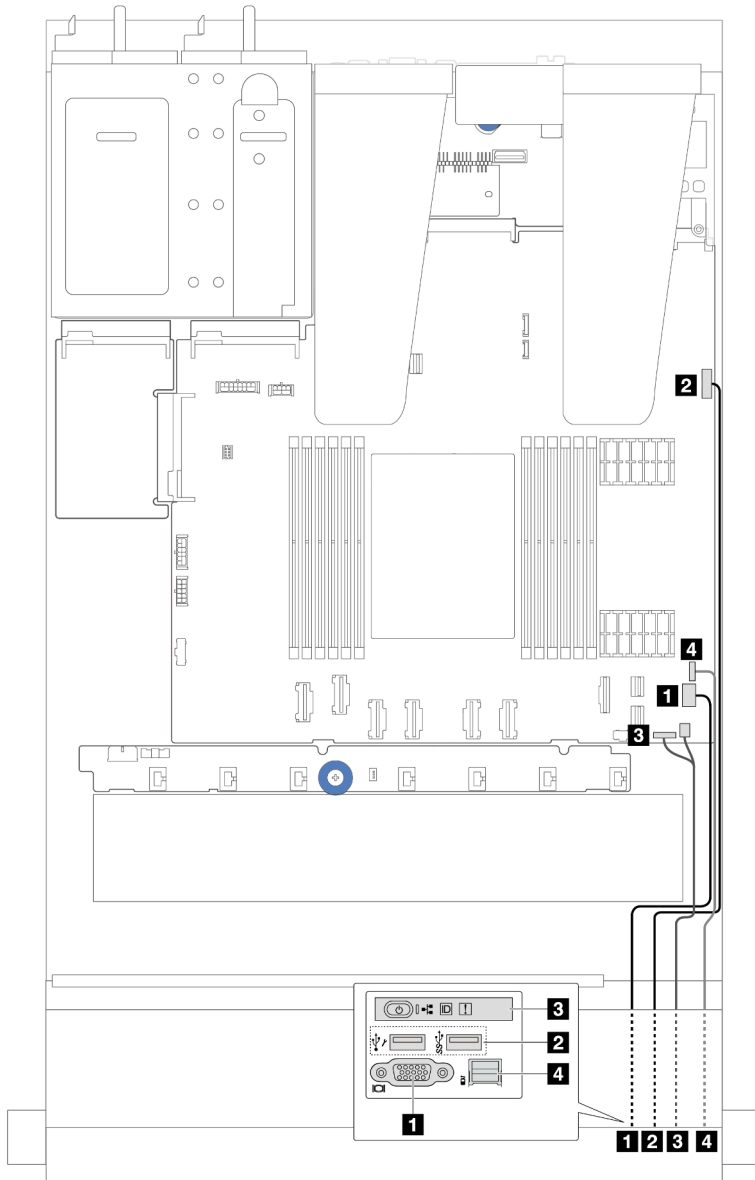


Figure 227. Cable routing for a front I/O module on 2.5-inch chassis

From	To
1 VGA cable	1 VGA connector on the system board assembly
2 USB cable	2 Front USB connector on the system board assembly

From	To
3 Diagnostics panel cable	3 Front I/O connector for Y cable and FIO connector on the system board assembly
4 External LCD diagnostics handset cable	4 External LCD connector ^{Note} on the system board assembly

Note: The external LCD connector is not available on certain front I/O modules of 10 x 2.5-inch server models.

Front riser assembly

Use the section to understand the power cable and signal cables routing for the front riser assembly.

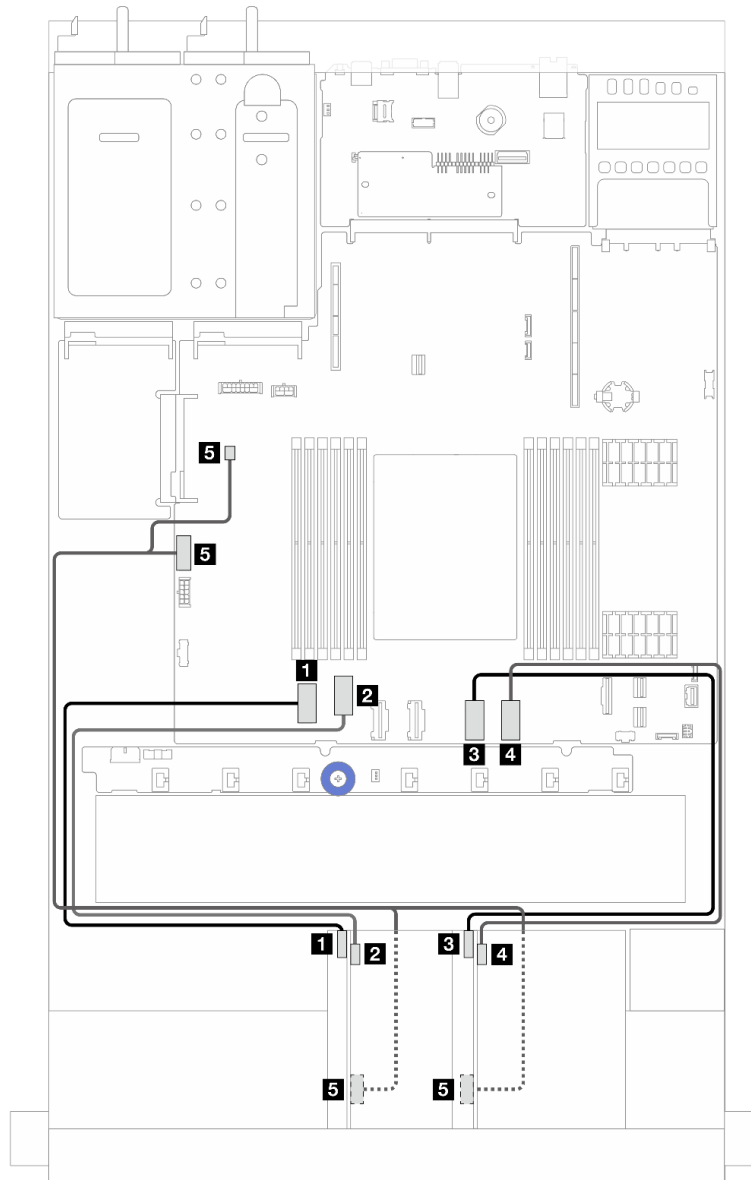


Figure 228. Cable routing for the front riser assembly

From	To
1 Riser 3 card signal (MCIO 2)	1 PCIe connector 1 on the system board assembly
2 Riser 3 card signal (MCIO 1)	2 PCIe connector 2 on the system board assembly
3 Riser 4 card signal (MCIO 2)	3 PCIe connector 5 on the system board assembly
4 Riser 4 card signal (MCIO 1)	4 PCIe connector 6 on the system board assembly
5 Riser 3 and Riser 4 power connectors	5 <ul style="list-style-type: none"> • CFF RAID power connector on the system board assembly • Pump connector on the system board assembly

Intrusion switch

Use the section to understand the cable routing for the intrusion switch.

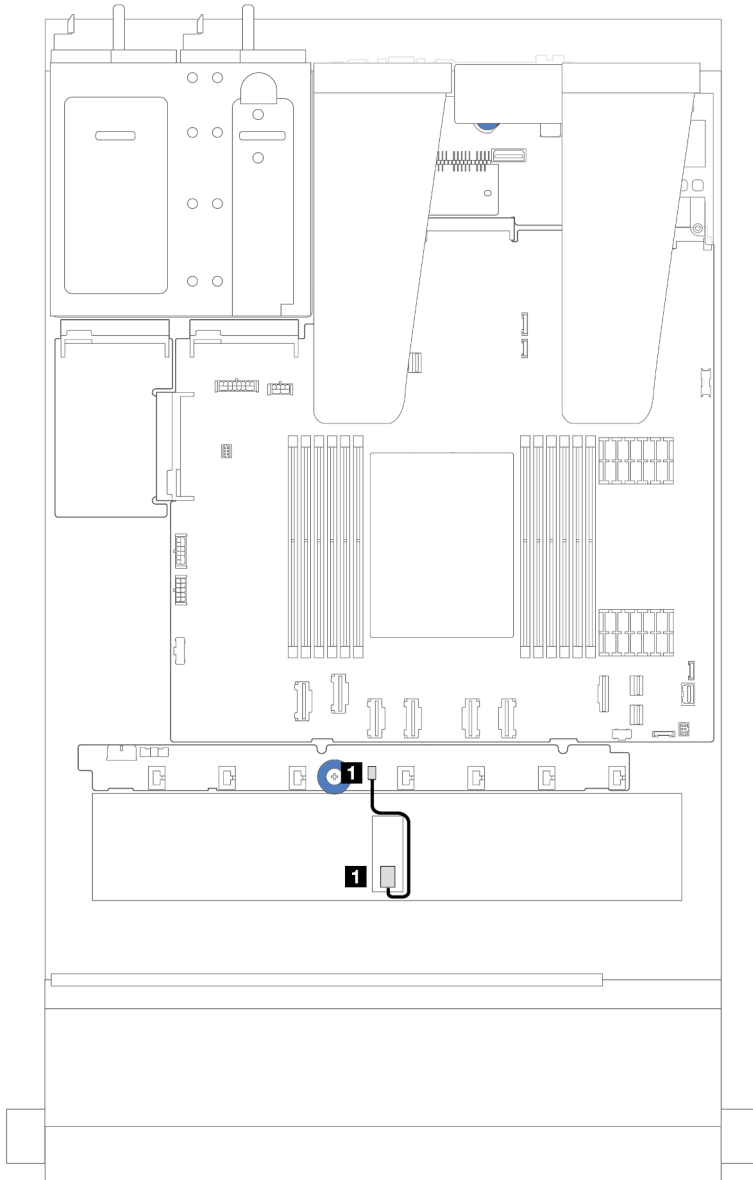


Figure 229. Intrusion switch cable routing

From	To
1 Intrusion switch cable	1 Intrusion switch connector on the system board assembly

OCP interposer card

Use the section to understand the cable routing between two OCP interposer cards and the system board assembly.

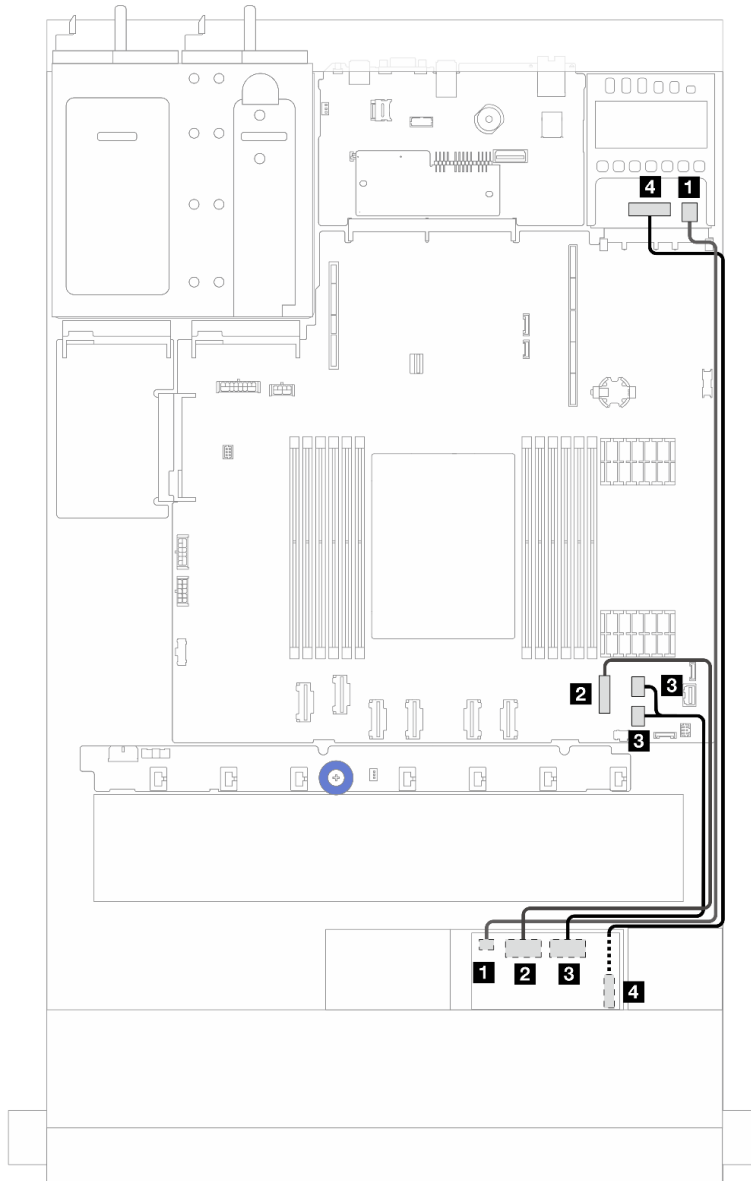


Figure 230. Cable routing for the OCP interposer cards

From	To
1 Front OCP interposer power	1 Rear OCP interposer power
2 Front OCP interposer signal (MCIO 2)	2 PCIe connector 7 on the system board assembly
3 Front OCP interposer signal (MCIO 1)	3 PCIe connectors 8 and 9 on the system board assembly
4 Front OCP interposer power sideband (SWIFT)	4 Rear OCP interposer power sideband (SWIFT)

RAID flash power modules

Use the section to understand the cable routing for RAID flash power modules.

Locations of RAID flash power modules

Use the illustration and table below to locate the RAID flash power modules.

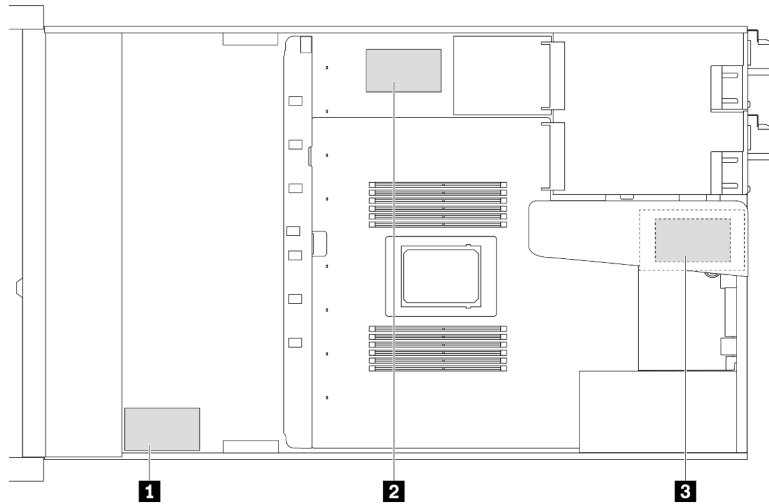


Figure 231. RAID flash power modules on the chassis

No.	Location	Suggested Priority	Use Scenarios
1	RAID flash power module on the chassis	1	Power for CFF and SFF RAID/HBA
2	RAID flash power module on the system board tray	2	Power for SFF RAID/HBA
3	RAID flash power module on the riser assembly (slot 3)	3	Power for SFF RAID/HBA

Cable routing of the RAID flash power module on the chassis

The following illustrations show the cable routing of the RAID flash power modules on the chassis

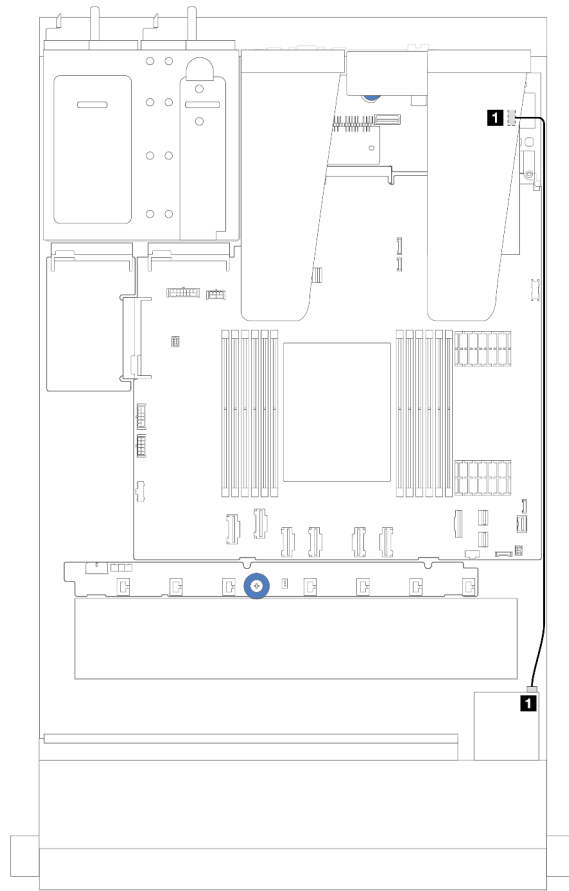
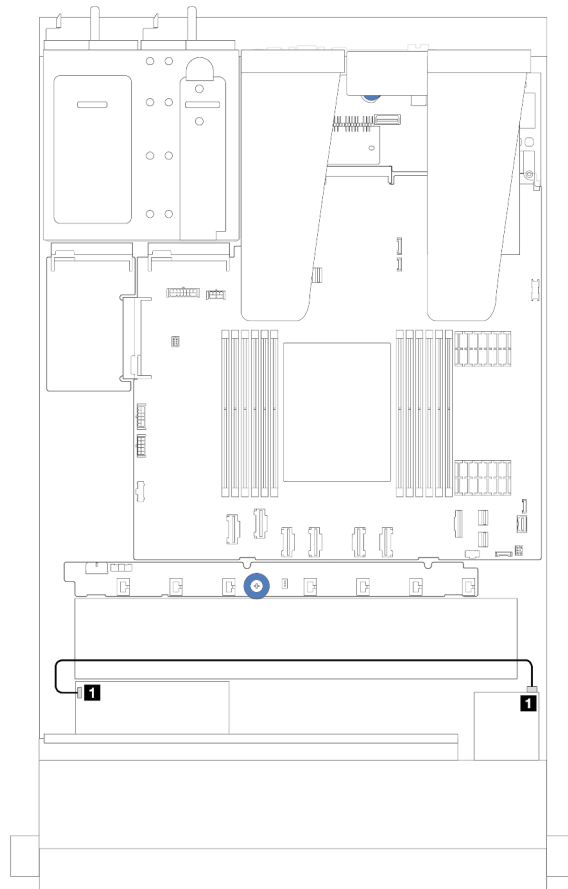


Figure 232. RAID flash power module cabling for SFF RAID/HBA adapters

From	To
1 RAID flash power module	1 RAID flash power port on the RAID/HBA adapter



From	To
1 RAID flash power module	1 RAID flash power port on the RAID/HBA adapter

Figure 233. RAID flash power module cabling for CFF RAID adapters

An extension cable is provided for each RAID flash power module for connection. Connect the RAID flash power module cable to the RAID flash power module connector on the corresponding RAID adapter as shown.

Cable routing of the RAID flash power module on the riser assembly

The following illustrations show the cable routing of the RAID flash power modules on the riser assembly.

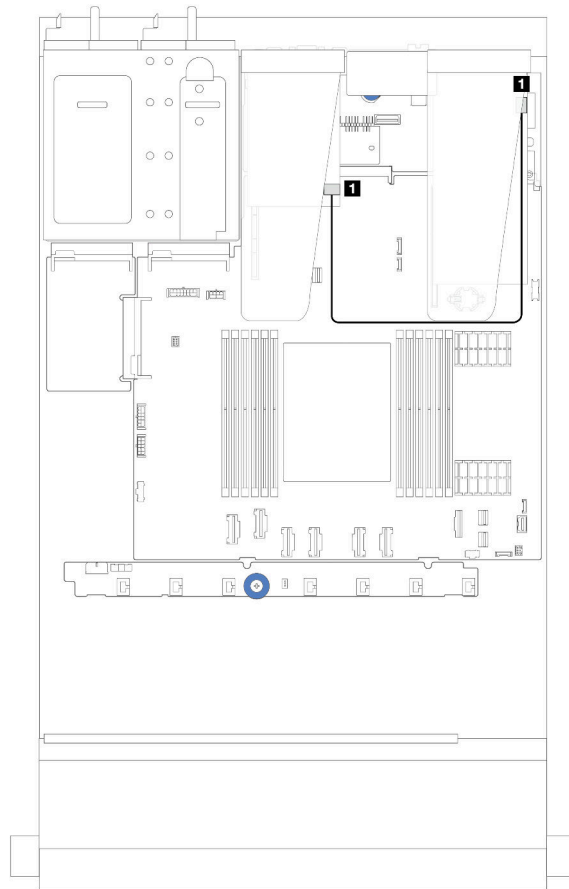


Figure 234. Cable routing of the RAID flash power module on the riser assembly

From	To
1 RAID flash power module	1 RAID flash power port on the RAID/HBA adapter

Cable routing of the RAID flash power modules on the system board tray

The following illustrations show the cable routing of the RAID flash power modules on the system board tray.

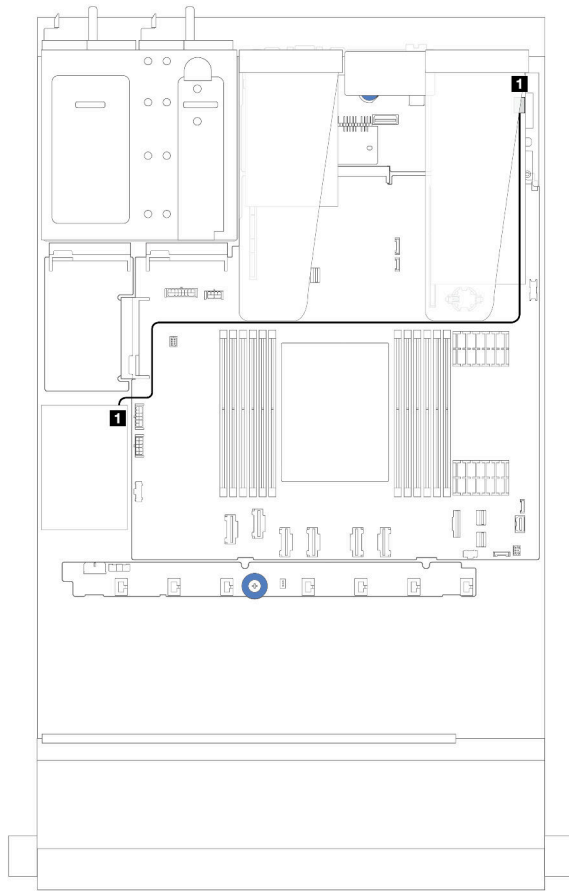


Figure 235. Cable routing of the RAID flash power modules on the system board tray

From	To
1 RAID flash power module	1 RAID flash power port on the RAID/HBA adapter

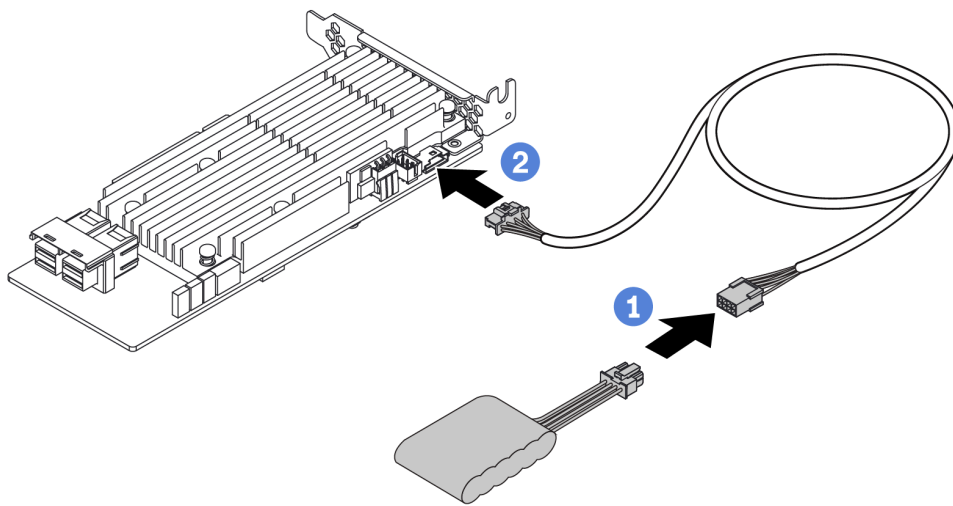


Figure 236. Power cable routing for RAID flash power module

From	To
RAID flash power module	RAID flash power port on the RAID/HBA adapter

Rear NVMe/SATA drive backplane

Use this section to understand the cable routing of rear NVMe/SATA backplanes.

- For the locations of rear NVMe/SATA drive backplane connectors on the processor board, see [“System-board-assembly connectors” on page 33](#) for details.
- See the following illustrations and tables for the onboard connections of rear NVMe/SATA drive backplanes:
 - [“Rear 2 x 2.5” NVMe drive backplane” on page 259](#)
 - [“Rear 2 x 2.5” SATA drive backplane” on page 260](#)

Rear 2 x 2.5" NVMe drive backplane

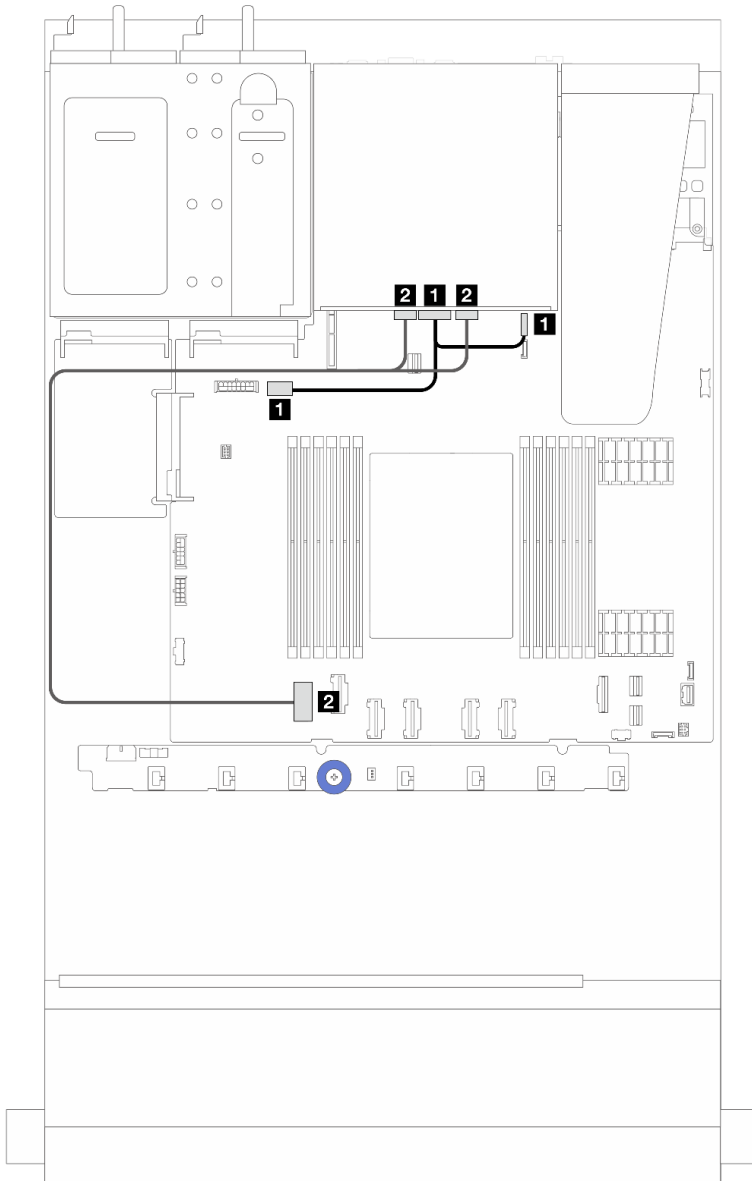


Figure 237. Rear 2 x 2.5" NVMe drive backplane cable routing

From	To
1 Power connector on the rear backplane	<ul style="list-style-type: none"> 1 Left: GPU/7mm/Rear backplane power connector on the system board assembly 1 Right: 7mm/Rear backplane sideband connector on the system board assembly
2 NVMe 0 connector and NVMe 1 connector on the rear backplane	2 PCIe connector 1 on the system board assembly

Rear 2 x 2.5" SATA drive backplane

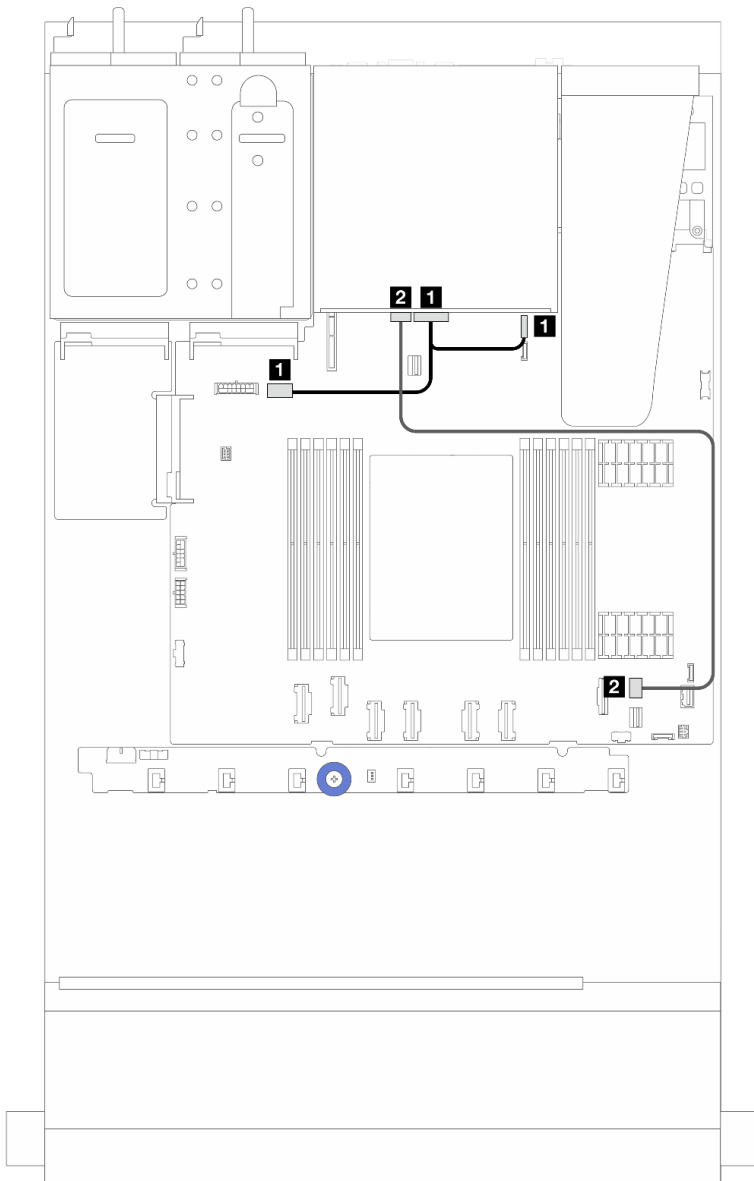


Figure 238. Rear 2 x 2.5" SATA drive backplane cable routing

From	To
1 Power connector on the rear backplane	<ul style="list-style-type: none"> 1 Left: GPU/7mm/Rear backplane power connector on the system board assembly 1 Right: 7mm/Rear backplane sideband connector on the system board assembly
2 SAS connector on the rear backplane	2 PCIe connector 8 on the system board assembly ^{note}

Note: For the configuration of 10 x 2.5" front SATA drives+ 2 x 2.5 rear SATA drives, it connects to PCIe connector 9 on the system board assembly.

7mm drive backplane

This section provides cable routing information for the 7mm drives.

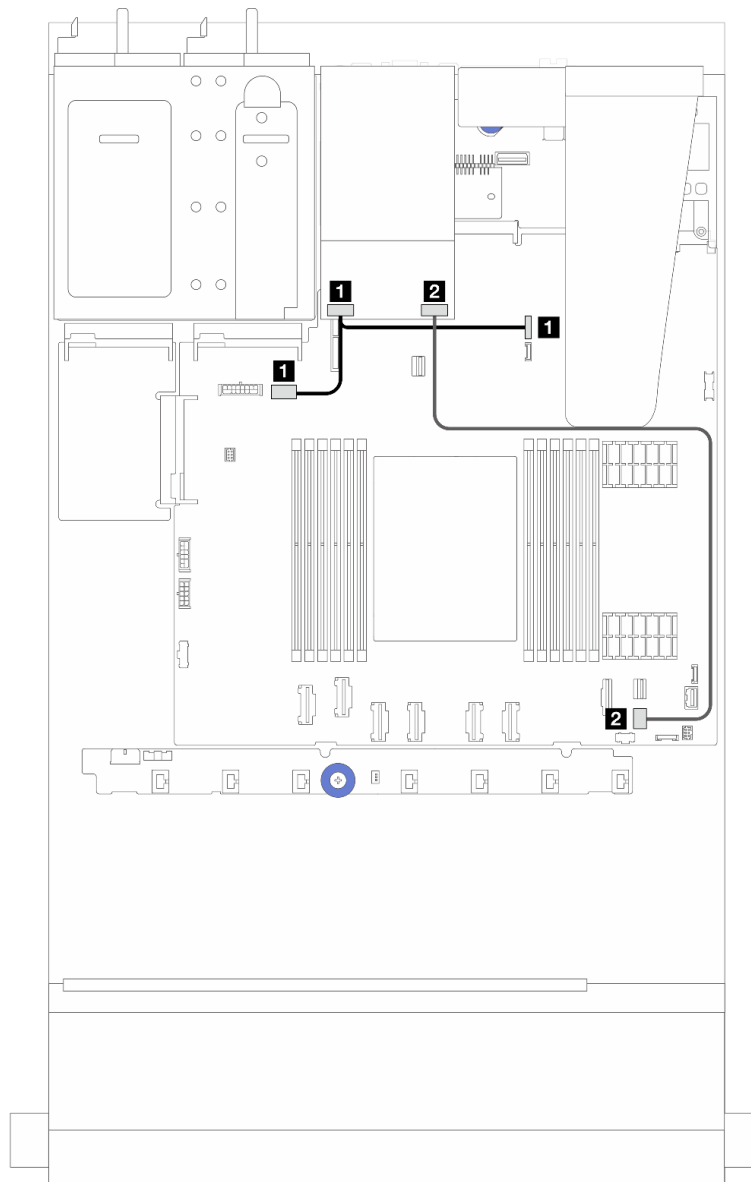
For the locations of connectors on the processor board, refer to [“System-board-assembly connectors” on page 33](#).

The server supports one of the following 7mm drive backplanes:

- [“7mm non-RAID SATA/NVMe 2-Bay backplanes” on page 261](#)
- [“7mm RAID NVMe 2-Bay backplanes” on page 264](#)
- [“7mm RAID SATA/NVMe 2-Bay backplanes” on page 265](#)

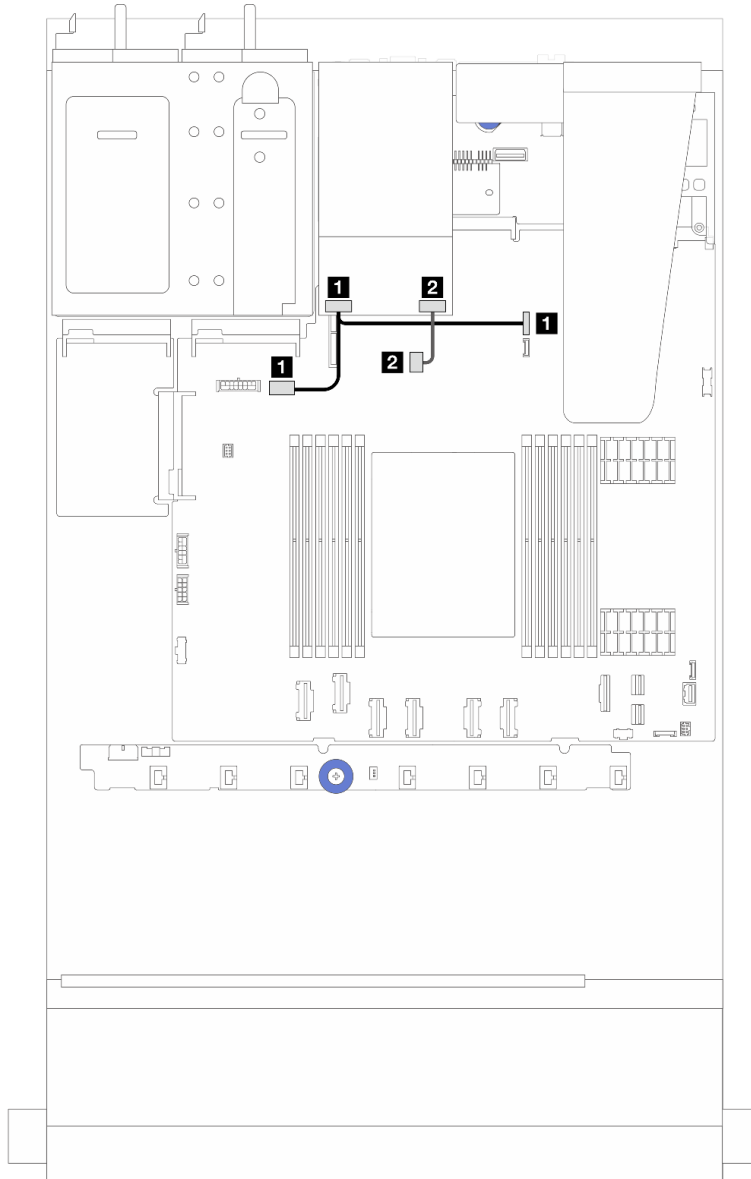
7mm non-RAID SATA/NVMe 2-Bay backplanes

Figure 239. SATA cable routing



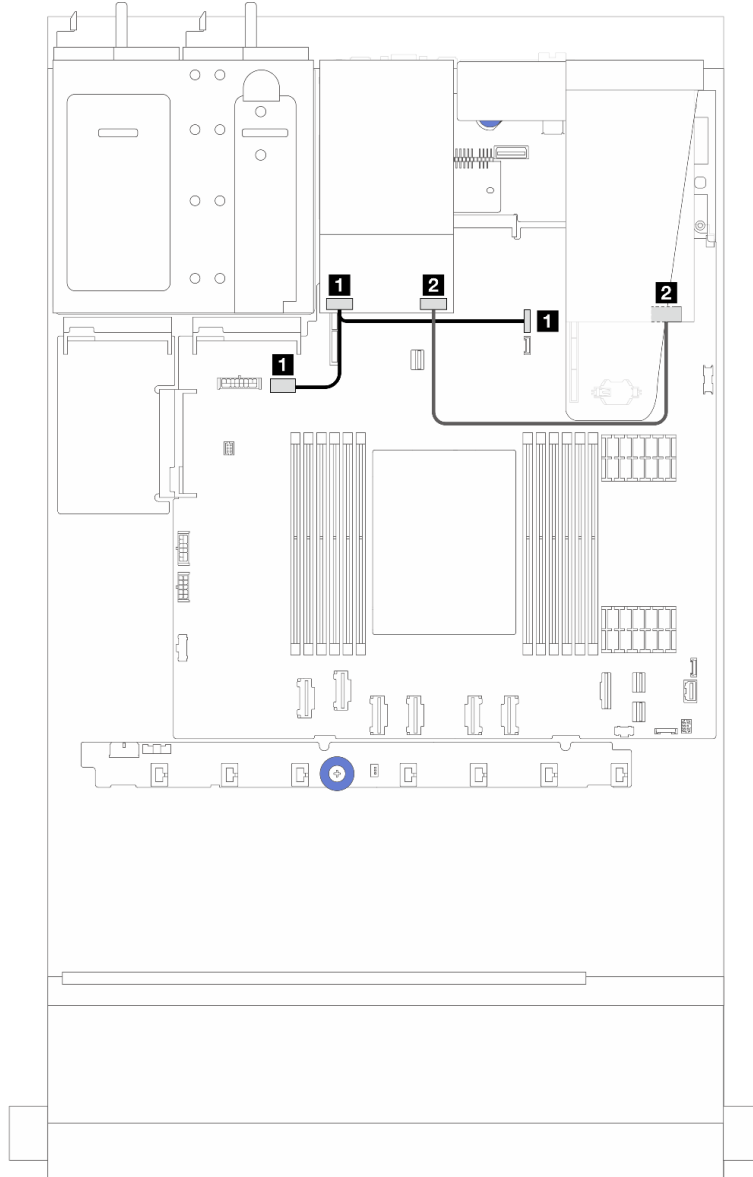
From	To
1 Power connector on the 7mm drive backplane	<ul style="list-style-type: none"> 1 Left: GPU/7mm/Rear backplane power connector on the system board assembly 1 Right: 7mm/Rear backplane sideband connector on the system board assembly
2 Signal port on the 7mm drive backplane	2 PCIe connector 9 on the system board assembly

Figure 240. NVMe cable routing



From	To
1 Power connector on the 7mm drive backplane	<ul style="list-style-type: none"> • 1 Left: GPU/7mm/Rear backplane power connector on the system board assembly • 1 Right: 7mm/Rear backplane sideband connector on the system board assembly
2 Signal connector on the 7mm drive backplane	2 M.2/7mm backplane signal connector on the system board assembly

Figure 241. RAID cable routing (with a Gen 3/ Gen 4 8i SFF RAID adapter)

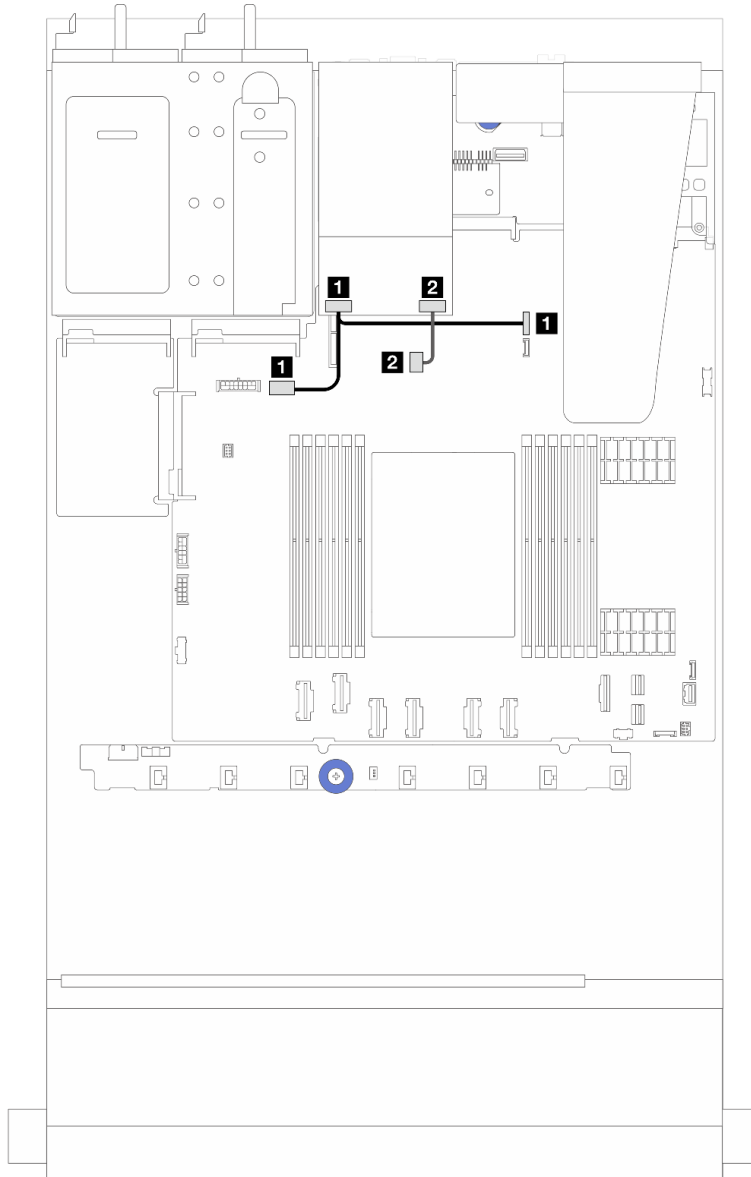


From	To
1 Power connector on the 7mm drive backplane	<ul style="list-style-type: none"> 1 Left: GPU/7mm/Rear backplane power connector on the system board assembly 1 Right: 7mm/Rear backplane sideband connector on the system board assembly
2 Signal port on the 7mm drive backplane	2 C0 connector on the SFF RAID adapter ^{note}

Note: The SFF RAID adapter here can be installed in slot 1 or slot 2.

7mm RAID NVMe 2-Bay backplanes

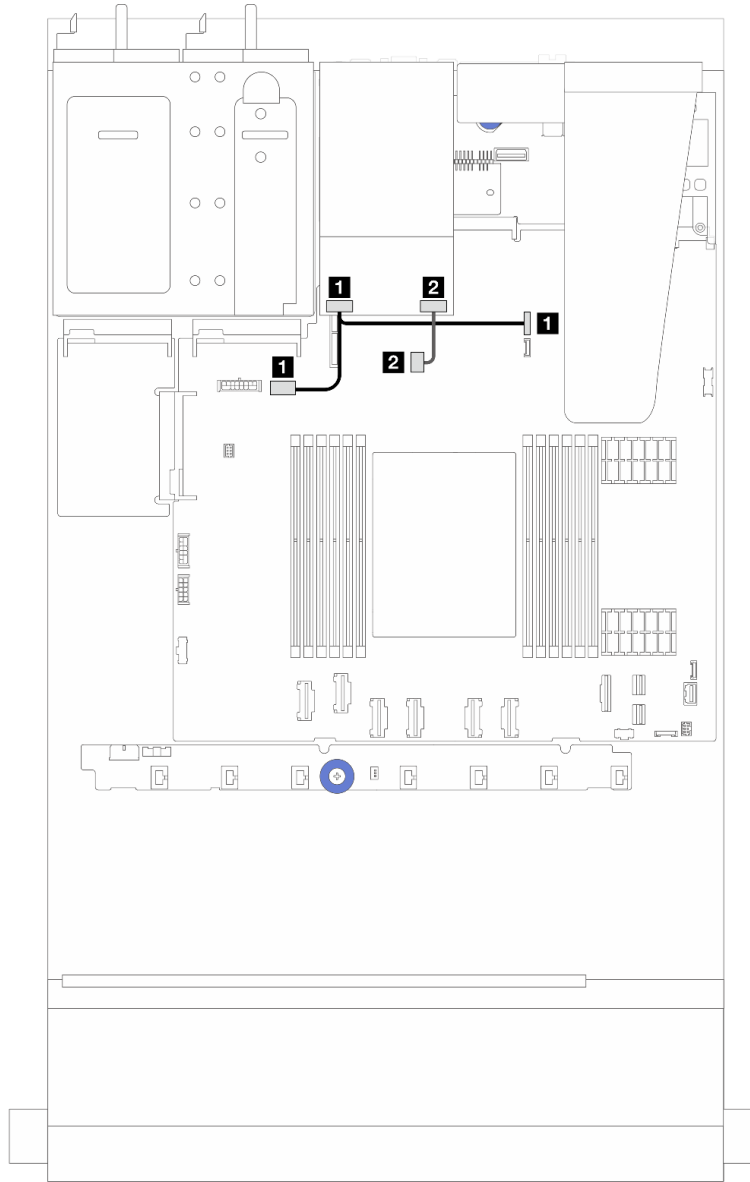
Figure 242. Cable routing for 7mm RAID NVMe 2-Bay backplanes



From	To
1 Power connector on the 7mm drive backplane	<ul style="list-style-type: none"> • 1 Left: GPU/7mm/Rear backplane power connector on the system board assembly • 1 Right: 7mm/Rear backplane sideband connector on the system board assembly
2 Signal connector on the 7mm drive backplane	2 M.2/7mm backplane signal connector on the system board assembly

7mm RAID SATA/NVMe 2-Bay backplanes

Figure 243. Cable routing for 7mm RAID SATA/NVMe 2-Bay backplanes



From	To
1 Power connector on the 7mm drive backplane	<ul style="list-style-type: none"> • 1 Left: GPU/7mm/Rear backplane power connector on the system board assembly • 1 Right: 7mm/Rear backplane sideband connector on the system board assembly
2 Signal connector on the 7mm drive backplane	2 M.2/7mm backplane signal connector on the system board assembly

Management NIC adapter

Use the section to understand the cable routing for the ThinkSystem V3 Management NIC Adapter Kit (management NIC adapter).

For the locations of connector on the system board assembly, see [“System-board-assembly connectors”](#) on [page 33](#) for details.

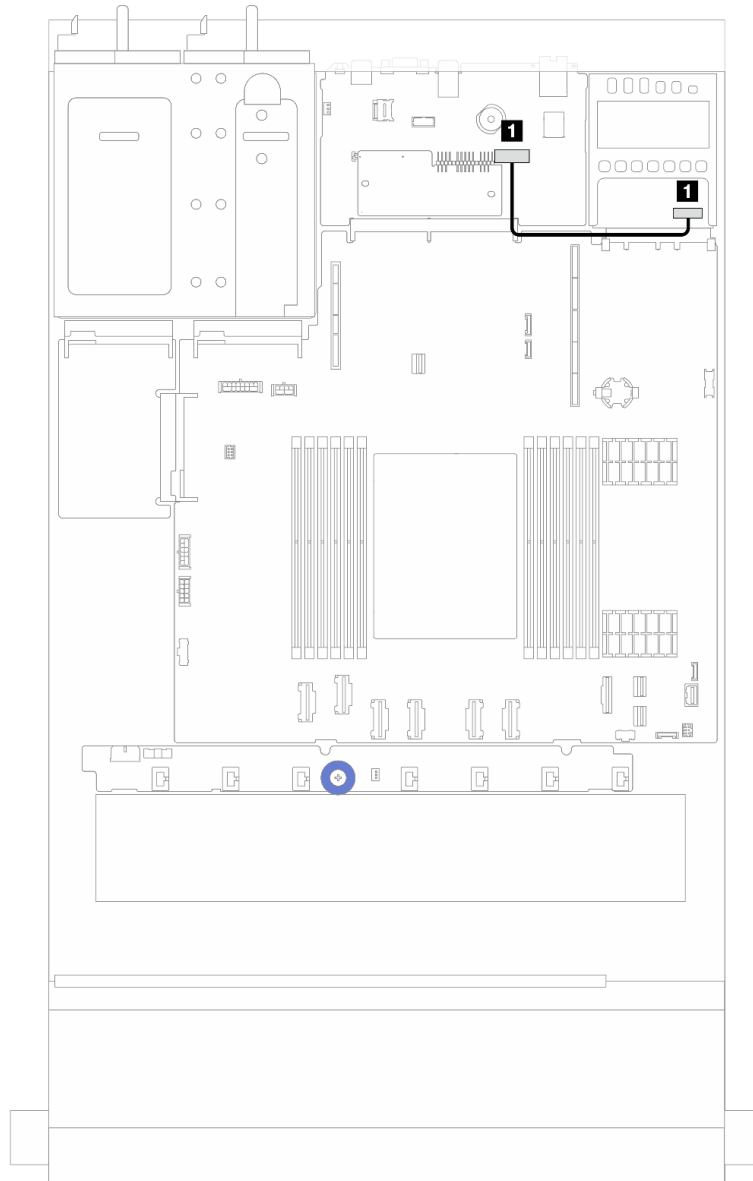


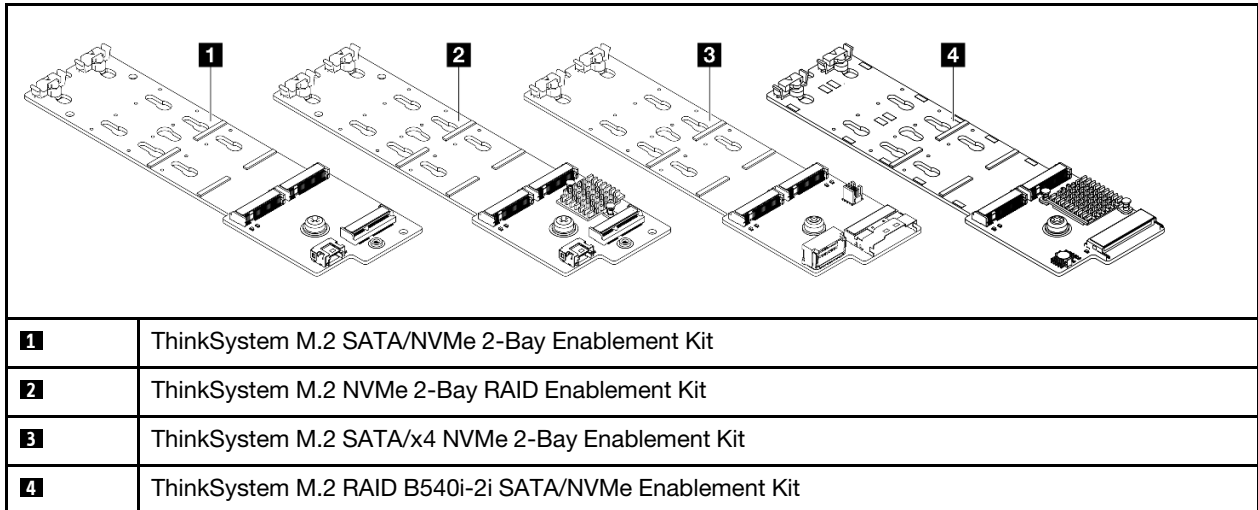
Figure 244. Management NIC adapter cable routing

From	To
1 The connector on the Management NIC adapter	1 Second management Ethernet connector on the system board assembly

M.2 drive backplane cable routing

This section provides cable routing information for the M.2 drives.

- Based on different drive types, the M.2 drive backplanes differ. Thus cables, connector layout and the cable routing are also different.
- For the locations of M.2 connectors on the processor board, see [“System-board-assembly connectors” on page 33](#) for details.
- The server supports the following M.2 drive backplanes (enablement kits):



- The following displays the cable routing of different M.2 drive backplanes:
 - [“1. Cable routing for ThinkSystem M.2 SATA/NVMe 2-Bay Enablement Kit” on page 269](#)
 - [“2. Cable routing for ThinkSystem M.2 NVMe 2-Bay RAID Enablement Kit” on page 271](#)
 - [“3. Cable routing for ThinkSystem M.2 SATA/x4 NVMe 2-Bay Enablement Kit” on page 272](#)
 - [“4. Cable routing for ThinkSystem M.2 RAID B540i-2i SATA/NVMe Enablement Kit” on page 274](#)

1. Cable routing for ThinkSystem M.2 SATA/NVMe 2-Bay Enablement Kit

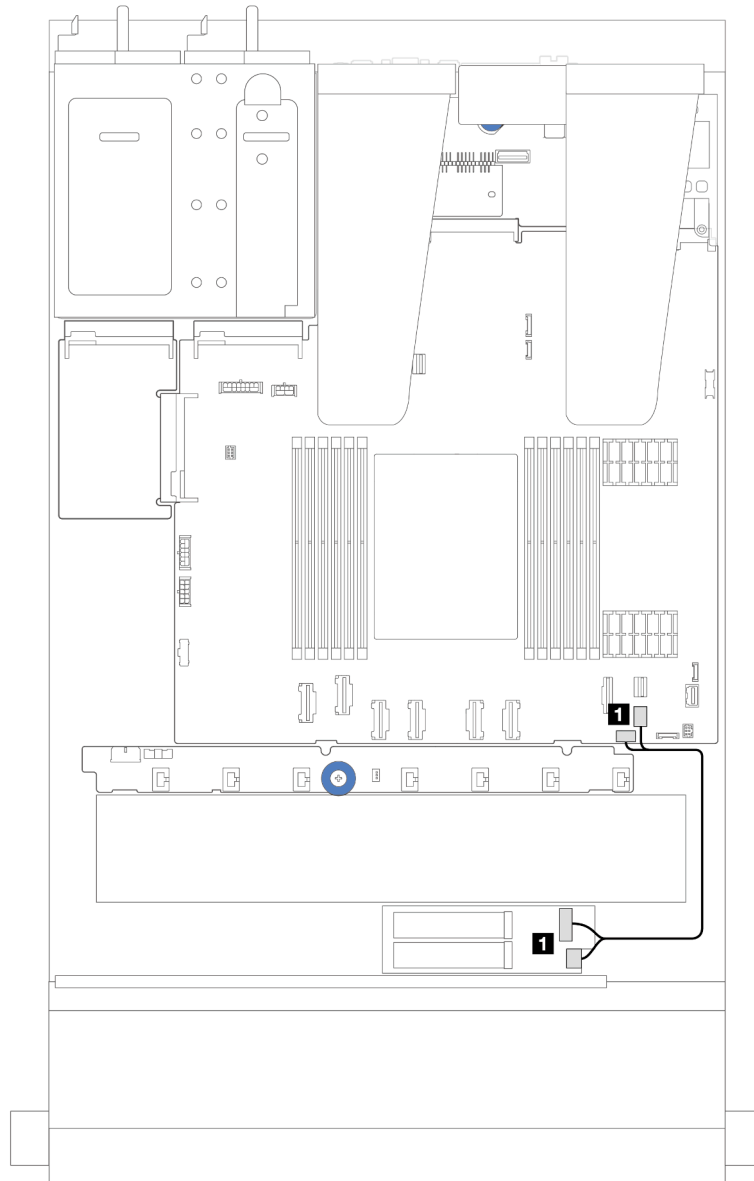


Figure 245. SATA cable routing

From	To
1 M.2 signal connector and power connector	1 PCIe connector 9 and M.2 power connector on the system board assembly

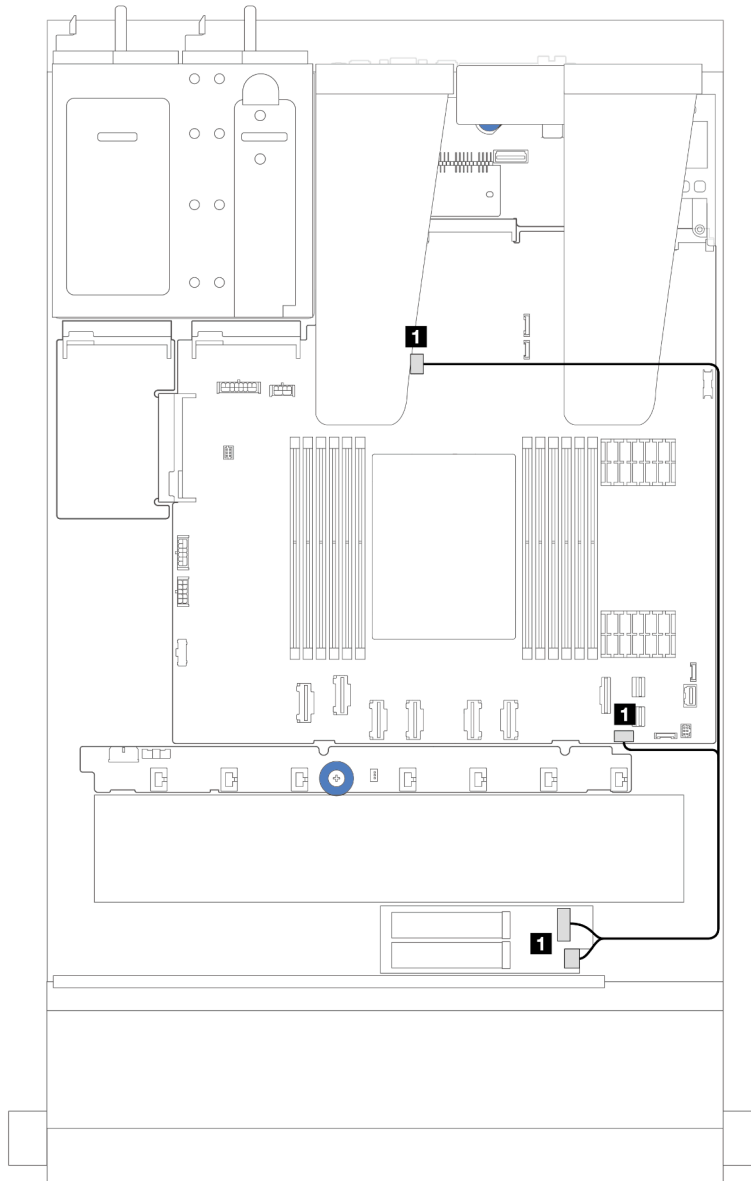


Figure 246. NVMe cable routing

From	To
1 M.2 signal connector and power connector	1 M.2 signal connector and M.2 power connector on the system board assembly

2. Cable routing for ThinkSystem M.2 NVMe 2-Bay RAID Enablement Kit

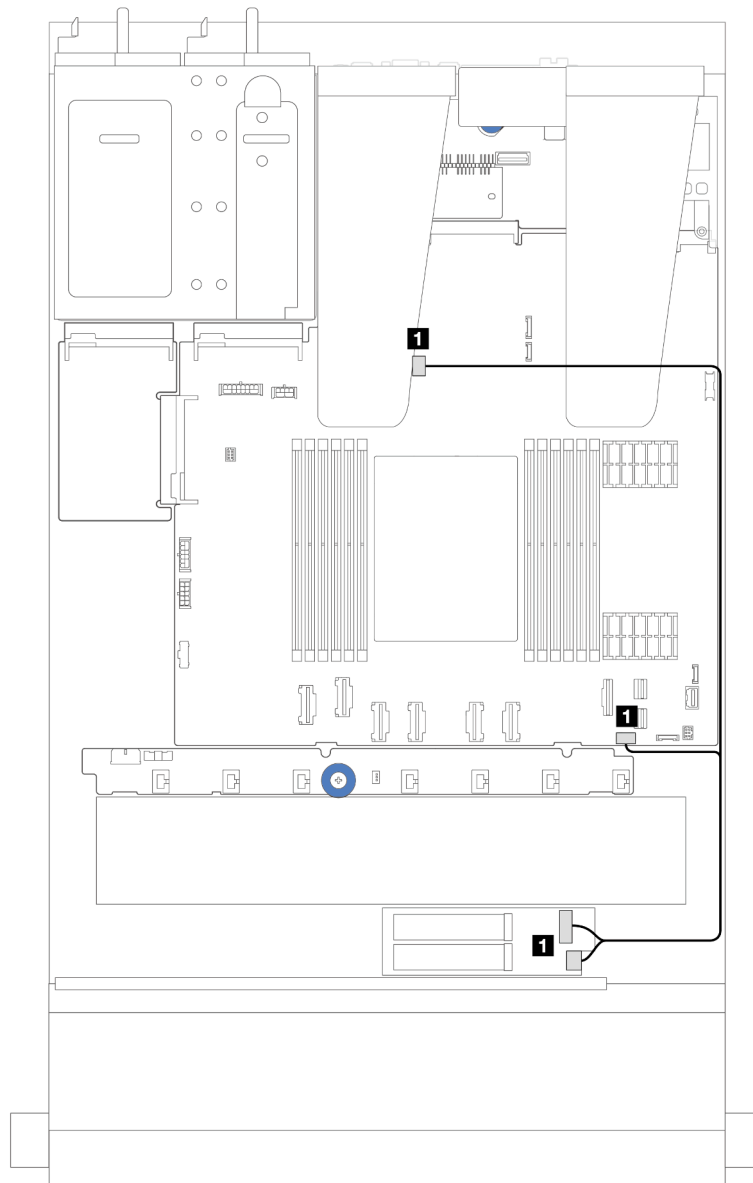


Figure 247. Cable routing for ThinkSystem M.2 NVMe 2-Bay RAID Enablement Kit

From	To
1 M.2 signal connector and power connector	1 M.2 signal connector and M.2 power connector on the system board assembly

3. Cable routing for ThinkSystem M.2 SATA/x4 NVMe 2-Bay Enablement Kit

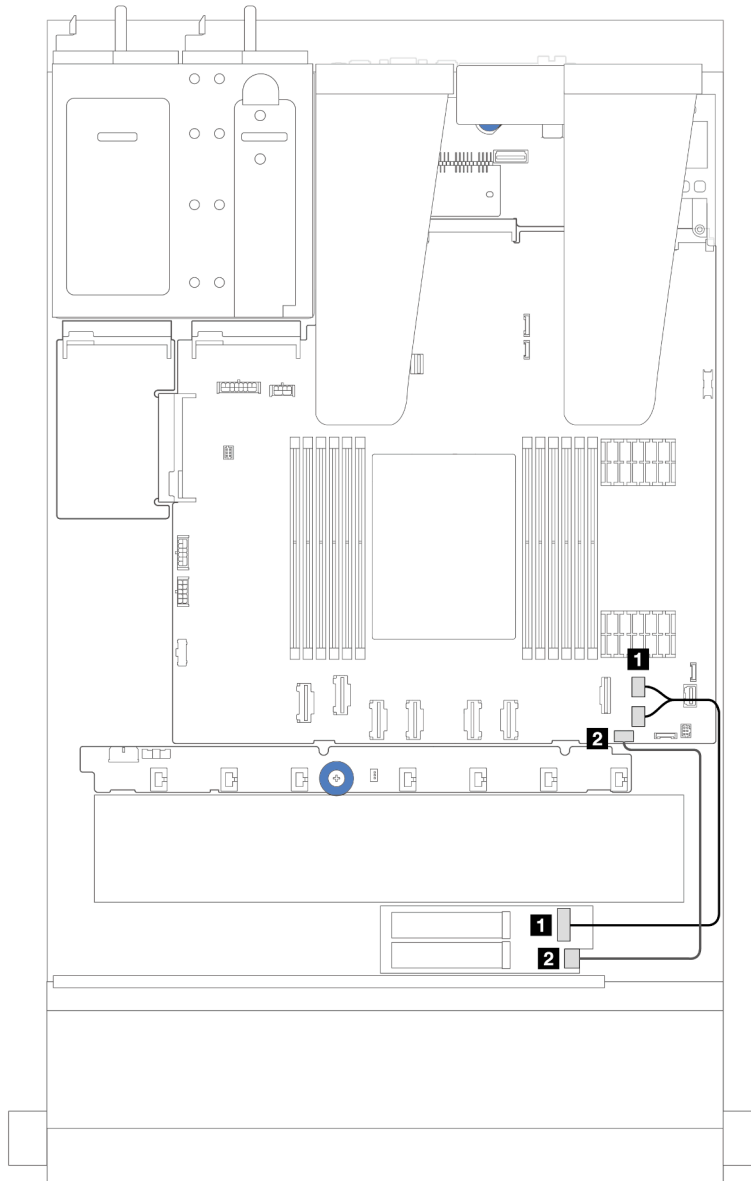


Figure 248. SATA/NVMe cable routing

From	To
1 M.2 signal connector	1 PCIe connectors 8 and 9 on the system board assembly
2 M.2 power connector	2 M.2 power connector on the system board assembly

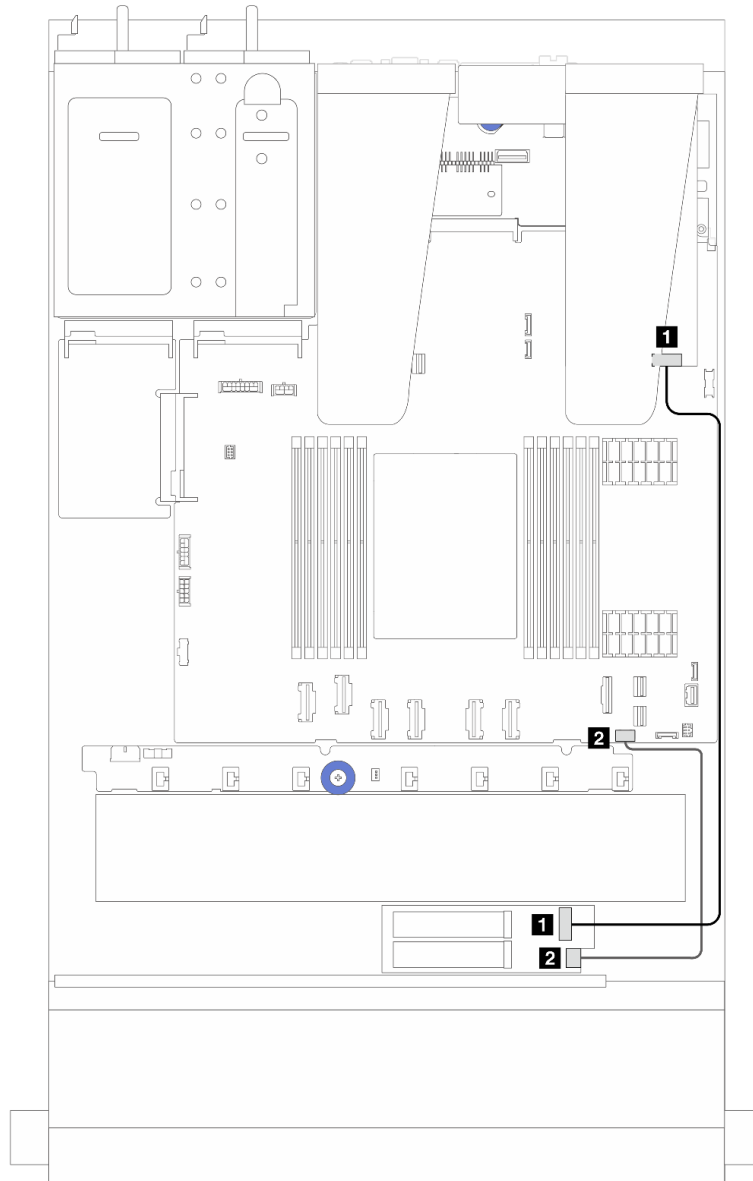


Figure 249. RAID cable routing (with a Gen 3/4 SFF RAID adapter)

From	To
1 M.2 signal connector	1 C0 on the SFF RAID adapter ^{note}
2 M.2 power connector	2 M.2 power connector on the system board assembly

Note: The SFF RAID adapter here can be installed in slot 1 or slot 2.

4. Cable routing for ThinkSystem M.2 RAID B540i-2i SATA/NVMe Enablement Kit

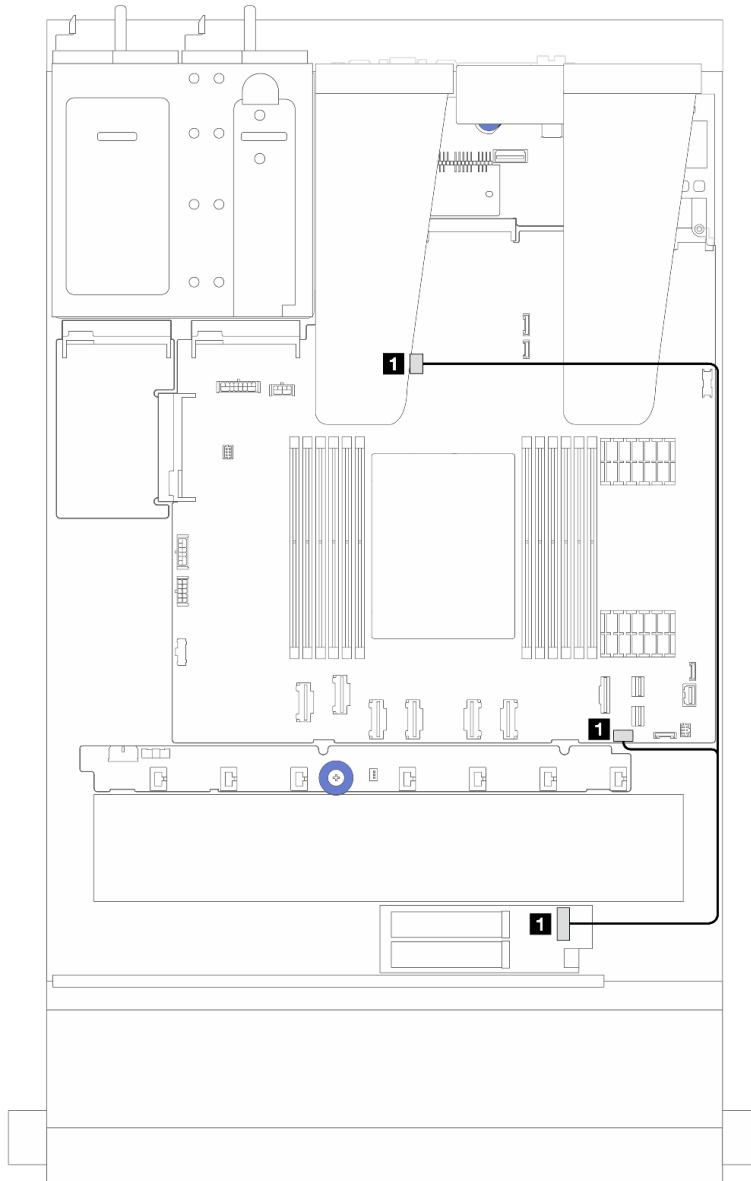


Figure 250. Cable routing for ThinkSystem M.2 RAID B540i-2i SATA/NVMe Enablement Kit

From	To
1 M.2 signal connector on the M.2 kit	1 M.2 power connector and signal connector on the system board assembly

Lenovo Neptune(TM) Liquid to Air Module cable routing

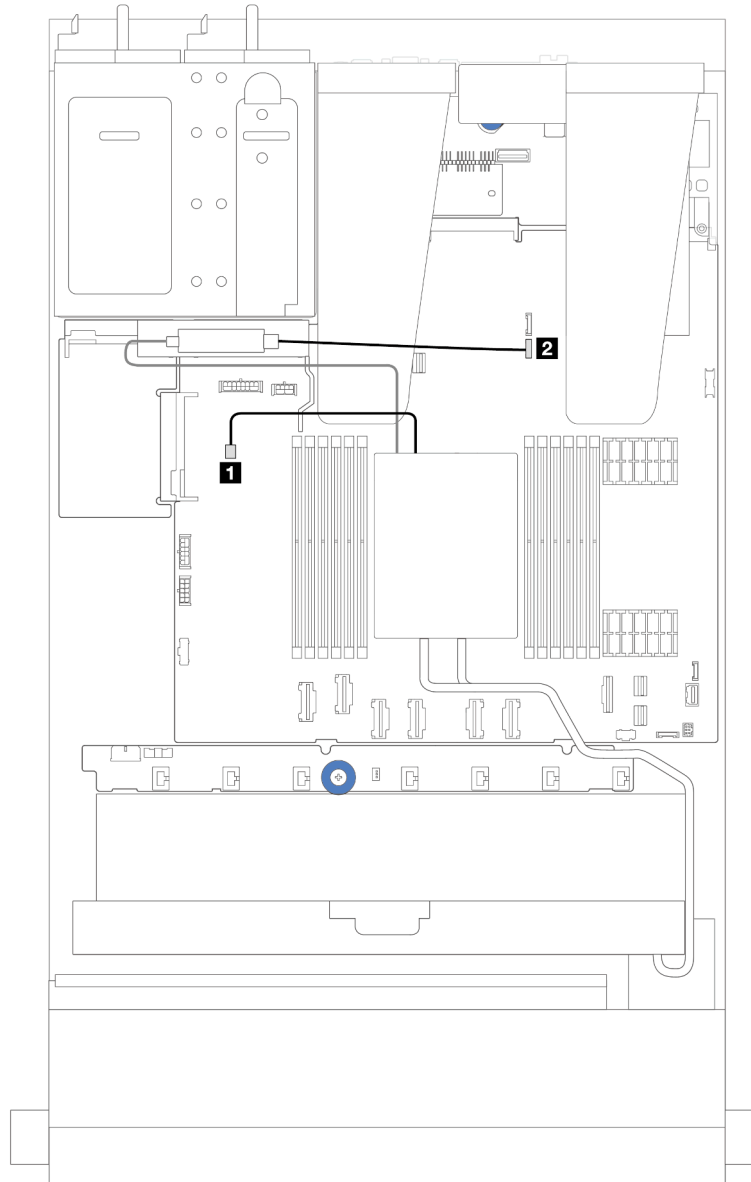
Use this section to understand the cable routing of the Lenovo Neptune(TM) Liquid to Air Module (L2AM).

- For the locations of the L2AM connectors the processor board, see [“System-board-assembly connectors” on page 33](#) for details.

- One pump cable and one cable for the leakage detection sensor module are integrated to the L2AM. Make sure that both cables are connected.

Note: For better cable arrangement, make sure that the leakage detection sensor module is secured in clips. Use the illustration below and [“Install the Lenovo Neptune\(TM\) Liquid to Air Module” on page 137](#) for details.

Liquid to Air Module cable routing



Cable	From	To
1 Pump	Pump cable	Pump connector
2 Leak detection	Leak detection cable	Leak detection connector

Power/Sideband cable routing

Use the section to understand the power and sideband cable routing for 2.5-inch drive backplanes and fan board.

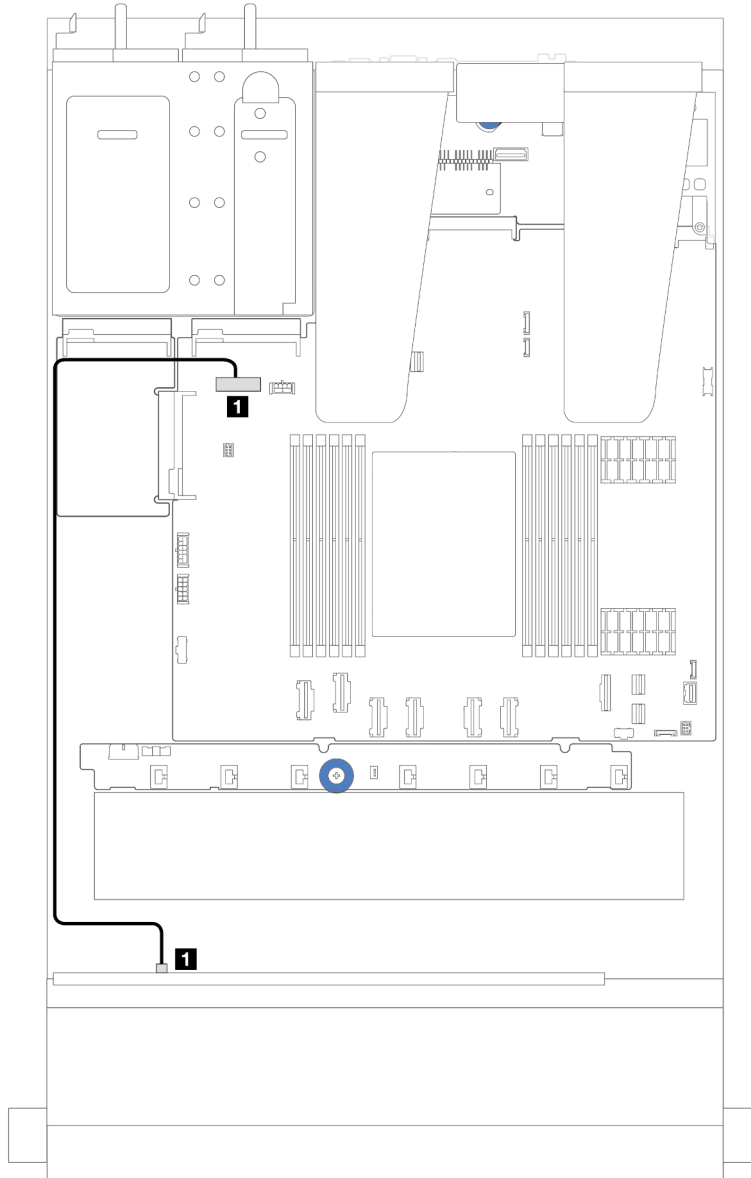


Figure 251. Backplane power cable connection for 8 or 10 x 2.5-inch drive backplanes

From	To
1 Power connector on the front drive backplane	2 Front backplane power port on the system board assembly

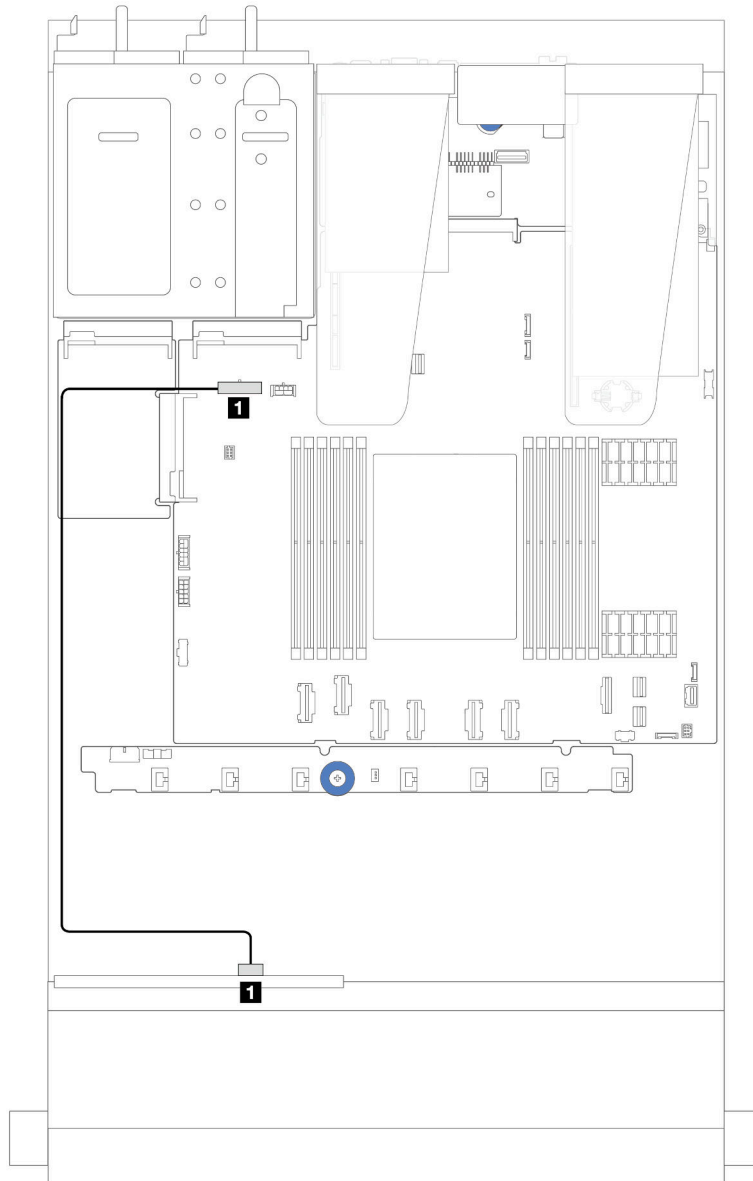


Figure 252. Backplane power cable connection for 4 x 2.5-inch drive backplanes

From	To
1 Power connector on the front drive backplane	1 Front backplane power port on the system board assembly

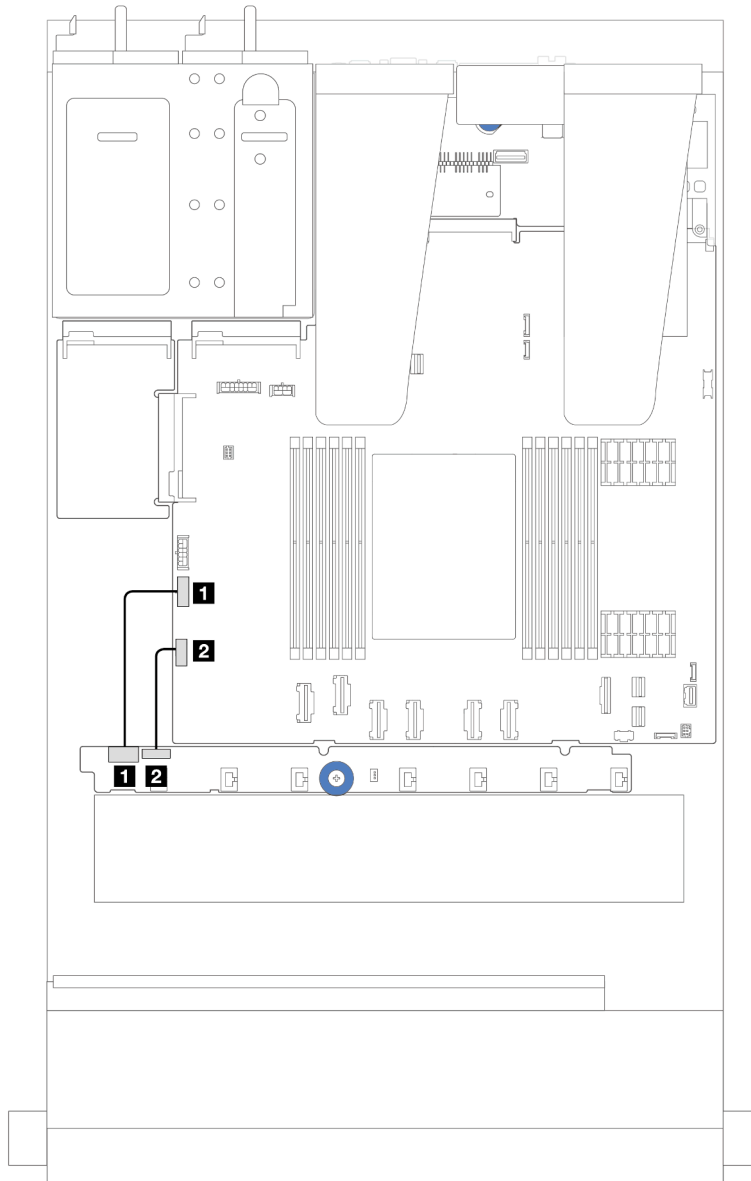


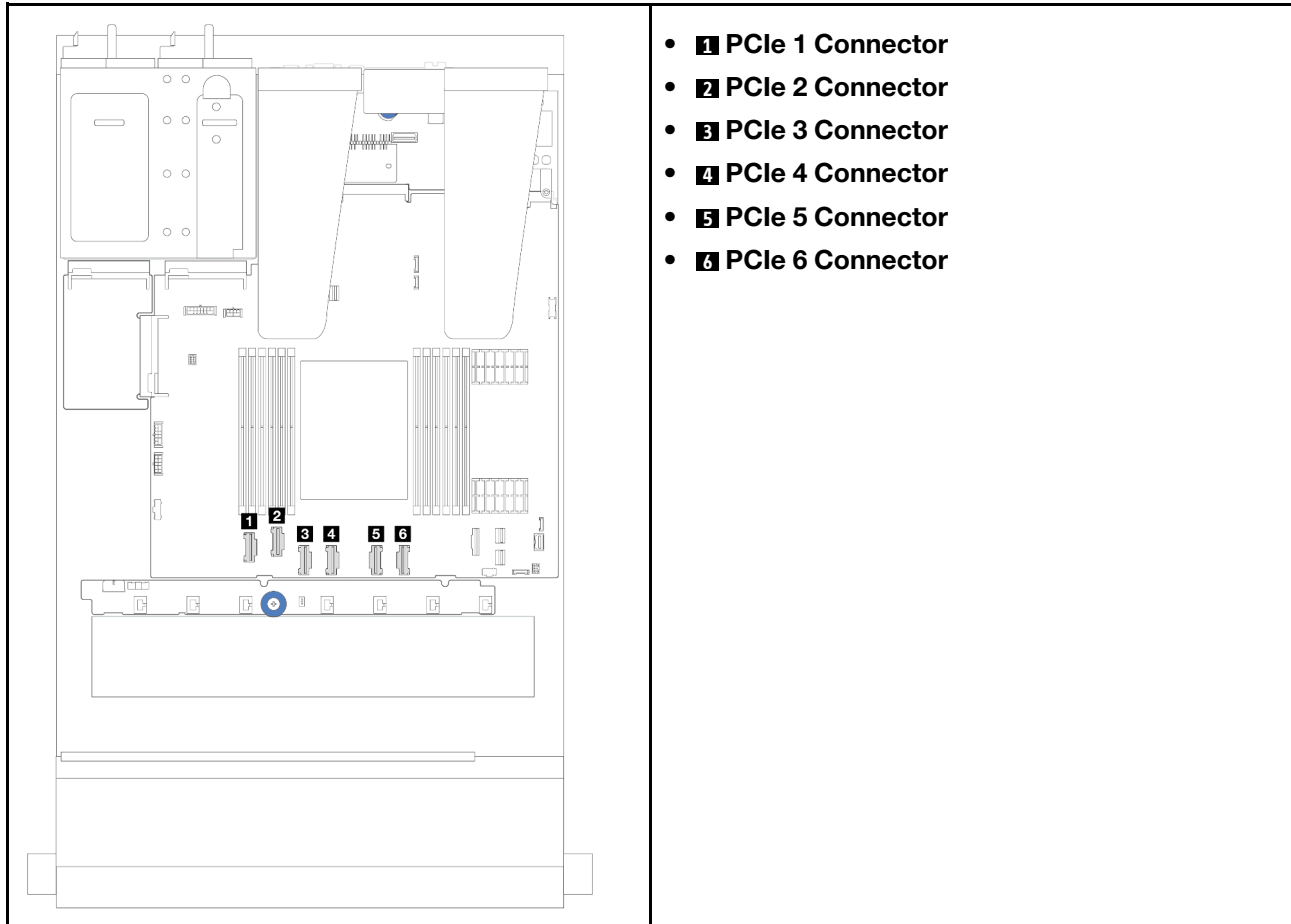
Figure 253. Fan board sideband and power cable routing

From	To
1 Fan board power connector on the fan board	1 Fan board power connector on the system board assembly
2 Sideband connector on the fan board	2 Fan sideband connector on the system board assembly

2.5-inch drive backplane (signal)

Use the section to understand the cable routing for signal cable connections for 2.5-inch drive backplanes.

Notes: For the server with an Air cooling heat sink (T-shape), remove the heat sink before disconnecting or connecting the cables which connect to PCIe 1, PCIe 2, PCIe 3, PCIe 4, PCIe 5, or PCIe 6 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 166](#) and [“Install a heat sink” on page 169](#).



Your server supports the following server models with:

- [“10 x 2.5” AnyBay backplane” on page 296](#)

4 x 2.5" front drives

Use the section to understand the cable routing for signal cable connections for 4 x 2.5" front drive backplanes.

4 x 2.5" SAS/SATA backplane

Use this section to understand the SAS/SATA backplane cable routing for server model with four 2.5-inch front drives.

- For the locations of connectors on the processor board, refer to [“System-board-assembly connectors” on page 33](#).

- To connect power cables for 2.5-inch drive backplanes, refer to [“Power/Sideband cable routing” on page 276](#).
- To connect power and input cables for CFF RAID/HBA adapters, refer to [“CFF RAID/HBA adapter” on page 246](#).
- To connect power and sideband cables for the rear drive backplane, refer to [“Rear NVMe/SATA drive backplane” on page 258](#).
- To connect power and sideband cables for the 7mm drive backplane, refer to [“7mm drive backplane” on page 261](#).
- To connect cables for RAID flash power modules, refer to [“RAID flash power modules” on page 253](#).

To connect signal cables for 4 x 2.5-inch SAS/SATA configuration, refer to the following cable routing scenarios depending on your server configuration:

- [“Cable routing for onboard configuration” on page 281](#)
- [“Cable routing with an SFF HBA/RAID adapter” on page 282](#)

Cable routing for onboard configuration

The following figure illustrates the cable routing for the onboard configuration of 4 x 2.5-inch front SAS/SATA drive bays. Connections between connectors: **1** ↔ **1**, **2** ↔ **2**, **3** ↔ **3**, ... **n** ↔ **n**.

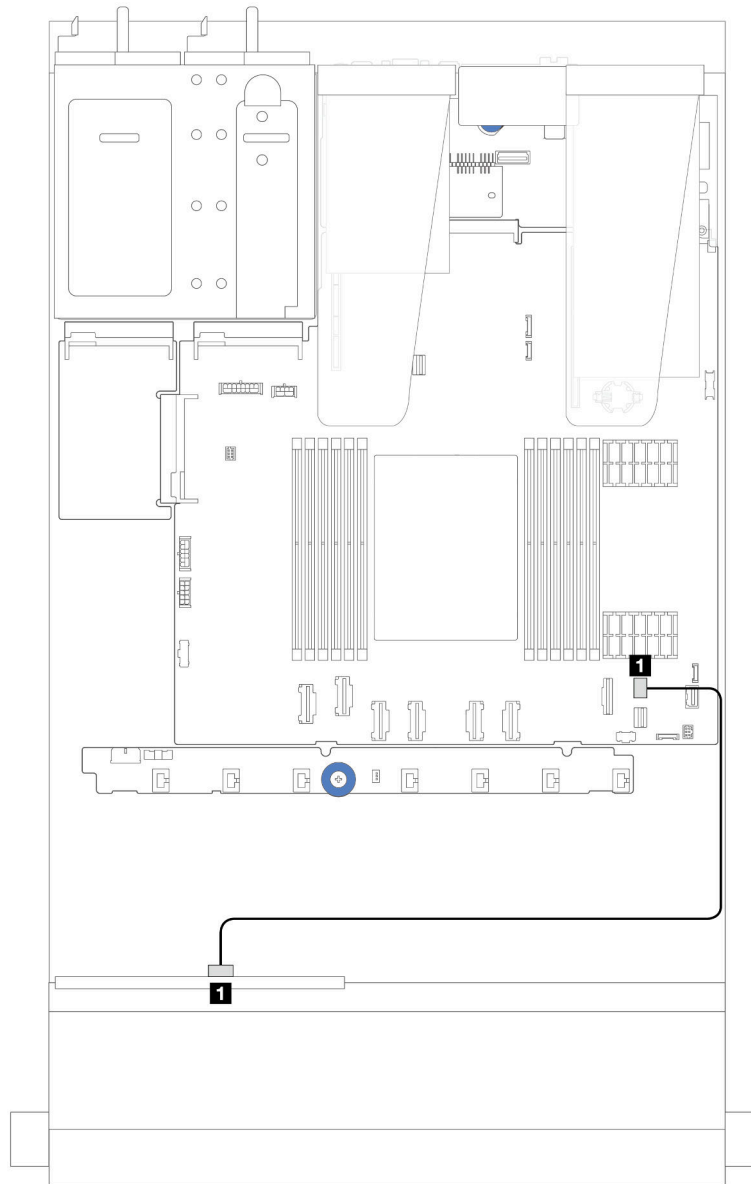


Figure 254. Cable routing for onboard configuration of 4 x 2.5-inch front SAS/SATA drive bays

Table 29. Mapping between backplane connectors and system board assembly connectors for onboard configuration

From	To
1 SAS on the front backplane	1 PCIe connector 8 on the system board assembly

Cable routing with an SFF HBA/RAID adapter

The following figure shows the mapping relationship between backplane connectors and system board assembly/adapter connectors when an 8i SFF HBA/RAID adapter (Gen 3 or Gen 4) is installed.

Note: Gen 3 and Gen 4 SFF RAID/HBA adapters are slightly different in their connectors, but the connection method is similar. The following illustration takes Gen 4 SFF RAID/HBA adapters as an example.

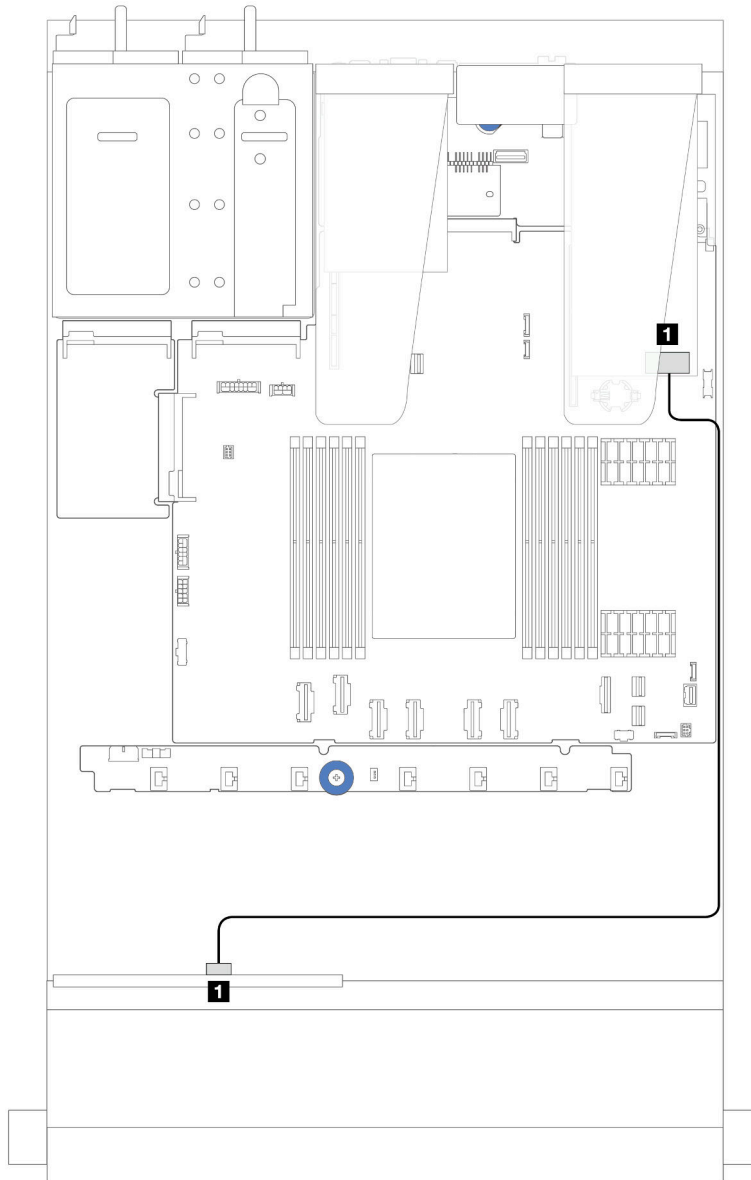


Figure 255. Cable routing for 4 x 2.5-inch front SAS/SATA drive bays with an 8i SFF RAID adapter (Gen 3/ Gen 4)

Table 30. Mapping between backplane connectors and system board assembly/adapter connectors when an 8i SFF HBA/RAID adapter is installed

From	To
1 SAS on the front backplane	1 C0 on the SFF HBA/RAID adapter

4 x 2.5" NVMe backplane

Use this section to understand the NVMe backplane cable routing for server model with four 2.5-inch front drives.

- For the locations of connectors on the processor board, refer to [“System-board-assembly connectors” on page 33](#).
- To connect power cables for 2.5-inch drive backplanes, refer to [“Power/Sideband cable routing” on page 276](#).
- To connect power and input cables for CFF RAID/HBA adapters, refer to [“CFF RAID/HBA adapter” on page 246](#).
- To connect power and sideband cables for the rear drive backplane, refer to [“Rear NVMe/SATA drive backplane” on page 258](#).
- To connect power and sideband cables for the 7mm drive backplane, refer to [“7mm drive backplane” on page 261](#).
- To connect cables for RAID flash power modules, refer to [“RAID flash power modules” on page 253](#).

To connect signal cables for a backplane for standard 4 x 2.5-inch front drives, refer to the following cable routing scenarios depending on your server configuration:

- [“Cable routing for onboard configuration” on page 283](#)
- [“Cable routing with an SFF RAID/HBA adapter” on page 286](#)

Cable routing for onboard configuration

The following figure illustrates the cable routing for the onboard configuration of 4 x 2.5-inch front NVMe drive bays. Connections between connectors: **1** ↔ **1**, **2** ↔ **2**, **3** ↔ **3**, ... **n** ↔ **n**

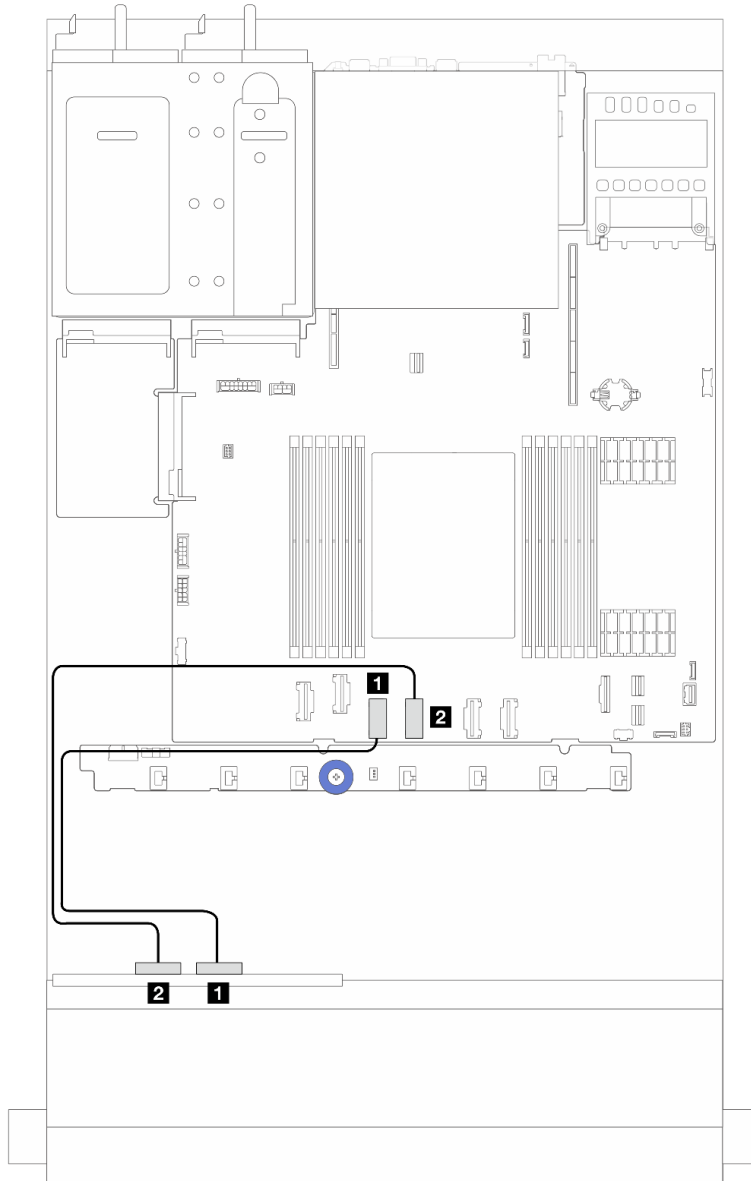


Figure 256. Cable routing for onboard configuration of 4 x 2.5-inch front NVMe drive bays (using 4 x 2.5-inch AnyBay backplane (Gen 4))

Table 31. Mapping between backplane connectors and system board assembly connectors for onboard configuration

From	To
1 NVMe 2-3 on the front backplane	1 PCIe connector 3 on the system board assembly
2 NVMe 0-1 on the front backplane	2 PCIe connector 4 on the system board assembly

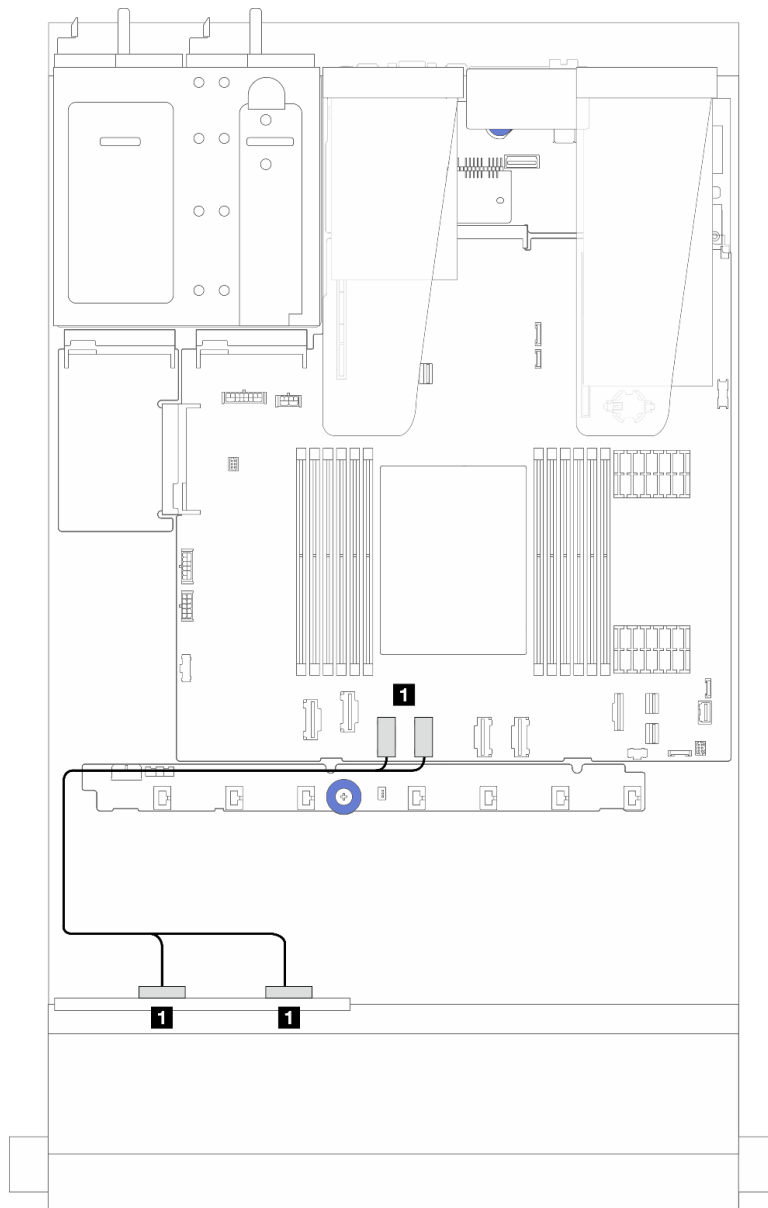


Figure 257. Cable routing for onboard configuration of 4 x 2.5-inch front NVMe drive bays (using 4 x2.5-inch AnyBay backplane (Gen 5))

Table 32. Mapping between backplane connectors and system board assembly connectors for onboard configuration

From	To
1 NVMe 2-3 and NVMe 0-1 on the front backplane	1 PCIe connector 3 and 4 on the system board assembly

Cable routing with an SFF RAID/HBA adapter

Note: Gen 3 and Gen 4 SFF RAID/HBA adapters are slightly different in their connectors, but the connection method is similar. The following illustration takes Gen 4 SFF RAID/HBA adapters as an example.

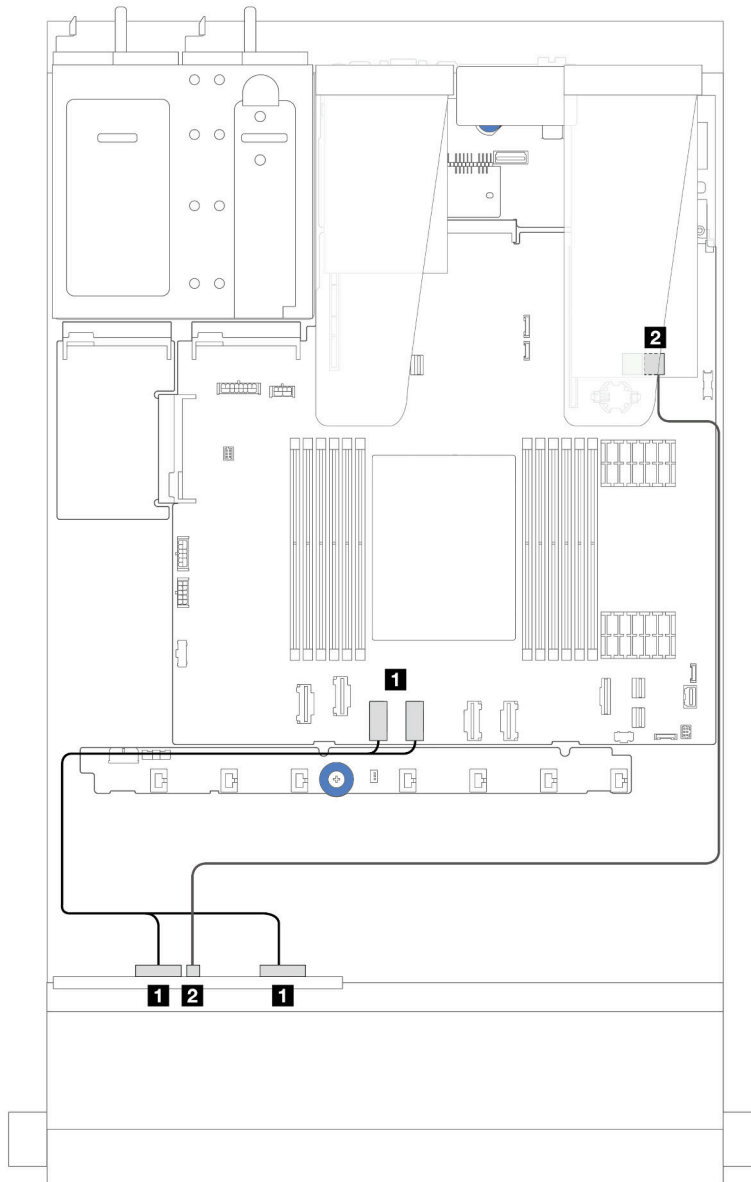


Figure 258. Cable routing of 4 x 2.5-inch front NVMe drive bays (using 4 x 2.5-inch AnyBay backplane (Gen 5)) and an SFF 8i RAID/HBA adapter (Gen 3/Gen 4)

Table 33. Mapping between a front backplane and an SFF 8i RAID/HBA adapter (Gen 3/Gen 4)

From	To
1 NVMe 2-3 and NVMe 0-1 on the front backplane	1 PCIe connector 3 and 4 on the system board assembly
2 SAS on the front backplane	2 C0 on the SFF RAID/HBA adapter

4 x 2.5" AnyBay backplane

Use this section to understand the cable routing for 4 x 2.5" AnyBay backplane.

- For the locations of connectors on the processor board, refer to [“System-board-assembly connectors” on page 33](#).
- To connect power cables for 2.5-inch drive backplanes, refer to [“Power/Sideband cable routing” on page 276](#).
- To connect power and input cables for CFF RAID/HBA adapters, refer to [“CFF RAID/HBA adapter” on page 246](#).
- To connect power and sideband cables for the rear drive backplane, refer to [“Rear NVMe/SATA drive backplane” on page 258](#).
- To connect power and sideband cables for the 7mm drive backplane, refer to [“7mm drive backplane” on page 261](#).
- To connect cables for RAID flash power modules, refer to [“RAID flash power modules” on page 253](#).

To connect signal cables for a backplane for 4 x 2.5" AnyBay front drives, refer to the following cable routing scenarios depending on your server configuration:

- [“Cable routing with an SFF HBA/RAID adapter” on page 287](#)

Cable routing with an SFF HBA/RAID adapter

The following illustrations and tables show the mapping relationship between backplane connectors and an 8i SFF RAID adapter (Gen 3 or Gen 4).

Note: Gen 3 and Gen 4 SFF RAID/HBA adapters are slightly different in their connectors, but the connection method is similar. The following illustration takes Gen 4 SFF RAID/HBA adapters as an example.

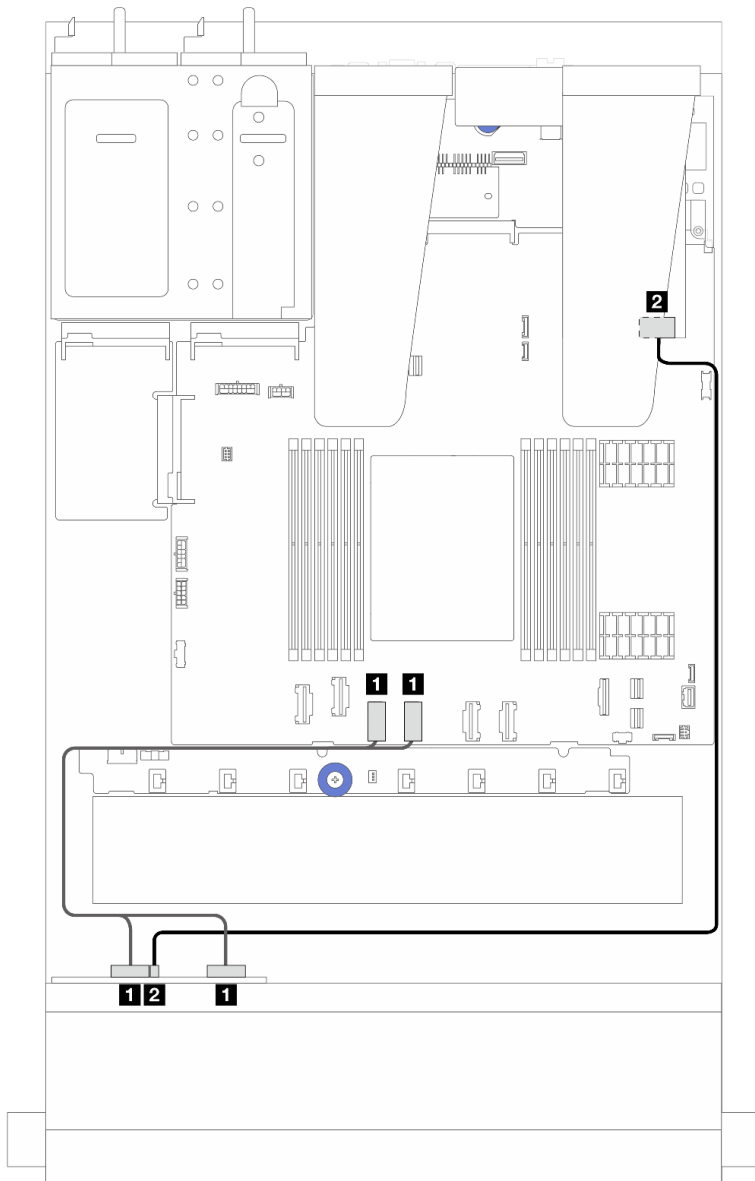


Figure 259. Cable routing for 4 x 2.5" AnyBay backplane drive with an 8i SFF RAID adapter (Gen 3 or Gen 4)

Table 34. Mapping between one front AnyBay backplane and an SFF HBA/RAID adapter (Gen 3 or Gen 4)

From	To
1 NVMe 0-1, NVMe 2-3 on the front backplane	1 PCIe connectors 3 and 4 on the system board assembly
2 SAS on the front backplane	2 C0 on the SFF HBA/RAID adapter

8 x 2.5" front drives

Use the section to understand the cable routing for signal cable connections for 8 x 2.5" front drive backplanes.

8 x 2.5" SAS/SATA backplane

Use this section to understand the SAS/SATA backplane cable routing for server model with eight 2.5-inch front drives.

- For the locations of connectors on the processor board, refer to [“System-board-assembly connectors” on page 33](#).
- To connect power cables for 2.5-inch drive backplanes, refer to [“Power/Sideband cable routing” on page 276](#).
- To connect power and input cables for CFF RAID/HBA adapters, refer to [“CFF RAID/HBA adapter” on page 246](#).
- To connect power and sideband cables for the rear drive backplane, refer to [“Rear NVMe/SATA drive backplane” on page 258](#).
- To connect power and sideband cables for the 7mm drive backplane, refer to [“7mm drive backplane” on page 261](#).
- To connect cables for RAID flash power modules, refer to [“RAID flash power modules” on page 253](#).

To connect signal cables for 8 x 2.5-inch SAS/SATA configuration, refer to the following cable routing scenarios depending on your server configuration:

- [“Cable routing for onboard configuration” on page 289](#)
- [“Cable routing with an SFF HBA/RAID adapter” on page 290](#)
- [“Cable routing with a CFF HBA/RAID adapter” on page 292](#)

Cable routing for onboard configuration

The following illustrations and tables show the mapping relationship between backplane connectors and system board assembly connectors for onboard configuration.

Connections between connectors: **1** ↔ **1**, **2** ↔ **2**, **3** ↔ **3**, ... **n** ↔ **n**.

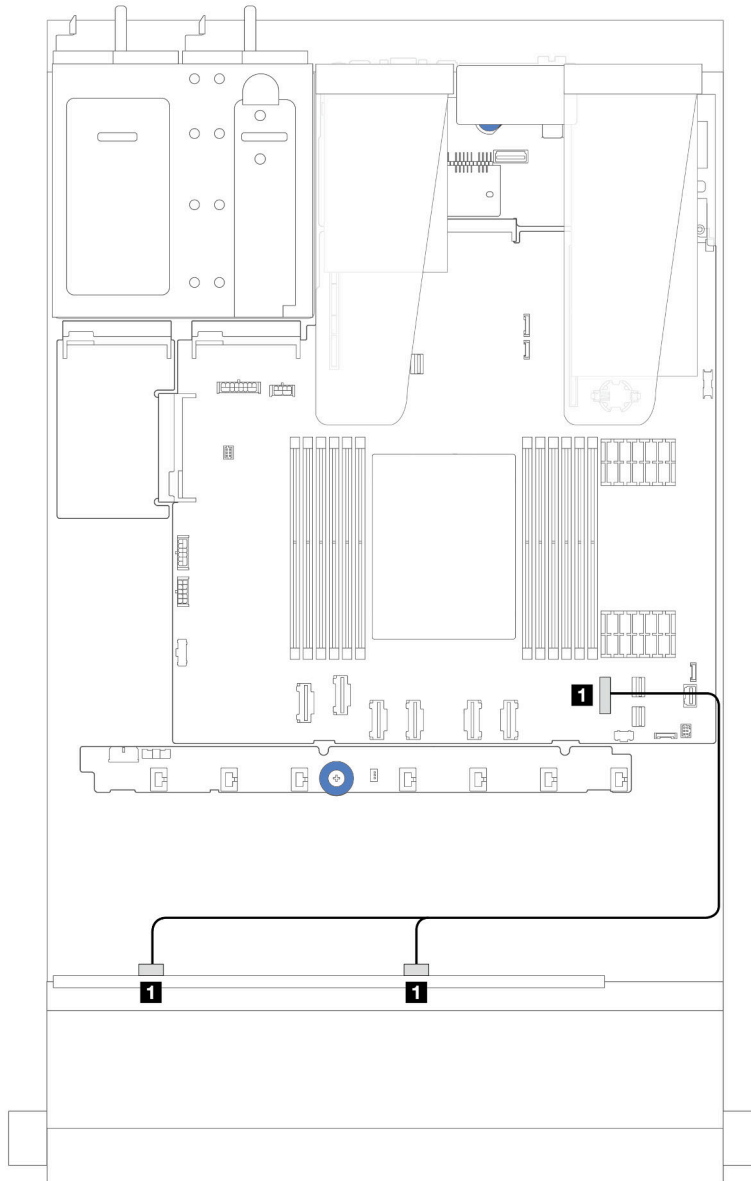


Figure 260. Cable routing for onboard configuration of 8 x 2.5 SATA front drives

Table 35. Mapping between one front 8 x 2.5-inch SATA backplane and the system board assembly for onboard configuration

From	To
1 SAS 0 and SAS1 on the front backplane	1 PCIe 7 connector on the system board assembly

Cable routing with an SFF HBA/RAID adapter

The following illustrations and tables show the mapping relationship between backplane connectors and an 8i or 16i SFF HBA/RAID adapter (Gen 3 or Gen 4).

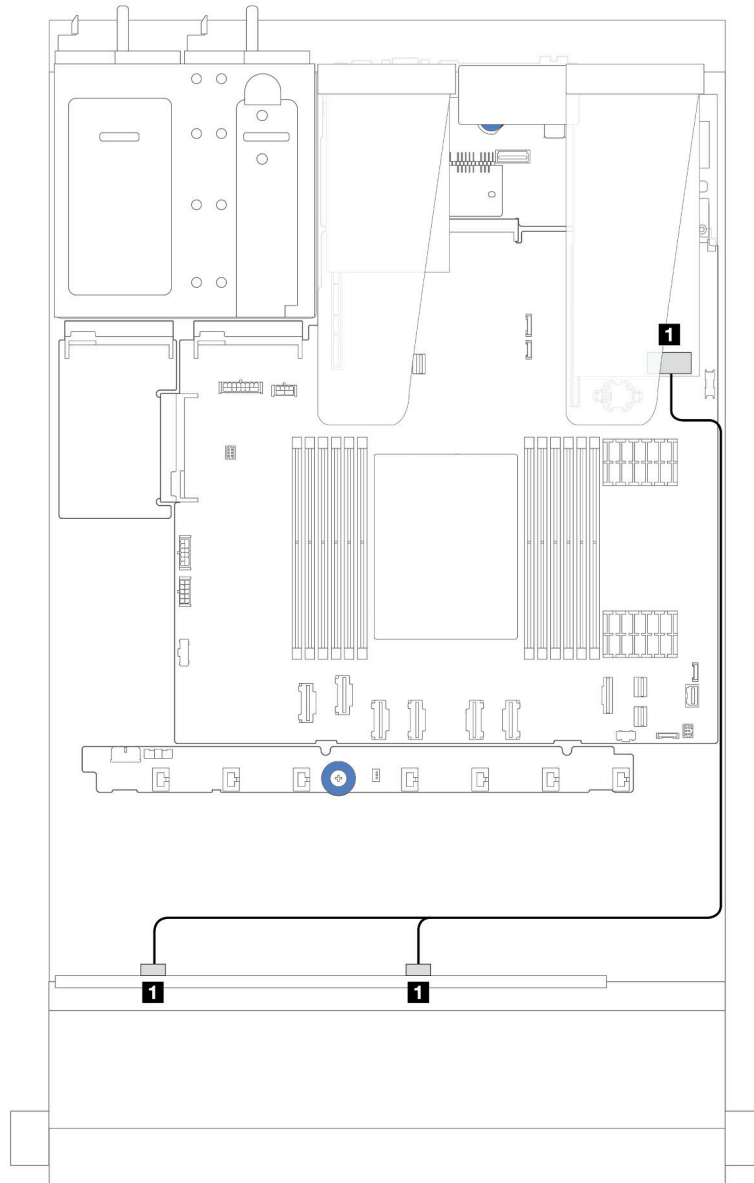


Figure 261. Cable routing for 8 x 2.5-inch front SAS/SATA drive bays with an 8i or 16i SFF RAID adapter (Gen 4)

Table 36. Mapping between one 8 x 2.5-inch front SAS/SATA backplane and an SFF HBA/RAID adapter

From	To
1 SAS 0 and SAS 1 on the front backplane	1 C0 on the SFF HBA/RAID adapter

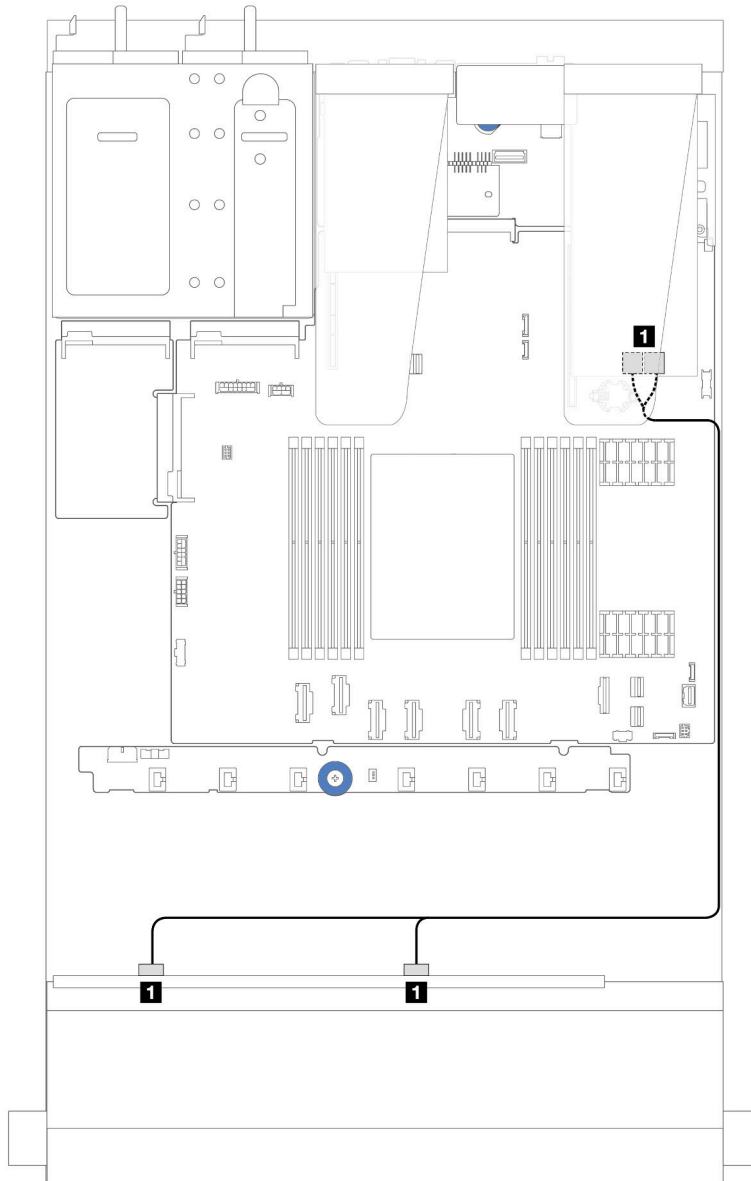


Figure 262. Cable routing for 8 x 2.5-inch front SAS/SATA drive bays with an 8i or 16i SFF RAID adapter (Gen 3)

Table 37. Mapping between one 8 x 2.5-inch front SAS/SATA backplane and an SFF HBA/RAID adapter

From	To
1 SAS 0 and SAS 1 on the front backplane	1 C0 and C1 on the SFF HBA/RAID adapter

Cable routing with a CFF HBA/RAID adapter

For power and input connections of CFF RAID/HBA adapters, refer to [“CFF RAID/HBA adapter” on page 246](#).

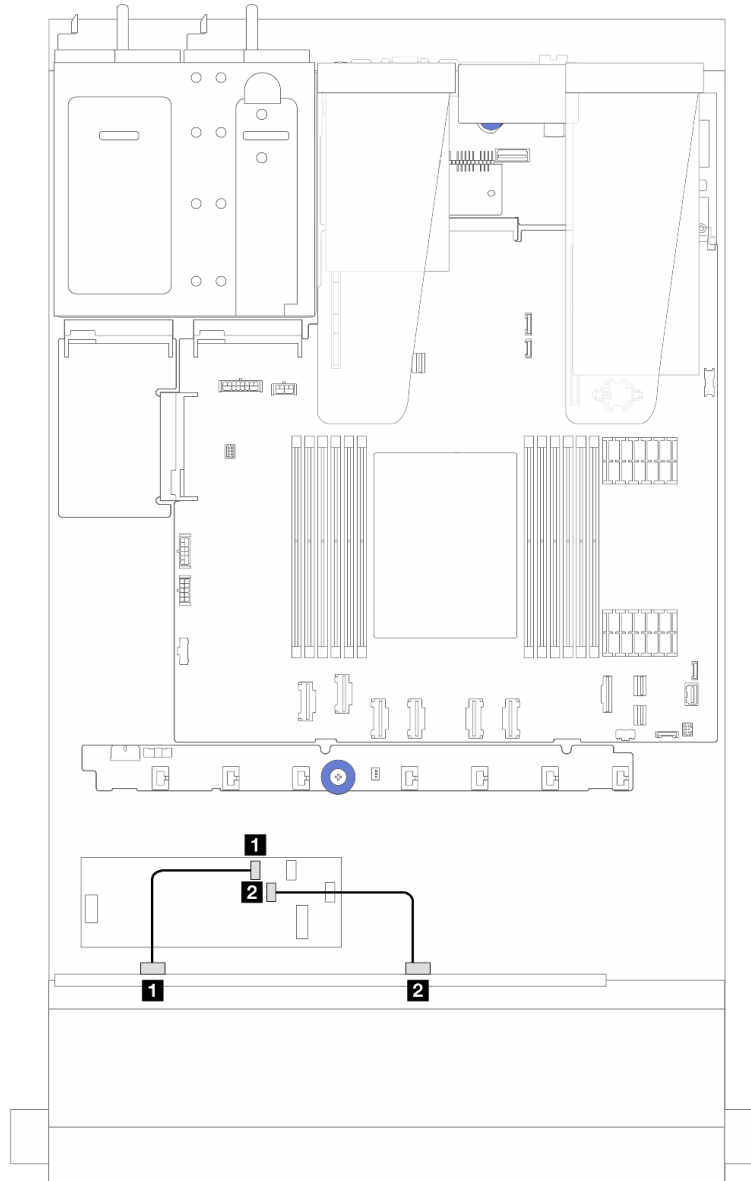


Figure 263. Cable routing for 8 x 2.5-inch front SAS/SATA drive bays with a 16i CFF RAID/HBA adapter (Gen 4)

Table 38. Mapping between one 8 x 2.5-inch front SAS/SATA backplane and a 16i CFF RAID/HBA adapter

From	To
1 SAS 0 on the front backplane	1 C0 on the CFF RAID/HBA adapter
2 SAS 1 on the front backplane	2 C1 on the CFF RAID/HBA adapter

For power and input connections of CFF RAID/HBA adapters, refer to [“CFF RAID/HBA adapter” on page 246](#).

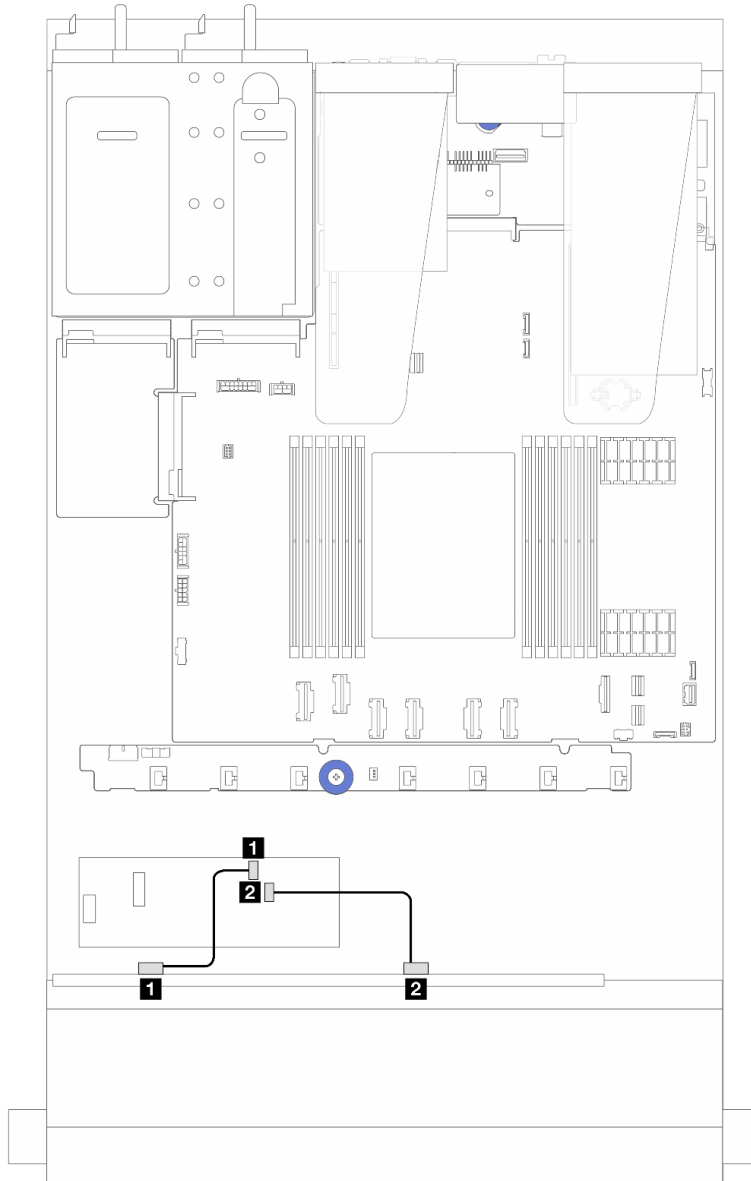


Figure 264. Cable routing for 8 x 2.5-inch front SAS/SATA drive bays with an 8i CFF RAID/HBA adapter (Gen 3)

Table 39. Mapping between one 8 x 2.5-inch front SAS/SATA backplane and an 8i CFF RAID/HBA adapter

From	To
1 SAS 0 on the front backplane	1 C0 on the CFF RAID/HBA adapter
2 SAS 1 on the front backplane	2 C1 on the CFF RAID/HBA adapter

8 x 2.5" U.3 drives with 10 x 2.5" AnyBay backplane

Use this section to understand the cable routing for eight U.3 drives with 10 x 2.5 Anybay backplane.

- For the locations of connectors on the processor board, refer to [“System-board-assembly connectors” on page 33](#).
- To connect power cables for 2.5-inch drive backplanes, refer to [“Power/Sideband cable routing” on page 276](#).

- To connect power and input cables for CFF RAID/HBA adapters, refer to “CFF RAID/HBA adapter” on page 246.
- To connect power and sideband cables for the rear drive backplane, refer to “Rear NVMe/SATA drive backplane” on page 258.
- To connect power and sideband cables for the 7mm drive backplane, refer to “7mm drive backplane” on page 261.
- To connect cables for RAID flash power modules, refer to “RAID flash power modules” on page 253.

Cable routing with an 8i SFF HBA/RAID adapter

The following illustrations and tables show the mapping relationship between backplane connectors and an 8i SFF RAID adapter (Gen 4).

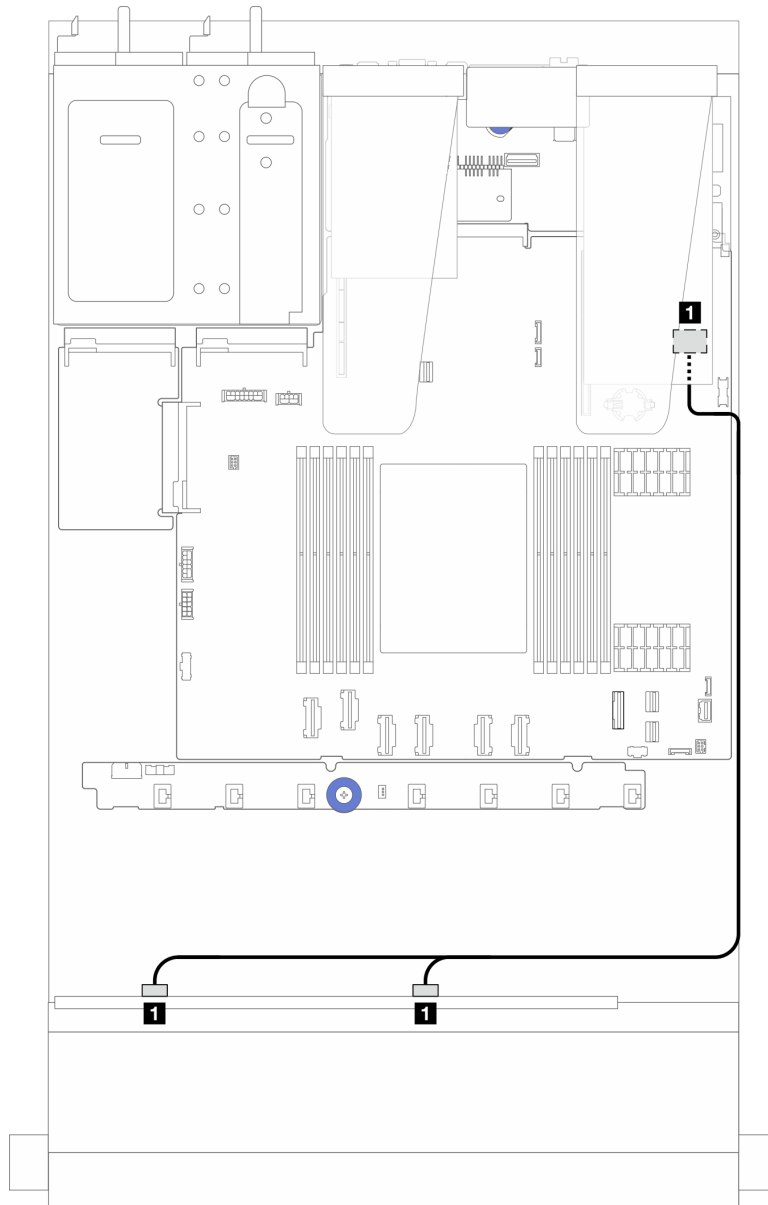


Figure 265. Cable routing for 8 x 2.5-inch front U.3 drives with an 8i SFF RAID adapter (Gen 4)

Table 40. Mapping between one front AnyBay backplane and an SFF HBA/RAID adapter

From	To
SAS 0 and SAS 1 on the front backplane	C0 on the SFF HBA/RAID adapter

10 x 2.5" front drives

Use this section to understand the AnyBay backplane cable routing for server model with ten 2.5-inch front drives.

10 x 2.5" AnyBay backplane

Use this section to understand the AnyBay backplane cable routing for server model with ten 2.5-inch front drives.

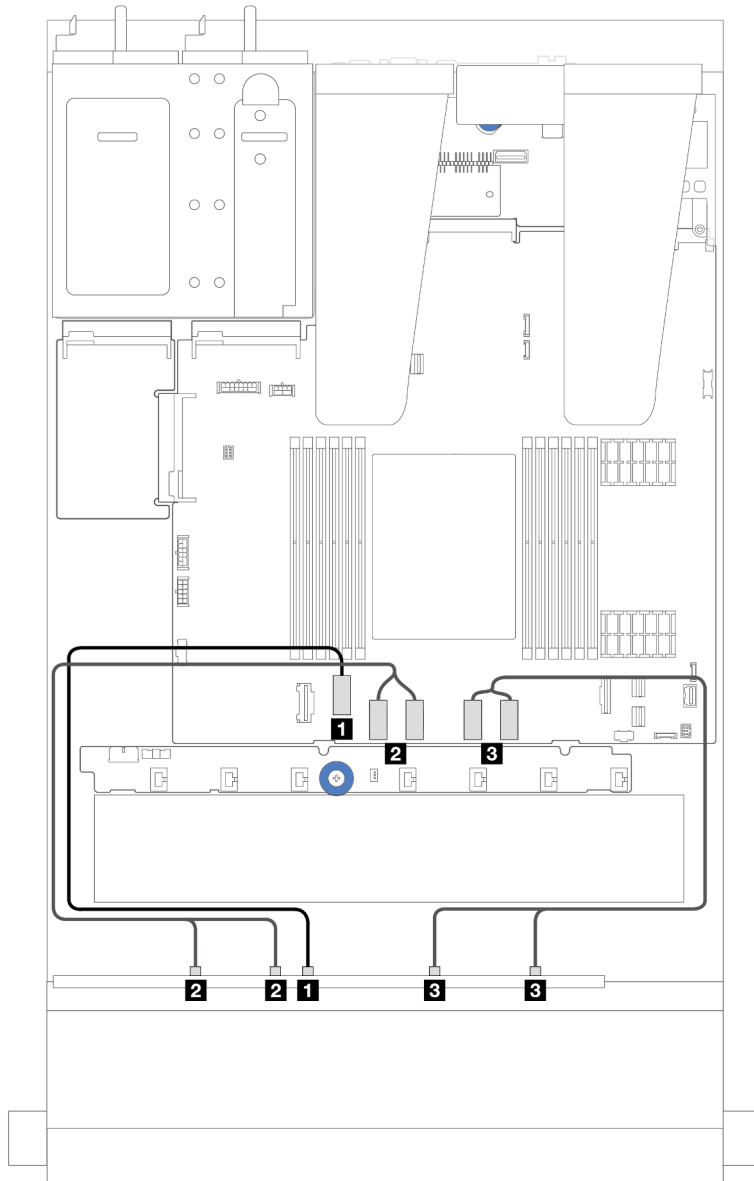
- For the locations of connectors on the processor board, refer to [“System-board-assembly connectors” on page 33](#).
- To connect power cables for 2.5-inch drive backplanes, refer to [“Power/Sideband cable routing” on page 276](#).
- To connect power and input cables for CFF RAID/HBA adapters, refer to [“CFF RAID/HBA adapter” on page 246](#).
- To connect power and sideband cables for the rear drive backplane, refer to [“Rear NVMe/SATA drive backplane” on page 258](#).
- To connect power and sideband cables for the 7mm drive backplane, refer to [“7mm drive backplane” on page 261](#).
- To connect cables for RAID flash power modules, refer to [“RAID flash power modules” on page 253](#).

To connect signal cables for a backplane for standard 10 x 2.5-inch front drives, refer to the following cable routing scenarios depending on your server configuration:

- [“Cable routing for server model with ten 2.5-inch AnyBay drives \(NVMe onboard connection\)” on page 296](#)
- [“Cable routing for server model with ten 2.5-inch AnyBay drives \(SATA onboard connection\)” on page 297](#)
- [“Cable routing for server model with ten 2.5-inch AnyBay drives and a 16i SFF RAID/HBA adapter” on page 298](#)

Cable routing for server model with ten 2.5-inch AnyBay drives (NVMe onboard connection)

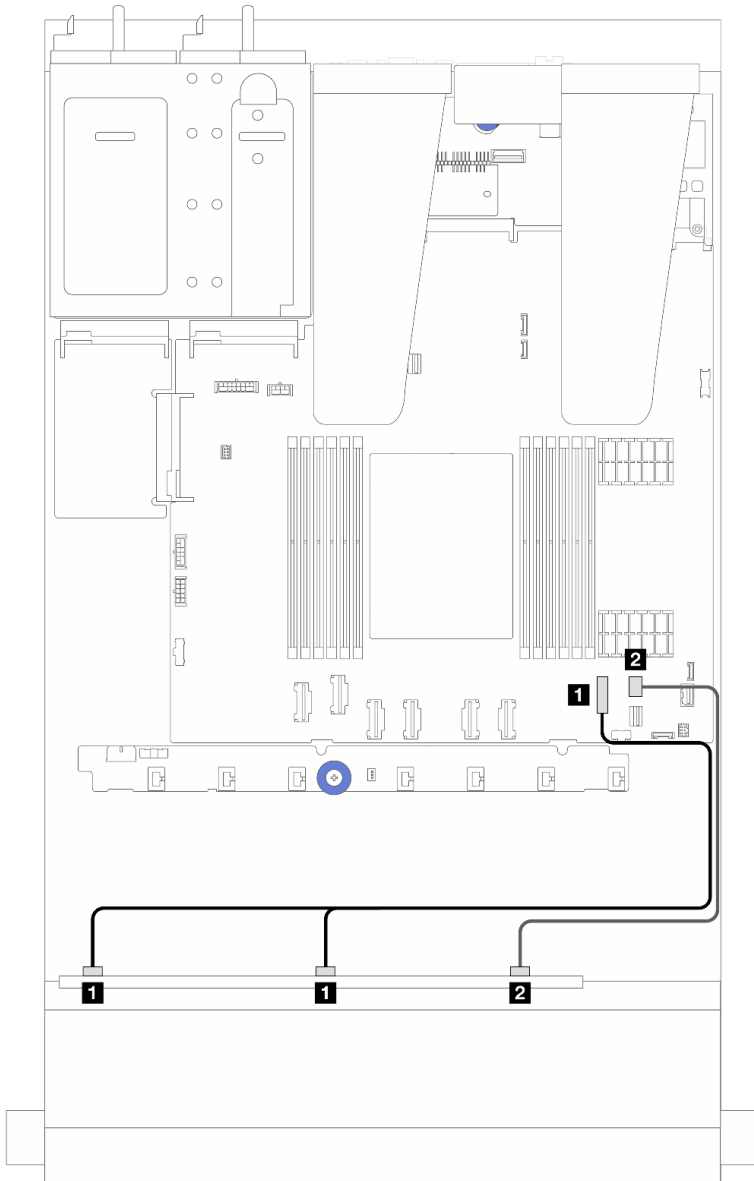
The following illustration shows NVMe onboard connection for server model with ten 2.5-inch AnyBay drives.



From	To
1 NVMe 4-5 on the front backplane	1 PCIe connector 2 on the system board assembly
2 NVMe 2-3 and NVMe 0-1 on the front backplane	2 PCIe connectors 3 and 4 on the system board assembly
3 NVMe 8-9 and NVMe 6-7 on the front backplane	3 PCIe connectors 5 and 6 on the system board assembly

Cable routing for server model with ten 2.5-inch AnyBay drives (SATA onboard connection)

The following illustration shows the SATA onboard connection for server model with ten 2.5-inch AnyBay configuration.

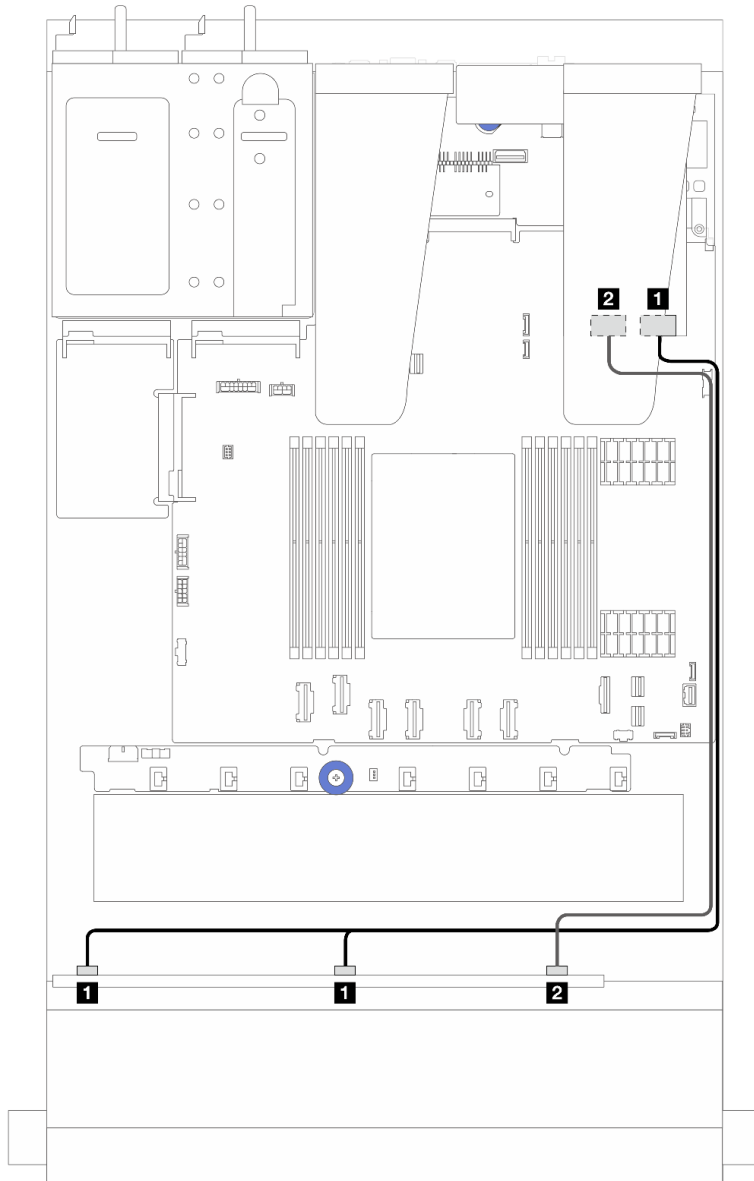


From	To
1 SAS 0 and SAS 1 on the front backplane	1 PCIe connector 7 on the system board assembly
2 SAS 2 on the front backplane	2 PCIe connector 8 on the system board assembly

Cable routing for server model with ten 2.5-inch AnyBay drives and a 16i SFF RAID/HBA adapter

The following illustration and table show the mapping relationship between backplane connectors and a 16i SFF HBA/RAID adapter.

Note: Gen 3 and Gen 4 SFF RAID/HBA adapters are slightly different in their connectors, but the connection method is similar. The following illustration takes Gen 4 SFF RAID/HBA adapters as an example.



From	To
1 SAS 0 and SAS 1 on the front backplane	1 SFF RAID/HBA adapter <ul style="list-style-type: none"> • Gen 4: C0 • Gen 3: C0, C1
2 SAS 2 on the front backplane	2 SFF RAID/HBA adapter <ul style="list-style-type: none"> • Gen 4: C1 • Gen 3: C2

6 x 2.5" SAS/SATA + 4 x 2.5" AnyBay backplane

See this section to understand the cable routing of 6 front SAS/SATA drives and 4 front AnyBay drives with 6 x 2.5" SAS/SATA + 4 x 2.5" AnyBay backplane installed.

- For the locations of connectors on the processor board, refer to [“System-board-assembly connectors”](#) on page 33.

- To connect power cables for 2.5-inch drive backplanes, refer to [“Power/Sideband cable routing” on page 276](#).
- To connect power and input cables for CFF RAID/HBA adapters, refer to [“CFF RAID/HBA adapter” on page 246](#).
- To connect power and sideband cables for the rear drive backplane, refer to [“Rear NVMe/SATA drive backplane” on page 258](#).
- To connect power and sideband cables for the 7mm drive backplane, refer to [“7mm drive backplane” on page 261](#).
- To connect cables for RAID flash power modules, refer to [“RAID flash power modules” on page 253](#).

To connect signal cables for a backplane for standard 6 front SAS/SATA drives and 4 front AnyBay drives, refer to the following cable routing scenarios depending on your server configuration:

- [“Cable routing for onboard configuration” on page 300](#)
- [“Cable routing with an SFF HBA/RAID adapter” on page 302](#)
- [“Cable routing with a CFF HBA/RAID adapter” on page 305](#)
- [“Cable routing with a CFF RAID/HBA adapter and 2x 2.5 rear SAS/SATA drives” on page 308](#)

Cable routing for onboard configuration

The following tables show the mapping relationship between backplane connectors and system board assembly connectors for onboard configuration.

Connections between connectors: **1** ↔ **1**, **2** ↔ **2**, **3** ↔ **3**, ... **n** ↔ **n**.

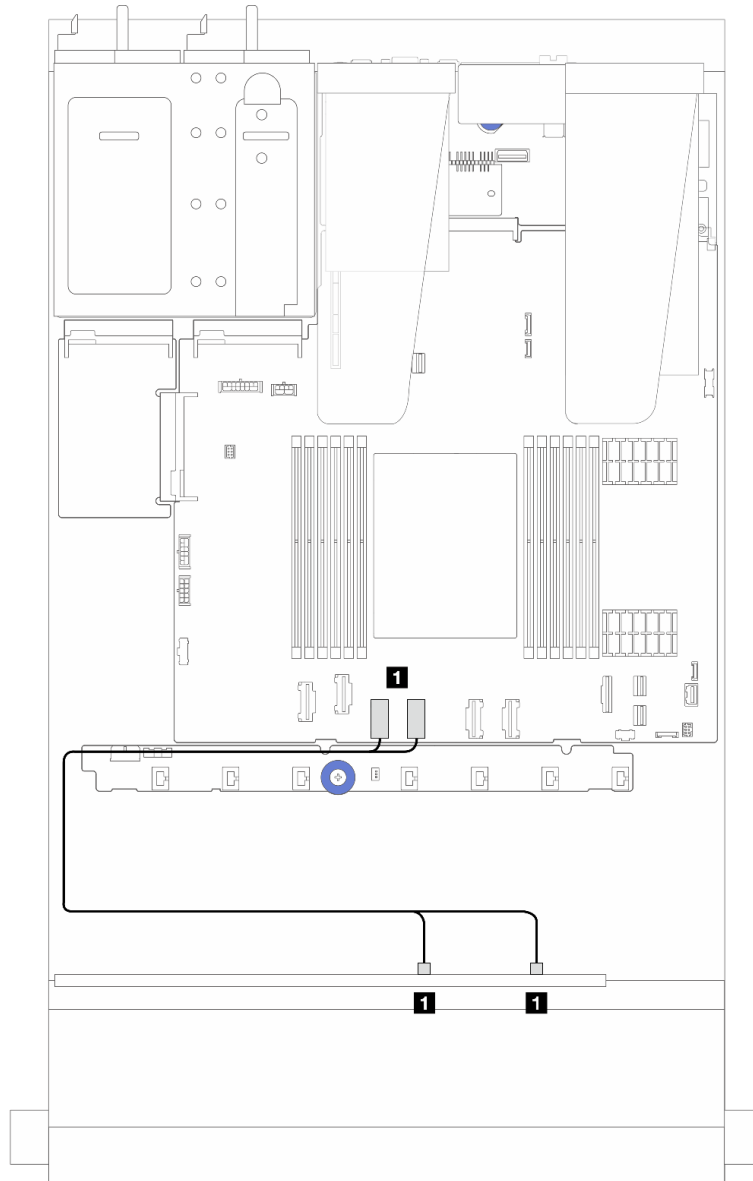


Figure 266. Cable routing for NVMe onboard configuration of 6 front SAS/SATA drives and 4 front AnyBay drive bays

Table 41. Mapping between one front AnyBay backplane and system board assembly for NVMe onboard configuration

From	To
1 NVMe 0-1 and 2-3 on the front backplane	1 PCIe connectors 4 and 3 on the system board assembly

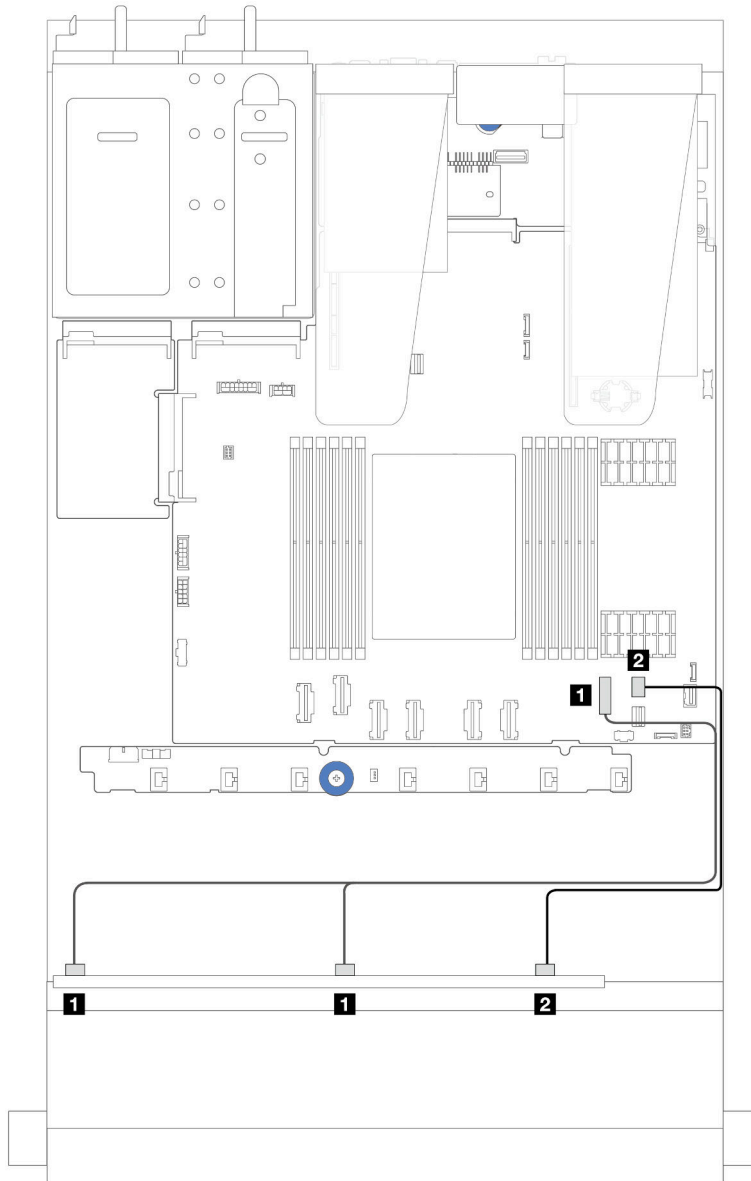


Figure 267. Cable routing for SATA onboard configuration of 6 front SAS/SATA drives and 4 front AnyBay drive bays

Table 42. Mapping between one front AnyBay backplane and system board assembly for SAS/SATA onboard configuration

From	To
1 SAS 0, SAS 1 on the front backplane	1 PCIe connector 7 on the system board assembly
2 SAS 2 on the front backplane	2 PCIe connector 8 on the processor board

Cable routing with an SFF HBA/RAID adapter

The following tables show the mapping relationship between backplane connectors and a 16i SFF HBA/RAID adapter (Gen 3 or Gen 4).

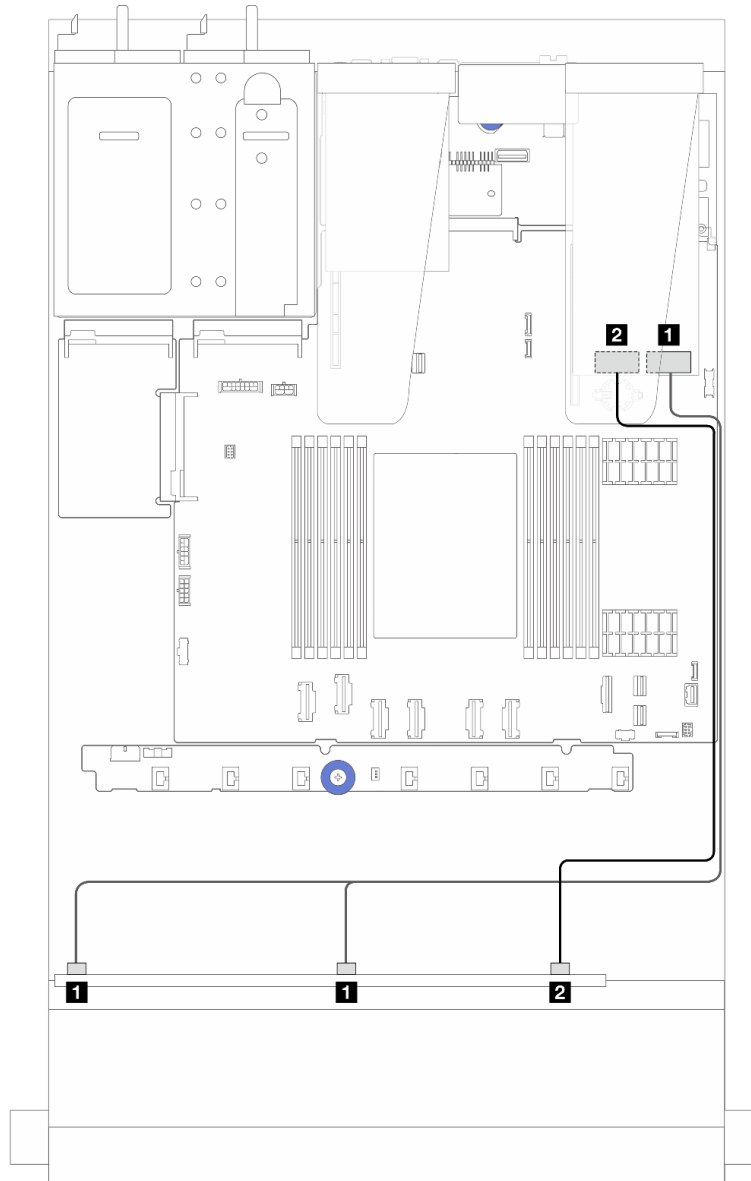


Figure 268. Cable routing for 6 front SAS/SATA drives and 4 front AnyBay drives bays with a 16i SFF RAID adapter (Gen 4)

Table 43. Mapping between one front AnyBay backplane and an SFF HBA/RAID adapter (Gen 4)

From	To
1 SAS 0 and SAS 1 on the front backplane	1 C0 on the SFF HBA/RAID adapter
3 SAS 2 on the front backplane	3 C1 on the SFF HBA/RAID adapter

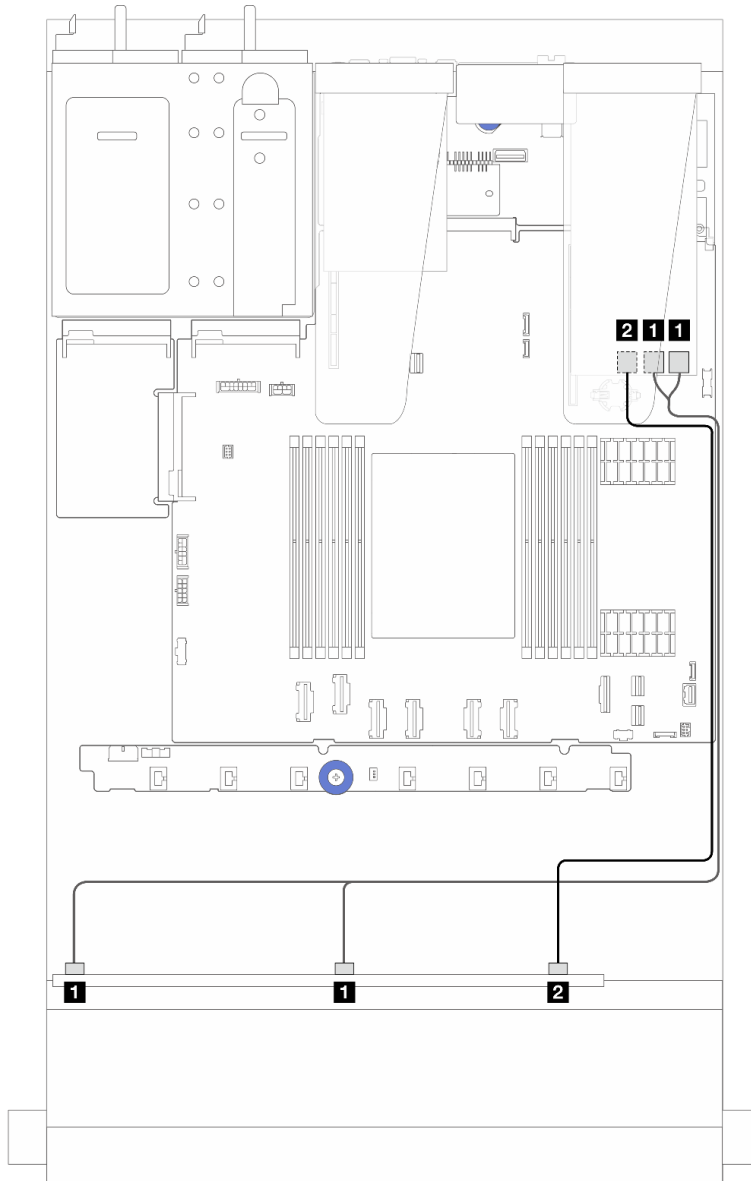


Figure 269. Cable routing for 6 front SAS/SATA drives and 4 front AnyBay drives bays with a 16i SFF RAID adapter (Gen 3)

Table 44. Mapping between one front AnyBay backplane and a 16i SFF HBA/RAID adapter (Gen 3)

From	To
1 SAS 0 and SAS 1 on the front backplane	1 C0 and C1 on the SFF RAID/HBA adapter
2 SAS 2 on the front backplane	2 C2 on the SFF RAID/HBA adapter

Cable routing with a CFF HBA/RAID adapter

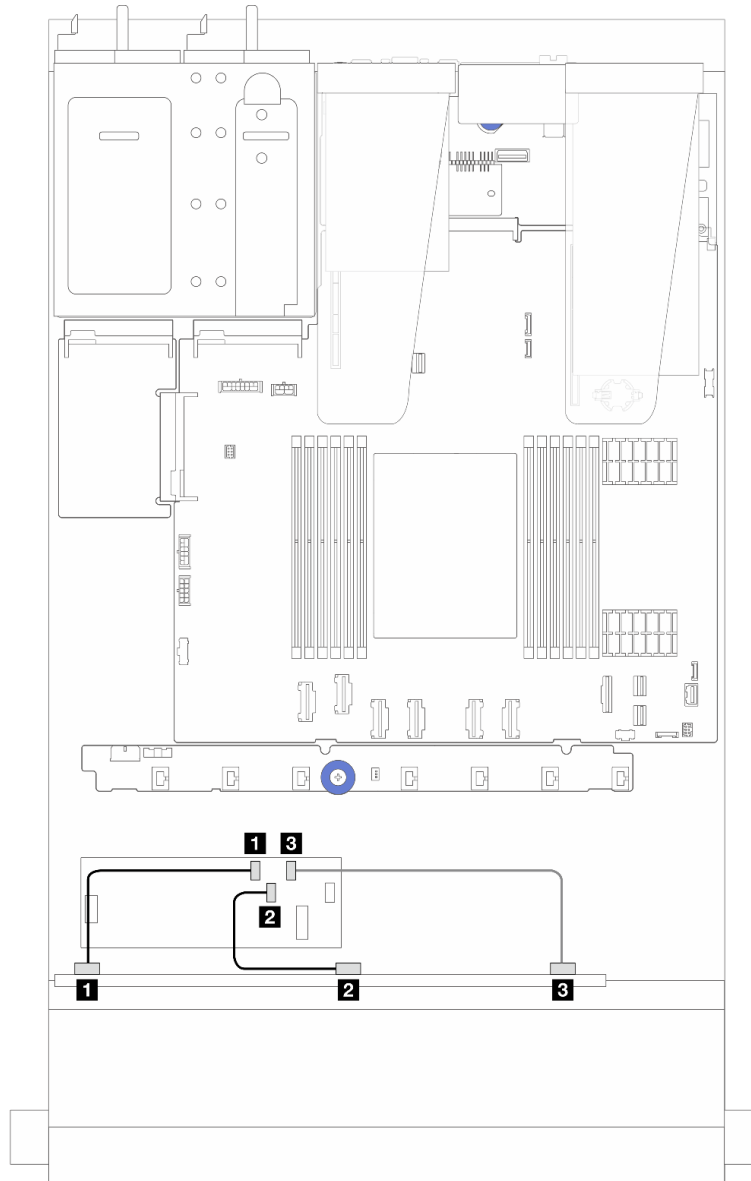


Figure 270. Cable routing for 6 front SAS/SATA drives and 4 front AnyBay drives bays and a 16i CFF RAID/HBA adapter (Gen 4)

Table 45. Mapping between one front AnyBay and a 16i CFF RAID/HBA adapter (Gen 4)

From	To
1 SAS 0 on the front backplane	1 C0 on the CFF RAID/HBA adapter
2 SAS 1 on the front backplane	2 C1 on the CFF RAID/HBA adapter
3 SAS 2 on the front backplane	3 C2 on the CFF RAID/HBA adapter

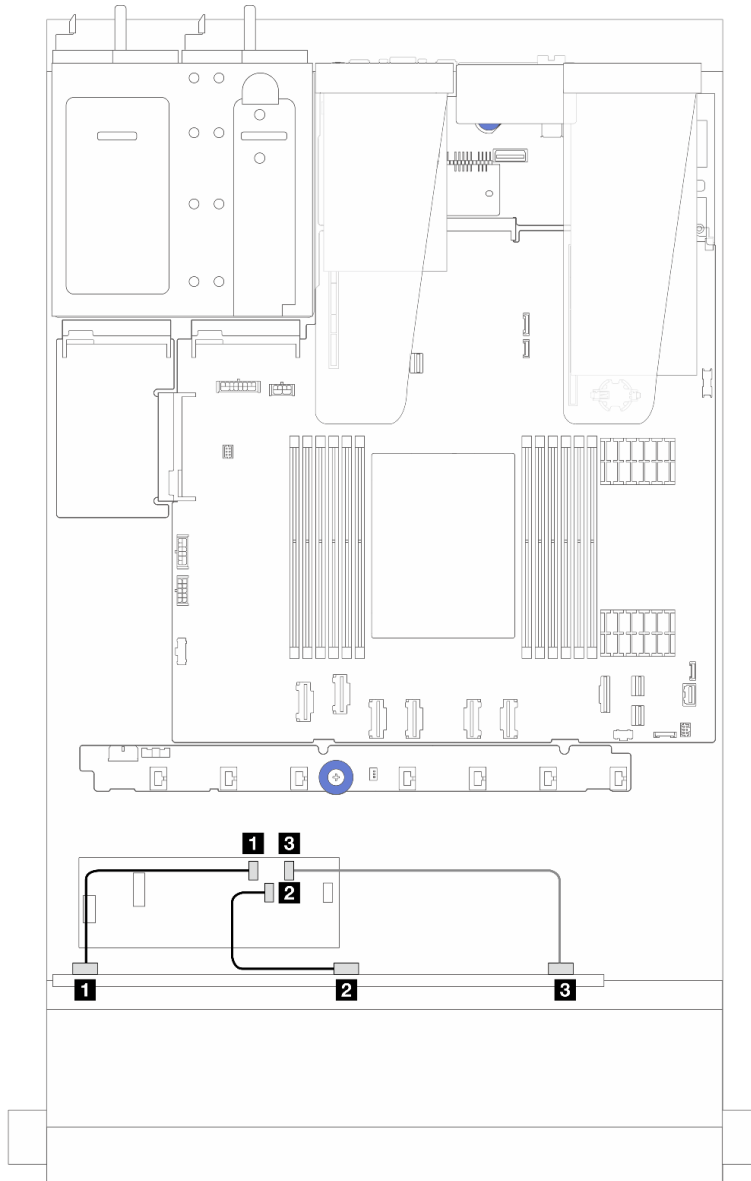


Figure 271. Cable routing for 6 front SAS/SATA drives and 4 front AnyBay drives bays and a 16i CFF RAID/HBA adapter (Gen 3)

Table 46. Mapping between one front AnyBay and a 16i CFF RAID/HBA adapter (Gen 3)

From	To
1 SAS 0 on the front backplane	1 C0 on the CFF RAID/HBA adapter
2 SAS 1 on the front backplane	2 C1 on the CFF RAID/HBA adapter
3 SAS 2 on the front backplane	3 C2 on the CFF RAID/HBA adapter

Note: Gen 3 and Gen 4 16i CFF RAID/HBA adapters are slightly different in their connector locations, but the connection method is similar. The following illustration takes Gen 4 16i CFF RAID/HBA adapters as an example.

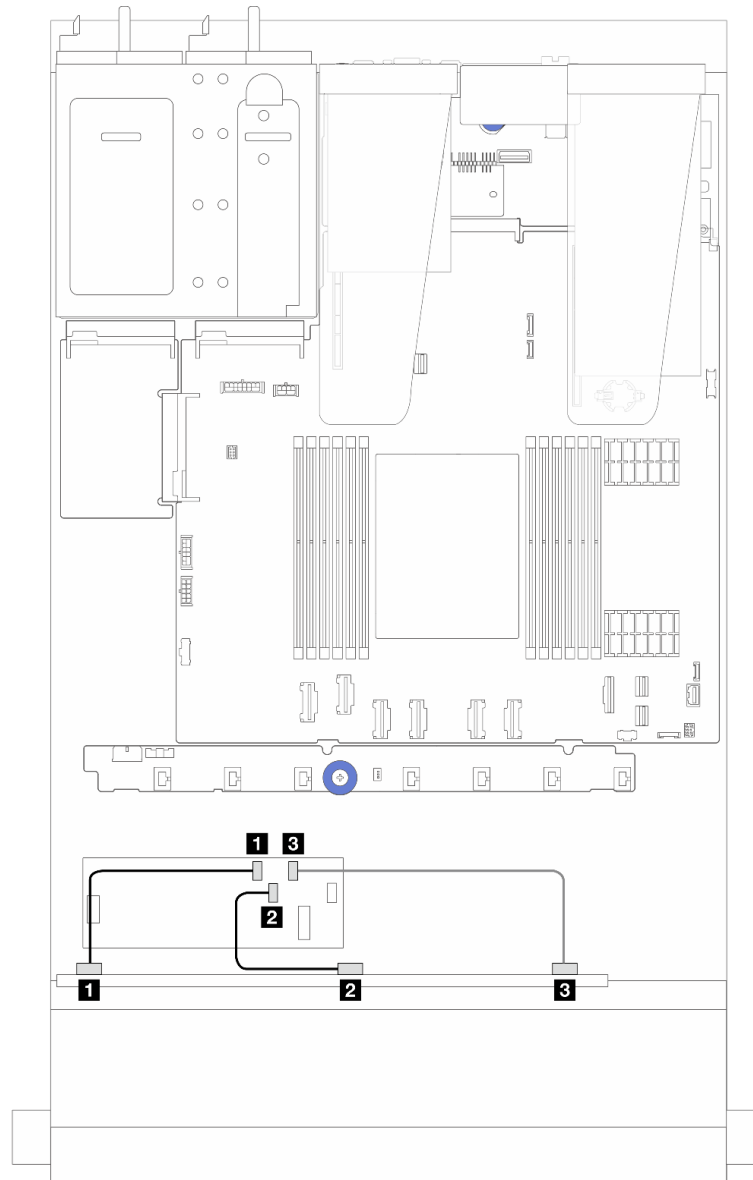


Figure 272. Cable routing for 6 front SAS/SATA drives and 4 front AnyBay drives bays and a 16i CFF RAID adapter (Gen 3 or Gen 4)

Table 47. Mapping between one front AnyBay and a 16i CFF HBA/RAID adapter

From	To
1 SAS 0 on the front backplane	1 C0 on the CFF RAID/HBA adapter
2 SAS 1 on the front backplane	2 C1 on the CFF RAID/HBA adapter
3 SAS 2 on the front backplane	3 C2 on the CFF RAID/HBA adapter

Cable routing with a CFF RAID/HBA adapter and 2x 2.5 rear SAS/SATA drives

Note: Gen 3 and Gen 4 16i CFF RAID/HBA adapters are slightly different in their connector locations, but the connection method is similar. The following illustration takes Gen 4 16i CFF RAID/HBA adapters as an example.

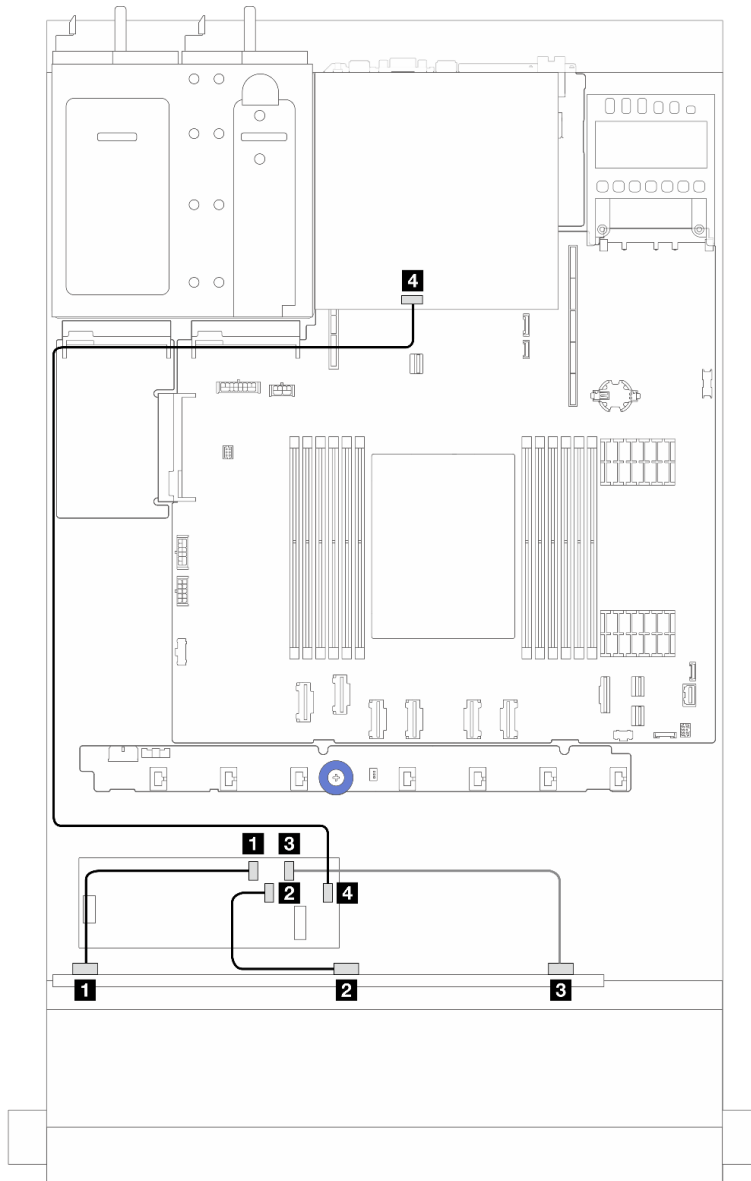


Figure 273. Cable routing for 6 front SAS/SATA drives and 4 front AnyBay drives bays and a 16i CFF RAID adapter (Gen 3/ Gen 4) with 2 x 2.5 rear SAS/SATA drives installed

Table 48. Mapping between one front AnyBay backplane and a 16i CFF RAID adapter (Gen 3) with 2 x 2.5 rear SAS/SATA drives installed

From	To
1 SAS 0 on the front backplane	1 C0 on the CFF RAID/HBA adapter
2 SAS 1 on the front backplane	2 C1 on the CFF RAID/HBA adapter

Table 48. Mapping between one front AnyBay backplane and a 16i CFF RAID adapter (Gen 3) with 2 x 2.5 rear SAS/SATA drives installed (continued)

From	To
3 SAS 2 on the front backplane	3 C2 on the CFF RAID/HBA adapter
4 SAS connector on the rear backplane	4 C3 on the CFF RAID/HBA adapter

6 x 2.5" SAS/SATA + 2 x 2.5" AnyBay + 2 x 2.5" NVMe backplane

See this section to understand the cable routing of 6 front SAS/SATA drives, 2 AnyBay drives and 2 front NVMe drives.

- For the locations of connectors on the processor board, refer to [“System-board-assembly connectors” on page 33](#).
- To connect power cables for 2.5-inch drive backplanes, refer to [“Power/Sideband cable routing” on page 276](#).
- To connect power and input cables for CFF RAID/HBA adapters, refer to [“CFF RAID/HBA adapter” on page 246](#).
- To connect power and sideband cables for the rear drive backplane, refer to [“Rear NVMe/SATA drive backplane” on page 258](#).
- To connect power and sideband cables for the 7mm drive backplane, refer to [“7mm drive backplane” on page 261](#).
- To connect cables for RAID flash power modules, refer to [“RAID flash power modules” on page 253](#).

To connect signal cables for a backplane for standard 6 front SAS/SATA drives, 2 AnyBay drives and 2 front NVMe drives, refer to the following cable routing scenarios depending on your server configuration:

- [“Cable routing with an SFF HBA/RAID adapter” on page 309](#)
- [“Cable routing with a CFF HBA/RAID adapter” on page 312](#)

Cable routing with an SFF HBA/RAID adapter

The following tables show the mapping relationship between backplane connectors and an SFF HBA/RAID adapter.

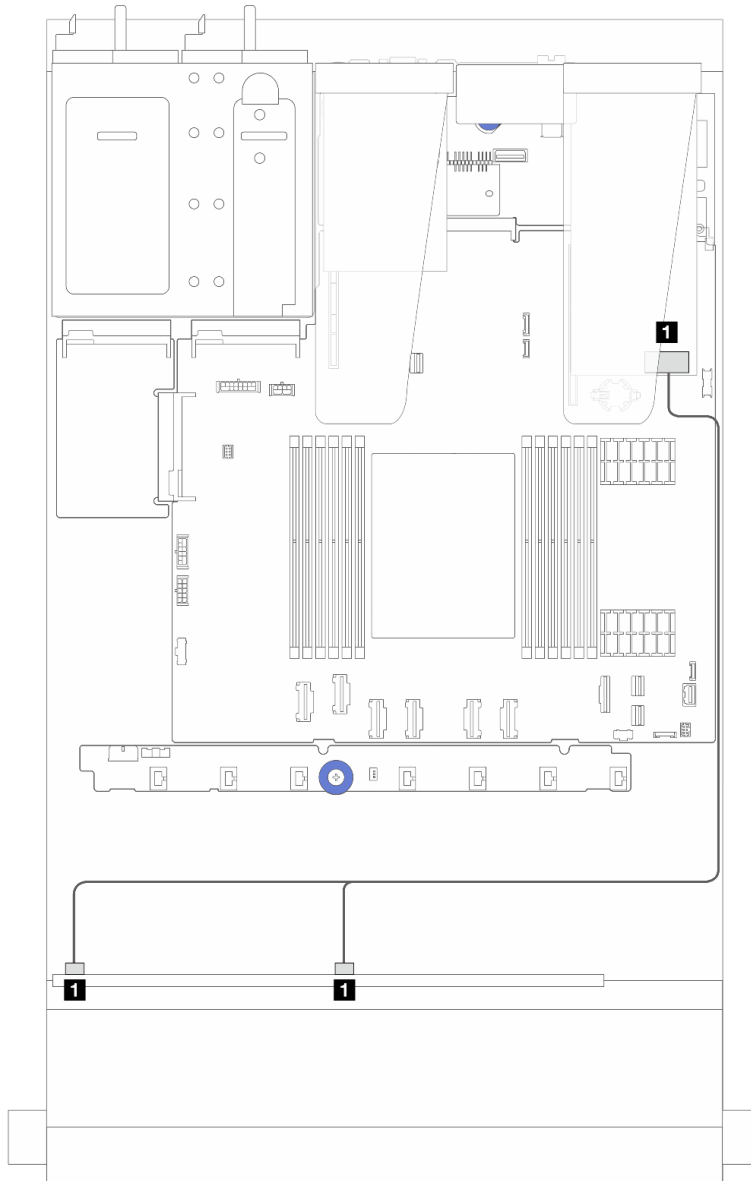


Figure 274. Cable routing for 6 SAS/SATA drives and 2 AnyBay drives and 2 NVMe front drive bays with an 8i SFF RAID adapter (Gen 4)

Table 49. Mapping between one front AnyBay backplane and an SFF HBA/RAID adapter

From	To
1 SAS 0 and SAS 1 on the front backplane	1 C0 on the SFF RAID/HBA adapter

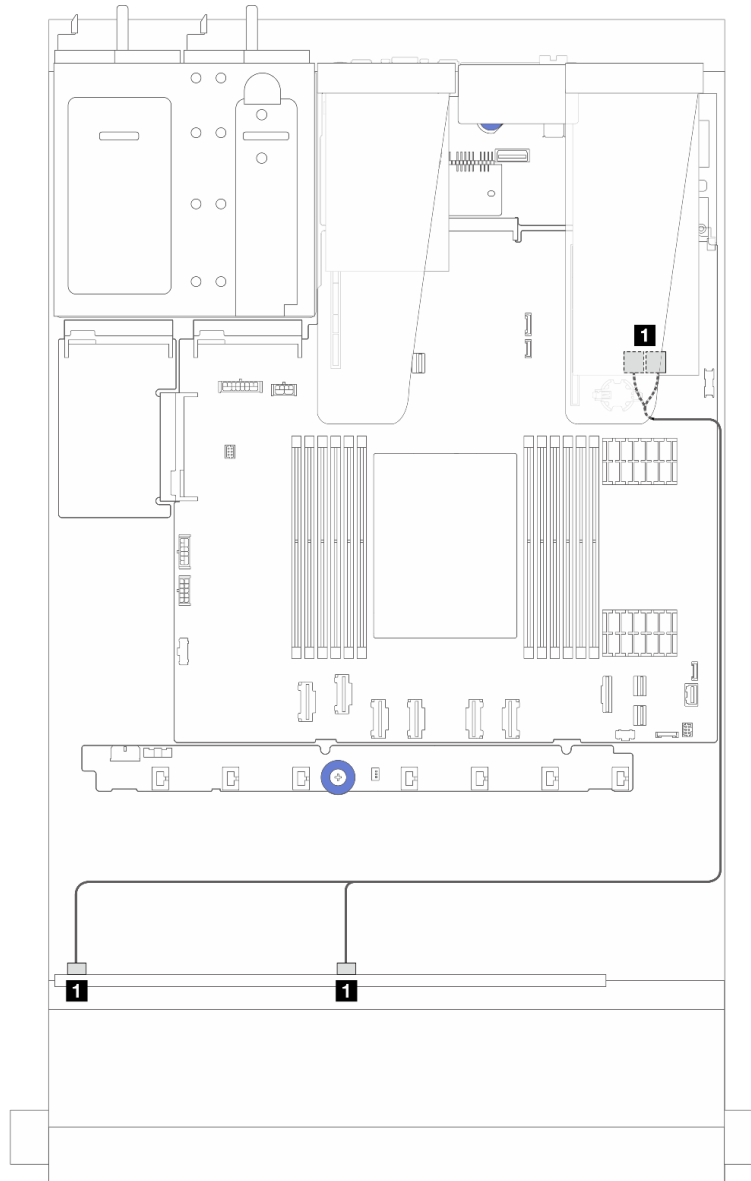


Figure 275. Cable routing for 6 SAS/SATA drives and 2 AnyBay drives and 2 NVMe front drive bays with an 8i SFF RAID adapter (Gen 3)

Table 50. Mapping between one front AnyBay backplane and an SFF HBA/RAID adapter

From	To
1 SAS 0 and SAS 1 on the front backplane	1 C0 and C1 on the SFF RAID/HBA adapter

Cable routing with a CFF HBA/RAID adapter

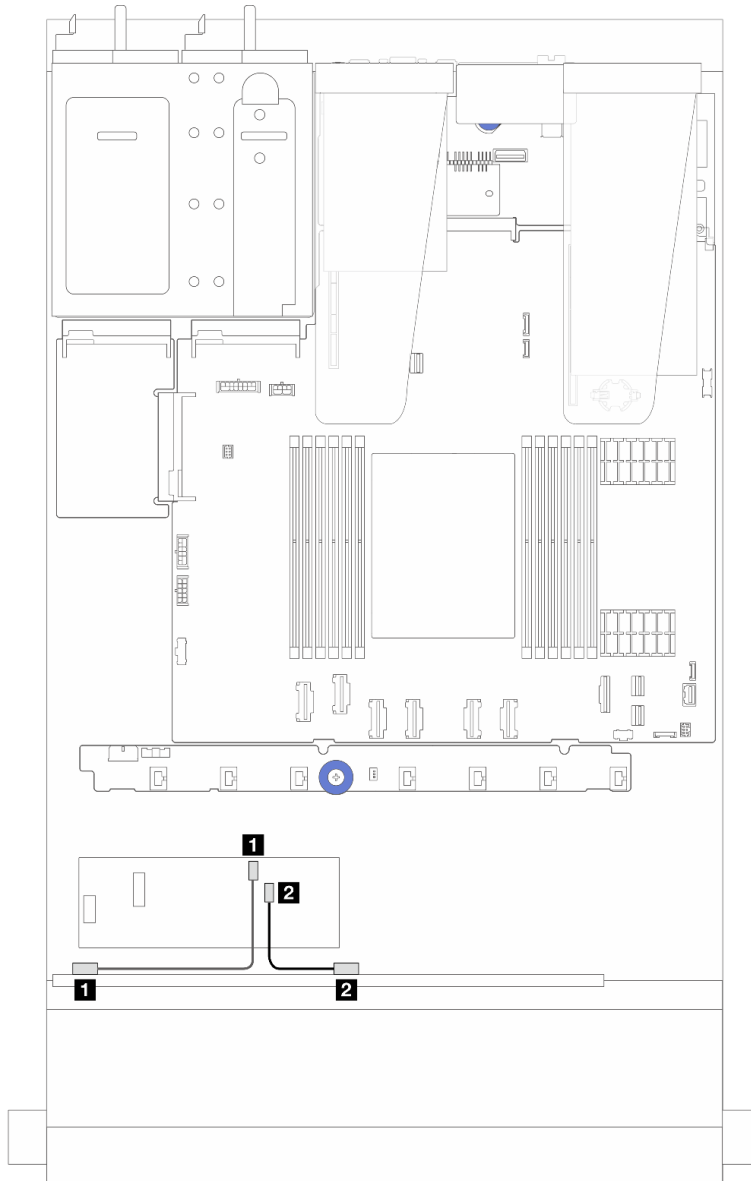


Figure 276. Cable routing for 6 SAS/SATA drives and 2 AnyBay drives and 2 NVMe front drive bays with an 8i CFF RAID adapter (Gen 3)

Table 51. Mapping between one front AnyBay backplane and an 8i CFF HBA/RAID adapter

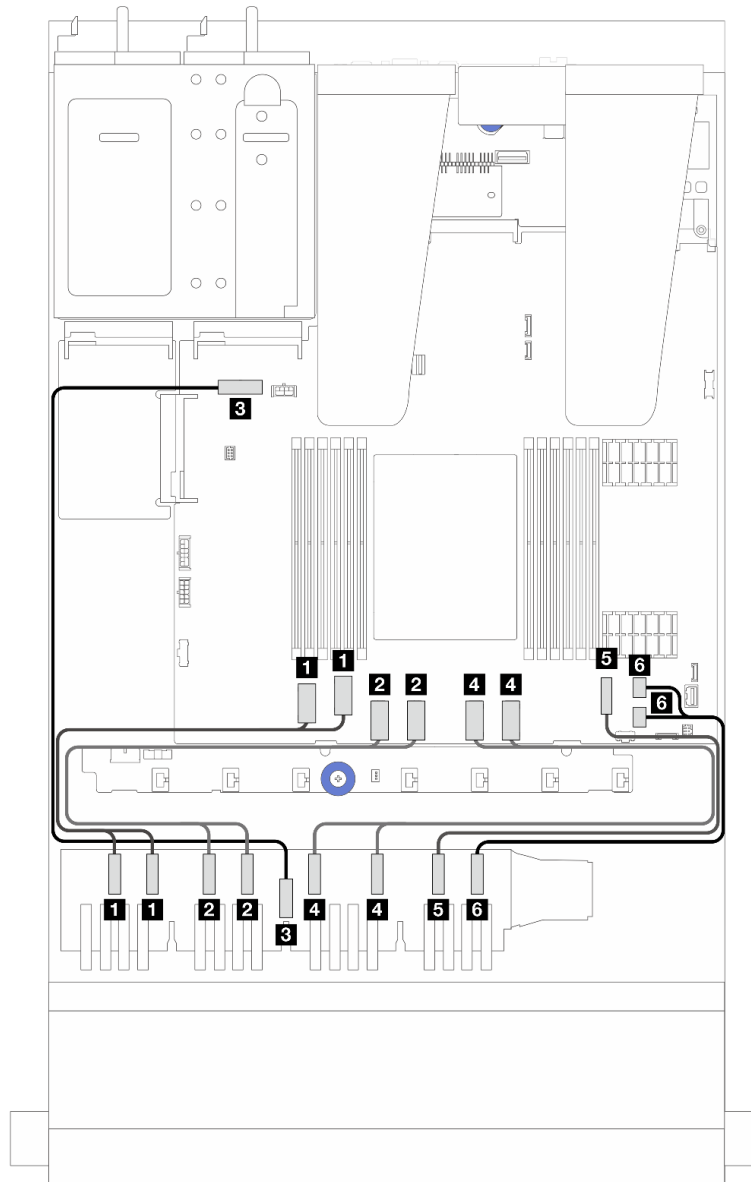
From	To
1 SAS 0 on the front backplane	1 C0 on the CFF RAID/HBA adapter
2 SAS 1 on the front backplane	2 C1 on the CFF RAID/HBA adapter

16-EDSFF drive backplane cable routing

Use this section to understand the backplane cable routing for the server model with 16 E1.S EDSFF front drives.

Cable routing for 16-EDSFF drive backplane

The following table shows the cabling routing for the 16-EDSFF drive backplane. For the locations of relevant connectors on the processor board, see [“System-board-assembly connectors”](#) on page 33 for details.



From	To
1 EDSFF 0-1, EDSFF 2-3	1 PCIe connector 1 and 2
2 EDSFF 4-5, EDSFF 6-7	2 PCIe connector 3 and 4
3 EDSFF Power	3 Backplane power connector on the system board assembly
4 EDSFF 8-9, EDSFF 10-11	4 PCIe connector 5 and 6
5 EDSFF 12-13	5 PCIe connector 7
6 EDSFF 14-15	6 PCIe connector 8 and 9

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 on your server. For the location of the XCC system management port, 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 41](#).

- 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](#).

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 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 second 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/lxccc-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/sr635v3/7d9h//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		√		
Lenovo XClarity Integrator (LXCI) for Microsoft Windows Admin Center	In-band Out-of-band On-Target Off-Target	√	All 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 System Center Configuration Manager	In-band On-Target	√	All I/O devices		√		√
Notes: <ol style="list-style-type: none"> For I/O firmware updates. For BMC and UEFI firmware updates. Drive firmware update is only supported by the tools and methods below: <ul style="list-style-type: none"> XCC Bare Metal Update (BMU): In-band, and requires system reboot. Lenovo XClarity Essentials OneCLI: <ul style="list-style-type: none"> 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.). 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/Invo-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/Invo-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.

Important: Lenovo does not recommend setting option ROMs to **Legacy**, but you can conduct this setting if necessary. Note that this setting prevents UEFI drivers for the slot devices from loading, which may cause negative side effects to Lenovo software, such as LXCA, OneCLI, and XCC. These side effects include but

are not limited to the inability to determine adapter card details, such as model name and firmware levels. For example, "ThinkSystem RAID 930-16i 4GB Flash" may be displayed as "Adapter 06:00:00". In some cases, the functionality on a specific PCIe adapter may not be enabled properly.

- **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 updating firmware 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
- VMware ESXi
- Microsoft Windows
- 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

- Lenovo XClarity Integrator deployment pack for SCCM (for Windows operating system only)
https://pubs.lenovo.com/lxci-deploypack-sccm/dpsccm_c_endtoend_deploy_scenario

- **Single-server**

Available tools:

- Lenovo XClarity Provisioning Manager
“OS Installation” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>
- Lenovo XClarity Essentials OneCLI
https://pubs.lenovo.com/lxce-onecli/onecli_r_uxspi_proxy_tool
- Lenovo XClarity Integrator deployment pack for SCCM (for Windows operating system only)
https://pubs.lenovo.com/lxci-deploypack-sccm/dpsccm_c_endtoend_deploy_scenario

Manual deployment

If you cannot access the above tools, follow the instructions below, download the corresponding OS *Installation Guide*, and deploy the operating system manually by referring to the guide.

1. Go to <https://datacentersupport.lenovo.com/solutions/server-os>.
2. Select an operating system from the navigation pane and click **Resources**.
3. Locate the “OS Install Guides” area and click the installation instructions. Then, follow the instructions to complete the operation system deployment task.

Back up the server configuration

After setting up the server or making changes to the configuration, it is a good practice to make a complete backup of the server configuration.

Make sure that you create backups for the following server components:

- **Management processor**

You can back up the management processor configuration through the Lenovo XClarity Controller interface. For details about backing up the management processor configuration, see:

“Backing up the BMC configuration” section in the XCC documentation compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>.

Alternatively, you can use the `save` command from Lenovo XClarity Essentials OneCLI to create a backup of all configuration settings. For more information about the `save` command, see:

https://pubs.lenovo.com/lxce-onecli/onecli_r_save_command

- **Operating system**

Use your backup methods to back up the operating system and user data for the server.

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 the documentation icon  from the navigation pane.
3. Click **Documentation 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/sr635-v3/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.

The Lenovo XClarity Controller monitors all components of the server and posts events in the Lenovo XClarity Controller event log.

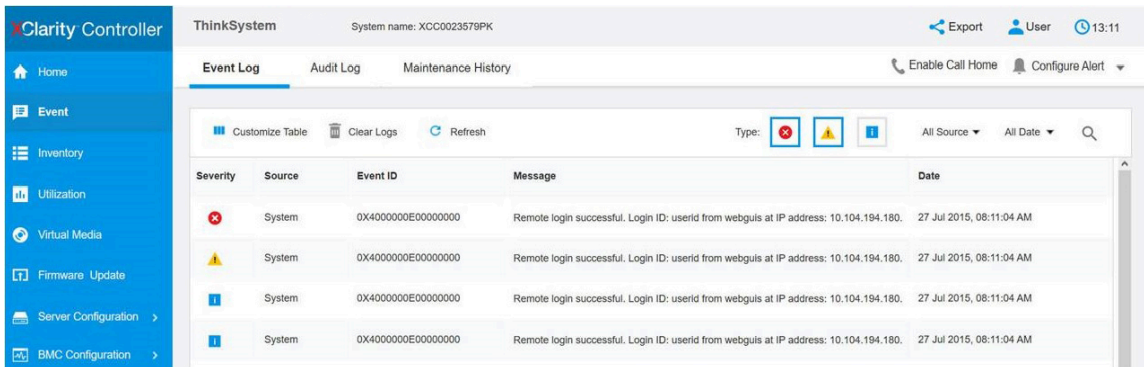


Figure 277. Lenovo XClarity Controller event log

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.

Logs

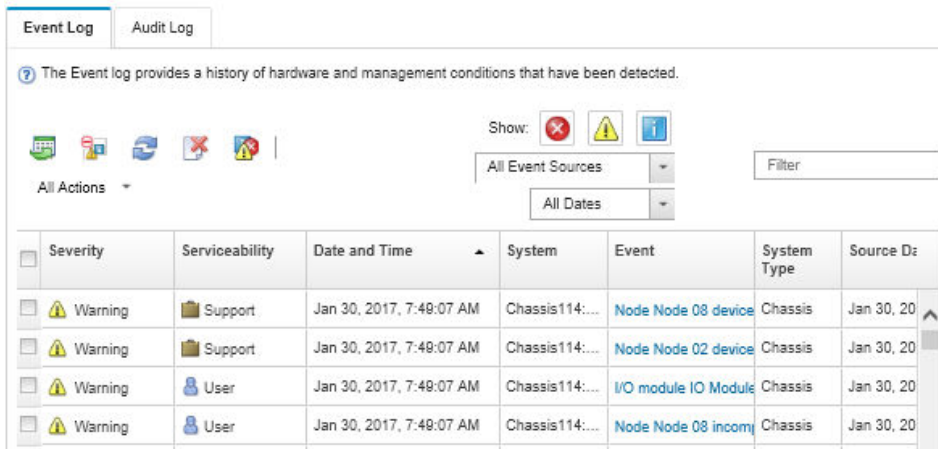


Figure 278. Lenovo XClarity Administrator event log

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

This topic provides information on drive LEDs.

Each 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 illustrations and tables describe the problems that are indicated by drive activity LED and drive status LED.

- [“LEDs on hard disk drives or solid-state drives” on page 327](#)
- [“LEDs on EDSFF drives” on page 328](#)

LEDs on hard disk drives or solid-state drives

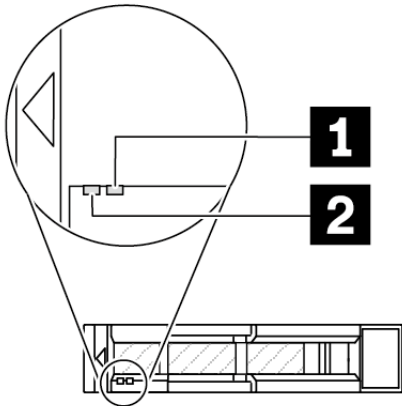


Figure 279. LEDs on hard disk drives or solid-state drives

Drive LED	Status	Description
1 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 RAID adapter is locating the drive.
2 Drive activity LED (left)	Solid green	The drive is powered but not active.
	Blinking green	The drive is active.

LEDs on EDSFF drives

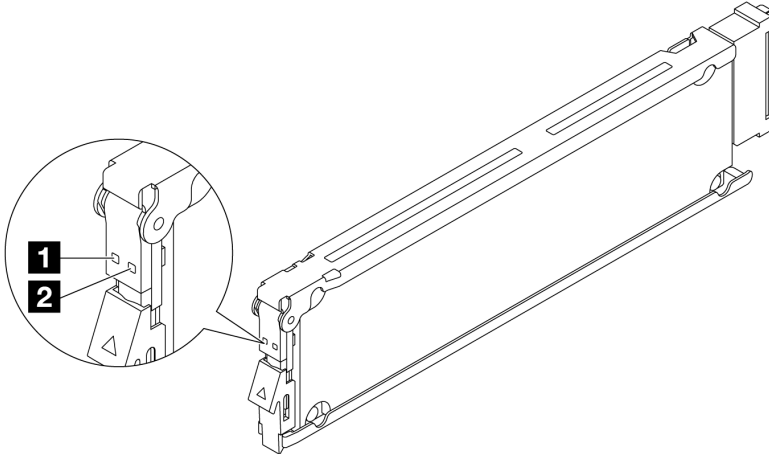


Figure 280. LEDs on EDSFF drives

Drive LED	Status	Description
1 Drive activity LED	Solid green	The drive is powered but not active.
	Blinking green (about four flashes per second)	The drive is active.
	Off	The drive is not powered.
2 Drive status LED	Solid amber	The drive has an error.
	Blinking amber (blinking slowly, about one flash per second)	The drive is being rebuilt.
	Blinking amber (blinking rapidly, about four flashes per second)	The RAID adapter is locating the drive.

Front operator panel LEDs

The front operator panel of the server provides controls, connectors, and LEDs.

Note: Diagnostics panel with an LCD display is available for some models. For details, see [“Integrated diagnostics panel”](#) on page 340 and [“External Diagnostics Handset”](#) on page 334.

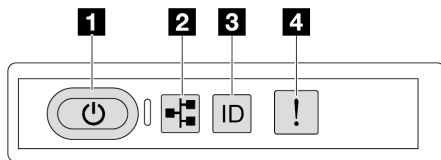


Figure 281. Front operator panel LEDs

Table 52. Front operator panel LEDs

1 “Power button with power status LED (green)” on page 329	3 “System ID button with system ID LED (blue)” on page 329
2 “Network activity LED (green)” on page 329	4 “System Error LED (yellow)” on page 329

1 Power button with power status LED (green)

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

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

2 Network activity LED (green)

The network activity LED helps you identify the network connectivity and activity.

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

3 System ID button with system ID LED (blue)

Use this system ID button and the blue system ID LED to visually locate the server. Each time you press the system ID button, the state of the system ID 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 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	<p>An error has been detected on the server. Causes might include but are not limited to the following errors:</p> <ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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 326. • Save the log if necessary.
Off	None	The server is off, or the server is on and is working correctly.	None.

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.

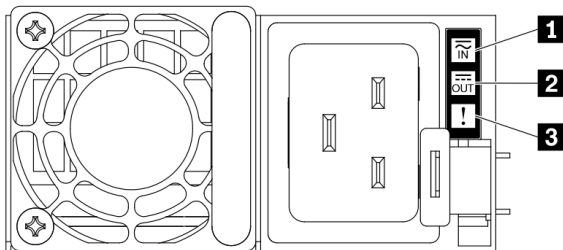


Figure 282. Power supply LEDs

LED	Description
1 Input status	<p>The input status LED can be in one of the following states:</p> <ul style="list-style-type: none"> • Off: The power supply is disconnected from the input power source. • Green: The power supply is connected to the input power source.
2 Output status	<p>The output status LED can be in one of the following states:</p> <ul style="list-style-type: none"> • Green: The server is on and the power supply is working normally. • Blinking green: The power supply is in zero-output mode (standby). When the server power load is low, one of the installed power supplies enters into the standby state while the other one delivers entire load. When the power load increases, the standby power supply will switch to active state to provide sufficient power to the server. <p>To disable zero-output mode, log in to the Lenovo XClarity Controller web interface, choose Server Configuration → Power Policy, disable Zero Output Mode, and then click Apply. If you disable zero-output mode, both power supplies will be in the active state. • Off: The server is powered off, or the power supply is not working properly. If the server is powered on but the power output LED is off, replace the power supply. <p>Zero-output mode can be disabled via Lenovo XClarity Controller web interface. Log in to the Lenovo XClarity Controller web interface, choose Server Configuration → Power Policy, disable Zero Output Mode, and then click Apply. If you disable zero-output mode, both power supplies will be in the active state.</p> </p>
3 Power supply error LED	<ul style="list-style-type: none"> • Off: The power supply is working normally • Yellow: Dump the FFDC log from affected systems and escalate to next level for PSU data log reviewing.

System-board-assembly LEDs

The following illustrations show the light-emitting diodes (LEDs) on the system board assembly which contains the system I/O board and the processor board.

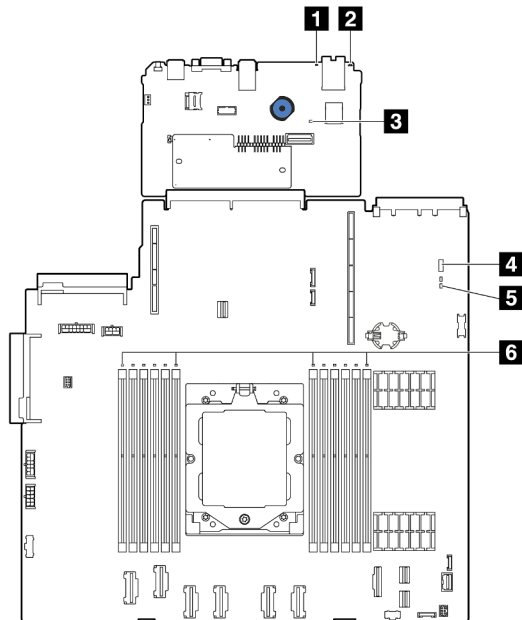


Figure 283. System-board-assembly LEDs

- **1** System error LED (yellow)
- **2** System ID LED (blue)
- **3** XCC heartbeat LED (green)
- **4** System status LED (green)
- **5** FPGA heartbeat LED (green)
- **6** DIMM error LEDs (amber)

Table 53. 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” on page 329 .
2 System ID LED (blue)	This LED helps you to 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 53. System-board-assembly LEDs (continued)

LED	Description	Action
<p>3 XCC heartbeat LED (green)</p>	<p>The XCC heartbeat LED helps you identify the XCC status.</p> <ul style="list-style-type: none"> • Blinking (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. 	<ul style="list-style-type: none"> • If the XCC heartbeat LED is always off or always on, do the following: <ul style="list-style-type: none"> – If XCC cannot be accessed: <ol style="list-style-type: none"> 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 technicians only) Replace the firmware and RoT security module. 4. (Trained technicians 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: <ol style="list-style-type: none"> 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 technicians only) Replace the firmware and RoT security module. 4. (Trained technicians only) Replace the system I/O board. • If the XCC heartbeat LED is blinking slowly over 5 minutes, do the following: <ol style="list-style-type: none"> 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.
<p>4 System status LED (green)</p>	<p>The system status LED indicates the working status of the system.</p> <ul style="list-style-type: none"> • Fast blinking (about four flashes per second): Power fault or is 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 	<ul style="list-style-type: none"> • 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: <ol style="list-style-type: none"> 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 technicians only) If the problem remains, capture FFDC log, and replace the processor board.

Table 53. System-board-assembly LEDs (continued)

LED	Description	Action
		4. If the problem still remains, contact Lenovo Support.
5 FPGA heartbeat LED (green)	The FPGA heartbeat LED helps you identify the FPGA status. <ul style="list-style-type: none"> 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: <ol style="list-style-type: none"> Replace the processor board. If the problem 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 354 .

XCC system management port LEDs

This topic provides information on LEDs of XCC system management port.

The following table describes the problems that are indicated by LEDs on XCC system management port.

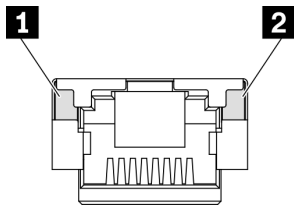


Figure 284. XCC system management port LEDs

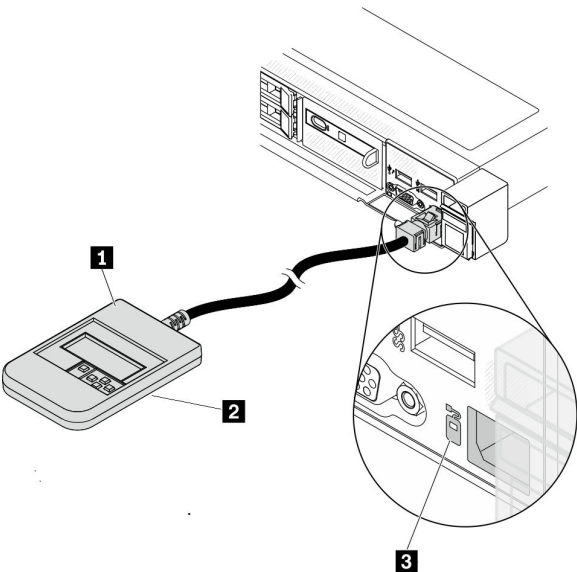
LED	Description
1 XCC system management port (1Gb RJ-45) Ethernet port link LED	Use this green LED to distinguish the network connectivity status: <ul style="list-style-type: none"> Off: The network link is disconnected. Green: The network link is established.
2 XCC system management port (1 Gb RJ-45) Ethernet port activity LED	Use this green LED to distinguish the network activity status: <ul style="list-style-type: none"> Off: The server is disconnected from a LAN. Green: The network is connected and active.

External Diagnostics Handset

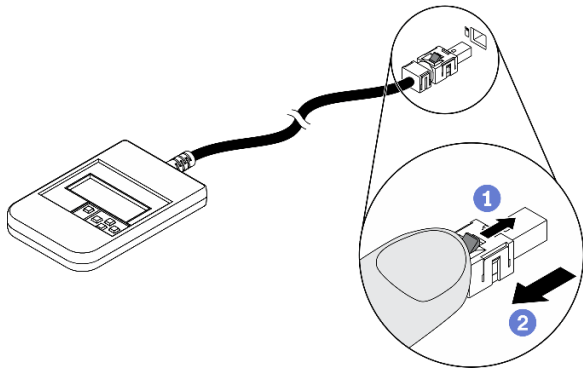
The External Diagnostics Handset is an external device that is connected to the server with a cable, and it allows quick access to system information such as errors, system status, firmware, network, and health information.

Note: The external diagnostics handset is an optional part that needs to be purchased separately.

Location of the External Diagnostics Handset

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

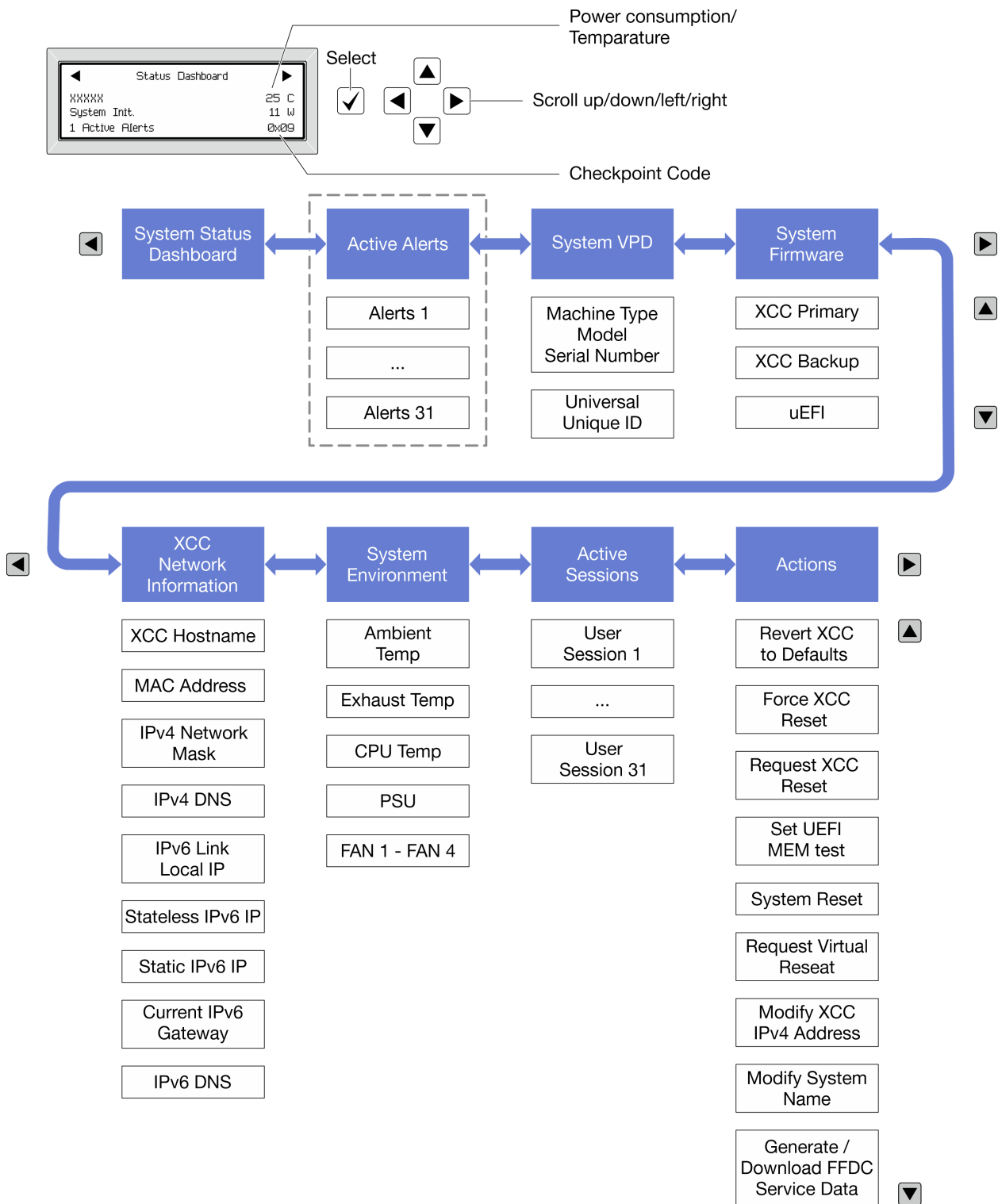
Note: When unplugging the External Diagnostics Handset, see the following instructions:



- 1** Press the plastic clip on the plug forward.
- 2** Hold the clip and remove the cable from the connector.

Display panel overview

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



Full menu list

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

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

Home Menu (System Status Dashboard)

Home Menu	Example
<p>1 System name</p> <p>2 System status</p> <p>3 Active alert quantity</p> <p>4 Temperature</p> <p>5 Power consumption</p> <p>6 Checkpoint code</p>	<p>The screenshot shows a 'Status Dashboard' with the following information: <ul style="list-style-type: none"> 1: System name (xxxxxx) 2: System status (System Init.) 3: Active alert quantity (1 Active Alerts) 4: Temperature (25 C) 5: Power consumption (11 W) 6: Checkpoint code (0x09) </p>

Active Alerts

Sub Menu	Example
<p>Home screen:</p> <p>Active error quantity</p> <p>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.</p>	<p>1 Active Alerts</p>
<p>Details screen:</p> <ul style="list-style-type: none"> • Error message ID (Type: Error/Warning/Information) • Occurrence time • Possible sources of the error 	<p>Active Alerts: 1</p> <p>Press ▼ to view alert details</p> <p>FQXSPPU009N(Error)</p> <p>04/07/2020 02:37:39 PM</p> <p>CPU 1 Status:</p> <p>Configuration Error</p>

System VPD Information

Sub Menu	Example
<ul style="list-style-type: none"> • Machine type and serial number • Universal Unique ID (UUID) 	<p>Machine Type: xxxx</p> <p>Serial Num: xxxxxx</p> <p>Universal Unique ID:</p> <p>xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx</p>

System Firmware

Sub Menu	Example
XCC Primary <ul style="list-style-type: none"> Firmware level (status) Build ID Version number Release date 	XCC Primary (Active) Build: DVI399T Version: 4.07 Date: 2020-04-07
XCC Backup <ul style="list-style-type: none"> Firmware level (status) Build ID Version number Release date 	XCC Backup (Active) Build: D8BT05I Version: 1.00 Date: 2019-12-30
UEFI <ul style="list-style-type: none"> Firmware level (status) Build ID Version number Release date 	UEFI (Inactive) Build: DOE101P Version: 1.00 Date: 2019-12-26

XCC Network Information

Sub Menu	Example
<ul style="list-style-type: none"> XCC hostname MAC address IPv4 Network Mask IPv4 DNS IPv6 Link Local IP Stateless IPv6 IP Static IPv6 IP Current IPv6 Gateway IPv6 DNS <p>Note: Only the MAC address that is currently in use is displayed (extension or shared).</p>	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
<ul style="list-style-type: none"> • 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

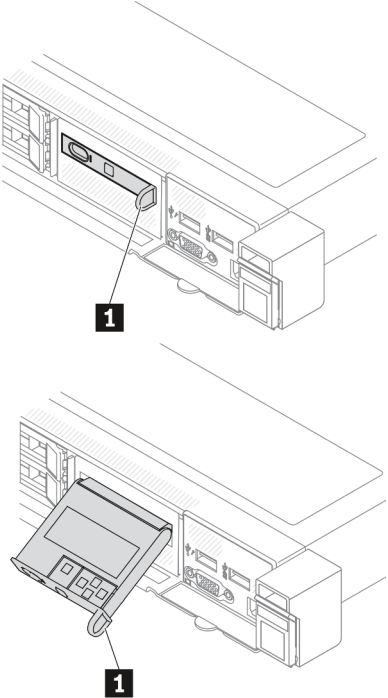
Actions

Sub Menu	Example
Several quick actions are available: <ul style="list-style-type: none"> • Revert XCC to Defaults • Force XCC Reset • Request XCC Reset • Set UEFI Memory Test • Request Virtual Reseat • Modify XCC Static IPv4 Address/Net mask/Gateway • Modify System Name • Generate/Download FFDC Service Data 	Request XCC Reset? This will request the BMC to reboot itself. Hold √ for 3 seconds

Integrated diagnostics panel

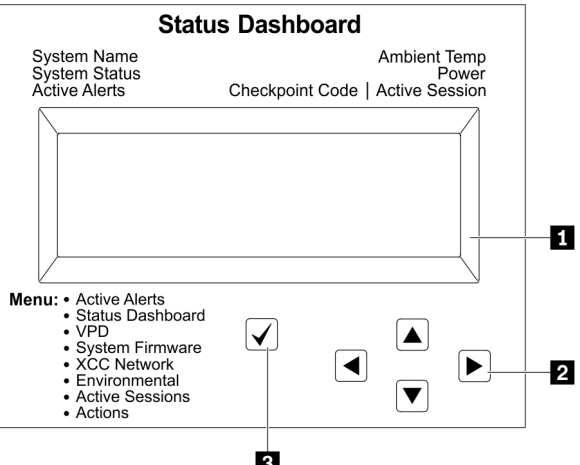
The integrated diagnostics panel is attached to the front of the server, while it allows quick access to system information such as errors, system status, firmware, network, and health information.

Location of the integrated diagnostics panel

<p>Location</p>	<p>The integrated diagnostics panel is attached to the front of the server.</p> 
<p>Callout</p>	<p>1 The handle with which the panel can be pulled out from the server.</p> <p>Notes:</p> <ul style="list-style-type: none"> • The panel can be pushed in or pulled out regardless of the system power status. • When pulling it out, do it gently to avoid damage.

Display panel overview

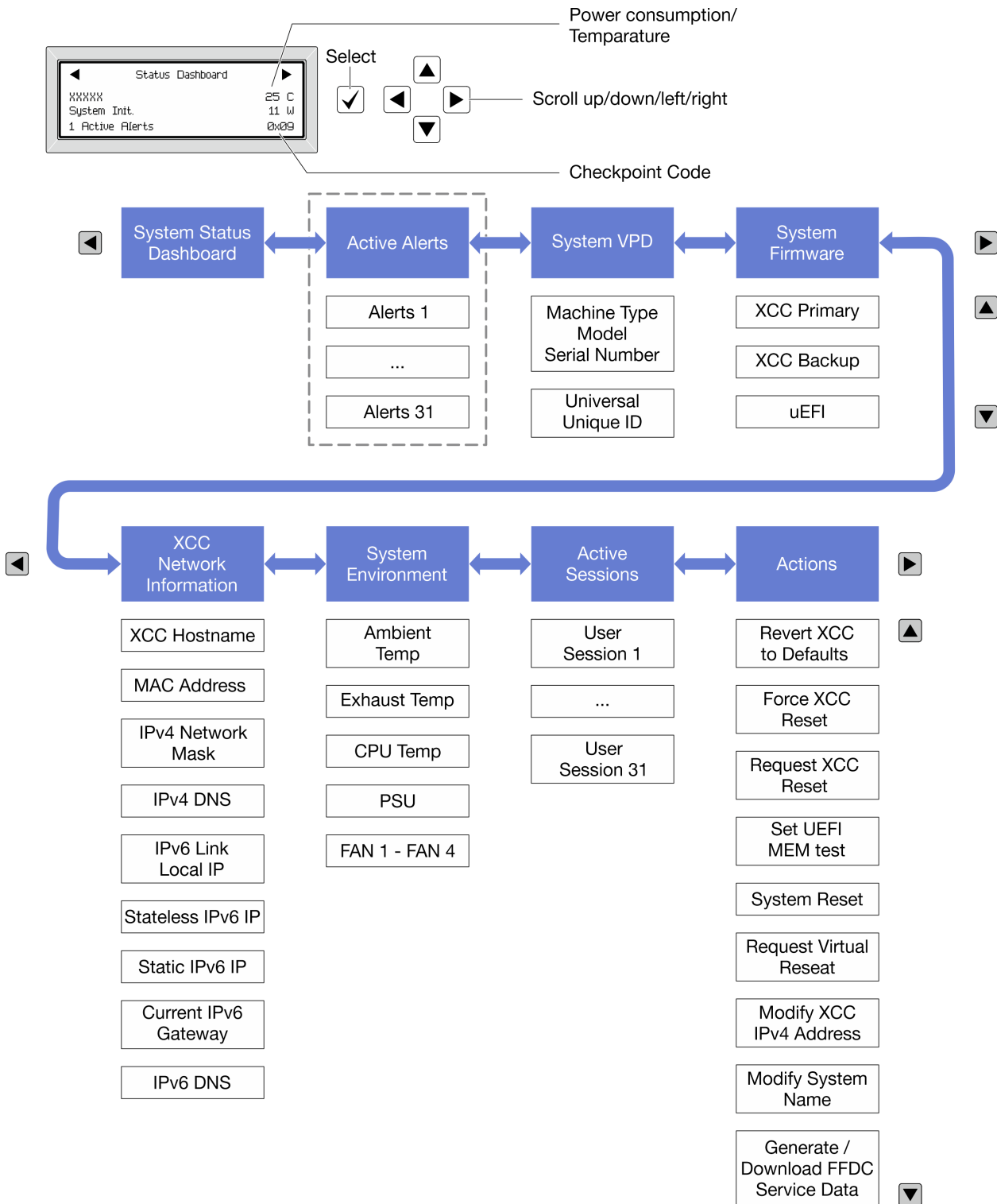
The diagnostics device consists of an LCD display and 5 navigation buttons.

	<p>1 LCD display</p> <p>2 Scroll buttons (up/down/left/right) Press the scroll buttons to locate and select system information.</p> <p>3 Select button Press the select button to select from the options in the menu.</p>
---	---

Option flow diagram

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

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



Full menu list

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

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

Home Menu (System Status Dashboard)

Home Menu	Example
<ul style="list-style-type: none"> 1 System name 2 System status 3 Active alert quantity 4 Temperature 5 Power consumption 6 Checkpoint code 	<p>The screenshot shows a 'Status Dashboard' screen with the following elements: <ul style="list-style-type: none"> 1: Left arrow navigation button 2: System name (displayed as 'xxxxxx') 3: System status ('System Init.') 4: Active alert quantity ('1 Active Alerts') 5: Temperature ('25 C') 6: Power consumption ('11 W') 7: Checkpoint code ('0x09') </p>

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: <ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • Machine type and serial number • Universal Unique ID (UUID) 	Machine Type: xxxx Serial Num: xxxxxx Universal Unique ID: xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

System Firmware

Sub Menu	Example
XCC Primary <ul style="list-style-type: none"> Firmware level (status) Build ID Version number Release date 	XCC Primary (Active) Build: DVI399T Version: 4.07 Date: 2020-04-07
XCC Backup <ul style="list-style-type: none"> Firmware level (status) Build ID Version number Release date 	XCC Backup (Active) Build: D8BT05I Version: 1.00 Date: 2019-12-30
UEFI <ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> XCC hostname MAC address IPv4 Network Mask IPv4 DNS IPv6 Link Local IP Stateless IPv6 IP Static IPv6 IP Current IPv6 Gateway IPv6 DNS <p>Note: Only the MAC address that is currently in use is displayed (extension or shared).</p>	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
<ul style="list-style-type: none"> • 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 are available: <ul style="list-style-type: none"> • Revert XCC to Defaults • Force XCC Reset • Request XCC Reset • Set UEFI Memory Test • Request Virtual Reseat • Modify XCC Static IPv4 Address/Net mask/Gateway • Modify System Name • Generate/Download FFDC Service Data 	Request XCC Reset? This will request the BMC to reboot itself. Hold √ for 3 seconds

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).

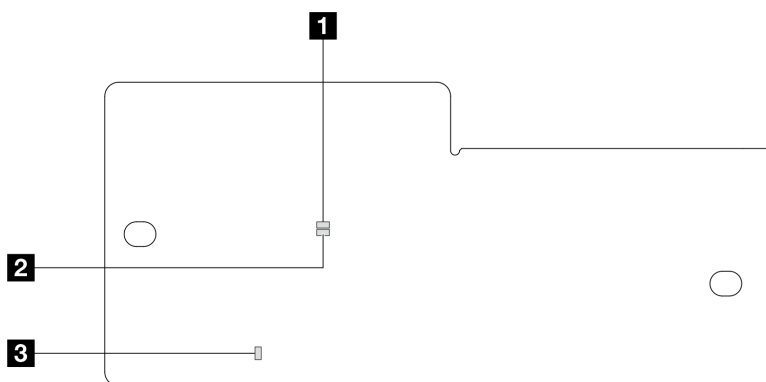


Figure 285. LEDs on the firmware and RoT security module

1 AP0 LED (Green)	2 AP1 LED (Green)	3 Fatal Error LED (Amber)
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Table 54. 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.
	Blink	N/A	On	On	N/A	Replace the firmware and RoT security module.
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: <ol style="list-style-type: none"> 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: <ol style="list-style-type: none"> 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.

Table 54. LEDs description (continued)

Scenario	AP0 LED	AP1 LED	Fatal Error LED	FPGA heartbeat LED ^{note}	XCC heartbeat LED ^{note}	Actions
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	On	Information only. No action is required.

Note: For locations of the FPGA LED and XCC heartbeat LED, see [“System-board-assembly LEDs” on page 331](#).

Liquid detection sensor LED

This topic provides information about the LED on the liquid cooling leak detection module.

The liquid detection sensor module on the L2AM comes with one LED. The following illustration shows the LED on the module.

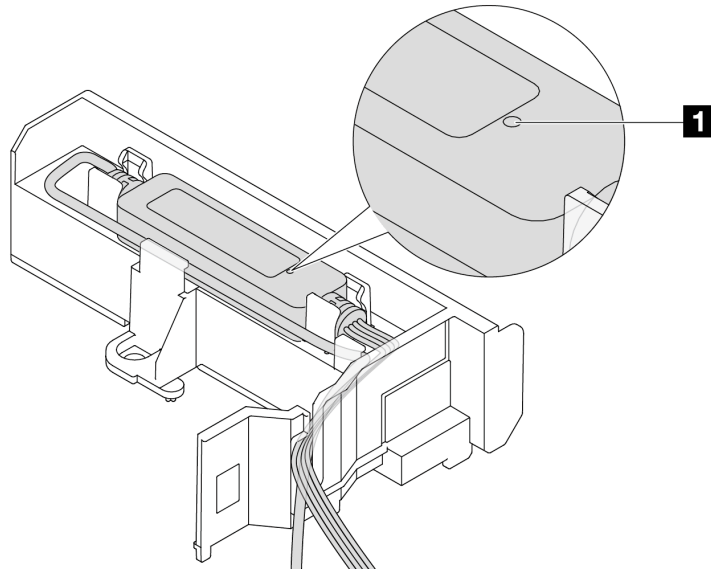


Figure 286. Leak detection LED

The following table describes the status that are indicated by L2AM LED.

Liquid detection sensor LED		
Status	Description	Action
Solid green	No coolant leakage detected.	No action required.
Blinking green	Abnormal status detected.	<ol style="list-style-type: none"> 1. Check for coolant leakage around the radiator, liquid pipes and pumps. 2. If coolant leakage found, turn off the power and remove the L2AM. 3. Contact Lenovo Support.

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 325](#).

- 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, reseal 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 used is supported by the adapter. For more information about the supported adapters, cables, and transceivers of the specific servers, go to <https://serverproven.lenovo.com/thinksystem/index>.
 - Make sure that the cable rating is sufficient for the data rate of the network. For example, a 1 Gb RJ45 network requires a cable of Cat5e or higher rating.
- Step 3. Determine whether the switch supports auto-negotiation. If not, try configuring the integrated Ethernet controller manually to match the speed of the switch port. Also, if forward error correction (FEC) modes are supported, make sure that both the adapter and the switch port have matching settings.
- Step 4. Check the Ethernet controller LEDs on the server. These LEDs indicate whether there is a problem with the connector, cable, or switch.

If the Ethernet function is implemented on the system board assembly, the Ethernet controller LED locations are specified in [“Troubleshooting by system LEDs and diagnostics display” on page 326](#).

- The Ethernet link status LED is lit when the Ethernet controller has established link with the switch port. If the LED is off, there might be a defective connector or cable or a problem with the switch port. In some cases, a bi-color link LED is used. Green indicates a link at the highest network speed. Yellow indicates a link lower than the highest network speed.
 - The Ethernet transmit/receive activity LED is lit or blinks when the Ethernet controller sends or receives data over the Ethernet network. If the Ethernet transmit/receive activity is off, make sure that the switch is powered on, the network is operating, and the correct device drivers are installed.
- Step 5. Check for operating-system-specific causes of the problem, and make sure that the operating system drivers are installed correctly.
 - Step 6. 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 the application that is managing the server and follow the suggested actions to resolve any event codes.
 - 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.

For more information about event logs (see [“Event logs” on page 325](#)).

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 371](#)).

Coolant leak problems

Use this information to resolve coolant leak problems with the L2AM (Lenovo Neptune(TM) Liquid to Air Module).

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 Liquid Leak has transitioned to critical from a less severe state.

The screenshot shows the 'Event Log' tab in a management console. It includes navigation tabs for 'Event Log', 'Audit Log', 'Maintenance History', and 'Alert Recipients'. Below the tabs are controls for 'Customize Table', 'Clear Logs', 'Refresh', and filters for 'Type' (Error, Warning, Info), 'All Event Sources', and 'All Dates'. A table displays one event with the following details:

Index	Severity	Source	Common ID	Message	Date
0	⊗	System	FQXSPUN0019M	Sensor Liquid Leak has transitioned to critical from a less severe state.	December 26, 202...

Below the table, there is a 'Health Summary' section with a highlighted 'Active System Events (1)' box. Underneath, a red error icon is followed by the text: 'Others Sensor Liquid Leak has transitioned to critical from a less severe state. FQXSPUN0019M FRU: December 26, 2022 10:38:22 AM'.

[View all event logs](#)

- 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.

```
sysadmin@Dev-Server:~$ ipmitool -C 17 -I lanplus -H 10.132.225.164 -U USERID -P ***** sel elist
1 | 12/26/2022 | 10:38:17 | Event Logging Disabled SEL Fullness | Log area reset/cleared | Asserted
2 | 12/26/2022 | 10:38:22 | Cooling Device Liquid Leak | Transition to Critical from less severe | Asserted
```

The event logs shown with the parameter sel elist.

```
sysadmin@Dev-Server:~$ ipmitool -C 17 -I lanplus -H 10.132.225.164 -U USERID -P ***** sdr elist |grep "Liquid Leak"
Liquid Leak | EAh | ok | 30.1 | Transition to Critical from less severe
```

Liquid Leak | EAh | 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 328](#) and [“Liquid detection sensor LED” on page 347](#) 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. Check for green coolant leakage around the radiator, coolant pipes and pumps.
2. If green coolant found, power off the server and remove the L2AM.
3. Clean up the coolant from any components in the chassis. Inspect the server for any signs of moisture in sockets or gaps.
4. 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 352](#)
- [“Intermittent KVM problems” on page 352](#)
- [“Intermittent unexpected reboots” on page 352](#)

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 325 for information about viewing the event log. If you are using Linux base operating system, then 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 353
- “[Mouse does not work](#)” on page 353
- “[KVM switch problems](#)” on page 353
- “[USB-device does not work](#)” on page 353

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 241](#)
 - b. Replace the front panel or front I/O module.
 - If the USB connector is at the rear of the server:
 - a. (Trained technicians 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 354](#)
- [“Invalid memory population detected” on page 354](#)
- [“DIMM PFA issue” on page 355](#)

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 49](#) 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 technicians 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 technicians 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 49](#) 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 355](#)
- [“Screen is blank” on page 355](#)
- [“Screen goes blank when you start some application programs” on page 356](#)
- [“The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted” on page 356](#)
- [“The wrong characters appear on the screen” on page 356](#)
- [“Monitor display fails when connected to the VGA connector of the server” on page 356](#)

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 317](#).

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 317](#).
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 317](#).

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 241](#)

- b. Replace the left rack latch with VGA. See [“Rack latches replacement” on page 175](#).
- c. (Trained technicians only) Replace the system I/O board.
- If the VGA connector is on the rear of the server:
 - a. (Trained technicians 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 357](#)
- [“The server immediately displays the POST Event Viewer when it is turned on” on page 357](#)
- [“Server is unresponsive \(POST is complete and operating system is running\)” on page 358](#)
- [“Server is unresponsive \(POST failed and cannot start System Setup\)” on page 358](#)
- [“Voltage planar fault is displayed in the event log” on page 358](#)
- [“Unusual smell” on page 359](#)
- [“Server seems to be running hot” on page 359](#)
- [“Cannot enter legacy mode after installing a new adapter” on page 359](#)
- [“Cracked parts or cracked chassis” on page 359](#)

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 (system board assembly)

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 compute node, 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 compute node and verify that all applications are running (no applications are hung).
 3. Restart the compute node.
 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 compute node 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 compute node from a command line.
 - a. If you are unable to get a response during a ping test, attempt to ping another compute node in the enclosure to determine whether it is a connection problem or compute node 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 compute node 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 system board (system board assembly).

You can specify the number of consecutive restart attempts 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** → **Recovery and RAS** → **POST Attempts** → **POST Attempts Limit**. Available options are 3, 6, 9, and disable.

Voltage planar fault is displayed in the event log

Complete the following steps until the problem is solved.

1. Revert the system to the minimum configuration. See [“Specifications” on page 3](#) for the minimally required number of processors and DIMMs.
2. Restart the system.
 - If the system restarts, add each of the removed items one at a time and restart the system each time until the error occurs. Replace the item for which the error occurs.
 - If the system does not restart, suspect the system board (system board assembly).

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 compute nodes 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 45](#) 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 each system has its own specific PMI raw command.

6. Check the management processor event log for rising temperature events. If there are no events, the compute node 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 360](#)
- [“PCIe adapter is not recognized or is not functioning” on page 360](#)
- [“Insufficient PCIe resources are detected.” on page 360](#)

- “A Lenovo optional device that was just installed does not work.” on page 360
- “A Lenovo optional device that worked previously does not work now” on page 361

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 damages, 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 361
- “Operating system performance” on page 361

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 362](#)
- [“Server does not power on” on page 362](#)
- [“Server does not power off” on page 363](#)

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 1a and 1b.
 - If the server starts, reseal 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 lights up and is flashing slowly.
 - The push force is enough and with button force response.
3. If the power button LED does not light up or is not flashing correctly, reseal all the power supplies and make sure AC LED on PSU rear side is lit up.
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 up, 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, 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 331](#).
4. Check if AC power LED lights up or the amber LED lights up 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, 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 (system board assembly).

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 363](#)
- [“System error LED is on and event log “Power supply 2 has lost input” is displayed” on page 363](#)

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.

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 364](#)
- [“Multiple hard drives fail” on page 365](#)
- [“Multiple hard drives are offline” on page 365](#)
- [“A replacement drive does not rebuild” on page 365](#)
- [“Green drive activity LED does not represent actual state of associated drive” on page 365](#)
- [“Yellow drive status LED does not represent actual state of associated drive” on page 366](#)
- [“U.3 NVMe drive can be detected in NVMe connection, but cannot be detected in Tri-mode” on page 366](#)

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 hard disk drives. When you start a server and press the key according to the on-screen instructions, the LXPM interface is displayed by default. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) You can perform 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 hard disk drives. When you start a server and press the key according to the on-screen instructions, the LXPM interface is displayed by default. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) You can perform 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 hard 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 hard 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 hard disk drives. When you start a server and press the key according to the on-screen instructions, the LXPM interface is displayed by default. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) You can perform

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

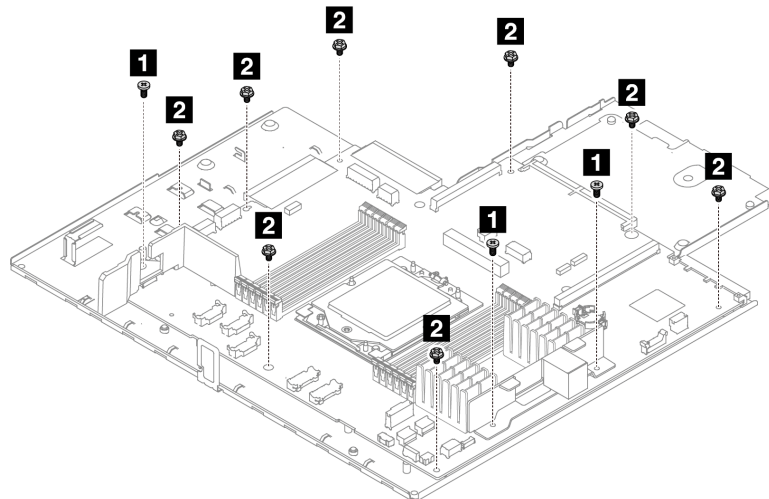
Follow the instructions in this section to disassemble the system board assembly before recycling.

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 firmware and RoT security module from the system I/O board. See [“Remove the firmware and RoT security module” on page 217](#).
- Step 2. Remove the system board assembly from the server, and separate the system I/O board from the processor board. See [“Remove the system I/O board or processor board” on page 222](#).
- Step 3. Remove the screws as illustrated from the processor board.





Screw	Quantity	Tools
1 	3	PH2 screwdriver
2 	8	PH2 screwdriver

Figure 287. Removing screws from the processor board

- Step 4. Remove the following components from the processor board.
 - **1** Small air baffle
 - **2** Cable wall bracket

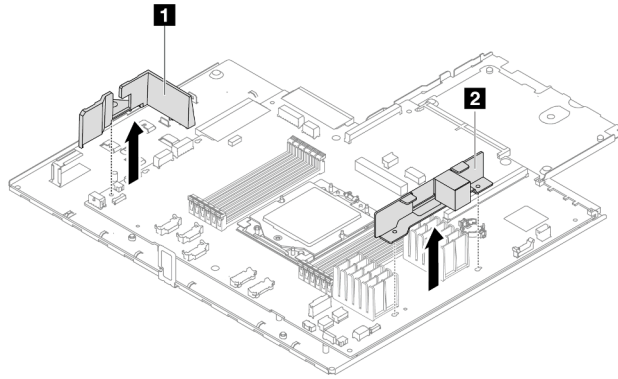


Figure 288. Removing components from the processor board

Step 5. Separate the processor board from the system board tray.

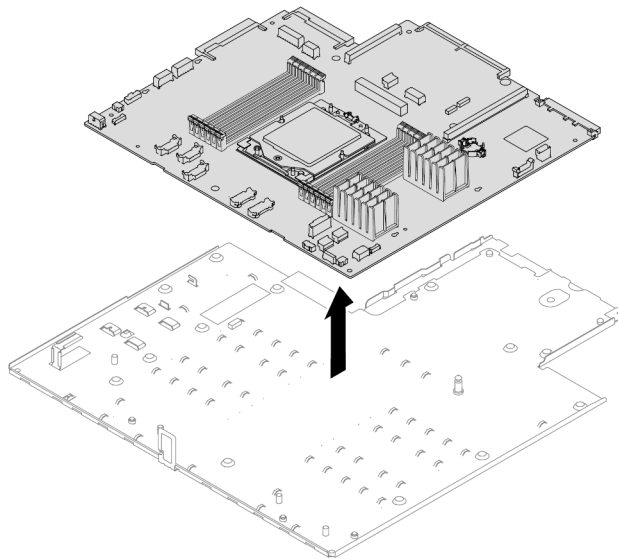


Figure 289. Separating the processor board from the system board tray

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/sr635v3/7d9h//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 325](#) for instructions on isolating and solving issues.

- 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 the documentation icon  from the navigation pane.

3. Click **Documentation 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 41.
- 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/supportphonenumber> 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/sr635-v3/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

Support websites

This section provides driver and firmware downloads and support resources.

Support and downloads

- Drivers and Software download website for ThinkSystem SR635 V3
 - <https://datacentersupport.lenovo.com/products/servers/thinksystem/sr635v3/7d9h//downloads/driver-list/>
- Lenovo Data Center Forum
 - https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv_eg
- Lenovo Data Center Support for ThinkSystem SR635 V3
 - <https://datacentersupport.lenovo.com/products/servers/thinksystem/sr635v3/7d9h/>
- Lenovo License Information Documents
 - <https://datacentersupport.lenovo.com/documents/Invo-eula>
- 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>

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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.

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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	○	○	○	○	○	○
機械組零件	-	○	○	○	○	○
空氣傳動設備	-	○	○	○	○	○
冷卻組零件	-	○	○	○	○	○
內存模組	-	○	○	○	○	○
處理器模組	-	○	○	○	○	○
電纜組零件	-	○	○	○	○	○
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。
 Note 1 : “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。
 Note 2 : “○” 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。
 Note 3 : 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

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